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CANADA – EU – TURKEY – GHANA - UK

RESULTS OF MASS BALANCE/PHREEQC MODELLING OF THE WASTE ROCK DUMP AT THE GÖKIRMAK COPPER PROJECT, KASTAMONU, TURKEY

Report prepared by:

David R Gladwell PhD PGeo FGS CGeol
Mehmet Altinpinar MSc
Geochemico Consulting Inc.
241021 Concession 3, Allenford,
Ontario, Canada, N0H 1A0

David@geochemico.com

Report prepared for:

Acacia Maden Isletmeleri A. S.
Hanonu Mah. Ali Sakalli Cad.
No. 26 Hanonu,
Kastamonu, Turkey

April 20, 2017

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1. EXECUTIVE SUMMARY

The purpose of this report is to describe a series of mass balance/PHREEQC modelling studies to characterize the proposed Corakoglu waste rock dump at the Gökirmak Copper Project, Kastamonu, Turkey and to determine the degree of probable environmental impact that the waste rock dump will cause. In addition, an engineered waste rock cover designed to partially mitigate leachate is proposed and modelled.

The proposed waste rock dump will incorporate greenschist and mixed schist together with small proportions of mineralized vein waste and alluvium. Waste rock loading rates were calculated from static and kinetic testing of waste rock samples and two sets of loading rates; the base case (median loading rates), and the worst case (95th percentile loading rates) were modelled for the proposed Corakoglu waste rock dump.

Mass balance/PHREEQC modelling of the Corakoglu waste rock dump without a constructed cover showed that principal contaminants of concern (PcoC) are: As, B, Na, Ni, Se, Sb, V, and Zn, and occasionally, acidity. An engineered cover consisting of locally available clay, gravel and overburden is described and tested from a hydrogeological perspective. The waste rock dump was re-modelled utilizing the engineered cover and very significant reductions in leachate concentrations at the toe of the dump are achievable using the engineered cover.

The probable environmental impact of the waste rock dump leachate on the Gökırmak River for both the base and worst case, with the engineered cover installed, was calculated using mass balance/PHREEQC modelling. The river water is naturally exceedant in sulphate. No other exceedances were found to be caused by the discharge of mine leachate, in fact the sulphate concentration of the river water is slightly diluted by the toe of dump leachate, after settling.

The lithologies beneath the Corakoglu waste rock dump are comprised of limestones, sandstone/claystone, and alternating beds of schists and sediments, covered by 4 to 10 metres of overburden. The hydraulic conductivity data indicate that all rock and overburden types except the sandstone/claystone are prone to percolation of pore water from within the core of the dump prior to the waste rock dump draining. It is recommended that a bed of clay ($K=2.7e^{-10}$) is placed under the waste rock dump to prevent contamination of the ground water under the Corakoglu dump.

2. CERTIFICATION

Acacia Maden A.Ş.
Kastamonu, Turkey

ATTENTION: Mr. Gokhan Unal

Reference: Certification of RESULTS OF MASS BALANCE/PHREEQC MODELLING OF THE WASTE ROCK DUMP AT THE GÖKIRMAK COPPER PROJECT, KASTAMONU, TURKEY

(1) Certification letter prepared by:

David Gladwell PhD FGS P. Geo CGeol
Senior Geochemist, Geochemico Consulting Inc.,
2424 Robie St., Halifax, N.S., Canada, B3K 4M7

(2) Dr. David Gladwell PGeo is an applied geochemist with a broad based academic and experimental background that encompasses geochemistry, biology, risk analysis and environmental science. Dr. Gladwell's 46 years of professional work experience has focused on the protection of soil, water and plant resources through carrying out acid rock drainage/ metal leaching assessment, risk analysis, and prediction programs for mining projects both internationally and in Canada.

(3) This certification letter relates to the assessment of acid rock drainage and metal leaching characteristics of waste rock and ore by kinetic testing at an accredited laboratory in Canada.

(4) Dr. David Gladwell examined geological information relating to the project and interpreted analytical data provided by Global ARD laboratories and certifies that the sampling/analytical methodologies and data interpretation comply with applicable NI-43-101 standards. Dr. Gladwell visited the mine site on several occasions in 2013, 2015 and 2016 and has observed all aspects of the mine site including drill core, location of the open pit, waste rock dump, tailings storage facility, processing plant and administration facilities.

(5) Dr. David Gladwell has no direct or indirect interest, current or expected, in Acacia Maden A.Ş. or any of its affiliates.

David Gladwell PhD FGS PGeo CGeol
Senior Geochemist,
Geochemico Consulting Inc.,
241021 Concession 3, Allenford, ON, Canada, N0H 1A0

E-mail: david@geochemico.com

April 20, 2017

(2) Certification letter prepared by:

Mehmet ALTINPINAR, M.Sc., Mining Engineer
Principal Engineer and Director, Geochemico Consulting Inc.,
Baglica Mahallesi 1162. Sokak Dorukcan 2 Sitesi No: 16 Etimesgut Ankara Turkey

(2) Mehmet ALTINPINAR MSc is a mining engineer with a-ten-year-experience mainly focused on mine planning, mineral exploration and environmental impact assessment stages of mines in Turkey. He has been a member of Chamber of the Mining Engineers of Turkey since 2005.

(3) This certification letter relates to the assessment of acid rock drainage and metal leaching characteristics of waste rock and ore by kinetic testing at an accredited laboratory in Canada.

(4) Mehmet ALTINPINAR MSc examined geological information relating to the project and interpreted analytical data provided by Global ARD laboratories and certifies that the sampling/analytical methodologies and data interpretation comply with applicable international standards.

(5) Mehmet ALTINPINAR has no direct or indirect interest, current or expected, in Acacia Maden A.Ş. or any of its affiliates.

Mehmet ALTINPINAR MSc
Principal Engineer and Director
Geochemico Consulting Inc.,
Baglica Mahallesi 1162. Sokak Dorukcan 2 Sitesi No: 16 Etimesgut Ankara Turkey

E-mail: mehmet@geochemico.com

April 20, 2017

3. INTRODUCTION

Mass balance/PHREEQC modelling of waste rock and mineralized vein waste (MWV) and leachate chemistry was carried out for the Gökirmak Copper Project (GCP) in order to: A) predict probable leachate chemistry and precipitate mineralogy in both the core of the waste rock dump (WRD) and the toe of the dump; B) compare predicted leachate chemistry with EU, Turkish and Canadian regulatory parameters, and C) optimize the WRD and cover design.

The input to the mass balance/PHREEQC modelling, for all models, was the static and kinetic test data generated on samples of lithologies submitted to Global ARD Laboratories, located in Burnaby, BC, which are described in a separate ARD/ML characterization report (Geochemico, 2016a, 2016b). Loading rates (mg/kg/L/year) were generated from the laboratory testing data and used, together with projected WRD geometry, hydrogeological modelling and known climatic data to estimate the waste rock loading or the within dump loading. The estimated loading was then diluted using the climatic (rainfall and evaporation) data. The mass of precipitating phases were calculated and the resultant solution chemistry was equilibrated with the atmosphere in order to model either WRD inner core chemistry or toe of dump chemistry, as appropriate.

Climate Change

The accuracy of modelling predictions is dependent on adequate analyses, adequate description of the facility modelled and adequate representation of climatic conditions. In the recent past, mean climatic conditions have remained quite stable, however, global climatic conditions are now changing quite rapidly due to climate change. Rainfall, in particular, is no longer as predictable as in the past with many locations experiencing double or triple the amount of rainfall compared to past records. The changes in global climatic conditions therefore render the future predictions of the modelling uncertain. For this reason, future predictions presented in this report are limited to a forty year period. Uncertainty caused by climate change increases with the future extent of the period modelled. The potential impact of climate change on the WRD design is, however, assessed.

3.1 MODELLING ASSUMPTIONS

The following modelling assumptions are inherent in the mass balance/PHREEQC approach to estimating pit sump/lake or leachate chemistry:

The PHREEQC modelling assumptions for the waste rock dump and cover chemistry are:

1) Solutions are assumed to be of relatively weak ionic strength (i.e. lower ionic strength than seawater) and to exhibit an overall neutral charge balance;
2) All minerals present are assumed to be ideal stoichiometry;
3) All gases are assumed to be present by equilibration with the atmosphere at STP;
4) All input solutions are invariant through time;
5) Ammonia from blasting is not modelled;
6) Static and kinetic testing were carried out with deionized water with an input pH of approximately 5.5; significant deviation from this leachate pH is not considered by the modelling;

7) Climatic changes are minimal;
8) Temperature and pressure are constant at STP (25 degrees C and 1 atmosphere);
9) All solutions mix completely within the time interval modelled (three months);
10) All mineral/solution reactions are completed within the time interval modelled;
11) Ion pair theory provides a good description of the solution chemistries;
12) Microbiological reactions with both solutions and minerals are not significant;
13) A drainage ditch is installed around the full perimeter of the waste rock dump and delivers a mix of run-off and leachate to a settling pond;
14) Cover, waste rock dump and the aquifer are homogenous both with respect to mineralogy as well as permeability and porosity; and
15) Analytical error (QA/QC) is acceptable.

3.2 METHODOLOGY OF MODELLING

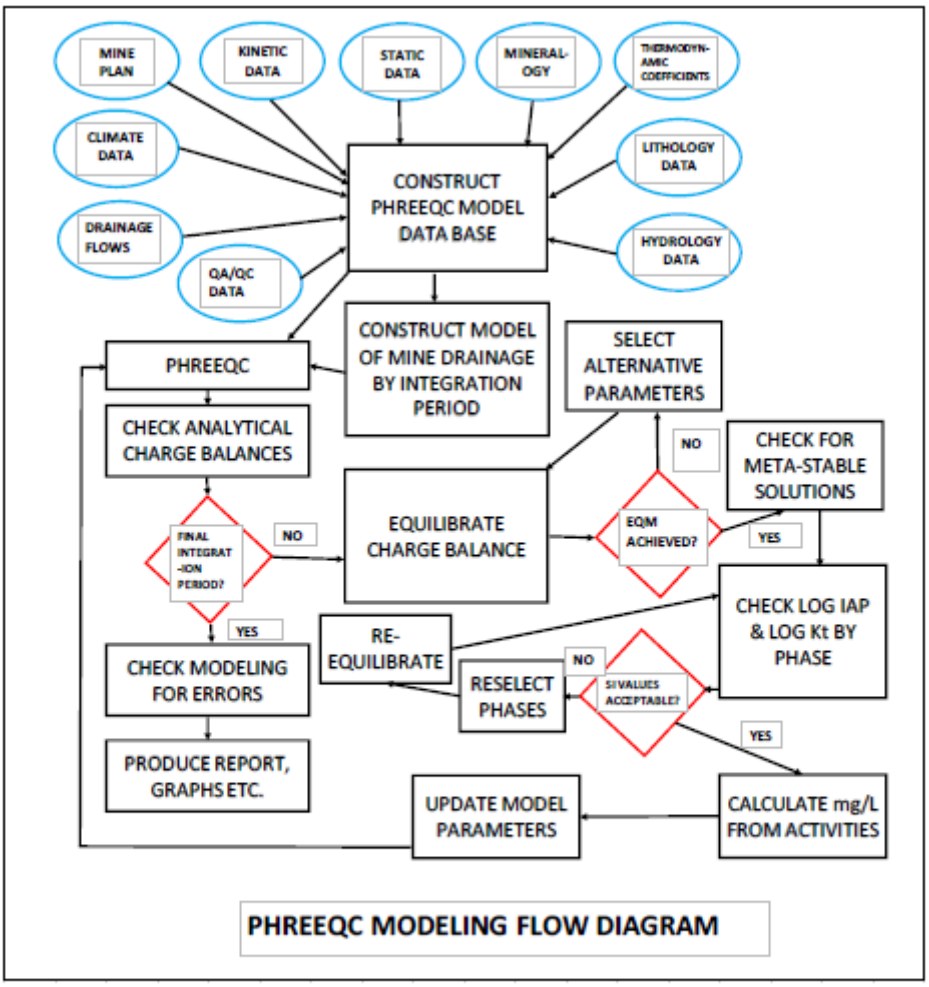
The first step in PHREEQC modelling is to accumulate all required input data into an EXCEL database, as well as selecting (and/or modifying) a suitable thermodynamic database. In summary, the assembled database usually includes the following components (cf. Figure 2-1):

- QA/QC analytical data
- Drainage flows (where applicable) including (where applicable) groundwater flow rates;
- Climate data (including rainfall, snowfall and lake evaporation rate) on a monthly basis. The data should ideally be the monthly averages for a period of at least ten years;
- Detailed mine plan, including estimates of area, volume and mass of waste rock, bench heights and widths etc.;
- Static (SFE) testing data;
- Appropriately selected thermodynamic constants for all reactions to be considered;
- Kinetic (usually humidity cell testing data);
- Known mineralogy;
- Lithological data, including mass (or volume) to be extracted or dumped on an appropriate timescale; and
- Hydrogeological data.

Once the database is collated, the physical mine plan may be modelled in Excel/PHREEQC. The physical mine plan should include all known data regarding material handling and mass, climate data, known limits on seepage collection pond volume etc. At the end of this phase of modelling (see Figure 2-1 there should exist a quarterly (the selected integration period) numerical model of the mine site facility being modelled. The WRD models were selected with a quarterly integration period in order to match the baseline data frequency of collection.

The second part of constructing the mine plan is to calculate loading rates for all selected parameters to be modelled. Input data for this usually consists of static testing data (especially SFE

or TCLP data) as well as equilibrated kinetic (humidity cell testing or NAG testing) data. Known mineralogy and petrology must also be included at this phase of modelling.



Further information on all procedures may be found at:
http://wwwbrr.cr.usgs.gov/projects/GWC_coupled/phreeqc/phreeqc3-html/phreeqc3.htm

Figure 2-1: Schematic flow diagram of mass-balance PHREEQC modelling

The mass balance portion of the model is completed by calculating the mass of each parameter from the loading rate for that parameter as well as the known mass of the lithology. The loading for a given time interval is then divided by the calculated precipitation for that time interval (taking into account temperature, rainfall, snowfall and evaporation rate.) A waste rock dump settling pond is planned in order to facilitate pumping of the mixed leachate and run-off to the process plant during operations.

The PHREEQC portion of the modelling begins by selecting a method of charge balance (since ion-pair theory is assumed by PHREEQC). In practice charge balancing uses slight adjustments to a selected anion (usually Cl^- is selected since it does not participate in mineral phase reactions in most

situations (Note: the presence of halite or similar mineral phases would require selection of an alternative parameter)). Alternatively, a selected cation (usually Na^+ is selected for similar reasons to choosing Cl^-) or the solution may be charge balanced by slight adjustments to pH, in which case alkalinity may not be fixed. Following charge balancing (which may need to change parameter through the modelling process) the saturation indices for a number of selected aqueous solutions must be examined. It is wise to select integration periods with as wide a variation in volume of water as possible for this process. Using the selected modelled data for the selected integration periods a list of mineral phases that are likely to precipitate is compiled and added to an EQUILIBRIUM_PHASES block in the PHREEQC code. It should be noted that these mineral phases should be re-checked after modelling is completed to make sure that all potentially precipitating phases (with the exception of silica, unless the temperature is above 50 deg. C) have been included. If mineral phases that are likely to be associated with significant adsorption (such as hydrous ferric oxide (FeOOH) or gibbsite) are found to be likely to precipitate from solution, then the PHREEQC code must be amended to account for these processes using the approach outlined by Djombak and Morel (1990) or similar methodology. Lastly, care must be taken to examine the input analytical data, especially for TOC. If large molecular weight organic molecules are present (e.g. fulvates, humates) then the PHREEQC modelling must be accompanied by separate modelling of the adsorption capabilities of these compounds using a model such as WHAM (Windermere Humic Acid Model). The latter modelling was not necessary at the GCP.

PHREEQC modelling then commences by integration period. At the GCP results from a previous integration period are to be included (ie. due to the settling pond and pore water chemistry) then care must be taken to convert the output from PHREEQC from moles/L back into mg/L. Once all integration periods are modelled the output must be carefully scanned to check for: errors, lack of convergence, additional mineral phases etc. It must be emphasized that at this stage of the modelling process it is also very important that the PHREEQC output (especially calculated pe, sulfate and pH) makes both geochemical and geological sense, since PHREEQC is essentially a mathematical solution to numerous simultaneous equations and therefore may find a meta-stable solution that is not geochemically or geologically meaningful. If such anomalies are found the entire modelling was repeated with care taken to ensure that results from each integration period are geochemically and mineralogically meaningful. Finally, the output from PHREEQC (moles/L) may be converted into the required reporting units and appropriate graphical/tabular summary statistics prepared and compared with appropriate regulatory standards (EU, Turkish and Canadian).

3.3 GCP WATER QUALITY MODEL WITH Hfo ADSORPTION

Introduction

Initial model runs showed that ferrihydrite (FeOOH) will very probably precipitate from the waste rock dump leachate as it emerges from the toe of the proposed waste rock dump and that this mineral phase is unlikely to precipitate within the waste rock dump pore water due to the low redox conditions in the pore water. There are two consequences, from an environmental perspective, of the probable ferrihydrite precipitation:

- Ferrihydrite (FeOOH) (also known colloquially as 'brown boy' or 'yellow boy' is unsightly and therefore should be allowed to settle in the leachate settling ponds before entering a natural drainage channel;
- Ferrihydrite, an amorphous mineral, has a very large surface area (approximately 600 m^2/g), and both cations and anions adsorb rapidly onto the adsorption sites within the mineral. The presence of ferrihydrite within the toe of dump leachate therefore may have a significant effect on the water quality of the leachate, potentially (depending on pH and EH conditions) reducing the concentrations of PCOC.

Dzombak and Morel (1990) investigated ferrihydrite adsorption properties and proposed a double layer model, determining the thermodynamic constants for various cations and anions. Their model has been subsequently improved upon by Eary (1999) and incorporated into PHREEQC, where the ferrihydrite is termed Hfo (Appelo et al., 2002; Appelo and Postma, 2005). These workers determined that two kinds of bonds form with cations and anions; strong bonds and weak bonds. Cations and anions (including Cd, Cu, Pb, Zn, As, carbonate, hydrogen ions, magnesium and calcium ions etc.) in aqueous solution compete for the bonding sites.

Figure 2-2 and Figure 2-3 present moles bonded with Hfo for a number of chemical species for both strong (Hfo_S) and weak (Hfo_w) bonds. Hydrogen ion bonds are prevalent below a pH of about five and other cation and anion bonds become more important as the pH increases. Of significance is that Cu forms the maximum number of strong bonds at about pH 5.5 and above, and at a slightly higher pH for Hfo_w bonds.

The mass of Hfo precipitating from solution is also pH and EH dependent, with Hfo being completely soluble below a pH of approximately 3.0 and under anoxic conditions.

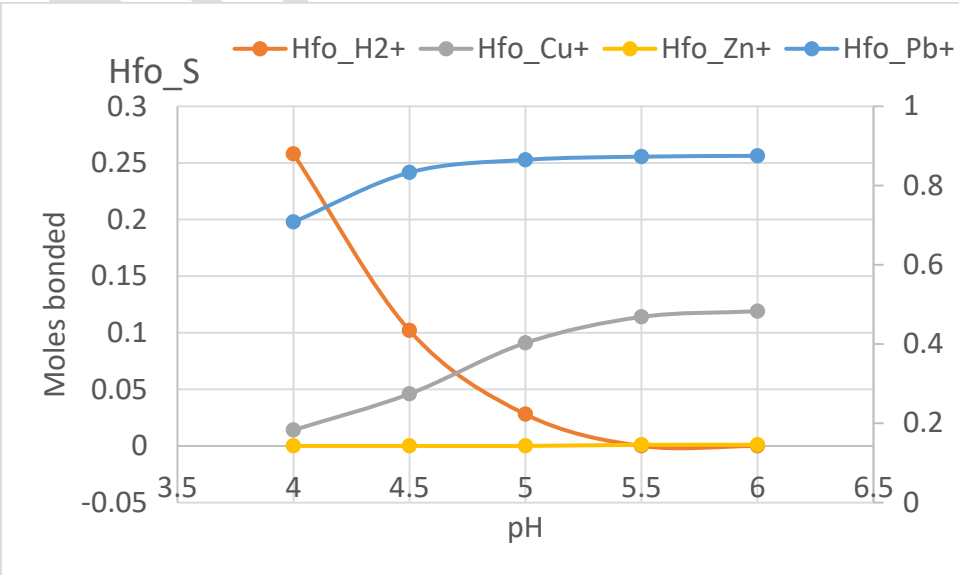


Figure 2-2 Variation in moles of selected elements bonded as strong bonds with Hfo with solution pH

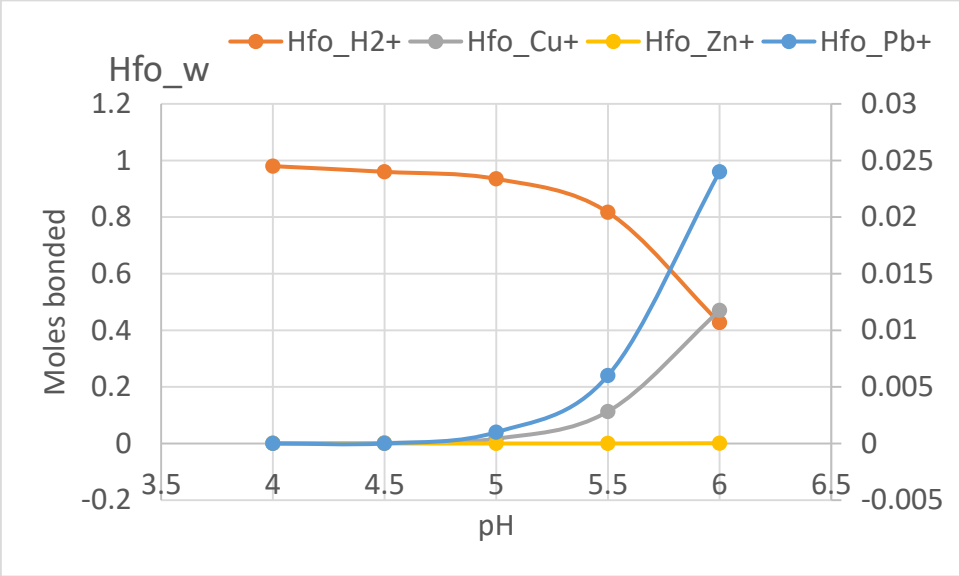


Figure 2-3: Variation in moles of selected elements bonded as weak bonds with Hfo with solution pH

The saturation indices for Ferrihydrite calculated by the waste rock dump model were used to calculate, using PHREEQC, the mass of ferrihydrite that would precipitate from each integration period at equilibrium. The procedure outlined by Dzombak and Morel (1990) and subsequently modified by Apello and Postma (2005) was used to calculate (using PHREEQC) the molalities of strong and weak Hfo bonds for a selection of competing cations and anions, including bicarbonate, hydrogen ions, Cu, Pb, Zn, Cd, Se, Fe and As and these calculations were used to predict the toe of dump leachate water quality for both median and 95th percentile loading rates.

4. MASS BALANCE/PHREEQC MODELLING OF GCP WASTE ROCK DUMP - INPUT

4.1 INTRODUCTION

GCP propose to deposit one waste rock dump, named Corakoglu. Deposition of waste is proposed from Year-1 (mainly surface waste and alluvium) and to continue for a period of twelve years thereafter.

There are three primary lithologies within the footprint of the proposed open pit, green schist (GS), mixed schist (MS) and low grade mineralized vein waste rocks (MVW) and therefore these three lithologies will constitute the waste rock dump. The green schist is exposed near surface and the mixed schist is located close to the ore. The ore itself is will not be deposited on the WRD, even for temporary storage. Additional details of the local geology are provided by Geochemico (2016a). Static testing has shown that the GS is almost devoid of PAF rocks. Static testing of MS demonstrated that approximately 30% of the lithology may be PAF, however, kinetic testing of two composite samples of MS showed that there is sufficient NP within the MS to prevent the generation of acidic leachate. The proponent plans to store MVW to a maximum of 300,000 tonnes, on a pit-run basis, with the GS and MS. All static tests conducted on MVW demonstrated that it is PAF (Geochemico, 2016a).

The proposed conceptual design of the WRD is shown as Figure 4-1. GS occurs close to the surface and therefore will be excavated first; as the pit excavation continues, an increasing proportion of MS will be incorporated into the WRD. The GS contains a higher NP than the MS and therefore the higher proportion of GS towards the base of the WRD may reduce leachate concentrations of PCoC. The proponent plans to cover the completed WRD with a capillary break layer of gravel, on top of which will be placed a clay soil to facilitate dump revegetation.

The goals of the modelling reported herein is to:

- Predict, using mass-balance/PHREEQC modeling the probable water quality of pore water within the WRD and the water quality of the toe of dump leachate during mining operations;
- Predict, using mass-balance/PHREEQC modeling the probable water quality of pore water within the WRD and the water quality of the toe of dump leachate after dump closure and rehabilitation;
- Optimize the design of the cover over the WRD, and
- Assess the environmental impact of the WRD leachate, with respect to both surface and ground water.

The four goals were achieved using a series of mass balance/PHREEQC water quality models as detailed herein.

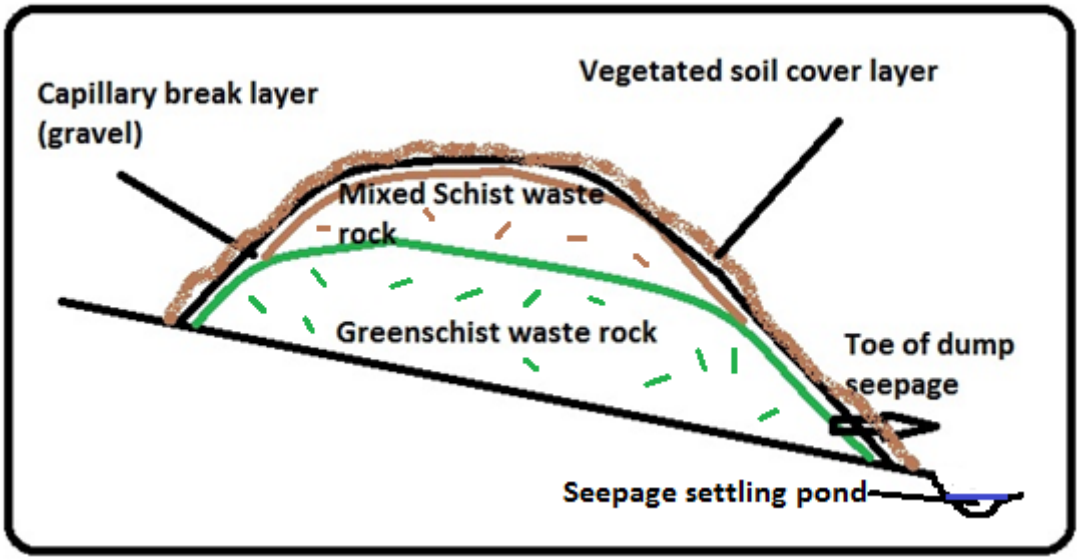


Figure 4-1: GCP, Initial design of GCP waste rock dump

Estimated waste rock tonnages, using projected bench heights and widths and provided as Table 4-2 together with loading rates estimated from static and kinetic laboratory testing data. Rock type codes are provided as Table 4-1.

Table 4-1: GCP waste rock dump, rock type codes

ROCK TYPE CODE	ROCK TYPE
MS	Mixed Schist
GS	Green Schist
MVW	Mineralized vein waste

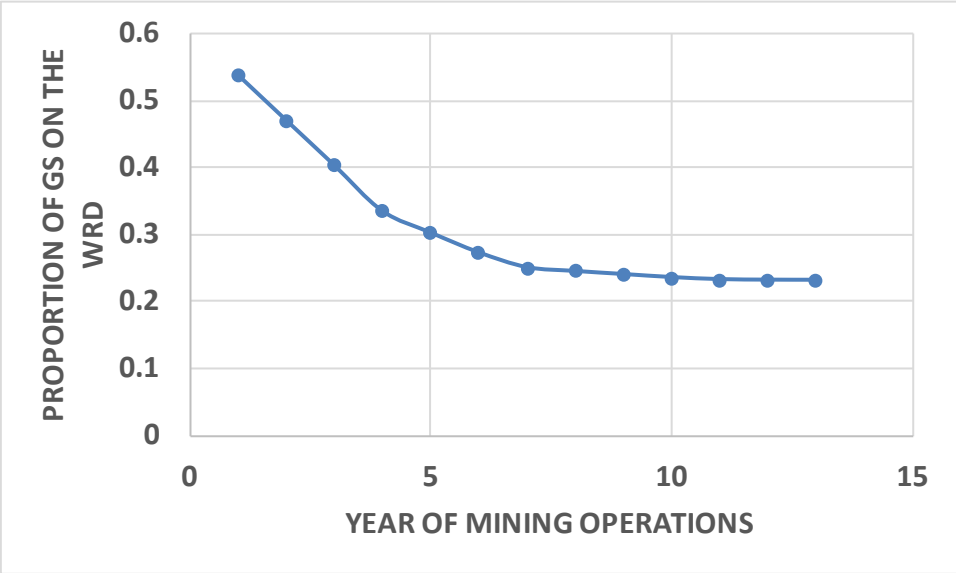


Figure 4-2: GCP, Proportion of GS in waste rock dump by operational year (operation year-1 is designated Year 1 on the X-axis)

4.2 INPUT DATA

4.2.1 Waste Rock Tonnages

The tonnages of waste rocks (GS and MS) to be placed on the WRD during the proposed thirteen years of mining operations are detailed as Table 4-2. The proportion of GS varies from approximately 56% in year 1 to approximately 23% in year 13.

Table 4-2: GCP, Tonnages of waste rocks to be placed on Corakoglu WRD during mining operations

ROCK CODE	Year-1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
GS	16435314	17752752	10997935	5953914	6063012	3998124	1386144	1820142	277218	1746			
MS	14122511.2	24332125	28450069	34799861	30302781	31294724.97	24009242	11413207	5862506	5200554	3605339	960625.5	231243.9
MVW		75723.66	28785.78	78006.34	99938.16	10132.32081	65526	77151.33	57710.74	15151.26	2099.673	25725.24	1487.891
TotAL	30557825.2	72718425	1.12E+08	1.53E+08	1.89E+08	224795709.4	2.5E+08	2.64E+08	2.7E+08	2.75E+08	2.79E+08	2.8E+08	2.8E+08

Figure 4-2 shows the decreasing proportion of GS deposited to the dump during the thirteen years of proposed mining operations.

4.2.2 Climate Data

Climatic data (Table 4-3) were collected at the Devrekani Meteorological Station and were provided by Acacia Maden.

Table 4-3. GCP, Climatic data (collected at Devrekani Meteorological Station)

Months	Mean Total Precipitation (mm)	Maximum Rainfall (mm)	Mean Evaporation Rate (mm)
January	35,80	27,60	-
February	31,40	23,90	-
March	37,40	23,90	-
April	56,00	35,80	3,60
May	75,70	52,20	99,60
June	59,80	39,80	119,00
July	32,30	55,60	152,10
August	34,00	44,00	151,70
September	35,00	53,50	105,10
October	44,70	42,10	52,10
November	32,80	25,10	1,20
December	48,00	33,20	-
ANNUAL	**522,90**	**55,60**	**152,10**

4.2.3 Lithology Loading Rates

Loading rates, or the rate at which the various lithologies dissolve into water, thus decreasing the water quality percolating through them, were calculated from static and kinetic testing data. Figure 4-3 compares the estimated equilibrium concentrations of all parameters analysed (Y-axis) with the parameters on the X-axis. There is strong agreement between the humidity cell data and the median of all SFE analyses.

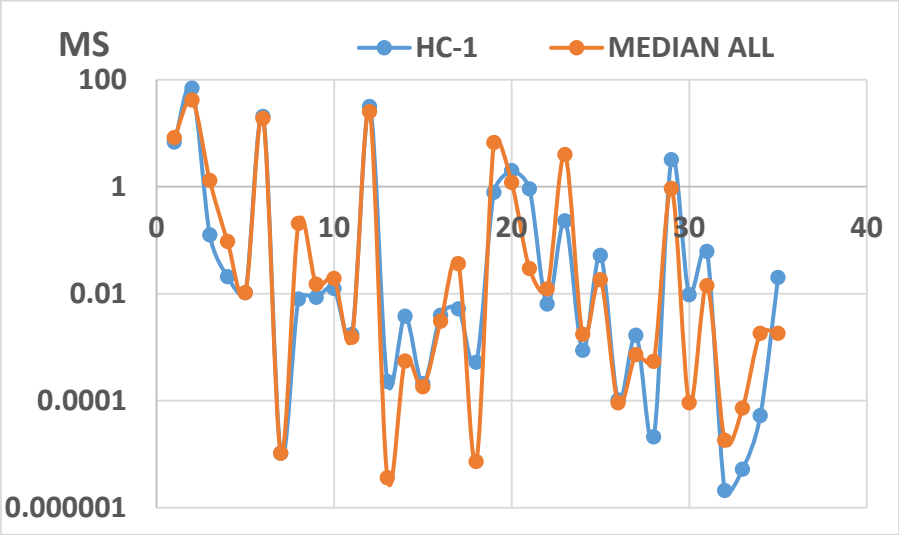


Figure 4-3: GCP, Comparison between Kinetic (humidity cell – blue line) and Static (SFE – orange line) estimates of equilibrium leachate concentrations. X-axis consists of all parameters analysed, Y-axis is the Log10(concentration in mg/l)

Humidity cell data were not acquired for the GS rock type, as static testing showed it contained no PAF rocks, however, the close geochemical similarity between MS and GS (Geochemico, 2016a) indicates that the median of all GS samples tested by SFE would provide a good estimate of GS loading rates. Figure 4-4 provides a comparison of the median MS (orange line) and GS (grey line) leachate concentrations (Y-axis) for all parameters determined. As expected from the similarity between the two rock types (both geochemically and mineralogically) the loading rates are similar for the two rock types.

SFE analysis of the GS and MS indicates a range of leachate concentrations. In order to facilitate sensitivity analysis of the mass balance/PHREEQC modelling loading rates were calculated using the medians and ninety-fifth percentiles of the leachate concentrations for both rock-types. The modelling results will therefore provide an estimate of quarterly median (base case) and quarterly ninety-fifth percentile (worst case) concentrations. The MVW loading rates were calculated using only the ninety-fifth percentile leachate concentrations as the MVW is expected to generate acidic leachate. The loading rate units (for all estimates) are mg/kg/L/month. Calculated loading rates are provided as Table 4-4.

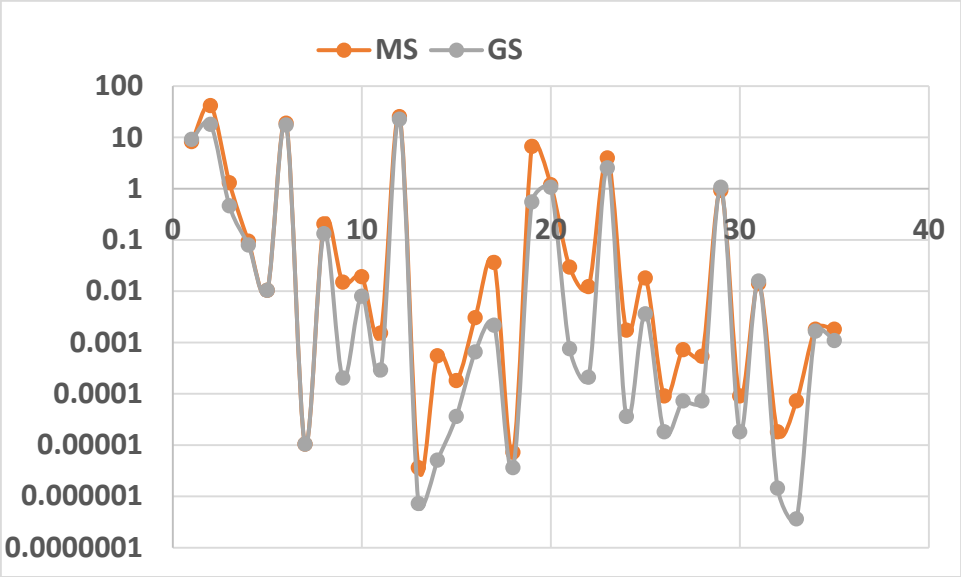


Figure 4-4: GCP, Comparison of MS (orange line) and GS (grey line) median leachate parameter concentrations. X-axis are all the parameters determined and the Y-axis are log10 (concentration) of the parameter.

Table 4-4: GCP, Calculated Loading rates for MS, GS and MVW rock types

	MEDIAN MS	95th PERCENTILE MS	MEDIAN GS	95th PERCENTILE GS	95th PERCENTILE MVW
PARAM-ETER	mg/kg/L/month	mg/kg/L/month	mg/kg/L/month	mg/kg/L/month	mg/kg/L/month
pH	8.2	8.931	9.12	9.39	6.38
S(6)	41	96	18	176	511
Cl	1.3	5.3	0.5	2.2	2.6
F	0.094	0.23	0.079	0.17	0.11
N	0.010	0.010	0.010	0.010	0.010
Alkalinity	19	35	17	21	7
Ag	1.0E-05	1.0E-05	1.0E-05	1.0E-05	1.0E-05
Al	0.21	1.5	0.13	0.27	0.094
As	0.015	0.088	0.00020	0.0013	0.0020
B	0.019	0.060	0.0079	0.040	0.075
Ba	0.0015	0.012	0.00029	0.0016	0.0058
Ca	25	24	23	45	132
Cd	3.6E-06	3.1E-05	7.2E-07	3.4E-06	1.0E-02
Co	0.00055	0.0028	0.0000051	0.000018	0.24
Cr	0.00018	0.0024	0.000036	0.00022	0.000054
Cu	0.0030	0.030	0.00065	0.0016	0.20
Fe	0.036	0.42	0.0022	0.0093	0.027
Hg	7.2E-06	2.0E-04	3.6E-06	3.6E-06	7.2E-06
K	6.6	20	0.55	1.6	3.5
Mg	1.2	8.1	1.06	4.8	9.4
Mn	0.03	0.33	0.00075	0.0034	1.65
Mo	0.012	0.033	0.00021	0.0019	0.11
Na	4.0	19	2.5	7.0	18
Ni	0.0017	0.010	0.000036	0.00011	0.085
P	0.018	0.028	0.0036	0.0036	0.0058
Pb	9.0E-05	6.7E-04	1.8E-05	1.8E-05	1.9E-04
Se	0.00072	0.0031	0.000072	0.0038	0.0039
Sb	0.00054	0.0051	0.000072	0.00019	0.0011
Si	0.92	3.4	1.1	2.5	1.7
Sn	9.0E-05	4.1E-04	1.8E-05	1.4E-04	4.2E-05
Sr	0.014	0.11	0.016	0.048	0.090
Tl	1.8E-05	6.6E-05	1.4E-06	1.4E-06	7.2E-05
U	7.2E-05	9.1E-04	3.6E-07	1.9E-05	1.7E-03
V	0.0018	0.0072	0.0017	0.0067	0.022
Zn	0.0018	0.0051	0.0011	0.0018	1.98

5. GCP MASS BALANCE/PHREEQC MODELLING RESULTS – PIT RUN MODELS FOR CORAKOGLU WASTE ROCK DUMP

5.1 INTRODUCTION

Two models of 'pit run' waste rock were carried out for the Corakoglu WRD in order to provide a base assessment of the expected performance of the WRD when no mitigation/rehabilitation strategies (engineered cover) were implemented. The first model incorporates the loading rates for MS, GS and MVW based on median values (base case). The second model incorporates loading rates for MS, GS and GS based on 95th percentile values (worst case). The models will provide a range of expected values for both pore water (within the dump) and toe of dump leachate as well as identify mineral phases that are likely to precipitate under both situations.

Physical parameters (e.g. height of dump, area of dump, mass and proportion of waste rocks, rainfall) are the same for both models. Some calculated parameters, such as volume of saturated pore space, flow at the toe of the dump are also common to both models. Typical PHREEQC model output is provided as Appendix A.

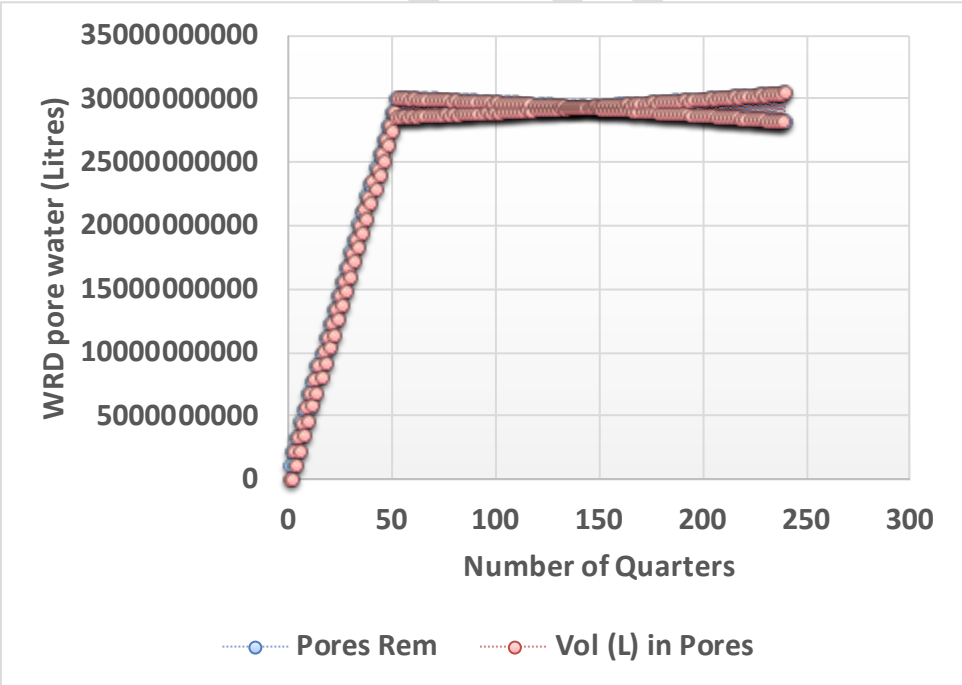


Figure 5-1: GCP, Pore space volume (L) for the first forty years of waste rock dump operation (no mitigation or rehabilitation strategies)

Figure 5-1 demonstrates the calculated cyclical nature of the volume of saturated pore spaces within the waste rock dump. Pore space volume is at a minimum in the summer (highest evaporation rate, minimum rainfall) and greatest in the Fall and Spring. Volume of wetted pore space has a strong impact on the toe of dump leachate chemistry. It is important to note that the WRD pore spaces are saturated by the time the dump is completed.

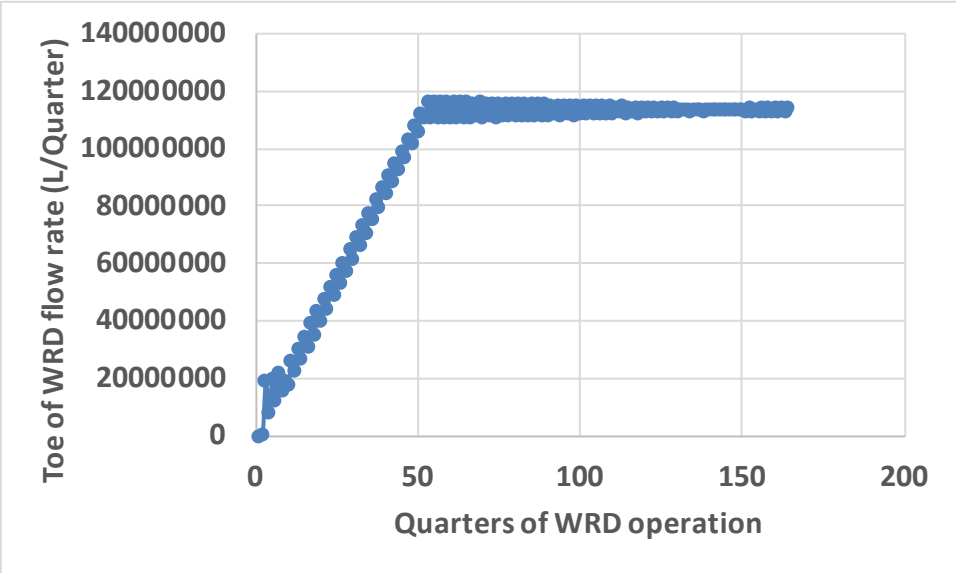


Figure 5-2: GCP, Toe of Dump Flow Rate (L/Quarter)

Figure 5-2 presents the calculated toe of dump flow rate, which also fluctuates slightly seasonally and is an important parameter for determining leachate concentrations. It should be noted that the toe of dump flow rate is expected to be quite stable by the time the WRD is completed at the end of Year 12.

The rock types and rock tonnages for both models are, of course, the same for the two models, although solution pH and pe vary between them. The mineral phases likely to precipitate both within the pore spaces and at the toe of the dump, when the leachate meets the atmosphere therefore differ and are described separately for each model, along with the model results.

5.2 GCP WATER QUALITY MODEL – MEDIAN LOADING RATES

5.2.1 Modelled Pore Water Chemistry

Figure 5-3 shows the distribution of predicted pH and Sulfate in pore water for the first forty years of WRD operation. The pH values are alkaline and increase during the life of the WRD, reaching seasonally fluctuating values of just almost pH 9. Sulfate concentrations in the pore water rise from initially low values of approximately 45 mg/L to a concentration of approximately 108 mg/L. The variation of two of the PCoC (B and V) are shown as Figure 5-4 and show a similar variation, gradually increasing in concentration with time.

Predicted, annual maximum and minimum pore water parameter concentrations were compared with EU, Turkish and Canadian water quality regulations (see Geochemico, 2016a). The complete statistical summary is provided as Appendix B. Pore water concentration exceedances (from EU, Turkish or Canadian water quality standards) are predicted for pH and maximum As, Mn, Mo (after year 10), Sb (after year 20), V and Zn (after year 10). Chloride concentrations are also predicted to exceed, however, Cl ion concentration was used in the modelling to charge balance solution

chemistry and therefore the predicted Cl concentrations are not considered to be reliable predictors of the pore water chemistry.

Mineral phases that are likely to precipitate within the core of the dump include: Ag_2Se, $Ba_3(AsO_4)_2$, $CoFe_2O_4$, Cr_2O_3, cuprousferrite, diaspore, hydroxylapatite, hausmannite, hematite, HgSe, and $SnSO_4$.

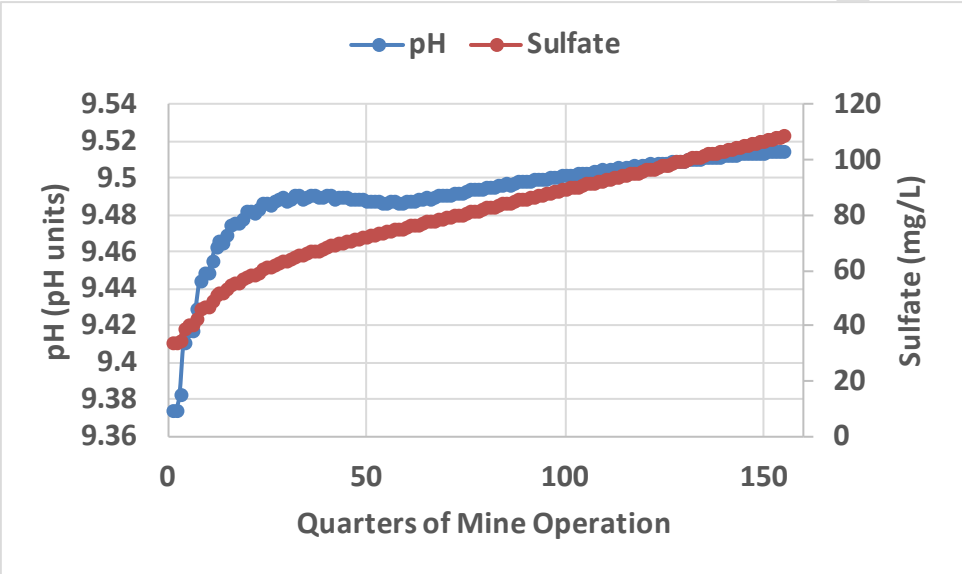


Figure 5-3: GCP, Pore water pH and Sulphate for median, pit run case

Figure 5-4: GCP, Pore water B and V concentrations (mg/L) for median, pit run case

5.2.2 Modelled Toe of Dump Chemistry

Figure 5-5 shows the distribution of predicted pH and Sulfate in the toe of dump leachate for the first forty years of WRD operation. The pH values are circum-neutral and fluctuate around pH 7 throughout the first forty years. Sulfate concentrations in the increase as the WRD ages to a maximum of approximately 40 mg/L. Alkalinity shows strong seasonal fluctuation and gradually increases as the WRD ages. Two of the PCoC (V and B, Figure 5-6) concentrations also gradually increase through the first forty years of the life of the WRD.

Mineral phases that are likely to precipitate at the toe of the dump include: diaspore, FCO3 apatite, and pyrolusite. It is probable that the toe of the dump will exhibit a brown/red precipitate of FeOOH and that the precipitate may adsorb some cations and anions from solution.

Predicted, annual maximum and minimum parameter toe of dump concentrations were compared with EU, Turkish and Canadian water quality regulations (see Geochemico, 2016a). The complete statistical summary of the predicted toe of dump leachate is provided as Appendix C. Exceedances (from any of the water quality standards) are predicted for minimum pH values, As (after year 5), B (maximum values only), V (from year 2) and maximum Zn concentrations after year 5. Chloride concentrations are also predicted to exceed, however, Cl ion concentration was used in the modelling to charge balance solution chemistry and therefore the predicted Cl concentrations are not considered to be reliable predictors of the toe of dump chemistry.

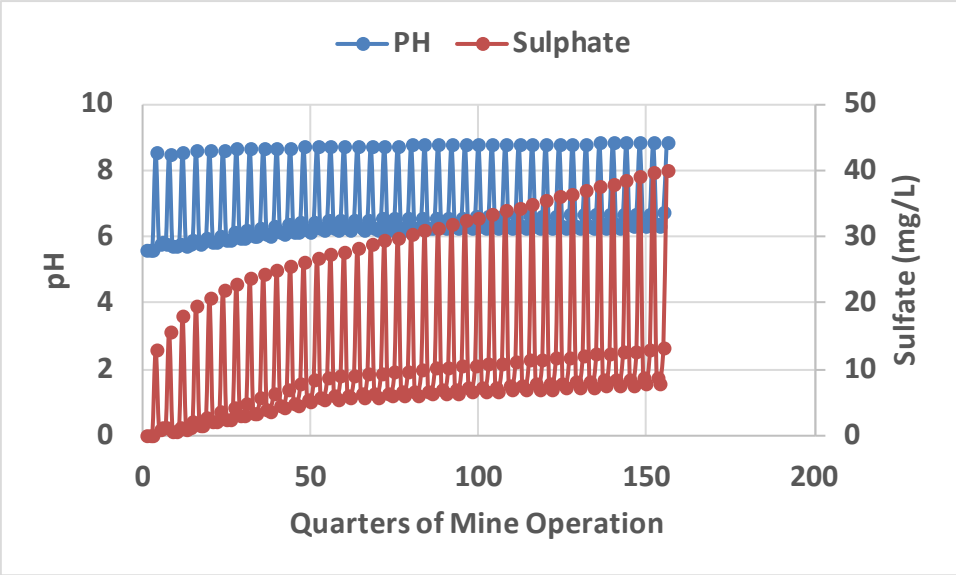


Figure 5-5: GCP, Toe of dump leachate pH and Sulfate for median, pit run case

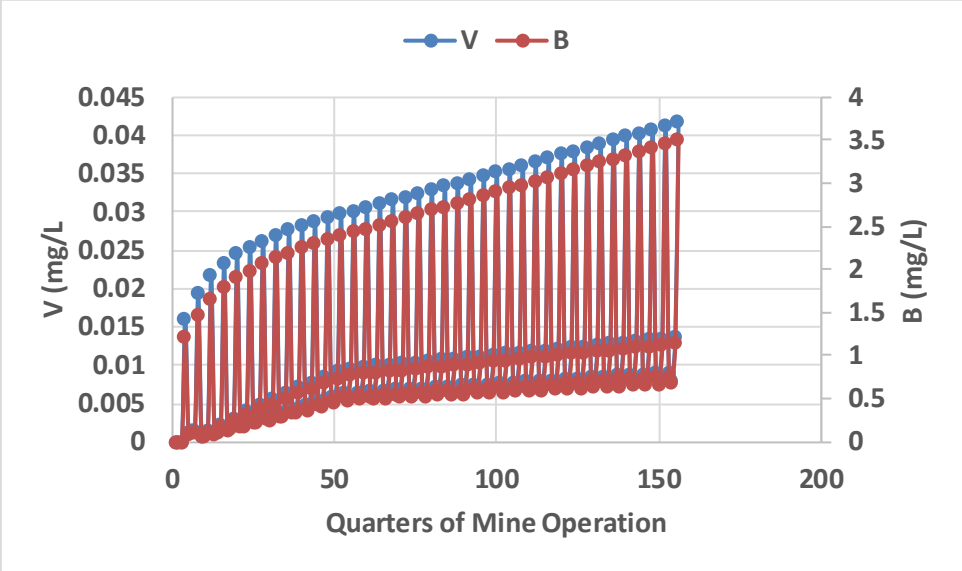


Figure 5-6: GCP, Toe of dump leachate V and B concentrations (mg/L) for median, pit run case

Figure 5-7: GCP, Comparison between pore water As content (mg/L – blue line) and toe of dump As content (mg/L – red line)

Figure 5-7 provides a comparison between As concentration in pore water (blue line) compared to As content of the toe of dump leachate after the FeOOH has settled in the settling pond (red line). The As concentration in aqueous solution at the toe of the dump is predicted to be almost an order of magnitude lower than the pore water, due to the adsorption of As onto FeOOH. It is important to note that the reduced aqueous As concentrations require settling of the precipitated FeOOH.

5.3 GCP WATER QUALITY MODEL FOR CORAKOGLU WASTE ROCK DUMP – 95th PERCENTILE LOADING RATES

5.3.1 Modelled Pore Water Chemistry

Figure 5-8 shows the distribution of predicted worst case (95th percentile) pH and Sulfate in pore water for the first forty years of WRD operation. The pH values are alkaline and increase slightly during the period modelled. Sulphate concentrations in the pore water gradually increase throughout the first 120 quarters, reaching a maximum concentration of about 1200 mg/L, after which the sulphate concentrations gradually decrease. Two of the PCoC (B and V) concentrations both show a gradual increase in pore water over time (Figure 5-9).

Predicted, annual maximum and minimum pore water parameter concentrations were compared with EU, Turkish and Canadian water quality regulations (see Geochemico, 2016a). The complete statistical summary is provided as Appendix D. Exceedances (from any of the water quality standards) are predicted for pH, sulphate, F, As, B (only after year 35), Mn, Mo, Na, Se, Sb, Ni, V, and Zn (after year 15). Chloride concentrations are also predicted to exceed, however, Cl ion concentration was used in the modelling to charge balance solution chemistry and therefore the predicted Cl concentrations are not considered to be reliable predictors of the pore water chemistry.

Mineral phases that are likely to precipitate within the pore water of the dump include: $Ba_3(AsO_4)_2$, $CaMoO_4$, $CoFe_2O_4$, fluorite, gypsum, kaolinite, Cr_2O_3, cuprousferrite, diaspore, hausmannite, hydroxyapatite, hematite, HgSe, and $SnSO_4$.

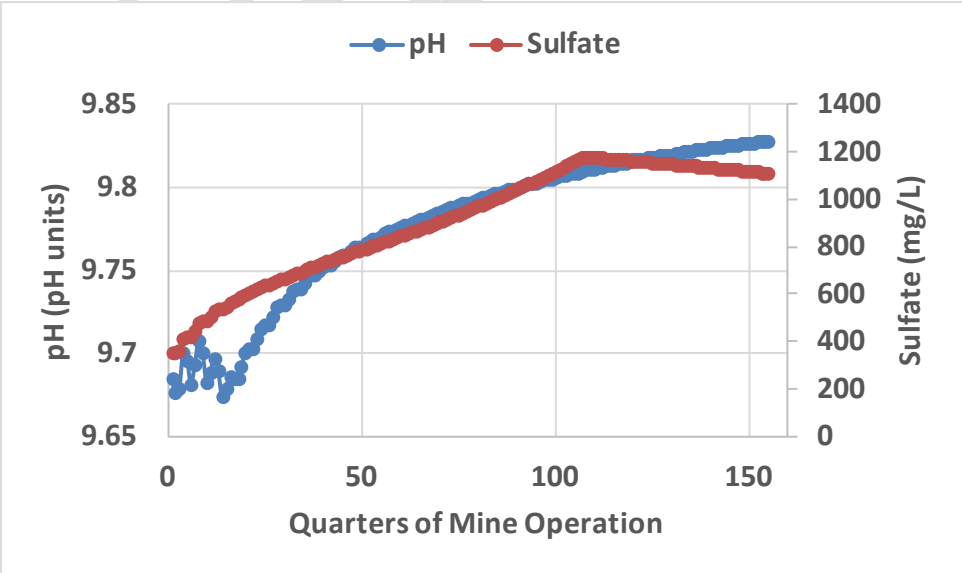


Figure 5-8: GCP, Pore water pH and Sulfate for 95th percentile, pit run case

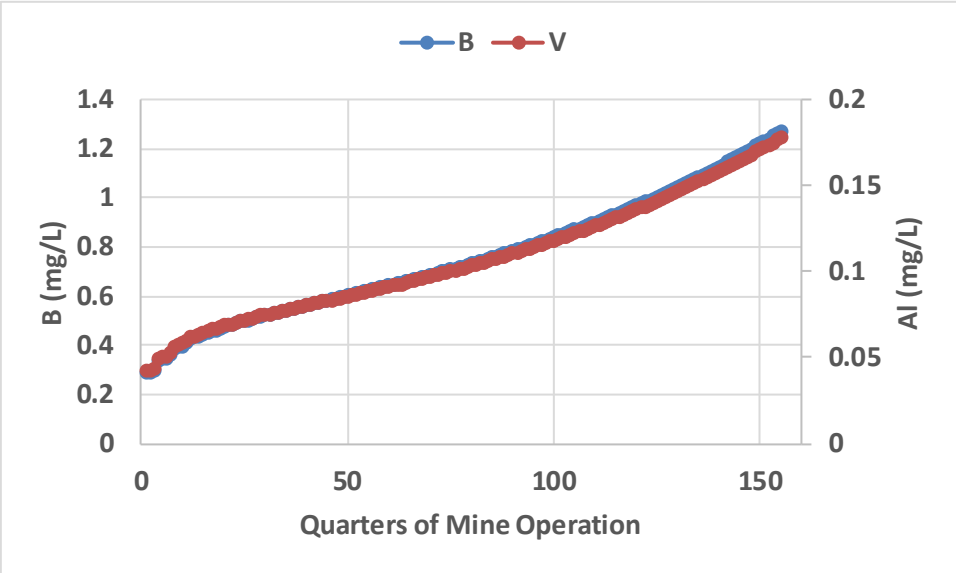


Figure 5-9: Pore water B and V concentrations for 95th percentile, pit run case

5.3.2 Modelled Toe of Dump Water Chemistry

Figure 5-10 shows the distribution of predicted pH and Sulfate at the toe of the dump for the first forty years of WRD operation. The pH values range from slightly acidic to alkaline in the first ten years, showing marked seasonal variation. After the WRD is completed the pH remains alkaline. Sulfate concentrations in the toe of dump leachate show strong seasonal fluctuation throughout the forty years modelled at up to approximately 420 mg/L. B and V, two of the PCoC, concentrations show a similar pattern to each other (Figure 5-11), gradually increasing through the life of the WRD.

Predicted, annual maximum and minimum parameter concentrations were compared with EU, Turkish and Canadian water quality regulations (see Geochemico, 2016a). The complete statistical summary is provided as Appendix E. Exceedances (from any of the water quality standards) are predicted for pH, sulphate (after year 10), As, B, Na, Ni (after year 4), Se (after year 3), Sb, V and Zn concentrations. Chloride concentrations are also predicted to exceed, however, Cl ion concentration was used in the modelling to charge balance solution chemistry and therefore the predicted Cl concentrations are not considered to be reliable predictors of the toe of dump chemistry.

Mineral phases that are likely to precipitate within the toe of dump water include: $CoFe_2O_4$, diaspore, and pryolusite.

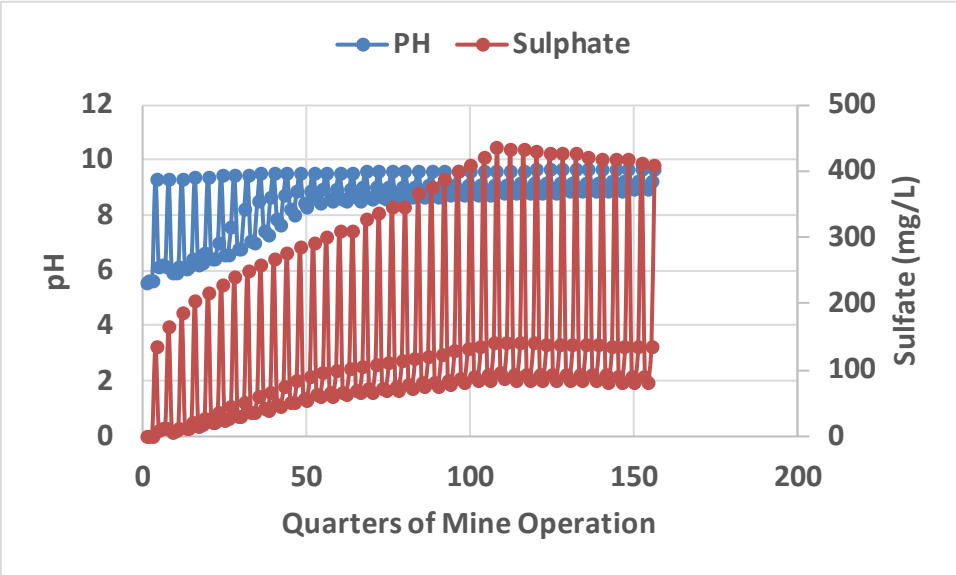


Figure 5-10: GCP, Toe of dump leachate pH and Sulfate for median, pit run case

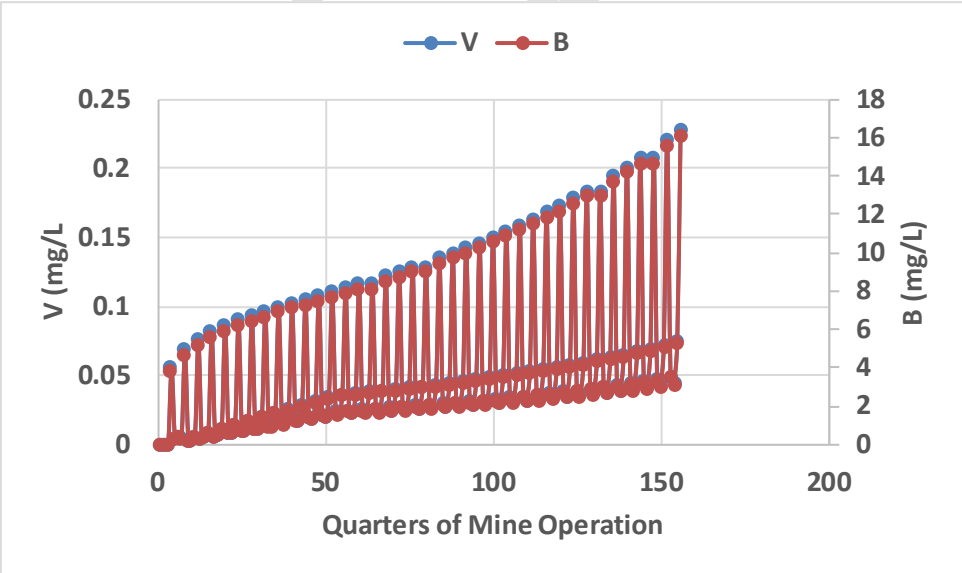


Figure 5-11: Toe of Dump water alkalinity and Al concentrations for 95th percentile, pit run case

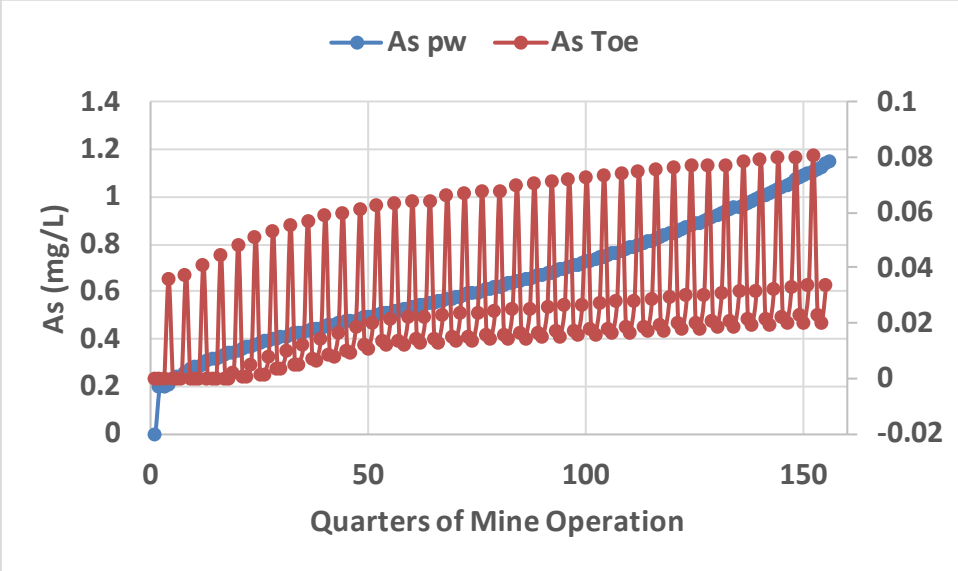


Figure 5-12: GCP, Comparison between pore water As content (mg/L – blue line) and toe of dump As content (mg/L – red line) for 95th percentile (worst case) loading rates

Figure 5-12 provides a comparison between As concentration in pore water (blue line) compared to As content of the toe of dump leachate after the FeOOH has settled in the settling pond (red line). The As concentration in aqueous solution at the toe of the dump is predicted to be over an order of magnitude lower than the pore water, due to the adsorption of As onto FeOOH. The adsorption to FeOOH is able to bond with the increasing As concentrations in the exiting pore water as FeOOH mass is also increasing with time. It is important to note that the reduced aqueous As concentrations require settling of the precipitated FeOOH.

6. OPTIMIZATION OF COVER DESIGN AND MODELLING REHABILITATION COVER IMPACT ON WATER QUALITY

6.1 INTRODUCTION

The purposes of an adequate WRD cover design at the GCP are:

1) To allow for re-vegetation of the WRD at mine closure;
2) To minimize the influx of precipitation into the WRD, therefore minimizing the flow of leachate at the toe of the dump and maximising dilution by run-off;
3) To prevent erosion; and
4) To prevent pore water present in the WRD from rising upwards, thereby forming a vadose zone in the upper zone of the WRD and potentially killing vegetation as well as mobilising secondary alteration minerals.

There are three material types at the GCP that may be utilized for a cover design, overburden/soil (shown by static testing to not be PAF (Geochemico, 2016a), clay, and locally available gravel.

6.2 COVER MATERIAL PROPERTIES

6.2.1 Overburden/Soil

The overburden/soil overlying the open pit area was statically tested (10 samples) and all samples were found to be not capable of generating acidity (NPAF). The overburden samples were found to be capable of leaching only minor Mn, Fe and Al and were therefore determined to be suitable for rehabilitation. Hydraulic parameters were not determined on the overburden samples, since their principal function will be to provide a medium for revegetation.

6.2.2 Gravel

The gravel at the GCP is primarily composed of GS and therefore not capable of generating acidity. The grain size distribution is presented in Table 6-1. Saturated hydraulic conductivity (K_s) was determined on four samples of gravel and found to range from $2.03e^{-3}$ to $7.19\ e^{-3}$. The gravel grain size distribution is presented graphically as Figure 6-1.

The unsaturated hydraulic conductivities (K_h) at a number of water contents were calculated using Poiseulle's Law and are shown as Figure 6-2.

Table 6-1: GCP, Grain size data for locally derived gravel

GRAIN DIAMETER	GRAVEL SAMPLE 1	GRAVEL SAMPLE 2	GRAVEL SAMPLE 3	GRAVEL SAMPLE 4	MEDIAN
mm	weight % passing	weight % passing	weight % passing	weight % passing	weight % passing
63.5	92.16	96.34	100	100	98.2
50.8	82.37	91.79	90.71	93.36	91.3
38.1	73.6	78.87	80.38	84.52	79.6
31.5	60.54	74.67	76.74	75.64	75.2
25.4	53.46	66.74	71.75	65.23	66.0
19	47.34	58.5	64.49	57.59	58.0
12.5	37.86	49.95	56.99	47.83	48.9
9.5	33.99	45.27	50.38	41.84	43.6
4.75	24.94	35.22	36.69	29.97	32.6
2.38	19.83	29.44	30.8	26.03	27.7
1.18	12.98	24.45	20.86	17.55	19.2
0.59	10.79	19.8	14.3	12.77	13.5
0.295	1.83	2.52	3.84	1.24	2.2
0.15	0.39	0.96	1.15	0.38	0.7

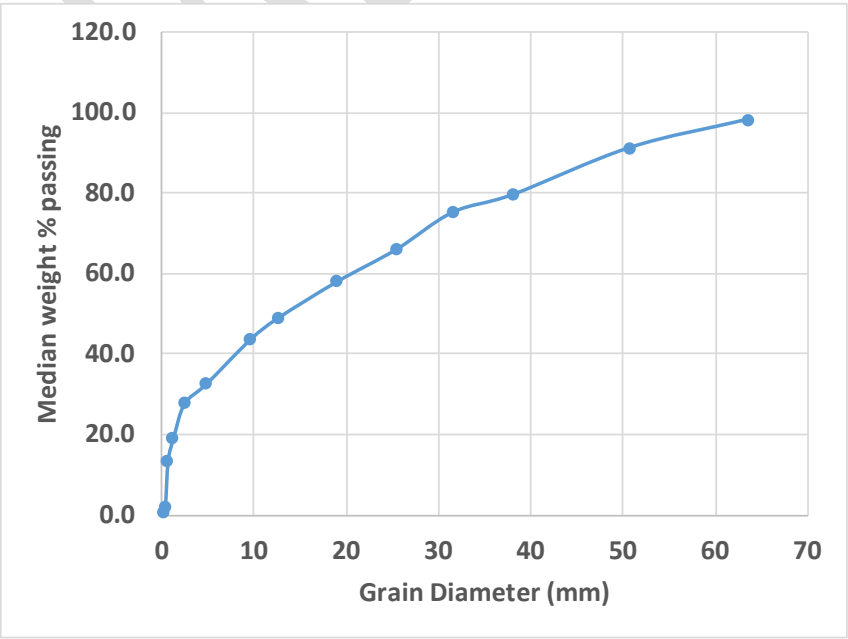


Figure 6-1: GCP, Median grain size distribution of local gravel

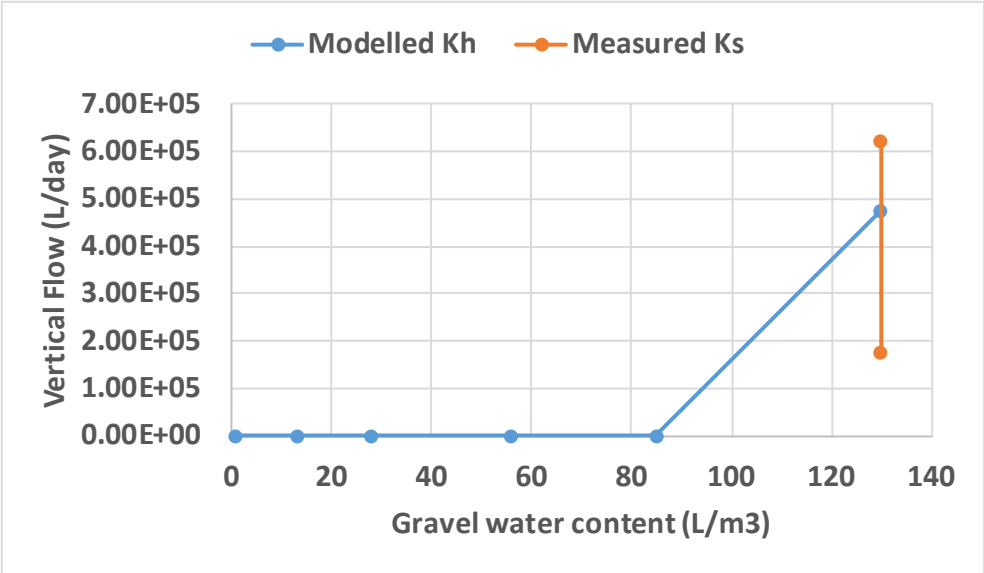


Figure 6-2: GCP, Modelled unsaturated hydraulic conductivities vs water content (blue line) compared to measured saturated conductivity

6.2.3 Clay

Three samples of locally derived clay were extensively analysed (including triaxial testing etc.) at the Middle Eastern University Civil Engineering laboratories; results pertinent to the present study are presented herein. The grain size distribution of the clay, by both sieve analysis and hydrometer testing are presented as Table 6-2 and Figure 6-3.

Table 6-2: GCP, Grain size distribution of locally derived clay.

SEIVE TESTING		HYDROMETER TESTING	
Grain diameter (mm)	Weight % passing	Grain diameter (mm)	Weight % passing
9.5	99.9	0.0458	71.75
6.3	99.5	0.0326	69.13
4.75	99.3	0.0231	68.47
2	98.4	0.0166	63.23
0.6	96.3	0.0123	57.65
0.3	94.4	0.0089	49.45
0.212	93	0.0064	41.25
0.15	92.1	0.0046	34.7
0.075	88.7	0.0033	27.15
		0.0014	16.99

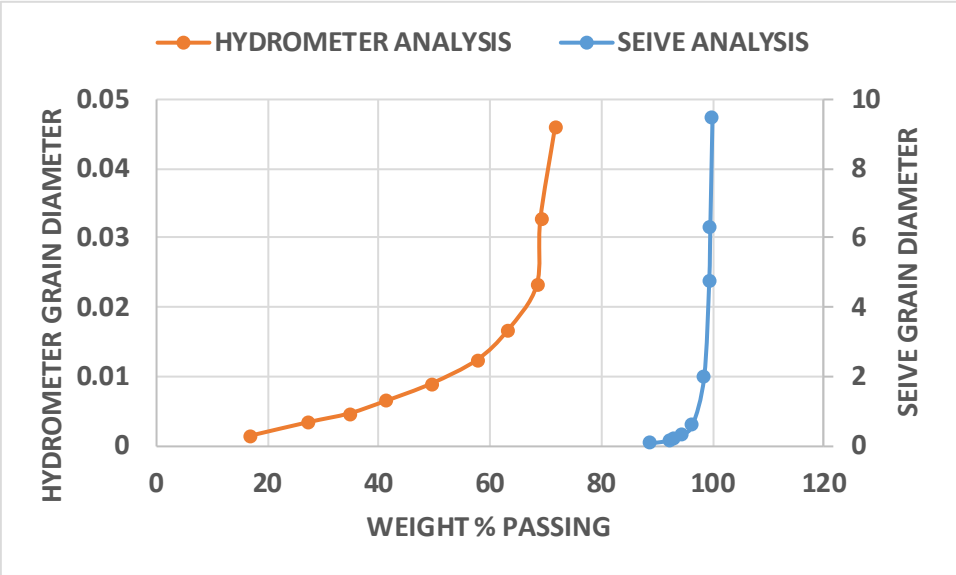


Figure 6-3: GCP, Seive and hydrometer analysis of locally derived clay

The measured saturated hydraulic conductivity of the clay was determined to be 2.797×10^{-10} m/sec and the bulk density 2.084 g/cm^3. The saturated clay is essentially impermeable.

6.3 WRD COVER DESIGN

The proponent initially suggested a cover of gravel, overlain by overburden to allow re-vegetation. The local gravel possesses a sufficiently high saturated hydraulic conductivity, however, that such a cover would allow all the incident rainfall to pass into the WRD, although slightly delaying the influx of precipitation. Such a design would not allow the attainment of cover criteria (2) although all other cover criteria would be met. Consequently, a more appropriate cover design was sought, using locally derived materials, especially in view of the potential of the WRD to generate metal leaching.

The proposed cover design, allowing the attainment of all criteria (Section 6.1) is formed of a 'sandwich' of a lower layer of gravel (nominal thickness 15 cm), itself covered by a layer of clay (nominal thickness 0.5 m) with an additional upper layer of gravel (nominal thickness 10 cm), which is itself covered by soil/overburden to facilitate re-vegetation (Figure 6-4). Rainfall on the WRD will pass through the upper vegetated soil layer, some of it evaporating and a portion of the rainfall will be transpired into the atmosphere. Evaporation was modelled but not transpiration as this factor depends greatly on the type of vegetation, biomass, leaf area etc., which at this point are unknown. Choosing not to model the transpiration also renders the cover model more conservative. The upper layer of gravel will transport rain water through it to the layer of clay, while also protecting the clay layer from erosion and from desiccating. Most of the rain water passing into the upper gravel layer will move horizontally and report to the seepage collection pond via the seepage collection ditches surrounding the WRD, where it will dilute any leachate from the WRD. The clay layer, remaining saturated, will allow throughput of a very small amount of rainwater into the lower gravel layer. The lower gravel layer receives a small increment of water each quarter from rainfall and a small increment from WRD pore water moving vertically by capillary action up into the gravel. Modelling

of the capillary movement of water upwards through the lower gravel layer indicates the pore water will not reach the lower gravel/clay interface. Effectively, no rain water will be able to percolate through the three cover layers. Modelling of the engineered cover indicates that the design is very resilient to any changes to climate patterns that may be caused in the future by climate change.

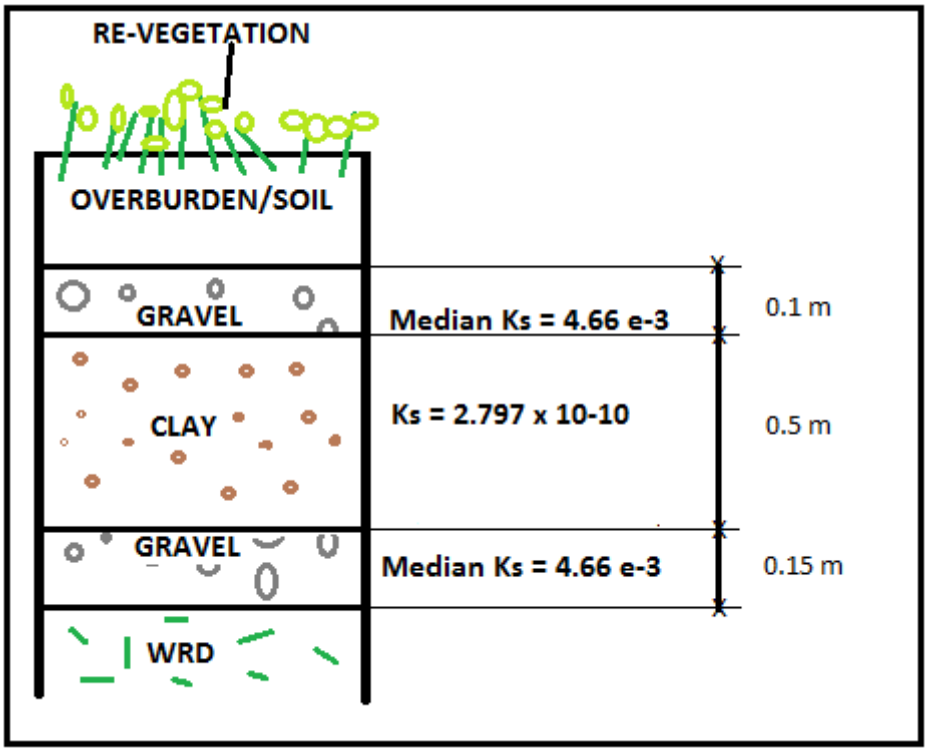


Figure 6-4: GCP, proposed WRD cover design

Cover Design Modelling

The flow of water through the proposed cover design was carried out using the laboratory measured saturated hydraulic conductivities, mean rainfall data, calculated unsaturated hydraulic conductivities (for gravel) and assuming a run-off coefficient of 0.7. The evaporo-transpirative effect of the soil cover or the vegetation was not modelled in order to maintain a conservative model. The results of the modelling are shown as Figure 6-5. No rainfall (median rainfall of 49 L/m2/quarter) enters the waste rock dump (through the designed cover). The clay layer remains permanently saturated. Seasonal evaporation is accounted for using the mean data supplied from the Devrekani meteorological station.

Hydrogeological modelling of the WRD shows that almost all of the pore voids will be saturated by rainfall by the time that WRD construction is complete. The WRD will require re-contouring following its completion, after which the engineered cover may be put in place. After the engineered cover is

in place the pore water within the dump will continue to exit from the toe of the dump for a number of years until the interior of the WRD becomes unsaturated. New rainfall deposited on the covered WRD will pass predominantly through the upper layer of gravel and exit at the toe of the dump. The gravel is composed of approximately 54% GS, 46% MS and small percentages of MVW and alluvium, therefore the rainwater passing through it will dissolve some of the minerals within the gravel, however, the mass of gravel is much less than the mass of waste rock within the dump, so eventually the engineered cover will reduce the PCoC exiting at the toe of the dump.

The designed cover appears to meet all the criteria for an adequate cover for the GCP WRD. The effect of the cover on post operational leachate concentrations will be described in the following section (Section 7).

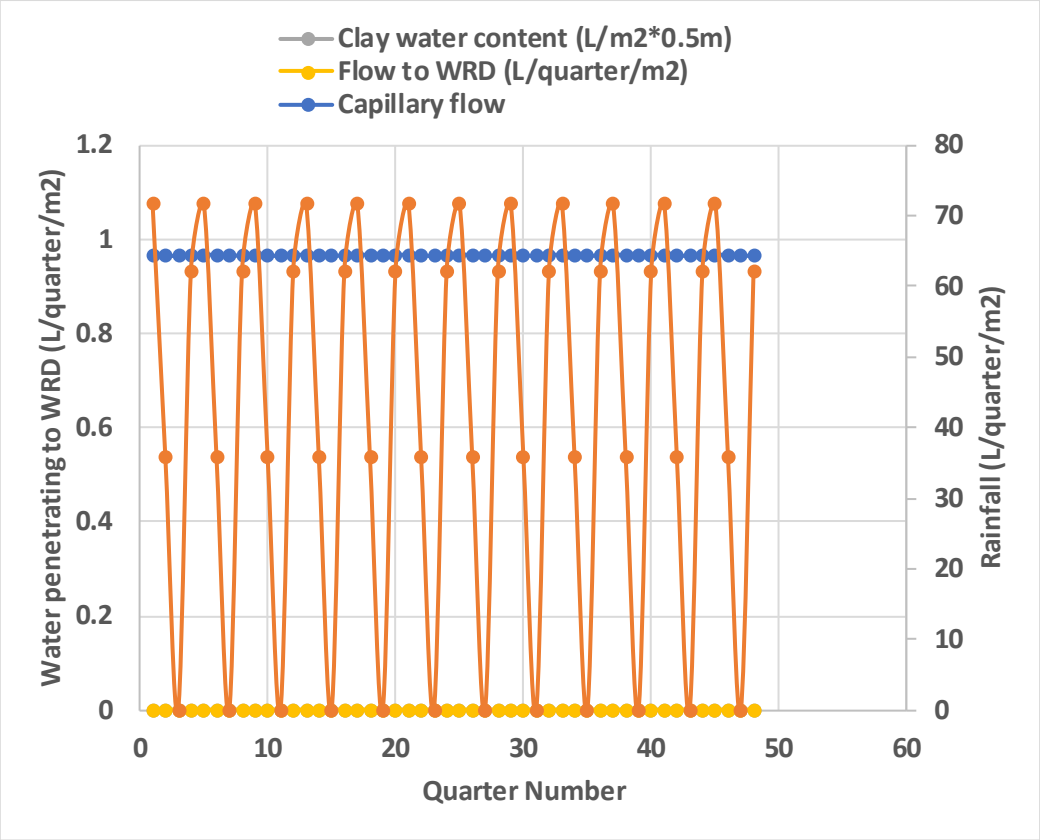


Figure 6-5: GCP, Modelled volume (L) of rainwater flowing through the designed cover to the underlying waste rock (yellow line, L/quarter/m2, x-axis). The blue line shows the incident rainfall (L/quarter/m2, x-axis) assuming a run-off coefficient of 0.7. The water content of the upper gravel is the same as incident rainfall (y-axis).

7. RE-MODELLING OF WRD WITH DESIGNED POST-OPERATIONAL ENGINEERED COVER

7.1 INTRODUCTION

Two models of 'pit run' waste rock were carried out for the Corakoglu waste rock dump in order to provide an assessment of the expected performance of the waste rock dump after mitigation/rehabilitation strategies (engineered cover) were implemented. The first model incorporates the loading rates for MS and GS based on median values (base case). The second model incorporates loading rates for MS and GS based on 95th percentile values (worst case). The models will provide a range of expected values for both pore water (within the dump) and toe of dump leachate as well as identify mineral phases that are likely to precipitate under both conditions.

Physical parameters (e.g. height of dump, mass and proportion of waste rocks, rainfall) are the same for all models of each WRD. Some calculated parameters, such as volume of saturated pore space, flow at the toe of the dump are also common to both models. Typical PHREEQC model output is provided as Appendix A.

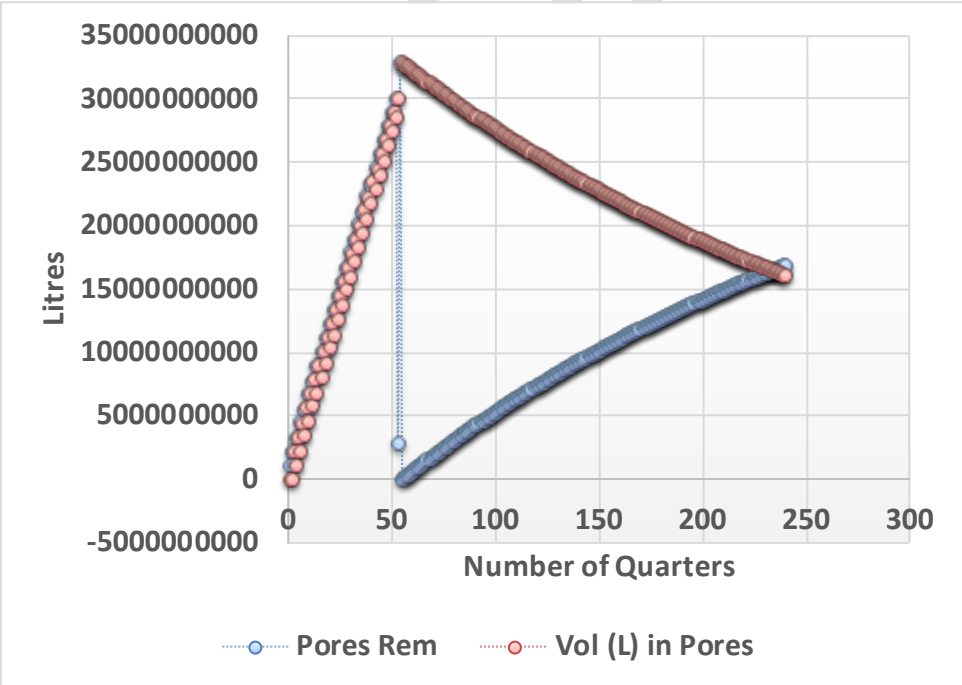


Figure 7-1: GCP, Pore space volume (L) for the first forty years of waste rock dump operation with engineered cover installed

Figure 7-1 demonstrates the calculated nature of the volume of saturated pore spaces within the waste rock dump. Volume of wetted pore space has a strong impact on the toe of dump leachate chemistry.

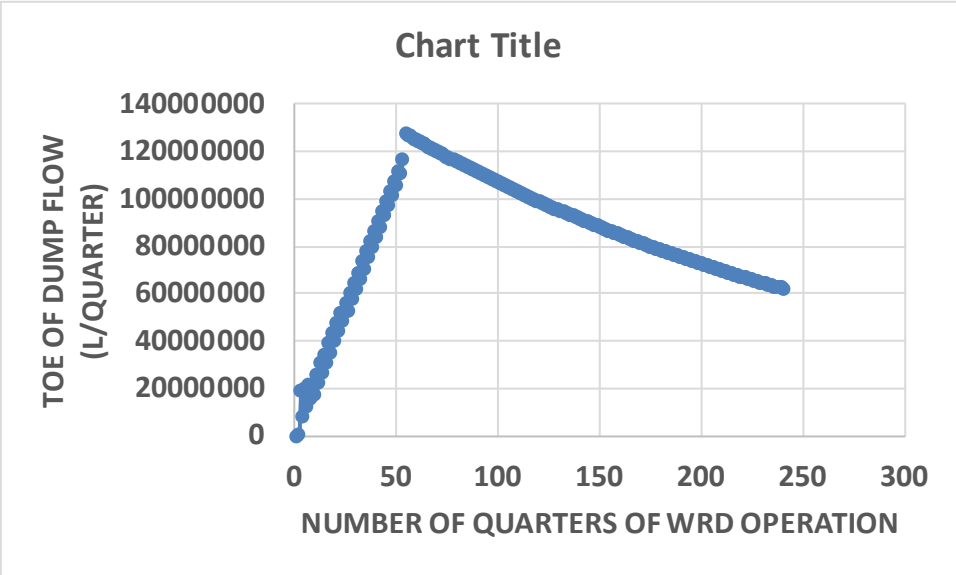


Figure 7-2: GCP, Toe of Dump Flow Rate (L/Quarter) with Engineered Cover Installed

Figure 7-2 presents the calculated toe of dump flow rate, which also shows much less seasonal fluctuation than is the case without an engineered cover. The rock types and rock tonnages for both models are, of course, the same for the two models, although solution pH and pe vary between them. The mineral phases likely to precipitate both within the pore spaces and at the toe of the dump, when the leachate meets the atmosphere therefore differ and are described separately for each model, along with the model results.

7.2 GCP WATER QUALITY MODEL – MEDIAN LOADING RATES

7.2.1 Modelled Pore Water Chemistry

Figure 7-3 shows the distribution of predicted pH and sulphate in pore water for the first forty years of WRD operation. The pH values are alkaline and increase slightly during the first ten years, reaching seasonally fluctuating values of just over pH 9.5. Sulphate concentrations in the pore water rise from initially low values of approximately 35 mg/L to a concentration of approximately 70 mg/L and then begin to fall once the cover is in place. Two of the PCoC, B and V, show similar patterns, rising concentrations until the engineered cover is in place, followed by gradually falling concentrations afterwards.

Predicted, annual maximum and minimum pore water parameter concentrations were compared with EU, Turkish and Canadian water quality regulations (see Geochemico, 2016a). The complete statistical summary is provided as Appendix F. Exceedances (from EU, Turkish or Canadian water quality standards) are predicted for pH, As, Mn, Mo, V and Zn. Chloride concentrations are also predicted to exceed, however, Cl ion concentration was used in the modelling to charge balance

solution chemistry and therefore the predicted Cl concentrations are not considered to be reliable predictors of the pore water Cl chemistry.

Mineral phases that are likely to precipitate within the core of the dump include: Ag_2Se, $Ba_3(AsO_4)_2$, $CoFe_2O_4$, Cr_2O_3, cuprousferrite, diaspore, hematite, hydroxylapatite, and $SnSO_4$.

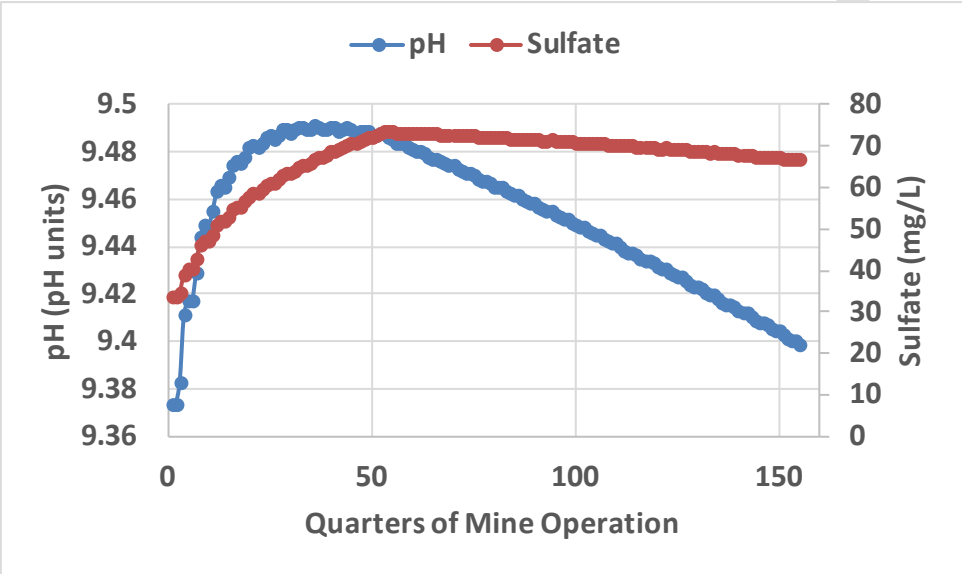


Figure 7-3: GCP, Pore water pH and Sulfate for median, pit run case with engineered cover

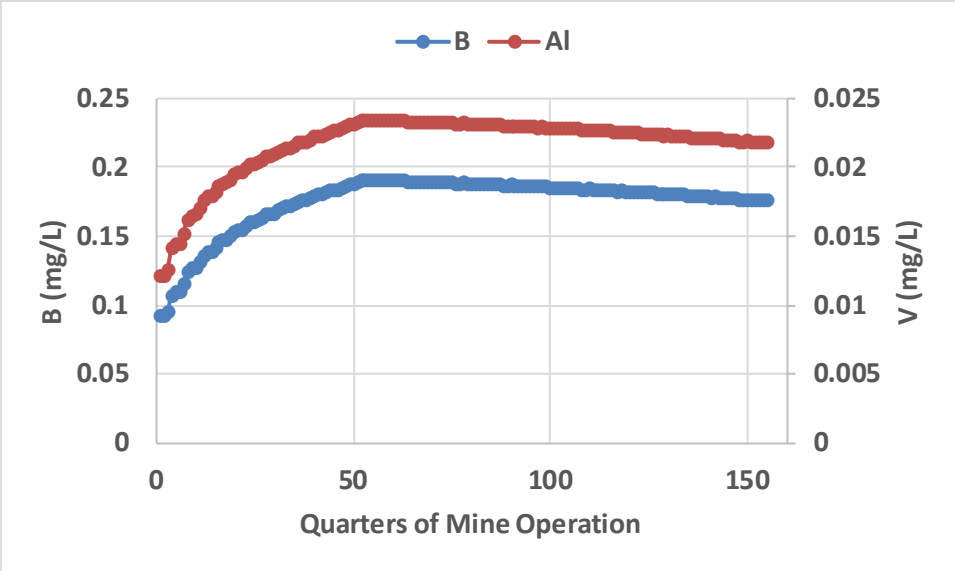


Figure 7-4: GCP, Pore water B and AlV concentrations (mg/L) for median, pit run case

7.2.2 Modelled Toe of Dump Chemistry

Figure 7-5 shows the distribution of predicted pH and sulphate in the toe of dump leachate for the first forty years of WRD operation. The pH values are circum-neutral and fluctuate around pH 7 throughout the first forty years, although the pH shows a slight increase after the engineered cover is installed. Sulphate concentrations in the leachate also fluctuate around approximately 20 mg/L and gradually drop once the engineered cover is installed and the WRD ages. Two of the PCoC, B and V, show strong seasonal fluctuation and gradually increase as the WRD is constructed followed by a markedly dropping concentrations once the engineered cover is installed (Figure 7-6).

Mineral phases that are likely to precipitate at the toe of the dump include: $Ba_3(AsO_4)_2$, $CoFe_2O_4$, Cr_2O_3, cupricferrite, diaspore, FCO3apatite, ferrihydrite, pyrolusite, and SnO_2. It is probable that the two of the dump will exhibit a brown/red precipitate of FeOOH and that the precipitate may adsorb some cations and anions from solution.

Predicted, annual maximum and minimum parameter toe of dump concentrations were compared with EU, Turkish and Canadian water quality regulations (see Geochemico, 2016a). The complete statistical summary of the predicted toe of dump leachate is provided as Appendix G. Exceedances (from any of the water quality standards) are predicted for pH (the minimum pH is predicted to fall below the regulatory standard), B (slight exceedances), V (slight exceedance of the regulatory limit) and Zn (slight exceedances). Chloride concentrations are also predicted to exceed, however, Cl ion concentration was used in the modelling to charge balance solution chemistry and therefore the predicted Cl concentrations are not considered to be reliable predictors of the toe of dump Cl chemistry.

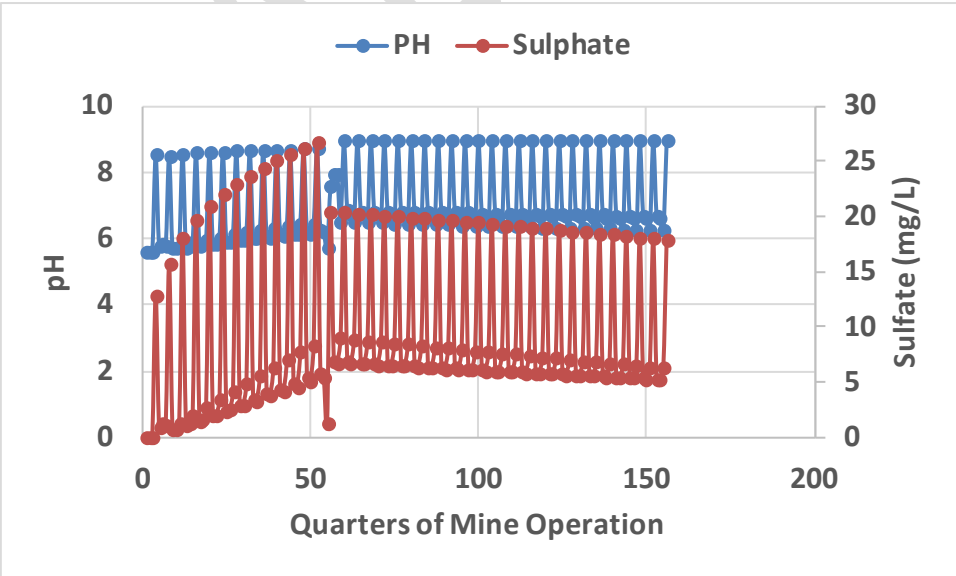


Figure 7-5: GCP, Toe of dump leachate pH and Sulphate for median, pit run case

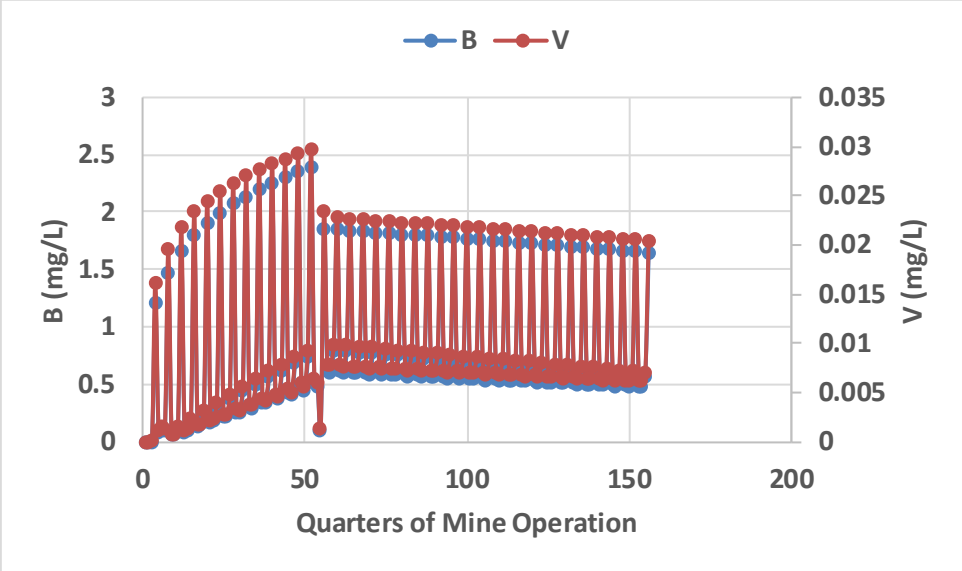


Figure 7-6: GCP, Toe of dump leachate alkalinity and Al concentrations (mg/L) for median, pit run case

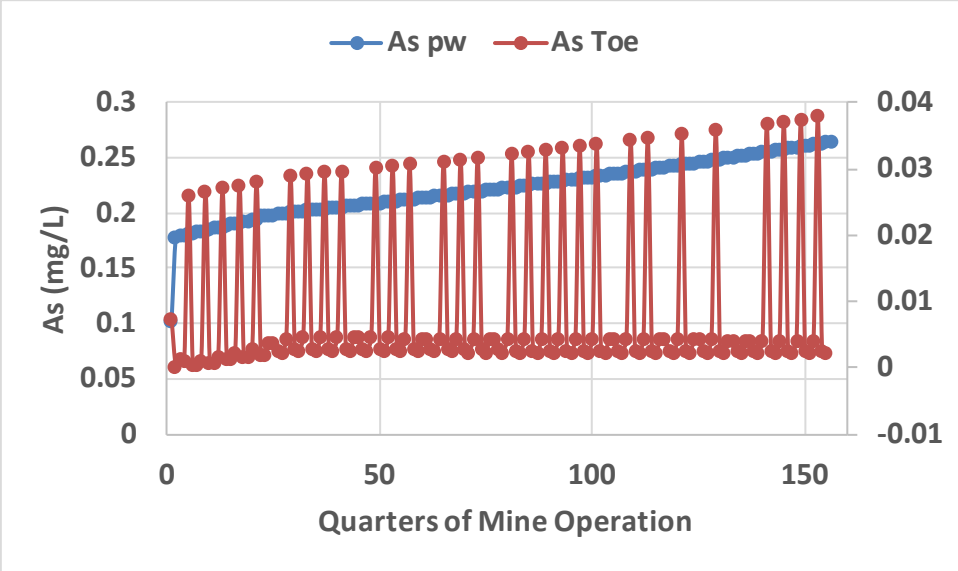


Figure 7-7: GCP, Comparison between pore water As content (mg/L – blue line) and toe of dump As content (mg/L – red line)

Figure 7-7 provides a comparison between As concentration in pore water (blue line) compared to As content of the toe of dump leachate after the FeOOH has settled in the settling pond (red line). The As concentration in aqueous solution at the toe of the dump is predicted to be almost an order of magnitude lower than the pore water, due to the adsorption of As onto FeOOH. It is important to note that the reduced aqueous As concentrations require settling of the precipitated FeOOH.

7.3 GCP WATER QUALITY MODEL FOR CORAKOGLU WASTE ROCK DUMP WITH ENGINEERED COVER – 95th PERCENTILE LOADING RATES

7.3.1 Modelled Pore Water Chemistry

Figure 7-8 shows the distribution of predicted worst case (95th percentile) pH and sulphate in pore water for the first forty years of WRD operation. The pH values are alkaline and increase slightly during the first twelve years, after which time they drop, reaching seasonally fluctuating values of just under pH 9.7. Sulfate concentrations in the pore water gradually rise throughout the forty years modelled, reaching a final concentration of just over 1000 mg/L. Concentrations of B and V (two of the PCoC) show a gradual increase in pore water over time (Figure 7-9).

Predicted, annual maximum and minimum parameter concentrations were compared with EU, Turkish and Canadian water quality regulations (see Geochemico, 2016a). The complete statistical summary is provided as Appendix L. Exceedances (from any of the water quality standards) are predicted for pH, sulphate, F, As, Mn, Mo, Ni, V, and Zn. Chloride concentrations are also predicted to exceed, however, Cl ion concentration was used in the modelling to charge balance solution chemistry and therefore the predicted Cl concentrations are not considered to be reliable predictors of the pore Cl water chemistry.

Mineral phases that are likely to precipitate within the pore water of the dump include: Ag_2Se, $Ba_3(AsO_4)_2$, calcite, $CoFe_2O_4$, clausthalite, fluorite, gypsum, kaolinite, Cr_2O_3, cuprousferrite, CuSe, diaspore, FCO3apatite, hematite, HgSe, $PbMo_4$, SbO_2, and $SnSO_4$.

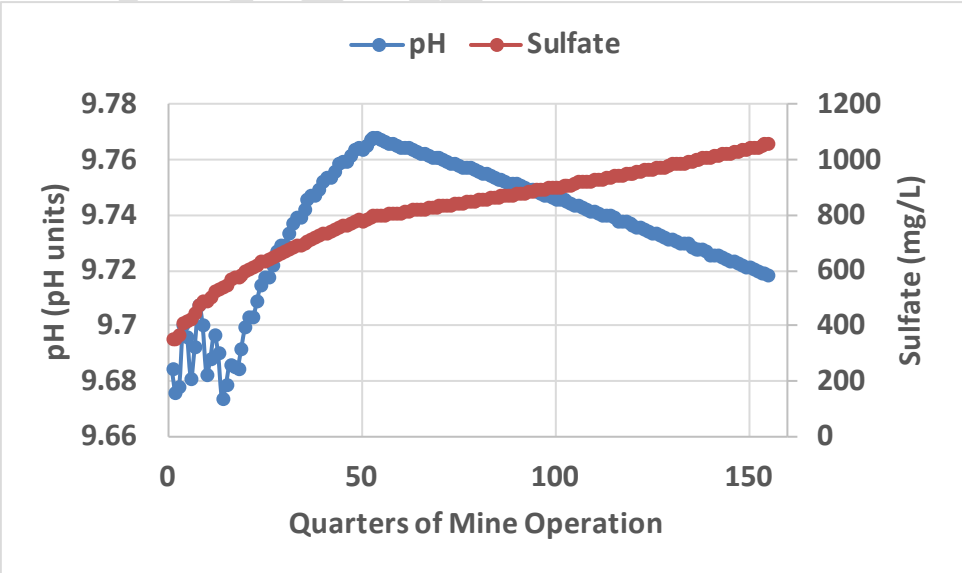


Figure 7-8: GCP, Pore water pH and Sulfate for 95th percentile, pit run case with engineered cover

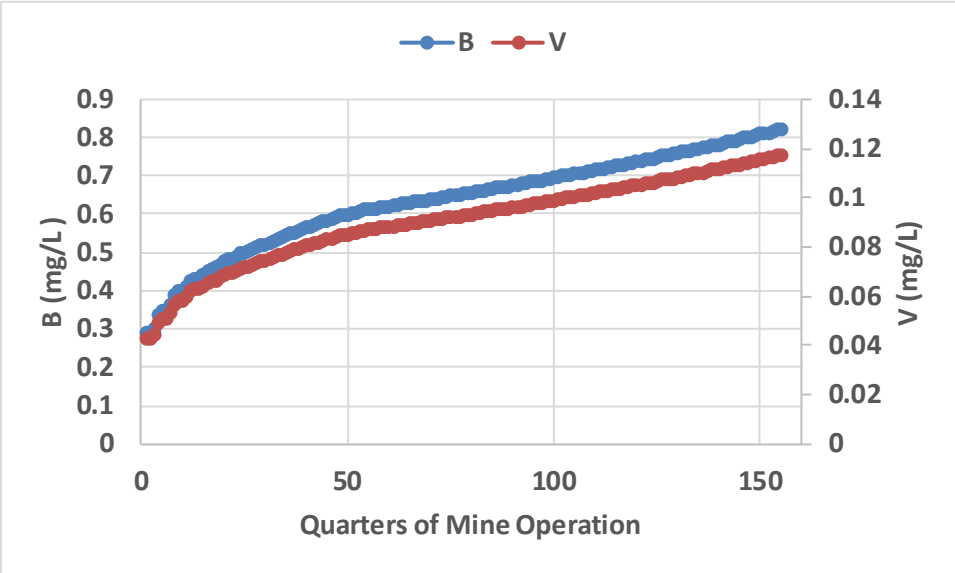


Figure 7-9: Pore water alkalinity and Al concentrations for 95th percentile, pit run case with engineered cover

7.3.2 Modelled Toe of Dump Water Chemistry

Figure 7-10 shows the distribution of predicted pH and sulphate at the toe of the dump for the first forty years of WRD operation for the worst-case loading rate model with an engineered cover. The pH values are circum-neutral, but show marked seasonal fluctuation and increase after the installation of the engineered cover. Sulphate concentrations in the pore water show strong seasonal fluctuation throughout the forty years modelled at approximately 200 mg/L although concentrations drop sharply after the installation of the cover. B and V concentrations show a similar pattern (Figure 7-11).

Predicted, annual maximum and minimum parameter concentrations were compared with EU, Turkish and Canadian water quality regulations (see Geochemico, 2016a). The complete statistical summary is provided as Appendix I. Exceedances (from any of the water quality standards) are predicted for pH, sulphate, As, F, Mn, Mo, Ni, Se, Sb, V and Zn concentrations. Chloride concentrations are also predicted to exceed, however, Cl ion concentration was used in the modelling to charge balance solution chemistry and therefore the predicted Cl concentrations are not considered to be reliable predictors of the toe of dump Cl chemistry.

Mineral phases that are likely to precipitate within the toe of dump water include: $Ba_3(AsO_4)_2$, $CoFe_2O_4$, Cr_2O_3, cuprousferrite, diaspore, fluorite, hausmannite, hydroxylapatite, hematite, and $SnSO_4$.

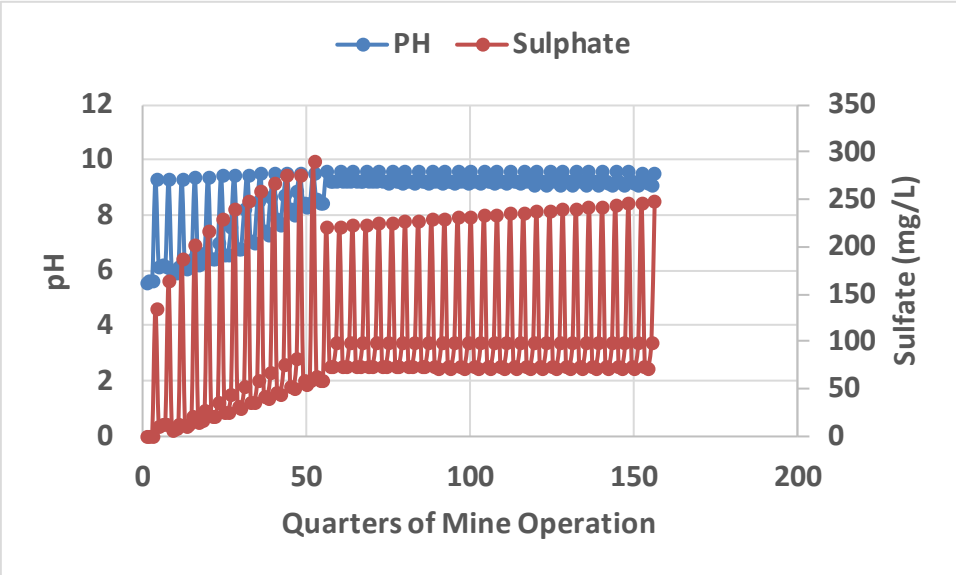


Figure 7-10: GCP, Toe of dump leachate pH and Sulphate for 95th percentile, pit run case

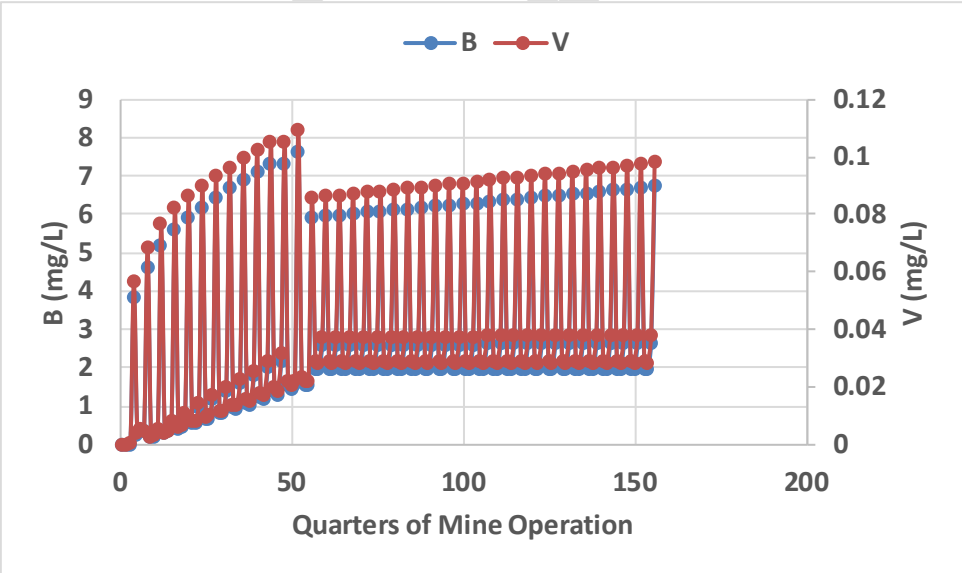


Figure 7-11: Toe of Dump water alkalinity and Al concentrations for 95th percentile, pit run case

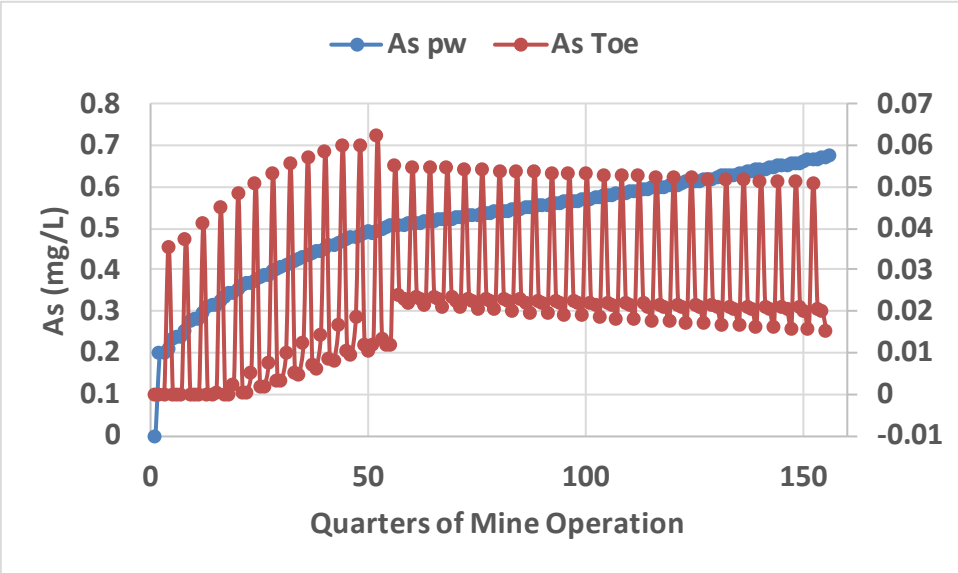


Figure 7-12: GCP, Comparison between pore water As content (mg/L – blue line) and toe of dump As content (mg/L – red line) for 95th percentile (worst case) loading rates

Figure 7-12 provides a comparison between As concentration in pore water (blue line) compared to As content of the toe of dump leachate after the FeOOH has settled in the settling pond (red line). The As concentration in aqueous solution at the toe of the dump is predicted to be an over an order of magnitude lower than the pore water, due to the adsorption of As onto FeOOH. The adsorption to FeOOH is able to bond with the increasing As concentrations in the exiting pore water as FeOOH mass is also increasing with time. It is important to note that the reduced aqueous As concentrations require settling of the precipitated FeOOH.

7.4 ASSESSMENT OF EFFECTS OF ENGINEERED COVER AT CORAKOGLU WASTE ROCK DUMP

The designed, engineered cover for the Corakoglu waste rock dump restricts the volume of rain water entering the waste rock dump. This has three principal effects:

- Less water is available to leach elements from the waste rock resulting in a lower mass of waste rock being leached, however, because the volume of water is lower the concentrations of parameters are generally higher;
- The volume of water emanating from the toe of the dump is much less; and
- The volume of run-off is greater and therefore greater dilution of the toe of dump leachate is possible.

The combined impact of these three effects may be assessed by comparing the total mass of any given parameter that could be released to the environment without the cover installed, to the total mass of the same parameter with the engineered cover installed.

When the engineered cover is installed there is a considerable volume of leachate present in the WRD, which gradually leaves the WRD through seepage at the toe of the dump. The effectiveness of

the engineered cover therefore increases with time. Furthermore, because the amount of dilution in the seepage collection pond varies with the rainfall, the effectiveness of the cover also varies seasonally. There are five PcoC for the base case (not including pH); As, B, Se, V, Zn. The change in the effectiveness (percent reduction of PcoC) effected by the engineered cover is shown below for As and B as Figure 7-13 and Figure 7-14. The maximum effectiveness of the engineered cover (for the modelled period) is presented as Table 7-1 for year 40 of operations (i.e. 27 years after the cover is installed) for all five PCoC.

Table 7-1: Percent Reduction in PCoC Toe of Dump Leachate Concentrations Effected by the Engineered Cover for the base case 27 years after the cover is installed

PCoC	As	B	Se	V	Zn
Year 27	70.29	68.24	74.25	66.6	75.3

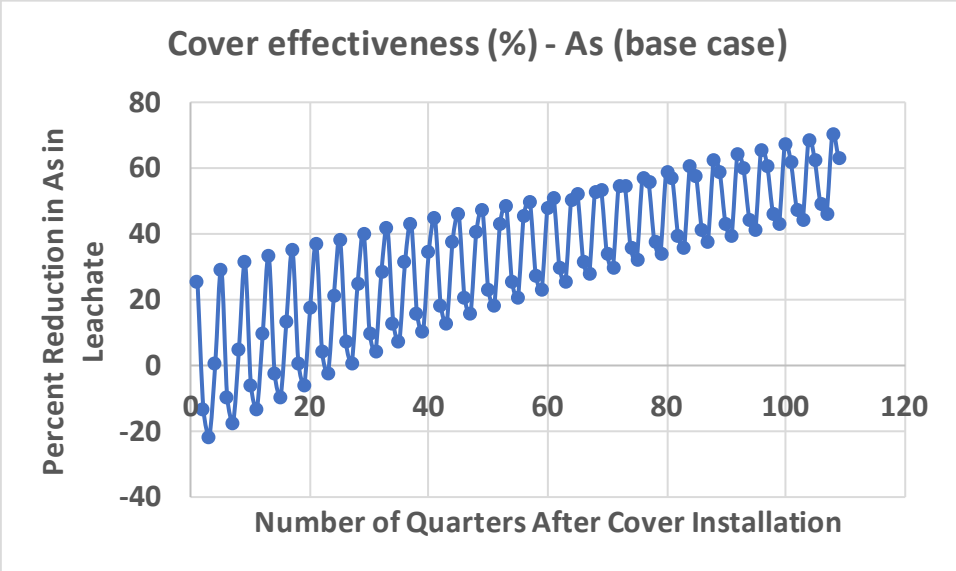


Figure 7-13: Effectiveness of Engineered Cover for Base Case As

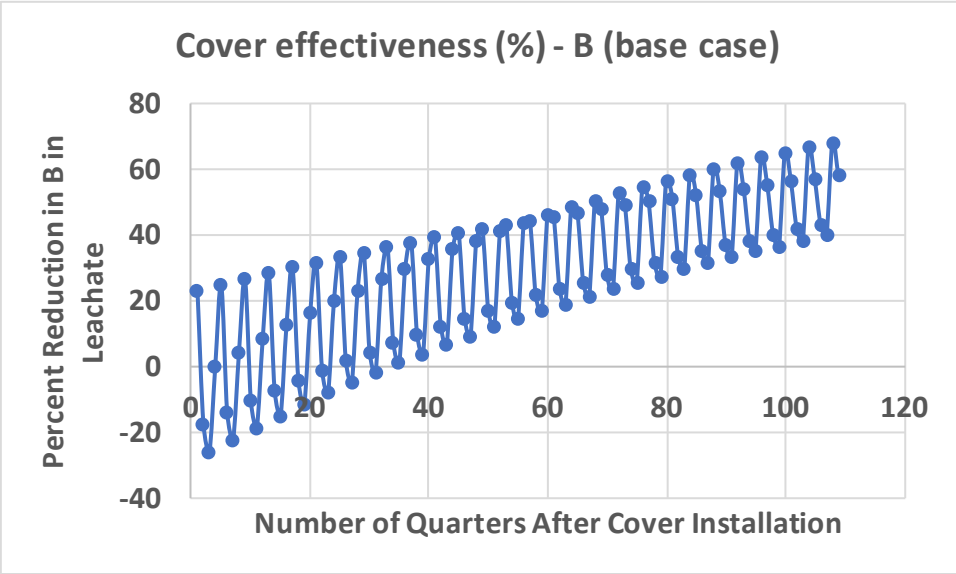


Figure 7-14: Effectiveness of Engineered Cover for Base Case B

The percent reduction in the eight PCoC for the 95th percentile (worst case) of As, B, Na, Ni, Se, Sb, V, and Zn caused by the installation of the engineered cover is presented as Table 7-2.

Table 7-2: Percent Reduction in PCoC Toe of Dump Leachate Concentrations Effected by the Engineered Cover for the worst case, 27 years after the cover is installed

PCoC	As	B	Na	Ni	Se	Sb	V	Zn
Year 27	70.89	67.9	68.95	71.00	72.36	70.64	67.2	75.82

The summary statistics for the WRD mass balance/PHREEQC models described herein are summarized as Table 7-3 for the period from cover installation to the end of the modelled period.

Table 7-3: Summary statistics for the mass balance/PHREEQC models toe of dump maximum and minimum concentrations for the period of cover installation compared to Turkish, EU and Canadian water quality standards

LOADING RATE	COVER?	Statistic	pH	F	As	B	Na	Ni	Se	Sb	V	Zn
		TURKISH	6.5 to 9	1.5	0.01	1	200	0.02	0.01	0.005		
		EU	6.5 to 9.5	1.5	0.01	1	200	0.02	0.01	0.005		
		CANADA	6.5 to 9					0.15			0.006	0.03
Base case	No	MAXIMUM	8.81	1.19	0.024	3.51	161	0.012	0.011	0.0016	0.042	0.098
(median)		Minimum	6.19	1.74E-01	0.0032	0.49	23	0.0015	0.0012	0.00021	6.1E-03	1.1E-02
Base case	Yes	MAXIMUM	8.93	0.47	0.012	1.85	88	0.0054	0.0051	0.00078	0.024	0.038
(median)		Minimum	5.72	3.80E-02	0.00070	0.11	5.03	0.00033	0.00026	4.583E-05	1.3E-03	2.5E-03
Worst case	No	MAXIMUM	9.65	1.27	0.17	16.15	875	0.076	0.078	0.017	0.23	0.12
(95th percentile)		Minimum	8.47	2.31E-01	0.015	1.60	84	0.0069	0.0064	0.0015	2.3E-02	9.6E-03
Worst case	Yes	MAXIMUM	9.58	0.70	0.060	6.74	348	0.027	0.038	0.0060	0.098	0.033
(95th percentile)		Minimum	8.41	1.60E-01	0.014	1.52	80	0.0065	0.0059	0.0014	2.2E-02	8.8E-03

In every case the WRD with an engineered cover installed markedly reduces leachate concentrations of the PCoC.

8. ENVIRONMENTAL IMPACT OF WASTE ROCK DUMP LEACHATE

8.1 ENVIRONMENTAL IMPACT OF WRD LEACHATE ON SURFACE DRAINAGE

The environmental impact of the waste rock dump leachate was determined by modelling the mixing of the Gökırmak River with the leachate streams from the waste rock dump at the median (base case) and 95th percentile (worst case) loading rates using the same mass balance/PHREEQC approach as previously.

The Gökırmak River is typically frozen in the first quarter of the year and consequently no settled leachate was modelled as discharged from the settling ponds during this period; leachate was modelled as accumulating in the seepage pond during quarter 1 and quarter 2. Flow rates for the WRD leachate were as determined by the modelling described herein. Flow rates for the Gökırmak River were obtained from the contractor providing the hydrological baseline study (AECOM, personal communication). The engineered cover over the Corakoglu WRD is assumed complete by the close of the second quarter of year 13.

It should be noted that the median sulphate concentration of the Gökırmak River, without any discharge from the WRD exceeds the EU regulatory standard by a factor of almost two and the median V concentration in the river is very close to the EU regulatory standard.

Environmental Impact for Median (Base Case) and 95th Percentile (Worst Case) Loading Rates

Table 8-1 provides modelled maximum and minimum concentrations expected to occur in the Gökırmak River for the full period of mining operations and after mine closure, for 27 years. The modelled concentrations are compared with Turkish, EU and Canadian standards and any exceedances are highlighted in yellow.

Table 8-1: Modelled maximum and minimum concentrations in the Gökırmak River during 41 years of mining operations for base case and worst case loading rates, compared to Turkish, EU and Canadian water quality standards

	YEAR		pH	S(6)	F	N	Alkalinity	Ag	Al	As
	TURKISH	mg/L	6.5 to 9	250.00000	1.50000				0.20000	0.01000
	EU	mg/L	6.5 to 9.5	250.00000	1.50000				0.20000	0.01000
	CANADA	mg/L	6.5 to 9						0.75000	
BASE	ALL YEARS	MAX	8.00	495	0.28	0.040	227	0.00050	0.0053	0.0027
CASE	ALL YEARS	MIN	8.00	485	0.27	0.030	223	0.00049	0.0049	0.0025
WORST	ALL YEARS	MAX	8.00	495	0.29	0.041	227	0.00050	0.0060	0.0037
CASE	ALL YEARS	MIN	8.00	487	0.27	0.030	223	0.00049	0.0049	0.0025

	YEAR		B	Ba	Ca	Cd	Co	Cr	Cu	Fe
	TURKISH	mg/L	1.000			0.00500		0.050	2.0	0.20
	EU	mg/L	1.000			0.00500		0.050	2.0	0.20
	CANADA	mg/L				0.00050			0.0050	
BASE	ALL YEARS	MAX	0.55	0.033	103	0.00020	0.0010	0.00050	0.0010	0.0024
CASE	ALL YEARS	MIN	0.51	0.033	87	0.00020	0.00098	0.00049	0.00098	0.0024
WORST	ALL YEARS	MAX	0.64	0.033	142	0.00020	0.0010	0.00056	0.0010	0.0024
CASE	ALL YEARS	MIN	0.51	0.033	87	0.00020	0.00098	0.00049	0.00098	0.0024

	YEAR		Hg	K	Mg	Mn	Mo	Na	Ni	P
	TURKISH	mg/L	0.001			0.050		200	0.02	
	EU	mg/L	0.001			0.050		200	0.02	
	CANADA	mg/L					0.07300		0.15	0.03
BASE	ALL YEARS	MAX	0.0	5.2	41	0.0013	0.0014	173	0.0011	0.0050
CASE	ALL YEARS	MIN	0.0	4.6	40	0.0012	0.00098	170	0.00098	0.0049
WORST	ALL YEARS	MAX	0.0	6.0	43	0.0013	0.0018	177	0.0015	0.0050
CASE	ALL YEARS	MIN	0.0	4.6	40	0.0012	0.00098	170	0.00098	0.0049

	YEAR		Pb	Se	Sb	Si	Sn	Sr	Tl	U	V	Zn
	TURKISH	mg/L	0.010	0.010	0.0050							
	EU	mg/L	0.010	0.010	0.0050							
	CANADA	mg/L	0.007								0.0060	0.030
BASE	ALL YEARS	MAX	0.0025	0.0050	0.0050	7.0	0.0	0.0079	0.0050	0.0000023	0.0054	0.0019
CASE	ALL YEARS	MIN	0.0025	0.0049	0.0049	6.9	0.0	0.0000	0.0049	0.0	0.0049	0.00098
WORST	ALL YEARS	MAX	0.0025	0.0055	0.0050	7.2	0.0	0.038	0.0050	0.000024	0.0068	0.0018
CASE	ALL YEARS	MIN	0.0025	0.0049	0.0049	6.9	0.0	0.0000	0.0049	0.0	0.0049	0.00098

The only parameter expected to exceed Turkish, EU and Canadian water quality standards is sulphate. Sulphate is already naturally exceedant in the river, by a factor of almost two. Discharge of leachate into the river is expected to reduce sulphate concentrations in the river by approximately 9.7 mg/L for the base case and 8.5 mg/L for the worst case loading rates.

Apart from sulphate, which is naturally exceedant, and is expected to be slightly diluted by the WRD leachate discharge, no other parameters are expected to exceed the EU, Turkish or Canadian regulatory standards for the base case or worst case.

8.2 ENVIRONMENTAL IMPACT OF WRD LEACHATE ON GROUNDWATER BENEATH THE WASTE ROCK DUMP

AECOM (2017), an incomplete report on the hydrogeology of the GCP, was utilized to provide an assessment of the probable environmental impact of the WRD pore water on the local groundwater. The WRD area is underlain by sandstones, claystones and volcanics of the Cankurtan Formation and by sandstones and marls of the Atbasi Formation, which are overlain by four to ten metres of overburden. AECOM (2017) provide estimates of the hydraulic conductivities of the limestone (6.18 e^{-6} m/s), sandstone/claystone (2.64e^{-8} m/s) and of the alternating beds of schists and sediments (4.42 e^{-6} m/s) using three drilled wells (GK-9, GK-7 and GK-6). AECOM (2017) report that fracture zones exist beneath the proposed location of the WRD but provide no estimate of the hydraulic conductivity of the fracture zones in the incomplete report. To this extent, the estimate of

environmental impact of the WRD pore water is limited by the lack of such data. It is understood (AECOM, personal communication) that the groundwater is percolating in all directions from the crown of the hill on which the WRD is to be constructed. The mean hydraulic gradient to the north of the crown of the WRD is 0.1, to the south 0.3, to the east 0.2 and to the west 0.1.

The drill logs of wells GK-9, GK-7 and GK-6 indicate an overburden cover of between 4 and 10 m. The overburden is described by AECOM (2017) as of moderate infiltration, which corresponds to a hydraulic conductivity of between $2.7e^{-7}$ and $8.7\ e^{-8}$ m/s. Table 8-2 presents the calculated minimum and maximum times for pore water from the WRD to pass through the overburden and reach the water table, located at between 19 and 36 m depth.

Table 8-2: Calculated minimum and maximum time (years) for pore water within the waste rock dump to reach the water table beneath it (yellow highlighting shows rock types where ground water is endangered).

DIRECTION OF FLOW	N & W		S		E	
	MIN	MAX	MIN	MAX	MIN	MAX
	YEARS	YEARS	YEARS	YEARS	YEARS	YEARS
Overburden	46	363	5.2	40.3	7.7	60.4
Limestone	9.7	18.5	1.1	2.1	2.4	4.6
Sandstone - clay	2280	4320	254	480	570	1080
Schists & sediments	13.6	25.8	1.5	2.9	3.4	6.5
Total Overburden and rock (years to reach water table)						
Limestone	55.7	381.5	6.3	42.4	10.1	65
Sandstone - clay	2326	4683	259.2	520.3	577.7	1140.4
Schists & sediments	59.6	388.8	6.7	43.2	11.1	66.9
Clay (0.5m)	5669		630		1417	
Total Clay, overburden and rock						
Limestone	5725	6051	636	672	1427	1482
Sandstone - clay	7995	10352	889	1150	1995	2557
Schists & sediments	5729	6058	637	673	1428	1484

The mass balance/PHREEQC modelling estimates that approximately 100 years will be required to permit the pore water within the WRD to drain completely. After this time contamination of the pore water is not possible, since no pore water remains to infiltrate to the water table. Table 8-2 indicates that certain flow directions (south and east) together with all underlying rock types except

sandstone clays are liable to be contaminated within this time, exposing the pristine ground water to exceedant levels of all PCoC. Limestone and intercalated schists and sediments south and east of the crown of the waste rock dump are particularly vulnerable to percolating pore water from the WRD.

The simplest mitigation strategy to avoid groundwater contamination is to place an 0.5 m layer of the same clay used to form the engineered cover underneath the WRD. The bottom section of Table 8-2 provides estimated times (years) for the pore water to percolate to the water table with the mitigation layer of clay in place. The mitigated travel times are all much greater than 100 years (time required to drain the WRD), thus preventing groundwater contamination completely.

9. CONCLUSIONS

The following conclusions may be drawn from the modelling studies described herein:

- Ferrihydrite (FeOOH, Hfo) will probably precipitate from the WRD leachate when it emerges from the toe of the dump. Adsorption of both anions and cations to the precipitating FeOOH will provide a measure of mitigation for As, sulphate, Cd and base metals provided the precipitate is allowed to settle;
- Loading rates for Mixed Schist and Greenschist were compared for static and kinetic testing data and found to be very similar, although a higher proportion of some parameters (e.g. sulphate) was found to dissolve from the mixed schist;
- Loading rates were calculated for the median (base case) and 95th percentile (worst case) in order to provide conservative modelling scenarios. Pore water and toe of dump leachate concentrations were calculated for the Corakoglu waste rock dump for each of the two loading rate cases;
- Base case principal contaminants of concern were found to be pH, As, Mn, Mo, Sb, V and Zn.
- For the base case, mineral phases that are likely to precipitate within the core of the dump include: Ag_2Se, $Ba_3(AsO_4)_2$, $CoFe_2O_4$, Cr_2O_3, cuprousferrite, diaspore, hydroxylapatite, hausmannite, hematite, HgSe, and $SnSO_4$;
- Mineral phases that are likely to precipitate at the toe of the dump for the base case include: diaspore, FCO3apatite, and pyrolusite;
- Worst case principal contaminants of concern were found to be sulphate, pH, sulphate, F, As, B, Mn, Mo, Na, Se, Sb, Ni, V, and Zn;
- For the worst case, mineral phases that are likely to precipitate within the pore water of the dump include: $Ba_3(AsO_4)_2$, $CaMoO_4$, $CoFe_2O_4$, fluorite, gypsum, kaolinite, Cr_2O_3, cuprousferrite, diaspore, hausmannite, hydroxyapatite, hematite, HgSe, and $SnSO_4$;
- For the worst case, mineral phases that are likely to precipitate at the toe of dump leachate include: $CoFe_2O_4$, diaspore, and pryolusite;
- Adsorption to Hfo provides an order of magnitude decrease in As concentrations at the toe of the dump for both the base and worst cases;
- The initially proposed waste rock cover design (local gravel) was determined from hydrogeological modelling to be inadequate;
- A waste rock cover design consisting of a 'sandwich' of a layer of local clay (0.5 m) between a capillary break layer of gravel (0.15 m) and an upper protective layer of gravel (0.1 m), the whole covered with overburden to provide a medium for re-vegetation was found by hydrogeological studies to be satisfactory;
- The Corakoglu waste rock dump (for both loading rate cases) were remodelled utilising the proposed engineered cover design. The engineered cover was found to reduce PCoC leaching by between 66 and 75% for both the base and worst case loading rates;
- The environmental impact of the Corakoglu waste rock dump leachate on the Gökırmak River was modelled. The naturally exceedant sulphate levels in the river were reduced slightly through dilution by the waste rock leachate for both loading rate cases and no other exceedances were observed; and

- Modelling of infiltration rates of the waste rock dump pore water into the underlying overburden and rock lithologies showed that all lithologies except for sandstone/claystone are susceptible to contamination by the pore water PCoC. A 0.5m layer of clay (K = 2.79 E^{-10}) placed at the base of the waste rock dump will mitigate the contamination until the waste rock dump pore water drains into the seepage collection pond.

10. REFERENCES

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APPENDIX A

(TYPICAL MASS BALANCE/PHREEQC MODELLING OUTPUT – Year 10, Quarter 1)

```
   Input file: C:\Users\David\Documents\JEO-
BAND\ASYA\MODEL\GCPWRD_MEDHfo_MIX_COVER_STEP_41
  Output file: C:\Users\David\Documents\JEO-
BAND\ASYA\MODEL\GCPWRD_MEDHfo_MIX_COVER_STEP_41.o
Database file: C:\Users\David\Documents\Geochemistry\PHREEQC\database\minteq.v4.dat

------------------
Reading data base.
------------------

       SOLUTION_MASTER_SPECIES
       SOLUTION_SPECIES
       SOLUTION_SPECIES
       PHASES
       PHASES
       SURFACE_MASTER_SPECIES
       SURFACE_SPECIES
       END
-------------------------------------
Reading input data for simulation 1.
-------------------------------------

       SELECTED_OUTPUT
       file     C:\Users\David\Documents\JEO-
BAND\ASYA\MODEL\GCPWRD_MEDHfo_MIX_COVER_STEP_41.xls
       solution True
       ph  True
       pe  True
       temperature   True
       alkalinity    True
       charge_balance     True
       totals   S(6) Cl   F    N    Alkalinity     Ag   Al   As   B    Ba   Ca   Cd
Co   Cr   Cu   Fe   Hg   K    Mg   Mn   Mo   Na   Ni   P    Pb   Se   Sb   Si   Sn
Sr   Tl   U    V    Zn
       KNOBS     500
       SURFACE_MASTER_SPECIES
       SURFACE_SPECIES
       Hfo_sOH   =    Hfo_sOH
       log_K  0
       Hfo_sOH   +    H+   =    Hfo_sOH2+
       log_k        7.29
       Hfo_sOH   =    Hfo_sO-   +    H+
       log_k =      -8.82
       Hfo_sOH   +    Cd+2 =    Hfo_sOCd+ +    H+
       log_k  0.43
       Hfo_sOH   +    Cu+2 =    Hfo_sOCu+ +    H+
       log_k  2.85
       Hfo_sOH   +    Pb+2 =    Hfo_sOPb+ +    H+
       log_k  4.71
       Hfo_sOH   +    Zn+2 =    Hfo_sOZn+ +    H+
       log_k  0.97
       Hfo_wOH   =    Hfo_wOH
       log_K        0
       Hfo_wOH   +    Cd+2 =    Hfo_wOCd+ +    H+
       log_k  -2.9
       Hfo_wOH   +    Cu+2 =    Hfo_wOCu+ +    H+
       log_k  0.6
       Hfo_wOH   +    Pb+2 =    Hfo_wOPb+ +    H+
       log_k  0.3
       Hfo_wOH   +    Zn+2 =    Hfo_wOZn+ +    H+
       log_k  -1.99
       Hfo_wOH   +    CO3-2     +    H+   =    Hfo_wO    CO2- +    H2O
       log_k  12.78
```

```
      Hfo_wOH   +    CO3-2     +    2H+  =    Hfo_wO    CO2H +    H2O
      log_k  20.37
      Hfo_wOH   +    Fe+2 =    Hfo_wOFe+      +   H+
      log_k  -2.98
      Hfo_wOH   +    Fe+2 +    H2O  =    Hfo_wOFeOH     +    2H+
      log_k  -11.55
      Hfo_sOH   +    Fe+2 =    Hfo_sOFe+ +    H+
      log_k  -0.95
      SOLUTION  1    Leachate
      pH   9
      S(6) 192.09315494269
      Cl   30.8160868578654    charge
      F    2.52352698103362
      N    0.288731702883963
      Ag   2.88731702883963E-04
      Al   5.2341452686061
      As   0.319401265711629
      B    0.463038159639264
      Ba   3.44522881120969E-02
      Ca   689.161658636857
      Cd   6.03726859994848E-04
      Co   2.40259542855423E-02
      Cr   4.07987490831658E-03
      Cu   7.89736299684492E-02
      Fe   0.783656934086501
      Hg   1.77664801061763E-04
      K    144.624141054973
      Mg   32.7901322366341
      Mn   0.713785990095563
      Mo   0.267454427594804
      Na   101.705736112118
      Ni   4.13139800986429E-02
      P    0.408006093794634
      Pb   2.04840180231207E-03
      Se   1.60374647103307E-02
      Sb   1.19717600582167E-02
      Si   26.5607839276333
      Sn   2.0406815726773E-03
      Sr   0.405417509867016
      Tl   3.97201072771673E-04
      U    1.62683699857252E-03
      V    5.04312433286651E-02
      Zn   0.147525948011214
      pe   0
      UNITS     mg/l
      END
-------------------------------------------
Beginning of initial solution calculations.
-------------------------------------------

Initial solution 1. Leachate

-----------------------------Solution composition------------------------------

      Elements           Molality       Moles

      Ag               2.680e-009  2.680e-009
      Al               1.942e-004  1.942e-004
      As               4.268e-006  4.268e-006
      B                4.289e-005  4.289e-005
      Ba               2.512e-007  2.512e-007
      Ca               1.722e-002  1.722e-002
      Cd               5.377e-009  5.377e-009
```

```
      Cl                4.083e-002  4.083e-002  Charge balance
      Co                4.082e-007  4.082e-007
      Cr                7.856e-008  7.856e-008
      Cu                1.244e-006  1.244e-006
      F                 1.330e-004  1.330e-004
      Fe                1.405e-005  1.405e-005
      Hg                8.868e-010  8.868e-010
      K                 3.704e-003  3.704e-003
      Mg                1.351e-003  1.351e-003
      Mn                1.301e-005  1.301e-005
      Mo                2.791e-006  2.791e-006
      N                 2.064e-005  2.064e-005
      Na                4.429e-003  4.429e-003
      Ni                7.048e-007  7.048e-007
      P                 1.319e-005  1.319e-005
      Pb                9.898e-009  9.898e-009
      S(6)              2.002e-003  2.002e-003
      Sb                9.845e-008  9.845e-008
      Se                2.034e-007  2.034e-007
      Si                4.426e-004  4.426e-004
      Sn                1.721e-008  1.721e-008
      Sr                4.633e-006  4.633e-006
      Tl                1.946e-009  1.946e-009
      U                 6.843e-009  6.843e-009
      V                 9.912e-007  9.912e-007
      Zn                2.259e-006  2.259e-006

----------------------------Description of solution----------------------------

                                     pH  =   9.000
                                     pe  =   0.000
                        Activity of water  =   0.999
                           Ionic strength  =  6.245e-002
                       Mass of water (kg)  =  1.000e+000
                 Total alkalinity (eq/kg)  =  9.395e-004
                    Total carbon (mol/kg)  =  0.000e+000
                     Total CO2 (mol/kg)  =  0.000e+000
                   Temperature (deg C)  =  25.000
                 Electrical balance (eq)  = -1.289e-017
 Percent error, 100*(Cat-|An|)/(Cat+|An|)  =  -0.00
                              Iterations  =  12
                                 Total H  = 1.110164e+002
                                 Total O  = 5.551767e+001

----------------------------Distribution of species----------------------------

                                                   Log       Log         Log
   Species                  Molality    Activity  Molality  Activity     Gamma

   OH-                    1.263e-005  1.006e-005    -4.899    -4.998    -0.099
   H+                     1.237e-009  1.000e-009    -8.908    -9.000    -0.092
   H2O                    5.551e+001  9.988e-001     1.744    -0.001     0.000
Ag                2.680e-009
   Ag2Se                  1.340e-009  1.340e-009    -8.873    -8.873     0.000
   AgCl2-                 3.275e-016  2.443e-016   -15.485   -15.612    -0.127
   AgCl                   8.498e-017  8.498e-017   -16.071   -16.071     0.000
   AgCl3-2                2.321e-017  7.188e-018   -16.634   -17.143    -0.509
   AgCl4-3                6.772e-018  4.845e-019   -17.169   -18.315    -1.145
   Ag+                    1.559e-018  1.261e-018   -17.807   -17.899    -0.092
   AgNH3+                 2.174e-020  1.621e-020   -19.663   -19.790    -0.127
   AgSO4-                 1.648e-020  1.229e-020   -19.783   -19.910    -0.127
   AgOH                   1.268e-021  1.268e-021   -20.897   -20.897     0.000
   Ag(NH3)2+              1.113e-021  8.300e-022   -20.954   -21.081    -0.127
```

AgF		2.987e-022	2.987e-022	-21.525	-21.525	0.000
AgH2BO3		2.437e-022	2.437e-022	-21.613	-21.613	0.000
AgSeO3-		6.154e-023	4.591e-023	-22.211	-22.338	-0.127
Ag(OH)2-		1.671e-024	1.246e-024	-23.777	-23.904	-0.127
Ag(SeO3)2-3		3.255e-028	2.329e-029	-27.487	-28.633	-1.145
AgNO2		9.034e-040	9.034e-040	-39.044	-39.044	0.000
Ag2MoO4		0.000e+000	0.000e+000	-42.144	-42.144	0.000
AgOH(Se)2-4		0.000e+000	0.000e+000	-43.343	-45.379	-2.036
AgNO3		0.000e+000	0.000e+000	-52.035	-52.035	0.000
Ag(NO2)2-		0.000e+000	0.000e+000	-62.192	-62.319	-0.127
Al	1.942e-004					
Al(OH)4-		1.941e-004	1.567e-004	-3.712	-3.805	-0.093
Al(OH)3		1.238e-007	1.238e-007	-6.907	-6.907	0.000
Al(OH)2+		7.556e-010	6.167e-010	-9.122	-9.210	-0.088
AlF2+		3.330e-013	2.718e-013	-12.478	-12.566	-0.088
AlF3		3.227e-013	3.227e-013	-12.491	-12.491	0.000
AlOH+2		1.739e-013	7.720e-014	-12.760	-13.112	-0.353
AlF4-		1.889e-014	1.525e-014	-13.724	-13.817	-0.093
AlF+2		1.631e-014	7.239e-015	-13.788	-14.140	-0.353
Al+3		5.196e-017	7.676e-018	-16.284	-17.115	-0.831
AlSO4+		3.607e-017	2.912e-017	-16.443	-16.536	-0.093
Al(SO4)2-		1.888e-019	1.525e-019	-18.724	-18.817	-0.093
AlMo6O21-3		0.000e+000	0.000e+000	-50.516	-51.661	-1.145
As(3)	2.753e-014					
H3AsO3		1.630e-014	1.630e-014	-13.788	-13.788	0.000
H2AsO3-		1.121e-014	8.359e-015	-13.951	-14.078	-0.127
HAsO3-2		2.462e-017	7.624e-018	-16.609	-17.118	-0.509
AsO3-3		4.108e-021	2.939e-022	-20.386	-21.532	-1.145
H4AsO3+		1.083e-023	8.075e-024	-22.966	-23.093	-0.127
As(5)	4.268e-006					
HAsO4-2		4.195e-006	1.299e-006	-5.377	-5.886	-0.509
AsO4-3		5.743e-008	4.108e-009	-7.241	-8.386	-1.145
H2AsO4-		1.588e-008	1.185e-008	-7.799	-7.926	-0.127
H3AsO4		2.030e-015	2.059e-015	-14.693	-14.686	0.006
B	4.289e-005					
H3BO3		2.069e-005	2.099e-005	-4.684	-4.678	0.006
H2BO3-		1.555e-005	1.219e-005	-4.808	-4.914	-0.106
CaH2BO3+		6.274e-006	4.919e-006	-5.202	-5.308	-0.106
MgH2BO3+		2.976e-007	2.333e-007	-6.526	-6.632	-0.106
NaH2BO3		6.902e-008	6.902e-008	-7.161	-7.161	0.000
SrH2BO3+		1.048e-009	8.219e-010	-8.980	-9.085	-0.106
BF(OH)3-		1.008e-009	7.901e-010	-8.997	-9.102	-0.106
H5(BO3)2-		2.779e-010	2.179e-010	-9.556	-9.662	-0.106
BaH2BO3+		5.158e-011	4.044e-011	-10.288	-10.393	-0.106
H8(BO3)3-		5.833e-013	4.574e-013	-12.234	-12.340	-0.106
BF2(OH)2-		1.017e-014	7.975e-015	-13.993	-14.098	-0.106
BF3OH-		3.736e-022	2.930e-022	-21.428	-21.533	-0.106
AgH2BO3		2.437e-022	2.437e-022	-21.613	-21.613	0.000
BF4-		1.736e-028	1.361e-028	-27.760	-27.866	-0.106
Ba	2.512e-007					
Ba+2		2.511e-007	1.073e-007	-6.600	-6.969	-0.369
BaH2BO3+		5.158e-011	4.044e-011	-10.288	-10.393	-0.106
BaOH+		5.801e-012	4.712e-012	-11.237	-11.327	-0.090
BaNH3+2		1.377e-012	4.265e-013	-11.861	-12.370	-0.509
BaNO3+		0.000e+000	0.000e+000	-40.177	-40.305	-0.127
Ca	1.722e-002					
Ca+2		1.640e-002	7.011e-003	-1.785	-2.154	-0.369
CaSO4		7.849e-004	7.849e-004	-3.105	-3.105	0.000
CaF+		8.884e-006	7.217e-006	-5.051	-5.142	-0.090
CaPO4-		8.385e-006	6.844e-006	-5.076	-5.165	-0.088
CaH2BO3+		6.274e-006	4.919e-006	-5.202	-5.308	-0.106
CaHPO4		2.572e-006	2.572e-006	-5.590	-5.590	0.000
CaOH+		1.712e-006	1.407e-006	-5.766	-5.852	-0.085

	CaNH3+2	1.795e-007	5.559e-008	-6.746	-7.255	-0.509
	CaH2PO4+	2.435e-009	1.988e-009	-8.613	-8.702	-0.088
	Ca(NH3)2+2	4.501e-013	1.394e-013	-12.347	-12.856	-0.509
	CaNO3+	2.740e-036	2.044e-036	-35.562	-35.690	-0.127
Cd	5.377e-009					
	CdCl+	2.660e-009	1.984e-009	-8.575	-8.702	-0.127
	Cd+2	1.473e-009	6.294e-010	-8.832	-9.201	-0.369
	CdOHCl	8.186e-010	8.186e-010	-9.087	-9.087	0.000
	CdCl2	2.731e-010	2.731e-010	-9.564	-9.564	0.000
	CdSO4	7.210e-011	7.210e-011	-10.142	-10.142	0.000
	CdOH+	6.741e-011	5.028e-011	-10.171	-10.299	-0.127
	CdCl3-	7.624e-012	5.687e-012	-11.118	-11.245	-0.127
	Cd(OH)2	3.191e-012	3.191e-012	-11.496	-11.496	0.000
	Cd(SO4)2-2	1.535e-012	4.753e-013	-11.814	-12.323	-0.509
	CdF+	1.261e-012	9.408e-013	-11.899	-12.026	-0.127
	Cd(OH)3-	2.628e-015	1.961e-015	-14.580	-14.708	-0.127
	CdF2	1.770e-016	1.770e-016	-15.752	-15.752	0.000
	Cd(SeO3)2-2	5.376e-018	1.665e-018	-17.270	-17.779	-0.509
	Cd2OH+3	2.217e-018	1.586e-019	-17.654	-18.800	-1.145
	Cd(OH)4-2	1.042e-020	3.228e-021	-19.982	-20.491	-0.509
	CdSeO4	8.197e-025	8.197e-025	-24.086	-24.086	0.000
	CdNO3+	0.000e+000	0.000e+000	-42.609	-42.736	-0.127
	Cd(NO3)2	0.000e+000	0.000e+000	-77.072	-77.072	0.000
Cl	4.083e-002					
	Cl-	4.083e-002	3.301e-002	-1.389	-1.481	-0.092
	CuCl2-	1.098e-006	8.803e-007	-5.960	-6.055	-0.096
	ZnOHCl	3.675e-007	3.675e-007	-6.435	-6.435	0.000
	MnCl+	1.954e-007	1.588e-007	-6.709	-6.799	-0.090
	CuCl	1.276e-007	1.276e-007	-6.894	-6.894	0.000
	ZnCl+	3.481e-008	2.791e-008	-7.458	-7.554	-0.096
	NiCl+	2.813e-008	2.098e-008	-7.551	-7.678	-0.127
	CoCl+	1.595e-008	1.190e-008	-7.797	-7.924	-0.127
	CuCl3-2	1.427e-008	6.213e-009	-7.846	-8.207	-0.361
	MnCl2	7.403e-009	7.403e-009	-8.131	-8.131	0.000
	CdCl+	2.660e-009	1.984e-009	-8.575	-8.702	-0.127
	ZnCl2	1.460e-009	1.460e-009	-8.836	-8.836	0.000
	CdOHCl	8.186e-010	8.186e-010	-9.087	-9.087	0.000
	PbCl+	3.353e-010	2.502e-010	-9.475	-9.602	-0.127
	CdCl2	2.731e-010	2.731e-010	-9.564	-9.564	0.000
	TlCl	1.418e-010	1.418e-010	-9.848	-9.848	0.000
	MnCl3-	8.286e-011	6.731e-011	-10.082	-10.172	-0.090
	ZnCl3-	4.775e-011	3.829e-011	-10.321	-10.417	-0.096
	PbCl2	3.689e-011	3.689e-011	-10.433	-10.433	0.000
	CdCl3-	7.624e-012	5.687e-012	-11.118	-11.245	-0.127
	TlCl2-	3.695e-012	2.757e-012	-11.432	-11.560	-0.127
	NiCl2	3.488e-012	3.488e-012	-11.457	-11.457	0.000
	ZnCl4-2	1.451e-012	6.321e-013	-11.838	-12.199	-0.361
	PbCl3-	6.498e-013	4.847e-013	-12.187	-12.314	-0.127
	CuCl+	4.091e-013	3.281e-013	-12.388	-12.484	-0.096
	PbCl4-2	2.362e-014	7.314e-015	-13.627	-14.136	-0.509
	CuCl2	3.755e-015	3.755e-015	-14.425	-14.425	0.000
	AgCl2-	3.275e-016	2.443e-016	-15.485	-15.612	-0.127
	UO2Cl+	1.299e-016	9.687e-017	-15.887	-16.014	-0.127
	AgCl	8.498e-017	8.498e-017	-16.071	-16.071	0.000
	AgCl3-2	2.321e-017	7.188e-018	-16.634	-17.143	-0.509
	CrOHCl2	8.230e-018	8.230e-018	-17.085	-17.085	0.000
	AgCl4-3	6.772e-018	4.845e-019	-17.169	-18.315	-1.145
	CrCl+2	4.212e-018	1.304e-018	-17.376	-17.885	-0.509
	CuCl3-	1.442e-018	1.157e-018	-17.841	-17.937	-0.096
	HgClOH	5.633e-020	5.633e-020	-19.249	-19.249	0.000
	FeCl+2	4.858e-020	2.116e-020	-19.314	-19.675	-0.361
	VOCl+	1.950e-020	1.454e-020	-19.710	-19.837	-0.127
	HgCl2	1.047e-020	1.047e-020	-19.980	-19.980	0.000

CrCl2+	5.476e-021	4.085e-021	-20.262	-20.389	-0.127
HgCl3-	4.633e-021	3.456e-021	-20.334	-20.461	-0.127
FeCl2+	3.840e-021	3.120e-021	-20.416	-20.506	-0.090
HgCl4-2	1.467e-021	4.542e-022	-20.834	-21.343	-0.509
CuCl4-2	4.395e-022	1.914e-022	-21.357	-21.718	-0.361
FeCl3	1.030e-023	1.030e-023	-22.987	-22.987	0.000
HgCl+	8.483e-026	6.328e-026	-25.071	-25.199	-0.127
CrO3Cl-	3.111e-034	2.321e-034	-33.507	-33.634	-0.127
Cr(NH3)6Cl+2	2.569e-035	7.955e-036	-34.590	-35.099	-0.509
SnCl+	2.793e-036	2.083e-036	-35.554	-35.681	-0.127
TlOHCl+	7.038e-037	5.251e-037	-36.153	-36.280	-0.127
SnCl2	4.240e-037	4.240e-037	-36.373	-36.373	0.000
CoCl+2	8.999e-039	2.787e-039	-38.046	-38.555	-0.509
Co(NH3)5Cl+2	8.005e-039	2.479e-039	-38.097	-38.606	-0.509
TlCl4-	2.322e-039	1.733e-039	-38.634	-38.761	-0.127
SnCl3-	1.258e-039	9.387e-040	-38.900	-39.027	-0.127
TlCl3	8.318e-040	8.318e-040	-39.080	-39.080	0.000
UCl+3	0.000e+000	0.000e+000	-40.161	-41.307	-1.145
TlCl2+	0.000e+000	0.000e+000	-40.491	-40.619	-0.127
TlCl+2	0.000e+000	0.000e+000	-44.388	-44.897	-0.509
Co(NH3)6Cl+2	0.000e+000	0.000e+000	-50.013	-50.522	-0.509
Co(2)	4.082e-007				
Co+2	3.366e-007	1.042e-007	-6.473	-6.982	-0.509
CoOH+	2.804e-008	2.091e-008	-7.552	-7.680	-0.127
Co(OH)2	1.671e-008	1.671e-008	-7.777	-7.777	0.000
CoCl+	1.595e-008	1.190e-008	-7.797	-7.924	-0.127
CoSO4	1.016e-008	1.016e-008	-7.993	-7.993	0.000
CoF+	4.167e-010	3.108e-010	-9.380	-9.507	-0.127
Co(NH3)+2	2.548e-010	7.892e-011	-9.594	-10.103	-0.509
CoHPO4	9.126e-011	9.126e-011	-10.040	-10.040	0.000
Co(OH)3-	4.495e-012	3.353e-012	-11.347	-11.475	-0.127
CoOOH-	1.129e-012	8.422e-013	-11.947	-12.075	-0.127
Co(NH3)2+2	6.847e-014	2.120e-014	-13.165	-13.674	-0.509
Co2OH+3	1.527e-015	1.092e-016	-14.816	-15.962	-1.145
Co(OH)4-2	1.726e-017	5.344e-018	-16.763	-17.272	-0.509
Co(NH3)3+2	5.429e-018	1.681e-018	-17.265	-17.774	-0.509
Co4(OH)4+4	4.151e-021	3.818e-023	-20.382	-22.418	-2.036
CoSeO4	3.653e-022	3.653e-022	-21.437	-21.437	0.000
Co(NH3)4+2	1.794e-022	5.557e-023	-21.746	-22.255	-0.509
Co(NH3)5+2	1.876e-027	5.808e-028	-26.727	-27.236	-0.509
CoNO2+	3.376e-030	2.519e-030	-29.472	-29.599	-0.127
CoNO3+	0.000e+000	0.000e+000	-40.690	-40.817	-0.127
Co(NO3)2	0.000e+000	0.000e+000	-74.544	-74.544	0.000
Co(3)	6.848e-032				
CoOH+2	6.848e-032	2.121e-032	-31.164	-31.674	-0.509
CoCl+2	8.999e-039	2.787e-039	-38.046	-38.555	-0.509
Co(NH3)5Cl+2	8.005e-039	2.479e-039	-38.097	-38.606	-0.509
Co+3	2.809e-039	4.149e-040	-38.551	-39.382	-0.831
Co(NH3)6SO4+	0.000e+000	0.000e+000	-47.299	-47.426	-0.127
Co(NH3)6OH+2	0.000e+000	0.000e+000	-49.329	-49.838	-0.509
Co(NH3)6Cl+2	0.000e+000	0.000e+000	-50.013	-50.522	-0.509
Cr(2)	2.355e-023				
Cr+2	2.355e-023	7.293e-024	-22.628	-23.137	-0.509
Cr(3)	7.856e-008				
Cr(OH)3	3.106e-008	3.106e-008	-7.508	-7.508	0.000
CrO2-	1.979e-008	1.477e-008	-7.703	-7.831	-0.127
Cr(OH)4-	1.667e-008	1.243e-008	-7.778	-7.905	-0.127
Cr(OH)2+	1.102e-008	8.220e-009	-7.958	-8.085	-0.127
Cr(OH)+2	2.169e-011	6.717e-012	-10.664	-11.173	-0.509
CrOHSO4	7.789e-013	7.789e-013	-12.109	-12.109	0.000
CrF+2	1.474e-015	4.563e-016	-14.832	-15.341	-0.509
Cr+3	4.267e-016	3.053e-017	-15.370	-16.515	-1.145
CrSO4+	4.670e-017	3.483e-017	-16.331	-16.458	-0.127

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   CrOHCl2                8.230e-018  8.230e-018   -17.085   -17.085     0.000
   CrCl+2                 4.212e-018  1.304e-018   -17.376   -17.885    -0.509
   CrCl2+                 5.476e-021  4.085e-021   -20.262   -20.389    -0.127
   Cr2(OH)2SO4+2          1.527e-021  4.729e-022   -20.816   -21.325    -0.509
   CrH2PO4+2              7.266e-022  2.250e-022   -21.139   -21.648    -0.509
   Cr2(OH)2(SO4)2         1.373e-023  1.373e-023   -22.862   -22.862     0.000
   Cr(NH3)5OH+2           2.316e-027  7.171e-028   -26.635   -27.144    -0.509
   Cr(NH3)6+3             2.663e-034  1.905e-035   -33.575   -34.720    -1.145
   Cr(NH3)6Cl+2           2.569e-035  7.955e-036   -34.590   -35.099    -0.509
   CrNO3+2                0.000e+000  0.000e+000   -51.401   -51.910    -0.509
Cr(6)            8.220e-022
   CrO4-2                 8.072e-022  3.450e-022   -21.093   -21.462    -0.369
   NaCrO4-                8.209e-024  6.124e-024   -23.086   -23.213    -0.127
   KCrO4-                 5.128e-024  3.825e-024   -23.290   -23.417    -0.127
   HCrO4-                 1.497e-024  1.116e-024   -23.825   -23.952    -0.127
   CrO3HPO4-2             1.810e-031  5.604e-032   -30.742   -31.252    -0.509
   H2CrO4                 9.050e-034  9.050e-034   -33.043   -33.043     0.000
   CrO3SO4-2              5.372e-034  1.664e-034   -33.270   -33.779    -0.509
   CrO3Cl-                3.111e-034  2.321e-034   -33.507   -33.634    -0.127
   CrO3H2PO4-             3.619e-038  2.699e-038   -37.441   -37.569    -0.127
   Cr2O7-2                0.000e+000  0.000e+000   -45.855   -46.364    -0.509
Cu(1)            1.244e-006
   CuCl2-                 1.098e-006  8.803e-007    -5.960    -6.055    -0.096
   CuCl                   1.276e-007  1.276e-007    -6.894    -6.894     0.000
   CuCl3-2                1.427e-008  6.213e-009    -7.846    -8.207    -0.361
   Cu+                    4.117e-009  3.071e-009    -8.385    -8.513    -0.127
Cu(2)            6.771e-010
   Cu(OH)2                4.002e-010  4.002e-010    -9.398    -9.398     0.000
   CuOH+                  2.487e-010  1.994e-010    -9.604    -9.700    -0.096
   Cu+2                   1.467e-011  6.271e-012   -10.834   -11.203    -0.369
   Cu(OH)3-               1.107e-011  8.256e-012   -10.956   -11.083    -0.127
   CuNH3+2                1.305e-012  4.041e-013   -11.884   -12.393    -0.509
   CuSO4                  7.020e-013  7.020e-013   -12.154   -12.154     0.000
   CuCl+                  4.091e-013  3.281e-013   -12.388   -12.484    -0.096
   CuF+                   5.002e-014  3.731e-014   -13.301   -13.428    -0.127
   CuCl2                  3.755e-015  3.755e-015   -14.425   -14.425     0.000
   Cu2(OH)2+2             3.226e-015  9.991e-016   -14.491   -15.000    -0.509
   Cu(OH)4-2              2.110e-015  6.535e-016   -14.676   -15.185    -0.509
   CuCl3-                 1.442e-018  1.157e-018   -17.841   -17.937    -0.096
   CuCl4-2                4.395e-022  1.914e-022   -21.357   -21.718    -0.361
   CuNO2+                 3.018e-033  2.252e-033   -32.520   -32.647    -0.127
   CuNO3+                 0.000e+000  0.000e+000   -44.611   -44.738    -0.127
   Cu(NO2)2               0.000e+000  0.000e+000   -55.102   -55.102     0.000
   Cu(NO3)2               0.000e+000  0.000e+000   -79.673   -79.673     0.000
F                1.330e-004
   F-                     1.166e-004  9.431e-005    -3.933    -4.025    -0.092
   CaF+                   8.884e-006  7.217e-006    -5.051    -5.142    -0.090
   MgF+                   7.234e-006  5.840e-006    -5.141    -5.234    -0.093
   NaF                    2.125e-007  2.125e-007    -6.673    -6.673     0.000
   MnF+                   1.766e-008  1.434e-008    -7.753    -7.843    -0.090
   BF(OH)3-               1.008e-009  7.901e-010    -8.997    -9.102    -0.106
   ZnF+                   8.492e-010  6.335e-010    -9.071    -9.198    -0.127
   SrF+                   8.483e-010  6.328e-010    -9.071    -9.199    -0.127
   NiF+                   7.890e-010  5.886e-010    -9.103    -9.230    -0.127
   CoF+                   4.167e-010  3.108e-010    -9.380    -9.507    -0.127
   HF                     1.395e-010  1.395e-010    -9.855    -9.855     0.000
   PbF+                   1.903e-012  1.419e-012   -11.721   -11.848    -0.127
   CdF+                   1.261e-012  9.408e-013   -11.899   -12.026    -0.127
   AlF2+                  3.330e-013  2.718e-013   -12.478   -12.566    -0.088
   AlF3                   3.227e-013  3.227e-013   -12.491   -12.491     0.000
   TlF                    1.576e-013  1.576e-013   -12.802   -12.802     0.000
   HF2-                   6.281e-014  5.002e-014   -13.202   -13.301    -0.099
   CuF+                   5.002e-014  3.731e-014   -13.301   -13.428    -0.127
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UO2F+	3.158e-014	2.356e-014	-13.501	-13.628	-0.127
AlF4-	1.889e-014	1.525e-014	-13.724	-13.817	-0.093
AlF+2	1.631e-014	7.239e-015	-13.788	-14.140	-0.353
BF2(OH)2-	1.017e-014	7.975e-015	-13.993	-14.098	-0.106
UO2F2	6.407e-015	6.407e-015	-14.193	-14.193	0.000
PbF2	2.634e-015	2.634e-015	-14.579	-14.579	0.000
CrF+2	1.474e-015	4.563e-016	-14.832	-15.341	-0.509
UO2F3-	2.035e-016	1.518e-016	-15.692	-15.819	-0.127
CdF2	1.770e-016	1.770e-016	-15.752	-15.752	0.000
FeF2+	6.818e-018	5.539e-018	-17.166	-17.257	-0.090
FeF+2	5.039e-018	2.195e-018	-17.298	-17.659	-0.361
FeF3	7.370e-019	7.370e-019	-18.133	-18.133	0.000
PbF3-	6.317e-019	4.712e-019	-18.199	-18.327	-0.127
UO2F4-2	3.672e-019	1.137e-019	-18.435	-18.944	-0.509
VO2F	3.244e-019	3.244e-019	-18.489	-18.489	0.000
VOF+	1.191e-019	8.884e-020	-18.924	-19.051	-0.127
H2F2	5.213e-020	5.213e-020	-19.283	-19.283	0.000
Sb(OH)2F	2.584e-020	2.584e-020	-19.588	-19.588	0.000
SbOF	2.544e-020	2.544e-020	-19.594	-19.594	0.000
VO2F2-	1.489e-020	1.111e-020	-19.827	-19.954	-0.127
VOF2	3.142e-021	3.142e-021	-20.503	-20.503	0.000
BF3OH-	3.736e-022	2.930e-022	-21.428	-21.533	-0.106
AgF	2.987e-022	2.987e-022	-21.525	-21.525	0.000
PbF4-2	6.869e-023	2.127e-023	-22.163	-22.672	-0.509
VO2F3-2	4.220e-023	1.307e-023	-22.375	-22.884	-0.509
VOF3-	1.409e-023	1.051e-023	-22.851	-22.978	-0.127
VOF4-2	1.292e-026	4.002e-027	-25.889	-26.398	-0.509
VO2F4-3	8.477e-027	6.064e-028	-26.072	-27.217	-1.145
BF4-	1.736e-028	1.361e-028	-27.760	-27.866	-0.106
UF3+	1.335e-032	9.959e-033	-31.874	-32.002	-0.127
UF2+2	2.152e-033	6.663e-034	-32.667	-33.176	-0.509
SiF6-2	9.327e-034	4.062e-034	-33.030	-33.391	-0.361
HgF+	4.503e-034	3.359e-034	-33.347	-33.474	-0.127
UF4	1.030e-034	1.030e-034	-33.987	-33.987	0.000
UF+3	7.845e-036	5.612e-037	-35.105	-36.251	-1.145
SnF+	5.622e-036	4.194e-036	-35.250	-35.377	-0.127
UF5-	5.160e-037	3.849e-037	-36.287	-36.415	-0.127
SnF2	2.519e-037	2.519e-037	-36.599	-36.599	0.000
UF6-2	3.540e-038	1.096e-038	-37.451	-37.960	-0.509
SnF3-	2.104e-038	1.569e-038	-37.677	-37.804	-0.127
SnF6-2	0.000e+000	0.000e+000	-52.193	-52.702	-0.509
Fe(2)	8.820e-007				
Fe+2	7.377e-007	2.284e-007	-6.132	-6.641	-0.509
FeOH+	1.126e-007	9.147e-008	-6.948	-7.039	-0.090
FeSO4	2.740e-008	2.740e-008	-7.562	-7.562	0.000
Fe(OH)3-	2.861e-009	2.324e-009	-8.543	-8.634	-0.090
Fe(OH)2	7.307e-010	7.307e-010	-9.136	-9.136	0.000
FeHPO4	7.300e-010	7.300e-010	-9.137	-9.137	0.000
FeH2PO4+	1.776e-012	1.450e-012	-11.750	-11.839	-0.088
Fe(3)	1.317e-005				
Fe(OH)4-	6.682e-006	5.454e-006	-5.175	-5.263	-0.088
Fe(OH)3	5.824e-006	5.824e-006	-5.235	-5.235	0.000
Fe(OH)2+	6.606e-007	5.392e-007	-6.180	-6.268	-0.088
FeOH+2	3.164e-013	1.378e-013	-12.500	-12.861	-0.361
FeHPO4+	1.724e-016	1.407e-016	-15.763	-15.852	-0.088
FeF2+	6.818e-018	5.539e-018	-17.166	-17.257	-0.090
FeF+2	5.039e-018	2.195e-018	-17.298	-17.659	-0.361
FeF3	7.370e-019	7.370e-019	-18.133	-18.133	0.000
Fe+3	1.437e-019	2.122e-020	-18.843	-19.673	-0.831
FeSO4+	1.432e-019	1.164e-019	-18.844	-18.934	-0.090
FeCl+2	4.858e-020	2.116e-020	-19.314	-19.675	-0.361
FeCl2+	3.840e-021	3.120e-021	-20.416	-20.506	-0.090
Fe(SO4)2-	1.630e-021	1.216e-021	-20.788	-20.915	-0.127

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   Fe2(OH)2+4            6.838e-023  6.289e-025   -22.165   -24.201    -2.036
   FeH2PO4+2             1.150e-023  5.103e-024   -22.939   -23.292    -0.353
   FeCl3                 1.030e-023  1.030e-023   -22.987   -22.987     0.000
   FeHSeO3+2             2.577e-024  7.980e-025   -23.589   -24.098    -0.509
   Fe3(OH)4+5            7.450e-027  4.901e-030   -26.128   -29.310    -3.182
   FeNO3+2               0.000e+000  0.000e+000   -52.199   -52.709    -0.509
H(0)            1.396e-021
   H2                    6.978e-022  7.079e-022   -21.156   -21.150     0.006
Hg(0)           8.868e-010
   Hg                    8.868e-010  8.868e-010    -9.052    -9.052     0.000
Hg(1)           3.736e-031
   Hg2+2                 1.868e-031  5.784e-032   -30.729   -31.238    -0.509
Hg(2)           1.334e-019
   Hg(OH)2               6.044e-020  6.132e-020   -19.219   -19.212     0.006
   HgClOH                5.633e-020  5.633e-020   -19.249   -19.249     0.000
   HgCl2                 1.047e-020  1.047e-020   -19.980   -19.980     0.000
   HgCl3-                4.633e-021  3.456e-021   -20.334   -20.461    -0.127
   HgCl4-2               1.467e-021  4.542e-022   -20.834   -21.343    -0.509
   Hg(NH3)2+2            7.765e-024  2.405e-024   -23.110   -23.619    -0.509
   Hg(OH)3-              1.041e-025  7.764e-026   -24.983   -25.110    -0.127
   HgCl+                 8.483e-026  6.328e-026   -25.071   -25.199    -0.127
   HgOH+                 5.157e-026  3.847e-026   -25.288   -25.415    -0.127
   HgNH3+2               1.233e-027  3.818e-028   -26.909   -27.418    -0.509
   Hg(NH3)3+2            1.947e-028  6.029e-029   -27.711   -28.220    -0.509
   Hg+2                  3.103e-031  9.608e-032   -30.508   -31.017    -0.509
   HgSO4                 1.229e-032  1.229e-032   -31.910   -31.910     0.000
   Hg(NH3)4+2            9.741e-033  3.016e-033   -32.011   -32.521    -0.509
   HgF+                  4.503e-034  3.359e-034   -33.347   -33.474    -0.127
   HgNO3+                0.000e+000  0.000e+000   -65.358   -65.485    -0.127
   Hg(NO3)2              0.000e+000  0.000e+000   -99.902   -99.902     0.000
K               3.704e-003
   K+                    3.691e-003  2.984e-003    -2.433    -2.525    -0.092
   KSO4-                 1.265e-005  1.032e-005    -4.898    -4.986    -0.088
   KHPO4-                2.226e-008  1.817e-008    -7.652    -7.741    -0.088
   KCrO4-                5.128e-024  3.825e-024   -23.290   -23.417    -0.127
Mg              1.351e-003
   Mg+2                  1.291e-003  5.519e-004    -2.889    -3.258    -0.369
   MgSO4                 4.907e-005  4.907e-005    -4.309    -4.309     0.000
   MgF+                  7.234e-006  5.840e-006    -5.141    -5.234    -0.093
   MgOH+                 2.675e-006  2.210e-006    -5.573    -5.656    -0.083
   MgH2BO3+              2.976e-007  2.333e-007    -6.526    -6.632    -0.106
   MgHPO4                2.795e-007  2.795e-007    -6.554    -6.554     0.000
   MgPO4-                1.032e-008  8.421e-009    -7.986    -8.075    -0.088
   MgH2PO4+              4.127e-010  3.369e-010    -9.384    -9.473    -0.088
Mn(2)           1.301e-005
   Mn+2                  1.234e-005  3.821e-006    -4.909    -5.418    -0.509
   MnSO4                 3.320e-007  3.320e-007    -6.479    -6.479     0.000
   MnCl+                 1.954e-007  1.588e-007    -6.709    -6.799    -0.090
   MnOH+                 1.188e-007  9.652e-008    -6.925    -7.015    -0.090
   MnF+                  1.766e-008  1.434e-008    -7.753    -7.843    -0.090
   MnCl2                 7.403e-009  7.403e-009    -8.131    -8.131     0.000
   MnCl3-                8.286e-011  6.731e-011   -10.082   -10.172    -0.090
   Mn(OH)3-              7.427e-014  6.034e-014   -13.129   -13.219    -0.090
   Mn(OH)4-2             4.499e-018  1.959e-018   -17.347   -17.708    -0.361
   MnSe                  1.629e-019  1.629e-019   -18.788   -18.788     0.000
   MnSeO4                7.192e-021  7.192e-021   -20.143   -20.143     0.000
   MnNO3+                7.483e-040  5.582e-040   -39.126   -39.253    -0.127
   Mn(NO3)2              0.000e+000  0.000e+000   -72.889   -72.889     0.000
Mn(3)           1.155e-030
   Mn+3                  1.155e-030  1.707e-031   -29.937   -30.768    -0.831
Mn(6)           0.000e+000
   MnO4-2                0.000e+000  0.000e+000   -51.481   -51.842    -0.361
Mn(7)           0.000e+000
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   MnO4-                  0.000e+000  0.000e+000   -61.112   -61.214    -0.102
Mo               2.791e-006
   MoO4-2                 2.791e-006  1.193e-006    -5.554    -5.923    -0.369
   HMoO4-                 3.182e-011  2.374e-011   -10.497   -10.625    -0.127
   H2MoO4                 1.739e-016  1.739e-016   -15.760   -15.760     0.000
   Ag2MoO4                0.000e+000  0.000e+000   -42.144   -42.144     0.000
   AlMo6O21-3             0.000e+000  0.000e+000   -50.516   -51.661    -1.145
   Mo7O24-6               0.000e+000  0.000e+000   -55.890   -60.471    -4.582
   HMo7O24-5              0.000e+000  0.000e+000   -59.903   -63.085    -3.182
   H2Mo7O24-4             0.000e+000  0.000e+000   -65.266   -67.302    -2.036
   H3Mo7O24-3             0.000e+000  0.000e+000   -71.911   -73.056    -1.145
N(-3)            2.064e-005
   NH4+                   1.409e-005  1.105e-005    -4.851    -4.957    -0.106
   NH3                    6.298e-006  6.298e-006    -5.201    -5.201     0.000
   CaNH3+2                1.795e-007  5.559e-008    -6.746    -7.255    -0.509
   NH4SO4-                7.120e-008  5.784e-008    -7.148    -7.238    -0.090
   NiNH3+2                2.714e-009  8.404e-010    -8.566    -9.076    -0.509
   Co(NH3)+2              2.548e-010  7.892e-011    -9.594   -10.103    -0.509
   SrNH3+2                3.069e-011  9.505e-012   -10.513   -11.022    -0.509
   Ni(NH3)2+2             2.470e-012  7.650e-013   -11.607   -12.116    -0.509
   BaNH3+2                1.377e-012  4.265e-013   -11.861   -12.370    -0.509
   CuNH3+2                1.305e-012  4.041e-013   -11.884   -12.393    -0.509
   Ca(NH3)2+2             4.501e-013  1.394e-013   -12.347   -12.856    -0.509
   Co(NH3)2+2             6.847e-014  2.120e-014   -13.165   -13.674    -0.509
   Co(NH3)3+2             5.429e-018  1.681e-018   -17.265   -17.774    -0.509
   AgNH3+                 2.174e-020  1.621e-020   -19.663   -19.790    -0.127
   Ag(NH3)2+              1.113e-021  8.300e-022   -20.954   -21.081    -0.127
   Co(NH3)4+2             1.794e-022  5.557e-023   -21.746   -22.255    -0.509
   Hg(NH3)2+2             7.765e-024  2.405e-024   -23.110   -23.619    -0.509
   Cr(NH3)5OH+2           2.316e-027  7.171e-028   -26.635   -27.144    -0.509
   Co(NH3)5+2             1.876e-027  5.808e-028   -26.727   -27.236    -0.509
   HgNH3+2                1.233e-027  3.818e-028   -26.909   -27.418    -0.509
   Hg(NH3)3+2             1.947e-028  6.029e-029   -27.711   -28.220    -0.509
   Hg(NH3)4+2             9.741e-033  3.016e-033   -32.011   -32.521    -0.509
   Cr(NH3)6+3             2.663e-034  1.905e-035   -33.575   -34.720    -1.145
   Cr(NH3)6Cl+2           2.569e-035  7.955e-036   -34.590   -35.099    -0.509
   Co(NH3)5Cl+2           8.005e-039  2.479e-039   -38.097   -38.606    -0.509
   Co(NH3)6SO4+           0.000e+000  0.000e+000   -47.299   -47.426    -0.127
   Co(NH3)6OH+2           0.000e+000  0.000e+000   -49.329   -49.838    -0.509
   Co(NH3)6Cl+2           0.000e+000  0.000e+000   -50.013   -50.522    -0.509
N(3)             4.338e-024
   NO2-                   4.338e-024  3.429e-024   -23.363   -23.465    -0.102
   CoNO2+                 3.376e-030  2.519e-030   -29.472   -29.599    -0.127
   TlNO2                  3.078e-032  3.078e-032   -31.512   -31.512     0.000
   CuNO2+                 3.018e-033  2.252e-033   -32.520   -32.647    -0.127
   AgNO2                  9.034e-040  9.034e-040   -39.044   -39.044     0.000
   Cu(NO2)2               0.000e+000  0.000e+000   -55.102   -55.102     0.000
   Ag(NO2)2-              0.000e+000  0.000e+000   -62.192   -62.319    -0.127
N(5)             1.168e-034
   NO3-                   1.140e-034  9.219e-035   -33.943   -34.035    -0.092
   CaNO3+                 2.740e-036  2.044e-036   -35.562   -35.690    -0.127
   SrNO3+                 9.347e-040  6.973e-040   -39.029   -39.157    -0.127
   MnNO3+                 7.483e-040  5.582e-040   -39.126   -39.253    -0.127
   ZnNO3+                 1.045e-040  0.000e+000   -39.981   -40.108    -0.127
   NiNO3+                 0.000e+000  0.000e+000   -40.113   -40.240    -0.127
   BaNO3+                 0.000e+000  0.000e+000   -40.177   -40.305    -0.127
   CoNO3+                 0.000e+000  0.000e+000   -40.690   -40.817    -0.127
   PbNO3+                 0.000e+000  0.000e+000   -42.408   -42.536    -0.127
   TlNO3                  0.000e+000  0.000e+000   -42.582   -42.582     0.000
   CdNO3+                 0.000e+000  0.000e+000   -42.609   -42.736    -0.127
   CuNO3+                 0.000e+000  0.000e+000   -44.611   -44.738    -0.127
   UO2NO3+                0.000e+000  0.000e+000   -48.351   -48.478    -0.127
   CrNO3+2                0.000e+000  0.000e+000   -51.401   -51.910    -0.509
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   AgNO3                  0.000e+000  0.000e+000   -52.035   -52.035     0.000
   VO2NO3                 0.000e+000  0.000e+000   -52.039   -52.039     0.000
   FeNO3+2                0.000e+000  0.000e+000   -52.199   -52.709    -0.509
   HgNO3+                 0.000e+000  0.000e+000   -65.358   -65.485    -0.127
   SnNO3+                 0.000e+000  0.000e+000   -68.900   -69.027    -0.127
   Mn(NO3)2               0.000e+000  0.000e+000   -72.889   -72.889     0.000
   Co(NO3)2               0.000e+000  0.000e+000   -74.544   -74.544     0.000
   Zn(NO3)2               0.000e+000  0.000e+000   -74.843   -74.843     0.000
   Pb(NO3)2               0.000e+000  0.000e+000   -76.341   -76.341     0.000
   Cd(NO3)2               0.000e+000  0.000e+000   -77.072   -77.072     0.000
   Cu(NO3)2               0.000e+000  0.000e+000   -79.673   -79.673     0.000
   TlNO3+2                0.000e+000  0.000e+000   -80.946   -81.455    -0.509
   Hg(NO3)2               0.000e+000  0.000e+000   -99.902   -99.902     0.000
Na              4.429e-003
   Na+                    4.418e-003  3.572e-003    -2.355    -2.447    -0.092
   NaSO4-                 1.148e-005  9.374e-006    -4.940    -5.028    -0.088
   NaF                    2.125e-007  2.125e-007    -6.673    -6.673     0.000
   NaH2BO3                6.902e-008  6.902e-008    -7.161    -7.161     0.000
   NaHPO4-                4.127e-008  3.368e-008    -7.384    -7.473    -0.088
   NaCrO4-                8.209e-024  6.124e-024   -23.086   -23.213    -0.127
Ni              7.048e-007
   Ni+2                   5.813e-007  2.485e-007    -6.236    -6.605    -0.369
   NiOH+                  4.217e-008  3.146e-008    -7.375    -7.502    -0.127
   NiCl+                  2.813e-008  2.098e-008    -7.551    -7.678    -0.127
   Ni(OH)2                2.513e-008  2.513e-008    -7.600    -7.600     0.000
   NiSO4                  2.422e-008  2.422e-008    -7.616    -7.616     0.000
   NiNH3+2                2.714e-009  8.404e-010    -8.566    -9.076    -0.509
   NiF+                   7.890e-010  5.886e-010    -9.103    -9.230    -0.127
   Ni(OH)3-               3.388e-010  2.528e-010    -9.470    -9.597    -0.127
   NiCl2                  3.488e-012  3.488e-012   -11.457   -11.457     0.000
   Ni(NH3)2+2             2.470e-012  7.650e-013   -11.607   -12.116    -0.509
   Ni(SO4)2-2             1.266e-012  3.920e-013   -11.898   -12.407    -0.509
   NiSeO4                 8.128e-022  8.128e-022   -21.090   -21.090     0.000
   NiNO3+                 0.000e+000  0.000e+000   -40.113   -40.240    -0.127
O(0)            0.000e+000
   O2                     0.000e+000  0.000e+000   -50.002   -49.996     0.006
P               1.319e-005
   CaPO4-                 8.385e-006  6.844e-006    -5.076    -5.165    -0.088
   CaHPO4                 2.572e-006  2.572e-006    -5.590    -5.590     0.000
   HPO4-2                 1.843e-006  8.026e-007    -5.734    -6.095    -0.361
   MgHPO4                 2.795e-007  2.795e-007    -6.554    -6.554     0.000
   NaHPO4-                4.127e-008  3.368e-008    -7.384    -7.473    -0.088
   KHPO4-                 2.226e-008  1.817e-008    -7.652    -7.741    -0.088
   H2PO4-                 1.551e-008  1.266e-008    -7.809    -7.897    -0.088
   MgPO4-                 1.032e-008  8.421e-009    -7.986    -8.075    -0.088
   UO2(HPO4)2-2           6.511e-009  2.016e-009    -8.186    -8.695    -0.509
   CaH2PO4+               2.435e-009  1.988e-009    -8.613    -8.702    -0.088
   PO4-3                  2.291e-009  3.385e-010    -8.640    -9.470    -0.831
   FeHPO4                 7.300e-010  7.300e-010    -9.137    -9.137     0.000
   SrHPO4                 4.798e-010  4.798e-010    -9.319    -9.319     0.000
   MgH2PO4+               4.127e-010  3.369e-010    -9.384    -9.473    -0.088
   CoHPO4                 9.126e-011  9.126e-011   -10.040   -10.040     0.000
   UO2PO4-                1.460e-011  1.089e-011   -10.836   -10.963    -0.127
   FeH2PO4+               1.776e-012  1.450e-012   -11.750   -11.839    -0.088
   SrH2PO4+               2.175e-013  1.622e-013   -12.663   -12.790    -0.127
   UO2HPO4                2.767e-014  2.767e-014   -13.558   -13.558     0.000
   H3PO4                  1.780e-015  1.780e-015   -14.749   -14.749     0.000
   FeHPO4+                1.724e-016  1.407e-016   -15.763   -15.852    -0.088
   UO2H2PO4+              5.589e-020  4.169e-020   -19.253   -19.380    -0.127
   CrH2PO4+2              7.266e-022  2.250e-022   -21.139   -21.648    -0.509
   FeH2PO4+2              1.150e-023  5.103e-024   -22.939   -23.292    -0.353
   U(HPO4)4-4             1.294e-025  1.190e-027   -24.888   -26.924    -2.036
   UO2(H2PO4)2            1.039e-025  1.039e-025   -24.983   -24.983     0.000
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   U(HPO4)3-2            1.368e-029  4.237e-030   -28.864   -29.373    -0.509
   CrO3HPO4-2            1.810e-031  5.604e-032   -30.742   -31.252    -0.509
   UO2(H2PO4)3-          1.653e-031  1.233e-031   -30.782   -30.909    -0.127
   U(HPO4)2              2.326e-032  2.326e-032   -31.633   -31.633     0.000
   UHPO4+2               9.040e-036  2.799e-036   -35.044   -35.553    -0.509
   CrO3H2PO4-            3.619e-038  2.699e-038   -37.441   -37.569    -0.127
Pb              9.898e-009
   PbOH+                 7.233e-009  5.396e-009    -8.141    -8.268    -0.127
   Pb(OH)2               1.716e-009  1.716e-009    -8.765    -8.765     0.000
   Pb+2                  4.997e-010  2.136e-010    -9.301    -9.670    -0.369
   PbCl+                 3.353e-010  2.502e-010    -9.475    -9.602    -0.127
   PbSO4                 5.112e-011  5.112e-011   -10.291   -10.291     0.000
   PbCl2                 3.689e-011  3.689e-011   -10.433   -10.433     0.000
   Pb(OH)3-              2.314e-011  1.726e-011   -10.636   -10.763    -0.127
   PbF+                  1.903e-012  1.419e-012   -11.721   -11.848    -0.127
   PbCl3-                6.498e-013  4.847e-013   -12.187   -12.314    -0.127
   Pb(SO4)2-2            4.860e-013  1.505e-013   -12.313   -12.822    -0.509
   Pb(OH)4-2             1.373e-013  4.251e-014   -12.862   -13.372    -0.509
   PbCl4-2               2.362e-014  7.314e-015   -13.627   -14.136    -0.509
   PbF2                  2.634e-015  2.634e-015   -14.579   -14.579     0.000
   Pb2OH+3               2.553e-016  1.826e-017   -15.593   -16.738    -1.145
   Pb3(OH)4+2            4.052e-017  1.255e-017   -16.392   -16.901    -0.509
   PbF3-                 6.317e-019  4.712e-019   -18.199   -18.327    -0.127
   Pb4(OH)4+4            2.315e-021  2.129e-023   -20.635   -22.672    -2.036
   PbF4-2                6.869e-023  2.127e-023   -22.163   -22.672    -0.509
   PbNO3+                0.000e+000  0.000e+000   -42.408   -42.536    -0.127
   Pb(NO3)2              0.000e+000  0.000e+000   -76.341   -76.341     0.000
S(6)            2.002e-003
   SO4-2                 1.143e-003  4.887e-004    -2.942    -3.311    -0.369
   CaSO4                 7.849e-004  7.849e-004    -3.105    -3.105     0.000
   MgSO4                 4.907e-005  4.907e-005    -4.309    -4.309     0.000
   KSO4-                 1.265e-005  1.032e-005    -4.898    -4.986    -0.088
   NaSO4-                1.148e-005  9.374e-006    -4.940    -5.028    -0.088
   MnSO4                 3.320e-007  3.320e-007    -6.479    -6.479     0.000
   SrSO4                 1.852e-007  1.852e-007    -6.732    -6.732     0.000
   NH4SO4-               7.120e-008  5.784e-008    -7.148    -7.238    -0.090
   ZnSO4                 3.599e-008  3.599e-008    -7.444    -7.444     0.000
   FeSO4                 2.740e-008  2.740e-008    -7.562    -7.562     0.000
   NiSO4                 2.422e-008  2.422e-008    -7.616    -7.616     0.000
   CoSO4                 1.016e-008  1.016e-008    -7.993    -7.993     0.000
   Zn(SO4)2-2            4.946e-010  1.532e-010    -9.306    -9.815    -0.509
   CdSO4                 7.210e-011  7.210e-011   -10.142   -10.142     0.000
   HSO4-                 5.915e-011  4.775e-011   -10.228   -10.321    -0.093
   PbSO4                 5.112e-011  5.112e-011   -10.291   -10.291     0.000
   TlSO4-                2.039e-011  1.521e-011   -10.691   -10.818    -0.127
   Cd(SO4)2-2            1.535e-012  4.753e-013   -11.814   -12.323    -0.509
   Ni(SO4)2-2            1.266e-012  3.920e-013   -11.898   -12.407    -0.509
   CrOHSO4               7.789e-013  7.789e-013   -12.109   -12.109     0.000
   CuSO4                 7.020e-013  7.020e-013   -12.154   -12.154     0.000
   Pb(SO4)2-2            4.860e-013  1.505e-013   -12.313   -12.822    -0.509
   UO2SO4                1.338e-015  1.338e-015   -14.873   -14.873     0.000
   CrSO4+                4.670e-017  3.483e-017   -16.331   -16.458    -0.127
   AlSO4+                3.607e-017  2.912e-017   -16.443   -16.536    -0.093
   UO2(SO4)2-2           2.784e-017  8.621e-018   -16.555   -17.064    -0.509
   Al(SO4)2-             1.888e-019  1.525e-019   -18.724   -18.817    -0.093
   FeSO4+                1.432e-019  1.164e-019   -18.844   -18.934    -0.090
   VO2SO4-               3.068e-020  2.288e-020   -19.513   -19.640    -0.127
   VOSO4                 2.114e-020  2.114e-020   -19.675   -19.675     0.000
   AgSO4-                1.648e-020  1.229e-020   -19.783   -19.910    -0.127
   Fe(SO4)2-             1.630e-021  1.216e-021   -20.788   -20.915    -0.127
   Cr2(OH)2SO4+2         1.527e-021  4.729e-022   -20.816   -21.325    -0.509
   Cr2(OH)2(SO4)2        1.373e-023  1.373e-023   -22.862   -22.862     0.000
   VSO4+                 2.415e-032  1.801e-032   -31.617   -31.744    -0.127
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HgSO4		1.229e-032	1.229e-032	-31.910	-31.910	0.000
CrO3SO4-2		5.372e-034	1.664e-034	-33.270	-33.779	-0.509
U(SO4)2		2.252e-038	2.252e-038	-37.647	-37.647	0.000
USO4+2		1.873e-038	5.802e-039	-37.727	-38.236	-0.509
Co(NH3)6SO4+		0.000e+000	0.000e+000	-47.299	-47.426	-0.127
Sb(3)	3.470e-013					
Sb(OH)3		1.752e-013	1.752e-013	-12.756	-12.756	0.000
HSbO2		1.712e-013	1.712e-013	-12.766	-12.766	0.000
SbO2-		3.718e-016	2.773e-016	-15.430	-15.557	-0.127
Sb(OH)4-		2.125e-016	1.586e-016	-15.673	-15.800	-0.127
Sb(OH)2F		2.584e-020	2.584e-020	-19.588	-19.588	0.000
SbOF		2.544e-020	2.544e-020	-19.594	-19.594	0.000
Sb(OH)2+		5.710e-021	4.260e-021	-20.243	-20.371	-0.127
SbO+		1.971e-021	1.470e-021	-20.705	-20.833	-0.127
Sb(5)	9.845e-008					
SbO3-		9.835e-008	7.336e-008	-7.007	-7.135	-0.127
Sb(OH)6-		1.058e-010	8.551e-011	-9.976	-10.068	-0.092
SbO2+		2.824e-026	2.107e-026	-25.549	-25.676	-0.127
Se(-2)	1.340e-009					
Ag2Se		1.340e-009	1.340e-009	-8.873	-8.873	0.000
HSe-		1.387e-017	1.035e-017	-16.858	-16.985	-0.127
MnSe		1.629e-019	1.629e-019	-18.788	-18.788	0.000
H2Se		8.031e-023	8.031e-023	-22.095	-22.095	0.000
Se-2		3.341e-023	1.035e-023	-22.476	-22.985	-0.509
AgOH(Se)2-4		0.000e+000	0.000e+000	-43.343	-45.379	-2.036
Se(4)	2.020e-007					
SeO3-2		1.829e-007	5.665e-008	-6.738	-7.247	-0.509
HSeO3-		1.908e-008	1.423e-008	-7.720	-7.847	-0.127
H2SeO3		6.070e-015	6.070e-015	-14.217	-14.217	0.000
Cd(SeO3)2-2		5.376e-018	1.665e-018	-17.270	-17.779	-0.509
AgSeO3-		6.154e-023	4.591e-023	-22.211	-22.338	-0.127
FeHSeO3+2		2.577e-024	7.980e-025	-23.589	-24.098	-0.509
Ag(SeO3)2-3		3.255e-028	2.329e-029	-27.487	-28.633	-1.145
Se(6)	1.637e-017					
SeO4-2		1.636e-017	6.994e-018	-16.786	-17.155	-0.369
MnSeO4		7.192e-021	7.192e-021	-20.143	-20.143	0.000
NiSeO4		8.128e-022	8.128e-022	-21.090	-21.090	0.000
CoSeO4		3.653e-022	3.653e-022	-21.437	-21.437	0.000
ZnSeO4		3.647e-022	3.647e-022	-21.438	-21.438	0.000
CdSeO4		8.197e-025	8.197e-025	-24.086	-24.086	0.000
HSeO4-		4.699e-025	3.505e-025	-24.328	-24.455	-0.127
Zn(SeO4)2-2		8.350e-039	2.586e-039	-38.078	-38.587	-0.509
Si	4.426e-004					
H4SiO4		3.742e-004	3.796e-004	-3.427	-3.421	0.006
H3SiO4-		6.842e-005	5.487e-005	-4.165	-4.261	-0.096
H2SiO4-2		7.800e-009	3.462e-009	-8.108	-8.461	-0.353
UO2H3SiO4+		1.130e-011	8.428e-012	-10.947	-11.074	-0.127
SiF6-2		9.327e-034	4.062e-034	-33.030	-33.391	-0.361
Sn(2)	3.467e-025					
HSnO2-		1.810e-025	1.350e-025	-24.742	-24.870	-0.127
Sn(OH)2		1.162e-025	1.162e-025	-24.935	-24.935	0.000
Sn(OH)3-		4.952e-026	3.694e-026	-25.305	-25.432	-0.127
SnOH+		7.759e-031	5.788e-031	-30.110	-30.237	-0.127
SnF+		5.622e-036	4.194e-036	-35.250	-35.377	-0.127
Sn+2		4.668e-036	1.446e-036	-35.331	-35.840	-0.509
SnCl+		2.793e-036	2.083e-036	-35.554	-35.681	-0.127
SnCl2		4.240e-037	4.240e-037	-36.373	-36.373	0.000
SnF2		2.519e-037	2.519e-037	-36.599	-36.599	0.000
SnF3-		2.104e-038	1.569e-038	-37.677	-37.804	-0.127
SnCl3-		1.258e-039	9.387e-040	-38.900	-39.027	-0.127
Sn2(OH)2+2		0.000e+000	0.000e+000	-57.966	-58.475	-0.509
SnNO3+		0.000e+000	0.000e+000	-68.900	-69.027	-0.127
Sn3(OH)4+2		0.000e+000	0.000e+000	-77.901	-78.410	-0.509

Sn(4)	1.721e-008					
Sn(OH)6-2		1.707e-008	7.294e-009	-7.768	-8.137	-0.369
SnO3-2		1.458e-010	4.515e-011	-9.836	-10.345	-0.509
Sn+4		1.324e-039	0.000e+000	-38.878	-40.915	-2.036
SnF6-2		0.000e+000	0.000e+000	-52.193	-52.702	-0.509
Sr	4.633e-006					
Sr+2		4.445e-006	1.900e-006	-5.352	-5.721	-0.369
SrSO4		1.852e-007	1.852e-007	-6.732	-6.732	0.000
SrH2BO3+		1.048e-009	8.219e-010	-8.980	-9.085	-0.106
SrF+		8.483e-010	6.328e-010	-9.071	-9.199	-0.127
SrHPO4		4.798e-010	4.798e-010	-9.319	-9.319	0.000
SrOH+		1.554e-010	1.262e-010	-9.809	-9.899	-0.090
SrNH3+2		3.069e-011	9.505e-012	-10.513	-11.022	-0.509
SrH2PO4+		2.175e-013	1.622e-013	-12.663	-12.790	-0.127
SrNO3+		9.347e-040	6.973e-040	-39.029	-39.157	-0.127
Tl(1)	1.946e-009					
Tl+		1.780e-009	1.328e-009	-8.750	-8.877	-0.127
TlCl		1.418e-010	1.418e-010	-9.848	-9.848	0.000
TlSO4-		2.039e-011	1.521e-011	-10.691	-10.818	-0.127
TlCl2-		3.695e-012	2.757e-012	-11.432	-11.560	-0.127
TlF		1.576e-013	1.576e-013	-12.802	-12.802	0.000
TlOH		8.233e-014	8.233e-014	-13.084	-13.084	0.000
TlNO2		3.078e-032	3.078e-032	-31.512	-31.512	0.000
TlNO3		0.000e+000	0.000e+000	-42.582	-42.582	0.000
Tl(3)	3.685e-028					
Tl(OH)3		3.675e-028	3.728e-028	-27.435	-27.428	0.006
Tl(OH)4-		1.003e-030	7.482e-031	-29.999	-30.126	-0.127
Tl(OH)2+		3.947e-035	2.945e-035	-34.404	-34.531	-0.127
TlOHCl+		7.038e-037	5.251e-037	-36.153	-36.280	-0.127
TlCl4-		2.322e-039	1.733e-039	-38.634	-38.761	-0.127
TlCl3		8.318e-040	8.318e-040	-39.080	-39.080	0.000
TlCl2+		0.000e+000	0.000e+000	-40.491	-40.619	-0.127
TlOH+2		0.000e+000	0.000e+000	-42.224	-42.733	-0.509
TlCl+2		0.000e+000	0.000e+000	-44.388	-44.897	-0.509
Tl+3		0.000e+000	0.000e+000	-49.990	-51.136	-1.145
TlNO3+2		0.000e+000	0.000e+000	-80.946	-81.455	-0.509
U(3)	0.000e+000					
U+3		0.000e+000	0.000e+000	-49.176	-50.321	-1.145
U(4)	3.015e-010					
U(OH)5-		3.015e-010	2.249e-010	-9.521	-9.648	-0.127
U(OH)4		9.430e-015	9.430e-015	-14.026	-14.026	0.000
U(OH)3+		4.627e-020	3.452e-020	-19.335	-19.462	-0.127
U(HPO4)4-4		1.294e-025	1.190e-027	-24.888	-26.924	-2.036
U(OH)2+2		5.160e-026	1.598e-026	-25.287	-25.796	-0.509
U(HPO4)3-2		1.368e-029	4.237e-030	-28.864	-29.373	-0.509
U(HPO4)2		2.326e-032	2.326e-032	-31.633	-31.633	0.000
UF3+		1.335e-032	9.959e-033	-31.874	-32.002	-0.127
UOH+3		1.053e-032	7.534e-034	-31.978	-33.123	-1.145
UF2+2		2.152e-033	6.663e-034	-32.667	-33.176	-0.509
UF4		1.030e-034	1.030e-034	-33.987	-33.987	0.000
UHPO4+2		9.040e-036	2.799e-036	-35.044	-35.553	-0.509
UF+3		7.845e-036	5.612e-037	-35.105	-36.251	-1.145
UF5-		5.160e-037	3.849e-037	-36.287	-36.415	-0.127
UF6-2		3.540e-038	1.096e-038	-37.451	-37.960	-0.509
U(SO4)2		2.252e-038	2.252e-038	-37.647	-37.647	0.000
USO4+2		1.873e-038	5.802e-039	-37.727	-38.236	-0.509
U+4		3.243e-040	0.000e+000	-39.489	-41.525	-2.036
UCl+3		0.000e+000	0.000e+000	-40.161	-41.307	-1.145
U6(OH)15+9		0.000e+000	0.000e+000	-121.006	-131.315	-10.309
U(5)	1.478e-012					
UO2+		1.478e-012	1.103e-012	-11.830	-11.957	-0.127
U(6)	6.540e-009					
UO2(HPO4)2-2		6.511e-009	2.016e-009	-8.186	-8.695	-0.509

	UO2PO4-	1.460e-011	1.089e-011	-10.836	-10.963	-0.127
	UO2H3SiO4+	1.130e-011	8.428e-012	-10.947	-11.074	-0.127
	UO2OH+	3.071e-012	2.291e-012	-11.513	-11.640	-0.127
	UO2F+	3.158e-014	2.356e-014	-13.501	-13.628	-0.127
	UO2HPO4	2.767e-014	2.767e-014	-13.558	-13.558	0.000
	UO2F2	6.407e-015	6.407e-015	-14.193	-14.193	0.000
	UO2+2	4.233e-015	1.809e-015	-14.373	-14.742	-0.369
	(UO2)3(OH)5+	2.052e-015	1.531e-015	-14.688	-14.815	-0.127
	UO2SO4	1.338e-015	1.338e-015	-14.873	-14.873	0.000
	UO2F3-	2.035e-016	1.518e-016	-15.692	-15.819	-0.127
	UO2Cl+	1.299e-016	9.687e-017	-15.887	-16.014	-0.127
	(UO2)2(OH)2+2	2.813e-017	8.710e-018	-16.551	-17.060	-0.509
	UO2(SO4)2-2	2.784e-017	8.621e-018	-16.555	-17.064	-0.509
	UO2F4-2	3.672e-019	1.137e-019	-18.435	-18.944	-0.509
	UO2H2PO4+	5.589e-020	4.169e-020	-19.253	-19.380	-0.127
	UO2(H2PO4)2	1.039e-025	1.039e-025	-24.983	-24.983	0.000
	UO2(H2PO4)3-	1.653e-031	1.233e-031	-30.782	-30.909	-0.127
	UO2NO3+	0.000e+000	0.000e+000	-48.351	-48.478	-0.127
V(2)	1.681e-033					
	VOH+	1.668e-033	1.245e-033	-32.778	-32.905	-0.127
	V+2	1.235e-035	3.824e-036	-34.908	-35.417	-0.509
V(3)	6.408e-008					
	V(OH)3	6.408e-008	6.408e-008	-7.193	-7.193	0.000
	V(OH)2+	5.556e-020	4.145e-020	-19.255	-19.382	-0.127
	VOH+2	1.271e-024	3.936e-025	-23.896	-24.405	-0.509
	V+3	1.091e-030	7.808e-032	-29.962	-31.107	-1.145
	VSO4+	2.415e-032	1.801e-032	-31.617	-31.744	-0.127
	V2(OH)3+3	0.000e+000	0.000e+000	-44.190	-45.336	-1.145
	V2(OH)2+4	0.000e+000	0.000e+000	-45.974	-48.010	-2.036
V(4)	4.226e-016					
	V(OH)3+	4.220e-016	3.148e-016	-15.375	-15.502	-0.127
	VO+2	5.071e-019	1.570e-019	-18.295	-18.804	-0.509
	VOF+	1.191e-019	8.884e-020	-18.924	-19.051	-0.127
	VOSO4	2.114e-020	2.114e-020	-19.675	-19.675	0.000
	VOCl+	1.950e-020	1.454e-020	-19.710	-19.837	-0.127
	VOF2	3.142e-021	3.142e-021	-20.503	-20.503	0.000
	VOF3-	1.409e-023	1.051e-023	-22.851	-22.978	-0.127
	H2V2O4+2	1.607e-026	4.978e-027	-25.794	-26.303	-0.509
	VOF4-2	1.292e-026	4.002e-027	-25.889	-26.398	-0.509
V(5)	9.272e-007					
	HVO4-2	7.954e-007	2.463e-007	-6.099	-6.609	-0.509
	H2VO4-	1.315e-007	9.806e-008	-6.881	-7.009	-0.127
	HV2O7-3	1.145e-010	8.194e-012	-9.941	-11.086	-1.145
	V2O7-4	2.398e-011	2.205e-013	-10.620	-12.656	-2.036
	VO4-3	1.726e-011	1.235e-012	-10.763	-11.909	-1.145
	H3VO4	9.806e-013	9.806e-013	-12.009	-12.009	0.000
	H3V2O7-	8.333e-013	6.216e-013	-12.079	-12.206	-0.127
	V3O9-3	1.385e-014	9.909e-016	-13.859	-15.004	-1.145
	V4O12-4	4.410e-018	4.055e-020	-17.356	-19.392	-2.036
	VO2+	2.426e-018	1.961e-018	-17.615	-17.707	-0.092
	VO2F	3.244e-019	3.244e-019	-18.489	-18.489	0.000
	VO2SO4-	3.068e-020	2.288e-020	-19.513	-19.640	-0.127
	VO2F2-	1.489e-020	1.111e-020	-19.827	-19.954	-0.127
	VO2F3-2	4.220e-023	1.307e-023	-22.375	-22.884	-0.509
	VO2F4-3	8.477e-027	6.064e-028	-26.072	-27.217	-1.145
	VO2NO3	0.000e+000	0.000e+000	-52.039	-52.039	0.000
	V10O28-6	0.000e+000	0.000e+000	-52.591	-57.173	-4.582
	HV10O28-5	0.000e+000	0.000e+000	-54.805	-57.986	-3.182
	H2V10O28-4	0.000e+000	0.000e+000	-59.743	-61.779	-2.036
Zn	2.259e-006					
	Zn+2	7.876e-007	3.366e-007	-6.104	-6.473	-0.369
	Zn(OH)2	5.397e-007	5.397e-007	-6.268	-6.268	0.000
	ZnOH+	4.539e-007	3.386e-007	-6.343	-6.470	-0.127

ZnOHCl	3.675e-007	3.675e-007	-6.435	-6.435	0.000
Zn(OH)3-	3.647e-008	2.720e-008	-7.438	-7.565	-0.127
ZnSO4	3.599e-008	3.599e-008	-7.444	-7.444	0.000
ZnCl+	3.481e-008	2.791e-008	-7.458	-7.554	-0.096
ZnCl2	1.460e-009	1.460e-009	-8.836	-8.836	0.000
ZnF+	8.492e-010	6.335e-010	-9.071	-9.198	-0.127
Zn(SO4)2-2	4.946e-010	1.532e-010	-9.306	-9.815	-0.509
ZnCl3-	4.775e-011	3.829e-011	-10.321	-10.417	-0.096
Zn(OH)4-2	3.517e-011	1.089e-011	-10.454	-10.963	-0.509
ZnCl4-2	1.451e-012	6.321e-013	-11.838	-12.199	-0.361
ZnSeO4	3.647e-022	3.647e-022	-21.438	-21.438	0.000
Zn(SeO4)2-2	8.350e-039	2.586e-039	-38.078	-38.587	-0.509
ZnNO3+	1.045e-040	0.000e+000	-39.981	-40.108	-0.127
Zn(NO3)2	0.000e+000	0.000e+000	-74.843	-74.843	0.000

----------Saturation indices----------

Phase	SI	log IAP	log KT	
(Co(NH3)5Cl)(NO3)2	-95.01	-88.72	6.29	(Co(NH3)5Cl)(NO3)2
(Co(NH3)5Cl)Cl2	-28.12	-23.61	4.51	(Co(NH3)5Cl)Cl2
(Co(NH3)5OH2)Cl3	-35.35	-23.61	11.74	(Co(NH3)5OH2)Cl3
(Co(NH3)6)(NO3)3	-135.16	-117.23	17.93	(Co(NH3)6)(NO3)3
(Co(NH3)6)Cl3	-39.60	-19.57	20.03	(Co(NH3)6)Cl3
(NH4)2CrO4	-31.78	-31.38	0.40	(NH4)2CrO4
(NH4)2SeO4	-27.52	-27.07	0.45	(NH4)2SeO4
(UO2)3(PO4)2	-13.77	-63.17	-49.40	(UO2)3(PO4)2
(VO)3(PO4)2	-50.25	-75.35	-25.10	(VO)3(PO4)2
Ag2CrO4	-45.67	-57.26	-11.59	Ag2CrO4
Ag2HVO4	-27.99	-26.51	1.48	Ag2HVO4
Ag2MoO4	-30.17	-41.72	-11.55	Ag2MoO4
Ag2O	-30.37	-17.80	12.57	Ag2O
Ag2Se	4.92	-43.78	-48.70	Ag2Se
Ag2SeO3	-27.50	-34.65	-7.15	Ag2SeO3
Ag2SeO4	-44.04	-52.95	-8.91	Ag2SeO4
Ag2SO4	-34.29	-39.11	-4.82	Ag2SO4
Ag3AsO3	-42.64	-40.49	2.16	Ag3AsO3
Ag3AsO4	-38.60	-41.38	-2.79	Ag3AsO4
Ag3H2VO5	-40.59	-35.41	5.18	Ag3H2VO5
Ag3PO4	-45.58	-63.17	-17.59	Ag3PO4
AgF:4H2O	-22.98	-21.93	1.05	AgF:4H2O
Agmetal	-4.39	-17.90	-13.51	Ag
AgVO3	-18.38	-17.61	0.77	AgVO3
Al(OH)3(am)	-0.92	9.88	10.80	Al(OH)3
Al2(MoO4)3	-54.37	-52.00	2.37	Al2(MoO4)3
Al2O3	0.12	19.77	19.65	Al2O3
Al4(OH)10SO4	-4.48	18.22	22.70	Al4(OH)10SO4
AlAsO4:2H2O	-9.60	-4.80	4.80	AlAsO4:2H2O
AlOHSO4	-8.20	-11.43	-3.23	AlOHSO4
AlSb	-122.49	-56.87	65.62	AlSb
Alunite	-5.09	-6.49	-1.40	KAl3(SO4)2(OH)6
Anglesite	-5.19	-12.98	-7.79	PbSO4
Anhydrite	-1.11	-5.47	-4.36	CaSO4
Antlerite	-9.71	-0.92	8.79	Cu3(OH)4SO4
Arsenolite	-52.39	-55.15	-2.76	As4O6
As2O5	-36.08	-29.37	6.71	As2O5
Atacamite	-4.28	3.11	7.39	Cu2(OH)3Cl
Autunite	-6.65	-50.58	-43.93	Ca(UO2)2(PO4)2
Avicennite	-41.86	-54.86	-13.00	Tl2O3
Ba(OH)2:8H2O	-13.37	11.03	24.39	Ba(OH)2:8H2O
Ba2V2O7:2H2O	-11.23	4.64	15.87	Ba2V2O7:2H2O
Ba3(AsO4)2	12.63	3.72	-8.91	Ba3(AsO4)2
Ba3(VO4)2:4H2O	-17.27	15.67	32.94	Ba3(VO4)2:4H2O

BaCrO4	-18.76	-28.43	-9.67	BaCrO4
BaF2	-9.20	-15.02	-5.82	BaF2
BaHPO4	-5.66	-25.44	-19.77	BaHPO4
BaMoO4	-5.93	-12.89	-6.96	BaMoO4
Barite	-0.30	-10.28	-9.98	BaSO4
BaSeO3	-7.65	-5.82	1.83	BaSeO3
BaSeO4	-16.66	-24.12	-7.46	BaSeO4
Bassetite	-10.58	-55.07	-44.48	Fe(UO2)2(PO4)2
Bianchite	-8.02	-9.79	-1.76	ZnSO4:6H2O
Birnessite	-12.86	5.23	18.09	MnO2
Bixbyite	-6.89	-7.54	-0.64	Mn2O3
Boehmite	1.31	9.88	8.58	AlOOH
Breithauptite	-27.84	-46.36	-18.52	NiSb
Brochantite	-9.35	5.88	15.22	Cu4(OH)6SO4
Brucite	-2.10	14.74	16.84	Mg(OH)2
Bunsenite	-1.05	11.39	12.45	NiO
Ca(VO3)2	-7.23	-1.57	5.66	Ca(VO3)2
Ca2V2O7	-3.22	14.28	17.50	Ca2V2O7
Ca2V2O7:2H2O	-7.28	14.27	21.55	Ca2V2O7:2H2O
Ca3(AsO4)2:4H2O	-4.14	18.16	22.30	Ca3(AsO4)2:4H2O
Ca3(PO4)2(beta)	3.52	-25.40	-28.92	Ca3(PO4)2
Ca3(VO4)2	-8.84	30.12	38.96	Ca3(VO4)2
Ca3(VO4)2:4H2O	-9.74	30.12	39.86	Ca3(VO4)2:4H2O
Ca3Sb2	-228.95	-85.97	142.97	Ca3Sb2
Ca4H(PO4)3:3H2O	1.05	-46.03	-47.08	Ca4H(PO4)3:3H2O
CaCrO4	-21.35	-23.62	-2.27	CaCrO4
CaHPO4	-1.35	-20.62	-19.27	CaHPO4
CaHPO4:2H2O	-1.63	-20.63	-19.00	CaHPO4:2H2O
Calomel	-16.29	-34.20	-17.91	Hg2Cl2
CaMoO4	-0.13	-8.08	-7.95	CaMoO4
Carnotite	0.79	1.02	0.23	KUO2VO4
CaSeO3:2H2O	-3.82	-1.00	2.81	CaSeO3:2H2O
CaSeO4:2H2O	-16.29	-19.31	-3.02	CaSeO4:2H2O
Cd(BO2)2	-10.40	-0.56	9.84	Cd(BO2)2
Cd(OH)2	-4.85	8.80	13.64	Cd(OH)2
Cd(OH)2(am)	-4.93	8.80	13.73	Cd(OH)2
Cd3(OH)2(SO4)2	-22.94	-16.23	6.71	Cd3(OH)2(SO4)2
Cd3(OH)4SO4	-17.48	5.08	22.56	Cd3(OH)4SO4
Cd3(PO4)2	-13.94	-46.54	-32.60	Cd3(PO4)2
Cd4(OH)6SO4	-14.52	13.88	28.40	Cd4(OH)6SO4
CdCl2	-11.50	-12.16	-0.66	CdCl2
CdCl2:1H2O	-10.47	-12.16	-1.69	CdCl2:1H2O
CdCl2:2.5H2O	-10.25	-12.17	-1.91	CdCl2:2.5H2O
CdF2	-16.04	-17.25	-1.21	CdF2
Cdmetal(alpha)	-22.72	-9.20	13.51	Cd
Cdmetal(gamma)	-22.82	-9.20	13.62	Cd
CdMoO4	-0.97	-15.12	-14.15	CdMoO4
CdOHCl	-5.22	-1.68	3.54	CdOHCl
CdSb	-48.61	-48.96	-0.35	CdSb
CdSe	3.01	-17.19	-20.20	CdSe
CdSeO4:2H2O	-24.51	-26.36	-1.85	CdSeO4:2H2O
CdSO4	-12.34	-12.51	-0.17	CdSO4
CdSO4:1H2O	-10.79	-12.51	-1.73	CdSO4:1H2O
CdSO4:2.67H2O	-10.64	-12.51	-1.87	CdSO4:2.67H2O
Celestite	-2.41	-9.03	-6.62	SrSO4
Cerargyrite	-9.63	-19.38	-9.75	AgCl
Chalcanthite	-11.88	-14.52	-2.64	CuSO4:5H2O
Chalcedony	0.13	-3.42	-3.55	SiO2
Chrysotile	5.18	37.38	32.20	Mg3Si2O5(OH)4
Claudetite	-52.08	-55.15	-3.06	As4O6
Clausthalite	9.44	-17.66	-27.10	PbSe
Co(BO2)2	-25.41	1.66	27.07	Co(BO2)2
Co(OH)2	-2.08	11.02	13.09	Co(OH)2

Co(OH)3	-10.07	-12.38	-2.31	Co(OH)3
Co3(AsO4)2	-9.35	3.68	13.03	Co3(AsO4)2
Co3(PO4)2	-5.20	-39.89	-34.69	Co3(PO4)2
Co3O4	-3.25	-13.75	-10.50	Co3O4
CoCl2	-18.21	-9.94	8.27	CoCl2
CoCl2:6H2O	-12.48	-9.95	2.54	CoCl2:6H2O
CoF2	-13.44	-15.03	-1.60	CoF2
CoF3	-50.00	-51.46	-1.46	CoF3
CoFe2O4	29.20	25.67	-3.53	CoFe2O4
CoHPO4	-6.39	-25.45	-19.06	CoHPO4
CoMoO4	-5.14	-12.91	-7.76	CoMoO4
CoO	-2.57	11.02	13.59	CoO
CoSe	1.23	-14.97	-16.20	CoSe
CoSeO3	-7.15	-5.83	1.32	CoSeO3
CoSeO4:6H2O	-22.61	-24.14	-1.53	CoSeO4:6H2O
CoSO4	-13.10	-10.29	2.80	CoSO4
CoSO4:6H2O	-7.82	-10.30	-2.47	CoSO4:6H2O
Cotunnite	-7.85	-12.63	-4.78	PbCl2
Cr(OH)2	-15.96	-5.14	10.82	Cr(OH)2
Cr(OH)3	-0.42	0.91	1.34	Cr(OH)3
Cr(OH)3(am)	1.66	0.91	-0.75	Cr(OH)3
Cr2O3	4.19	1.83	-2.36	Cr2O3
CrCl2	-40.19	-26.10	14.09	CrCl2
CrCl3	-45.64	-30.53	15.11	CrCl3
CrF3	-26.82	-38.16	-11.34	CrF3
Cristobalite	-0.07	-3.42	-3.35	SiO2
Crmetal	-53.62	-23.14	30.48	Cr
CrO3	-36.25	-39.46	-3.21	CrO3
Cryolite	-14.77	-48.61	-33.84	Na3AlF6
Cu(OH)2	-1.88	6.80	8.67	Cu(OH)2
Cu(SbO3)2	-27.93	17.28	45.21	Cu(SbO3)2
Cu2(OH)3NO3	-38.69	-29.44	9.25	Cu2(OH)3NO3
Cu2Sb:3H2O	-24.59	-59.47	-34.88	Cu2Sb:3H2O
Cu2Se(alpha)	20.79	-25.01	-45.80	Cu2Se
Cu2SO4	-18.39	-20.34	-1.95	Cu2SO4
Cu3(AsO4)2:2H2O	-15.08	-8.98	6.10	Cu3(AsO4)2:2H2O
Cu3(PO4)2	-15.70	-52.55	-36.85	Cu3(PO4)2
Cu3(PO4)2:3H2O	-17.43	-52.55	-35.12	Cu3(PO4)2:3H2O
Cu3Sb	-22.70	-65.29	-42.59	Cu3Sb
Cu3Se2	19.29	-44.20	-63.49	Cu3Se2
CuCrO4	-27.22	-32.66	-5.44	CuCrO4
CuF	-7.63	-12.54	-4.91	CuF
CuF2	-20.37	-19.25	1.12	CuF2
CuF2:2H2O	-14.70	-19.25	-4.55	CuF2:2H2O
Cumetal	0.24	-8.51	-8.76	Cu
CuMoO4	-4.05	-17.13	-13.08	CuMoO4
CuOCuSO4	-18.02	-7.72	10.30	CuOCuSO4
Cupricferrite	15.46	21.45	5.99	CuFe2O4
Cuprite	2.38	0.97	-1.41	Cu2O
Cuprousferrite	16.73	7.81	-8.92	CuFeO2
CuSe	13.91	-19.19	-33.10	CuSe
CuSe2	6.19	-27.17	-33.37	CuSe2
CuSeO3:2H2O	-10.56	-10.05	0.51	CuSeO3:2H2O
CuSeO4:5H2O	-25.92	-28.36	-2.44	CuSeO4:5H2O
CuSO4	-17.45	-14.51	2.94	CuSO4
Diaspore	3.01	9.88	6.87	AlOOH
Epsomite	-4.45	-6.57	-2.13	MgSO4:7H2O
Fe(OH)2	-2.21	11.36	13.56	Fe(OH)2
Fe(OH)2.7Cl.3	7.22	4.18	-3.04	Fe(OH)2.7Cl.3
Fe(VO3)2	-2.34	-6.06	-3.72	Fe(VO3)2
Fe2(OH)4SeO3	-3.75	-2.20	1.55	Fe2(OH)4SeO3
Fe2(SeO3)3:2H2O	-15.26	-35.89	-20.63	Fe2(SeO3)3:2H2O
Fe2(SO4)3	-45.55	-49.28	-3.73	Fe2(SO4)3

Fe3(OH)8	5.79	26.01	20.22	Fe3(OH)8
FeAsO4:2H2O	-7.76	-7.36	0.40	FeAsO4:2H2O
FeCr2O4	5.99	13.19	7.20	FeCr2O4
FeMoO4	-2.47	-12.56	-10.09	FeMoO4
Ferrihydrite	4.13	7.33	3.19	Fe(OH)3
Ferroselite	-4.02	-22.61	-18.60	FeSe2
FeSe	-3.63	-14.63	-11.00	FeSe
Fluorite	0.29	-10.21	-10.50	CaF2
Gibbsite	1.59	9.88	8.29	Al(OH)3
Goethite	6.83	7.33	0.49	FeOOH
Goslarite	-7.78	-9.79	-2.01	ZnSO4:7H2O
Greenalite	6.42	27.23	20.81	Fe3Si2O5(OH)4
Gummite	-4.41	3.26	7.67	UO3
Gypsum	-0.86	-5.47	-4.61	CaSO4:2H2O
H-Autunite	-18.49	-66.43	-47.93	H2(UO2)2(PO4)2
H-Jarosite	-8.55	-20.65	-12.10	(H3O)Fe3(SO4)2(OH)6
H2MoO4	-11.05	-23.92	-12.88	H2MoO4
H2Se(g)	-21.03	-25.99	-4.96	H2Se
H2Sn(OH)6	-2.61	-26.14	-23.53	H2Sn(OH)6
Halite	-5.53	-3.93	1.60	NaCl
Halloysite	3.35	12.93	9.57	Al2Si2O5(OH)4
Hausmannite	-5.29	55.74	61.03	Mn3O4
Hematite	16.07	14.65	-1.42	Fe2O3
Hercynite	8.23	31.13	22.89	FeAl2O4
Hg(g)	-7.75	-15.62	-7.87	Hg
Hg(OH)2	-15.72	-19.21	-3.50	Hg(OH)2
Hg2(g)	-16.28	-31.24	-14.96	Hg2
Hg2(OH)2	-18.50	-13.24	5.26	Hg2(OH)2
Hg2CrO4	-44.00	-52.70	-8.70	Hg2CrO4
Hg2F2	-28.93	-39.29	-10.36	Hg2F2
Hg2HPO4	-24.93	-49.71	-24.77	Hg2HPO4
Hg2SeO3	-25.43	-30.08	-4.66	Hg2SeO3
Hg2SO4	-28.42	-34.55	-6.13	Hg2SO4
HgCl(g)	-36.60	-17.10	19.50	HgCl
HgCl2	-18.91	-40.17	-21.26	HgCl2
HgF(g)	-52.32	-19.64	32.68	HgF
HgF2(g)	-57.83	-45.26	12.57	HgF2
Hgmetal(l)	-2.17	-15.62	-13.45	Hg
HgSe	10.50	-45.20	-55.69	HgSe
HgSeO3	-23.63	-36.06	-12.43	HgSeO3
HgSO4	-31.10	-40.52	-9.42	HgSO4
Hinsdalite	-17.30	-19.80	-2.50	PbAl3PO4SO4(OH)6
Hydroxylapatite	14.15	-30.18	-44.33	Ca5(PO4)3OH
Hydroxylpyromorphite	-4.97	-67.76	-62.79	Pb5(PO4)3OH
K-Alum	-21.10	-26.27	-5.17	KAl(SO4)2:12H2O
K-Autunite	-5.23	-53.48	-48.24	K2(UO2)2(PO4)2
K-Jarosite	0.63	-14.17	-14.80	KFe3(SO4)2(OH)6
K2Cr2O7	-48.73	-65.97	-17.24	K2Cr2O7
K2CrO4	-26.00	-26.51	-0.51	K2CrO4
K2MoO4	-14.24	-10.97	3.26	K2MoO4
K2SeO4	-21.48	-22.21	-0.73	K2SeO4
Kaolinite	5.49	12.93	7.43	Al2Si2O5(OH)4
Langite	-11.61	5.87	17.49	Cu4(OH)6SO4:H2O
Larnakite	-4.22	-4.65	-0.43	PbO:PbSO4
Laurionite	-2.78	-2.15	0.62	PbOHCl
Lepidocrocite	5.95	7.33	1.37	FeOOH
Lime	-16.85	15.85	32.70	CaO
Litharge	-4.36	8.33	12.69	PbO
Maghemite	8.27	14.65	6.39	Fe2O3
Magnesioferrite	12.53	29.39	16.86	Fe2MgO4
Magnetite	22.61	26.01	3.40	Fe3O4
Manganite	-3.76	21.58	25.34	MnOOH
Massicot	-4.56	8.33	12.89	PbO

Matlockite	-6.20	-15.18	-8.97	PbClF
Melanothallite	-20.42	-14.17	6.26	CuCl2
Melanterite	-7.75	-9.96	-2.21	FeSO4:7H2O
Mg(OH)2(active)	-4.05	14.74	18.79	Mg(OH)2
Mg(VO3)2	-13.95	-2.67	11.28	Mg(VO3)2
Mg2Sb3	-200.46	-125.78	74.68	Mg2Sb3
Mg2V2O7	-14.29	12.07	26.36	Mg2V2O7
Mg3(PO4)2	-5.44	-28.72	-23.28	Mg3(PO4)2
MgCr2O4	0.37	16.57	16.20	MgCr2O4
MgCrO4	-30.10	-24.72	5.38	MgCrO4
MgF2	-3.18	-11.31	-8.13	MgF2
MgHPO4:3H2O	-3.56	-21.73	-18.18	MgHPO4:3H2O
MgMoO4	-7.33	-9.18	-1.85	MgMoO4
MgSeO3:6H2O	-5.16	-2.11	3.06	MgSeO3:6H2O
MgSeO4:6H2O	-19.22	-20.42	-1.20	MgSeO4:6H2O
Minium	-30.54	42.99	73.52	Pb3O4
Mirabilite	-7.10	-8.21	-1.11	Na2SO4:10H2O
Mn(VO3)2	-9.73	-4.83	4.90	Mn(VO3)2
Mn2(SO4)3	-65.76	-71.47	-5.71	Mn2(SO4)3
Mn2Sb	-111.67	-50.59	61.08	Mn2Sb
Mn3(AsO4)2:8H2O	-4.13	8.37	12.50	Mn3(AsO4)2:8H2O
Mn3(PO4)2	-11.37	-35.19	-23.83	Mn3(PO4)2
MnCl2:4H2O	-11.10	-8.38	2.72	MnCl2:4H2O
MnHPO4	1.51	-23.89	-25.40	MnHPO4
MnSb	-67.61	-70.52	-2.91	MnSb
MnSe	-16.90	-13.40	3.50	MnSe
MnSeO3	-5.39	-4.26	1.13	MnSeO3
MnSeO3:2H2O	-5.25	-4.27	0.98	MnSeO3:2H2O
MnSeO4:5H2O	-20.53	-22.58	-2.05	MnSeO4:5H2O
MnSO4	-11.31	-8.73	2.58	MnSO4
Monteponite	-6.30	8.80	15.10	CdO
Montroydite	-15.57	-19.21	-3.64	HgO
MoO3	-15.92	-23.92	-8.00	MoO3
Morenosite	-7.77	-9.92	-2.14	NiSO4:7H2O
Na-Autunite	-5.91	-53.32	-47.41	Na2(UO2)2(PO4)2
Na-Jarosite	-2.89	-14.09	-11.20	NaFe3(SO4)2(OH)6
Na2Cr2O7	-55.92	-65.82	-9.90	Na2Cr2O7
Na2CrO4	-29.29	-26.36	2.93	Na2CrO4
Na2Mo2O7	-18.14	-34.74	-16.60	Na2Mo2O7
Na2MoO4	-12.31	-10.82	1.49	Na2MoO4
Na2MoO4:2H2O	-12.04	-10.82	1.22	Na2MoO4:2H2O
Na2SeO3:5H2O	-14.04	-3.74	10.30	Na2SeO3:5H2O
Na2SeO4	-23.33	-22.05	1.28	Na2SeO4
Na3Sb	-141.55	-47.10	94.45	Na3Sb
Na3VO4	-25.73	10.95	36.68	Na3VO4
Na4V2O7	-28.60	8.80	37.40	Na4V2O7
Nantokite	-3.26	-9.99	-6.73	CuCl
NaSb	-65.37	-42.20	23.17	NaSb
NaVO3	-6.01	-2.16	3.86	NaVO3
Ni(OH)2	-1.40	11.39	12.79	Ni(OH)2
Ni3(AsO4)2:8H2O	-10.89	4.81	15.70	Ni3(AsO4)2:8H2O
Ni3(PO4)2	-7.46	-38.76	-31.30	Ni3(PO4)2
Ni4(OH)6SO4	-7.73	24.27	32.00	Ni4(OH)6SO4
NiMoO4	-1.39	-12.53	-11.14	NiMoO4
Ningyoite	-8.72	-62.62	-53.91	CaU(PO4)2:2H2O
NiSe	3.11	-14.59	-17.70	NiSe
NiSeO3:2H2O	-8.27	-5.45	2.81	NiSeO3:2H2O
NiSeO4:6H2O	-22.24	-23.76	-1.52	NiSeO4:6H2O
Nsutite	-12.27	5.23	17.50	MnO2
O2(g)	-47.09	36.00	83.09	O2
Pb(BO2)2	-7.54	-1.03	6.52	Pb(BO2)2
Pb(OH)2	0.18	8.33	8.15	Pb(OH)2
Pb2(OH)3Cl	-2.62	6.18	8.79	Pb2(OH)3Cl

Pb2O(OH)2	-9.53	16.66	26.19	Pb2O(OH)2
Pb2O3	-26.38	34.66	61.04	Pb2O3
Pb2V2O7	1.14	-0.76	-1.90	Pb2V2O7
Pb3(AsO4)2	-10.18	-4.38	5.80	Pb3(AsO4)2
Pb3(PO4)2	-4.42	-47.95	-43.53	Pb3(PO4)2
Pb3(VO4)2	1.43	7.57	6.14	Pb3(VO4)2
Pb3O2SO4	-7.01	3.68	10.69	Pb3O2SO4
Pb4(OH)6SO4	-9.10	12.00	21.10	Pb4(OH)6SO4
Pb4O3SO4	-9.87	12.01	21.88	Pb4O3SO4
PbCrO4	-18.53	-31.13	-12.60	PbCrO4
PbF2	-10.28	-17.72	-7.44	PbF2
PbHPO4	-4.34	-28.14	-23.81	PbHPO4
Pbmetal	-13.92	-9.67	4.25	Pb
PbMoO4	0.03	-15.59	-15.62	PbMoO4
PbO:0.3H2O	-4.65	8.33	12.98	PbO:0.33H2O
PbSeO4	-19.99	-26.83	-6.84	PbSeO4
Periclase	-6.84	14.74	21.58	MgO
Plattnerite	-23.27	26.33	49.60	PbO2
Plumbgummite	-2.17	-34.96	-32.79	PbAl3(PO4)2(OH)5:H2O
Portlandite	-6.96	15.84	22.80	Ca(OH)2
Przhevalskite	-13.73	-58.10	-44.37	Pb(UO2)2(PO4)2
Pyrochroite	-2.61	12.58	15.19	Mn(OH)2
Pyrolusite	-10.80	30.58	41.38	MnO2
Pyromorphite	6.18	-78.25	-84.43	Pb5(PO4)3Cl
Quartz	0.58	-3.42	-4.00	SiO2
Retgersite	-7.88	-9.92	-2.04	NiSO4:6H2O
Saleeite	-8.04	-51.68	-43.65	Mg(UO2)2(PO4)2
Sb(OH)3	-5.65	-12.76	-7.11	Sb(OH)3
Sb2O4	-10.91	-7.51	3.40	Sb2O4
Sb2O5	-28.46	-38.13	-9.67	Sb2O5
Sb2Se3	-35.71	-103.47	-67.76	Sb2Se3
Sb4O6(cubic)	-32.76	-51.02	-18.26	Sb4O6
Sb4O6(orth)	-33.12	-51.02	-17.90	Sb4O6
SbCl3	-44.77	-44.20	0.57	SbCl3
SbF3	-41.61	-51.83	-10.23	SbF3
Sbmetal	-28.07	-39.75	-11.69	Sb
SbO2	-0.24	-28.07	-27.82	SbO2
Schoepite	-2.74	3.26	5.99	UO2(OH)2:H2O
Semetal(am)	-0.88	-7.99	-7.11	Se
Semetal(hex	-0.28	-7.99	-7.71	Se
Senarmontite	-13.15	-25.51	-12.37	Sb2O3
SeO2	-16.97	-16.85	0.12	SeO2
SeO3	-56.20	-35.15	21.04	SeO3
Sepiolite	3.46	19.22	15.76	Mg2Si3O7.5OH:3H2O
Sepiolite(A)	0.44	19.22	18.78	Mg2Si3O7.5OH:3H2O
SiO2(am-gel)	-0.71	-3.42	-2.71	SiO2
SiO2(am-ppt)	-0.68	-3.42	-2.74	SiO2
Sn(OH)2	-19.50	-24.93	-5.43	Sn(OH)2
Sn(OH)4	-3.86	-26.14	-22.28	Sn(OH)4
Sn(SO4)2	-53.54	-68.76	-15.21	Sn(SO4)2
SnCl2	-36.62	-45.90	-9.28	SnCl2
Snmetal(wht)	-40.61	-42.93	-2.33	Sn
SnO	-20.02	-24.93	-4.91	SnO
SnO2	2.84	-26.13	-28.97	SnO2
SnSe	-20.43	-50.92	-30.49	SnSe
SnSe2	-12.99	-78.10	-65.12	SnSe2
SnSO4	10.73	-46.24	-56.97	SnSO4
Spinel	-2.34	34.51	36.85	MgAl2O4
Sr-Autunite	-9.69	-54.15	-44.46	Sr(UO2)2(PO4)2
SrCrO4	-22.53	-27.18	-4.65	SrCrO4
SrF2	-5.19	-13.77	-8.58	SrF2
SrHPO4	-4.90	-24.19	-19.30	SrHPO4
SrSeO3	-6.87	-4.57	2.30	SrSeO3

SrSeO4	-18.48	-22.88	-4.40	SrSeO4
Strengite	-2.74	-29.14	-26.40	FePO4:2H2O
Tenorite	-0.85	6.80	7.64	CuO
Thenardite	-8.53	-8.21	0.32	Na2SO4
Tl(OH)3	-21.99	-27.43	-5.44	Tl(OH)3
Tl2CrO4	-27.21	-39.22	-12.01	Tl2CrO4
Tl2MoO4	-15.69	-23.68	-7.99	Tl2MoO4
Tl2O	-26.85	0.25	27.09	Tl2O
Tl2Se	-7.64	-25.74	-18.10	Tl2Se
Tl2SeO4	-30.81	-34.91	-4.10	Tl2SeO4
Tl2SO4	-17.28	-21.06	-3.79	Tl2SO4
TlCl	-6.62	-10.36	-3.74	TlCl
Tlmetal	-14.55	-8.88	5.68	Tl
TlNO3	-41.30	-42.91	-1.61	TlNO3
TlOH	-12.80	0.12	12.92	TlOH
Torbernite	-14.35	-59.63	-45.28	Cu(UO2)2(PO4)2
Tsumebite	-3.23	-13.02	-9.79	Pb2CuPO4(OH)3:3H2O
Tyuyamunite	0.86	4.94	4.08	Ca(UO2)2(VO4)2
U(HPO4)2:4H2O	-26.88	-78.47	-51.58	U(HPO4)2:4H2O
U3O8	-1.66	19.42	21.08	U3O8
U3Sb4	-435.98	-283.60	152.38	U3Sb4
U4O9	-1.09	-4.11	-3.02	U4O9
UF4	-28.09	-57.63	-29.54	UF4
UF4:2.5H2O	-24.91	-57.63	-32.72	UF4:2.5H2O
UO2(am)	-6.46	-5.53	0.93	UO2
UO2(NO3)2	-94.96	-82.81	12.15	UO2(NO3)2
UO2(NO3)2:2H2O	-87.67	-82.81	4.85	UO2(NO3)2:2H2O
UO2(NO3)2:3H2O	-86.20	-82.81	3.39	UO2(NO3)2:3H2O
UO2(NO3)2:6H2O	-84.86	-82.82	2.05	UO2(NO3)2:6H2O
UO2(OH)2(beta)	-2.36	3.26	5.61	UO2(OH)2
UO2HPO4	-8.99	-33.21	-24.23	UO2HPO4
UO2SeO4:4H2O	-29.65	-31.90	-2.25	UO2SeO4:4H2O
UO3	-4.44	3.26	7.70	UO3
Uramphite	-6.59	-58.34	-51.75	(NH4)2(UO2)2(PO4)2
Uraninite	-0.86	-5.53	-4.67	UO2
Uranocircite	-10.76	-55.40	-44.63	Ba(UO2)2(PO4)2
USb2	-159.83	-130.25	29.58	USb2
V(OH)3	-11.70	-4.11	7.59	V(OH)3
V2O5	-16.06	-17.42	-1.36	V2O5
V3O5	-22.25	-20.41	1.84	V3O5
V4O7	-28.40	-21.22	7.19	V4O7
V6O13	-27.39	-88.25	-60.86	V6O13
Valentinite	-17.03	-25.51	-8.48	Sb2O3
VCl2	-52.94	-34.07	18.87	VCl2
VCl3	-58.98	-35.55	23.43	VCl3
VF4	-67.84	-52.91	14.93	VF4
Vivianite	-2.87	-38.87	-36.00	Fe3(PO4)2:8H2O
Vmetal	-75.13	-31.11	44.03	V
VO	-27.86	-13.11	14.76	VO
VO(OH)2	-5.96	-0.80	5.15	VO(OH)2
VO2Cl	-22.03	-19.19	2.84	VO2Cl
VOCl	-25.74	-14.59	11.15	VOCl
VOCl2	-34.53	-21.77	12.76	VOCl2
VOSO4	-25.72	-22.11	3.61	VOSO4
Zincite	0.19	11.53	11.33	ZnO
Zincosite	-13.71	-9.78	3.93	ZnSO4
Zn(BO2)2	-6.12	2.17	8.29	Zn(BO2)2
Zn(NO3)2:6H2O	-77.86	-74.55	3.32	Zn(NO3)2:6H2O
Zn(OH)2	-0.67	11.53	12.20	Zn(OH)2
Zn(OH)2(am)	-0.95	11.53	12.47	Zn(OH)2
Zn(OH)2(beta)	-0.23	11.53	11.75	Zn(OH)2
Zn(OH)2(epsilon)	-0.01	11.53	11.53	Zn(OH)2
Zn(OH)2(gamma)	-0.21	11.53	11.73	Zn(OH)2

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      Zn2(OH)2SO4       -5.76    1.74    7.50  Zn2(OH)2SO4
      Zn2(OH)3Cl        -2.62   12.57   15.19  Zn2(OH)3Cl
      Zn3(AsO4)2:2.5H2O  -8.44    5.21   13.65  Zn3(AsO4)2:2.5H2O
      Zn3(PO4)2:4H2O    -2.94  -38.36  -35.42  Zn3(PO4)2:4H2O
      Zn3O(SO4)2       -26.95   -8.04   18.91  Zn3O(SO4)2
      Zn4(OH)6SO4       -3.61   24.79   28.40  Zn4(OH)6SO4
      Zn5(OH)8Cl2       -1.83   36.67   38.50  Zn5(OH)8Cl2
      ZnCl2            -16.49   -9.44    7.05  ZnCl2
      ZnF2             -13.99  -14.52   -0.53  ZnF2
      Znmetal          -32.26   -6.47   25.79  Zn
      ZnMoO4            -2.27  -12.40  -10.13  ZnMoO4
      ZnO(active)        0.34   11.53   11.19  ZnO
      ZnSb             -57.24  -46.23   11.01  ZnSb
      ZnSe              -0.06  -14.46  -14.40  ZnSe
      ZnSeO4:6H2O      -22.11  -23.63   -1.52  ZnSeO4:6H2O
      ZnSO4:1H2O        -9.15   -9.78   -0.64  ZnSO4:1H2O

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End of simulation.
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Reading input data for simulation 2.
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      SOLUTION  2    Pore water
      pH   9.48977
      S(6) 67.78479808
      Cl   629.0248  charge
      F    1.095633658
      N    0.129998967
      Ag   0.000000114762893
      Al   0.0148916515568
      As   0.0999009948
      B    0.17737048
      Ba   0.000001341425707
      Ca   301.0899828
      Cd   0.0001040421996
      Co   2.190421744E-16
      Cr   0.0000570968076
      Cu   1.934848608E-11
      Fe   1.32039918E-08
      Hg   0.00001606445074
      K    48.7825746
      Mg   14.2752987
      Mn   0.1231325394
      Mo   0.0869771844
      Na   41.740644
      Ni   0.01275751048
      P    0.00000589218402
      Pb   0.00030120664
      Se   0.00334419288
      Sb   0.00413728304
      Si   0.0704399885
      Sn   7.51497604E-08
      Sr   0.185693066
      Tl   0.0001331760518
      U    0.00056963344345
      V    0.02201000052
      Zn   0.0330960098
      pe   2
      UNITS     mg/l
      END
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Beginning of initial solution calculations.
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Initial solution 2. Pore water

-----------------------------Solution composition------------------------------

       Elements           Molality       Moles

       Ag               1.065e-012  1.065e-012
       Al               5.525e-007  5.525e-007
       As               1.335e-006  1.335e-006
       B                1.643e-005  1.643e-005
       Ba               9.779e-012  9.779e-012
       Ca               7.521e-003  7.521e-003
       Cd               9.266e-010  9.266e-010
       Cl               1.776e-002  1.776e-002  Charge balance
       Co               3.721e-021  3.721e-021
       Cr               1.099e-009  1.099e-009
       Cu               3.048e-016  3.048e-016
       F                5.773e-005  5.773e-005
       Fe               2.367e-013  2.367e-013
       Hg               8.017e-011  8.017e-011
       K                1.249e-003  1.249e-003
       Mg               5.880e-004  5.880e-004
       Mn               2.244e-006  2.244e-006
       Mo               9.076e-007  9.076e-007
       N                9.291e-006  9.291e-006
       Na               1.818e-003  1.818e-003
       Ni               2.176e-007  2.176e-007
       P                1.904e-010  1.904e-010
       Pb               1.455e-009  1.455e-009
       S(6)             7.064e-004  7.064e-004
       Sb               3.402e-008  3.402e-008
       Se               4.240e-008  4.240e-008
       Si               1.174e-006  1.174e-006
       Sn               6.338e-013  6.338e-013
       Sr               2.122e-006  2.122e-006
       Tl               6.523e-010  6.523e-010
       U                2.396e-009  2.396e-009
       V                4.326e-007  4.326e-007
       Zn               5.067e-007  5.067e-007

----------------------------Description of solution----------------------------

                                        pH  =   9.490
                                        pe  =   2.000
                         Activity of water  =   0.999
                            Ionic strength  =  2.714e-002
                        Mass of water (kg)  =  1.000e+000
                  Total alkalinity (eq/kg)  =  6.676e-005
                     Total carbon (mol/kg)  =  0.000e+000
                        Total CO2 (mol/kg)  =  0.000e+000
                       Temperature (deg C)  =  25.000
                    Electrical balance (eq)  = -8.420e-018
 Percent error, 100*(Cat-|An|)/(Cat+|An|)  =  -0.00
                                Iterations  =  11
                                   Total H  = 1.110138e+002
                                   Total O  = 5.550977e+001

----------------------------Distribution of species----------------------------
```

Species	Molality	Activity	Log Molality	Log Activity	Log Gamma
OH-	3.657e-005	3.109e-005	-4.437	-4.507	-0.071
H+	3.785e-010	3.238e-010	-9.422	-9.490	-0.068
H2O	5.551e+001	9.995e-001	1.744	-0.000	0.000
Ag	1.065e-012				
AgCl2-	6.366e-013	5.247e-013	-12.196	-12.280	-0.084
AgCl	3.965e-013	3.965e-013	-12.402	-12.402	0.000
AgCl3-2	1.539e-014	7.106e-015	-13.813	-14.148	-0.336
Ag+	1.494e-014	1.278e-014	-13.826	-13.893	-0.068
AgCl4-3	1.254e-015	2.204e-016	-14.902	-15.657	-0.755
AgNH3+	1.743e-016	1.437e-016	-15.759	-15.843	-0.084
AgSO4-	7.704e-017	6.351e-017	-16.113	-16.197	-0.084
Ag2Se	5.232e-017	5.232e-017	-16.281	-16.281	0.000
AgOH	3.973e-017	3.973e-017	-16.401	-16.401	0.000
Ag(NH3)2+	7.803e-018	6.432e-018	-17.108	-17.192	-0.084
AgH2BO3	1.647e-018	1.647e-018	-17.783	-17.783	0.000
AgF	1.472e-018	1.472e-018	-17.832	-17.832	0.000
AgSeO3-	1.866e-019	1.538e-019	-18.729	-18.813	-0.084
Ag(OH)2-	1.464e-019	1.207e-019	-18.834	-18.918	-0.084
AgNO2	2.150e-020	2.150e-020	-19.668	-19.668	0.000
Ag(SeO3)2-3	1.467e-025	2.579e-026	-24.833	-25.589	-0.755
Ag(NO2)2-	3.252e-028	2.681e-028	-27.488	-27.572	-0.084
AgNO3	2.098e-028	2.098e-028	-27.678	-27.678	0.000
Ag2MoO4	3.004e-035	3.004e-035	-34.522	-34.522	0.000
AgOH(Se)2-4	0.000e+000	0.000e+000	-70.382	-71.724	-1.342
Al	5.525e-007				
Al(OH)4-	5.524e-007	4.729e-007	-6.258	-6.325	-0.067
Al(OH)3	1.208e-010	1.208e-010	-9.918	-9.918	0.000
Al(OH)2+	2.263e-013	1.948e-013	-12.645	-12.710	-0.065
AlOH+2	1.435e-017	7.891e-018	-16.843	-17.103	-0.260
AlF2+	2.465e-018	2.123e-018	-17.608	-17.673	-0.065
AlF3	1.225e-018	1.225e-018	-17.912	-17.912	0.000
AlF+2	2.116e-019	1.163e-019	-18.674	-18.934	-0.260
AlF4-	3.287e-020	2.814e-020	-19.483	-19.551	-0.067
Al+3	1.036e-021	2.538e-022	-20.984	-21.595	-0.611
AlSO4+	5.732e-022	4.907e-022	-21.242	-21.309	-0.067
Al(SO4)2-	1.529e-024	1.309e-024	-23.816	-23.883	-0.067
AlMo6O21-3	0.000e+000	0.000e+000	-60.668	-61.423	-0.755
As(3)	2.423e-020				
H2AsO3-	1.588e-020	1.309e-020	-19.799	-19.883	-0.084
H3AsO3	8.266e-021	8.266e-021	-20.083	-20.083	0.000
HAsO3-2	7.988e-023	3.688e-023	-22.098	-22.433	-0.336
AsO3-3	2.499e-026	4.391e-027	-25.602	-26.357	-0.755
H4AsO3+	1.608e-030	1.326e-030	-29.794	-29.877	-0.084
As(5)	1.335e-006				
HAsO4-2	1.299e-006	6.000e-007	-5.886	-6.222	-0.336
AsO4-3	3.334e-008	5.860e-009	-7.477	-8.232	-0.755
H2AsO4-	2.149e-009	1.772e-009	-8.668	-8.752	-0.084
H3AsO4	9.906e-017	9.968e-017	-16.004	-16.001	0.003
B	1.643e-005				
H2BO3-	9.637e-006	8.129e-006	-5.016	-5.090	-0.074
H3BO3	4.503e-006	4.532e-006	-5.346	-5.344	0.003
CaH2BO3+	2.164e-006	1.825e-006	-5.665	-5.739	-0.074
MgH2BO3+	1.016e-007	8.566e-008	-6.993	-7.067	-0.074
NaH2BO3	2.000e-008	2.000e-008	-7.699	-7.699	0.000
SrH2BO3+	3.780e-010	3.188e-010	-9.423	-9.496	-0.074
BF(OH)3-	9.825e-011	8.288e-011	-10.008	-10.082	-0.074
H5(BO3)2-	3.717e-011	3.135e-011	-10.430	-10.504	-0.074
H8(BO3)3-	1.684e-014	1.421e-014	-13.774	-13.847	-0.074
BaH2BO3+	1.558e-015	1.314e-015	-14.807	-14.881	-0.074
BF2(OH)2-	1.559e-016	1.315e-016	-15.807	-15.881	-0.074

AgH2BO3		1.647e-018	1.647e-018	-17.783	-17.783	0.000
BF3OH-		9.008e-025	7.598e-025	-24.045	-24.119	-0.074
BF4-		6.580e-032	5.551e-032	-31.182	-31.256	-0.074
Ba	9.779e-012					
Ba+2		9.776e-012	5.231e-012	-11.010	-11.281	-0.272
BaH2BO3+		1.558e-015	1.314e-015	-14.807	-14.881	-0.074
BaOH+		8.265e-016	7.099e-016	-15.083	-15.149	-0.066
BaNH3+2		3.936e-017	1.818e-017	-16.405	-16.741	-0.336
BaNO3+		6.572e-025	5.417e-025	-24.182	-24.266	-0.084
Ca	7.521e-003					
Ca+2		7.291e-003	3.902e-003	-2.137	-2.409	-0.272
CaSO4		2.226e-004	2.226e-004	-3.653	-3.653	0.000
CaOH+		2.800e-006	2.420e-006	-5.553	-5.616	-0.063
CaF+		2.272e-006	1.952e-006	-5.644	-5.710	-0.066
CaH2BO3+		2.164e-006	1.825e-006	-5.665	-5.739	-0.074
CaNH3+2		5.857e-008	2.705e-008	-7.232	-7.568	-0.336
CaPO4-		1.551e-010	1.336e-010	-9.809	-9.874	-0.065
CaHPO4		1.625e-011	1.625e-011	-10.789	-10.789	0.000
Ca(NH3)2+2		1.284e-013	5.929e-014	-12.891	-13.227	-0.336
CaH2PO4+		4.722e-015	4.066e-015	-14.326	-14.391	-0.065
CaNO3+		3.092e-016	2.549e-016	-15.510	-15.594	-0.084
Cd	9.266e-010					
Cd+2		2.896e-010	1.549e-010	-9.538	-9.810	-0.272
CdOHCl		2.867e-010	2.867e-010	-9.543	-9.543	0.000
CdCl+		2.727e-010	2.248e-010	-9.564	-9.648	-0.084
CdOH+		4.641e-011	3.826e-011	-10.333	-10.417	-0.084
CdCl2		1.424e-011	1.424e-011	-10.846	-10.846	0.000
CdSO4		9.045e-012	9.045e-012	-11.044	-11.044	0.000
Cd(OH)2		7.504e-012	7.504e-012	-11.125	-11.125	0.000
CdCl3-		1.656e-013	1.365e-013	-12.781	-12.865	-0.084
CdF+		1.365e-013	1.126e-013	-12.865	-12.949	-0.084
Cd(SO4)2-2		6.580e-014	3.038e-014	-13.182	-13.517	-0.336
Cd(OH)3-		1.729e-014	1.425e-014	-13.762	-13.846	-0.084
CdF2		1.029e-017	1.029e-017	-16.987	-16.987	0.000
Cd2OH+3		1.691e-019	2.971e-020	-18.772	-19.527	-0.755
Cd(OH)4-2		1.570e-019	7.251e-020	-18.804	-19.140	-0.336
Cd(SeO3)2-2		9.697e-020	4.477e-020	-19.013	-19.349	-0.336
CdSeO4		6.367e-021	6.367e-021	-20.196	-20.196	0.000
CdNO3+		1.228e-023	1.012e-023	-22.911	-22.995	-0.084
Cd(NO3)2		1.048e-037	1.048e-037	-36.980	-36.980	0.000
Cl	1.776e-002					
Cl-		1.776e-002	1.519e-002	-1.750	-1.818	-0.068
ZnOHCl		3.085e-008	3.085e-008	-7.511	-7.511	0.000
MnCl+		2.149e-008	1.845e-008	-7.668	-7.734	-0.066
NiCl+		2.974e-009	2.451e-009	-8.527	-8.611	-0.084
ZnCl+		8.886e-010	7.581e-010	-9.051	-9.120	-0.069
MnCl2		3.961e-010	3.961e-010	-9.402	-9.402	0.000
CdOHCl		2.867e-010	2.867e-010	-9.543	-9.543	0.000
CdCl+		2.727e-010	2.248e-010	-9.564	-9.648	-0.084
TlCl		2.525e-011	2.525e-011	-10.598	-10.598	0.000
ZnCl2		1.825e-011	1.825e-011	-10.739	-10.739	0.000
CdCl2		1.424e-011	1.424e-011	-10.846	-10.846	0.000
PbCl+		5.374e-012	4.430e-012	-11.270	-11.354	-0.084
MnCl3-		1.930e-012	1.657e-012	-11.715	-11.781	-0.066
AgCl2-		6.366e-013	5.247e-013	-12.196	-12.280	-0.084
AgCl		3.965e-013	3.965e-013	-12.402	-12.402	0.000
PbCl2		3.007e-013	3.007e-013	-12.522	-12.522	0.000
TlCl2-		2.741e-013	2.259e-013	-12.562	-12.646	-0.084
ZnCl3-		2.582e-013	2.203e-013	-12.588	-12.657	-0.069
NiCl2		1.875e-013	1.875e-013	-12.727	-12.727	0.000
CdCl3-		1.656e-013	1.365e-013	-12.781	-12.865	-0.084
AgCl3-2		1.539e-014	7.106e-015	-13.813	-14.148	-0.336
ZnCl4-2		3.075e-015	1.674e-015	-14.512	-14.776	-0.264

PbCl3-	2.206e-015	1.819e-015	-14.656	-14.740	-0.084
AgCl4-3	1.254e-015	2.204e-016	-14.902	-15.657	-0.755
UO2Cl+	6.137e-016	5.059e-016	-15.212	-15.296	-0.084
CuCl2-	8.680e-017	7.405e-017	-16.061	-16.130	-0.069
HgClOH	7.245e-017	7.245e-017	-16.140	-16.140	0.000
PbCl4-2	2.735e-017	1.263e-017	-16.563	-16.899	-0.336
CuCl	2.333e-017	2.333e-017	-16.632	-16.632	0.000
HgCl2	2.005e-018	2.005e-018	-17.698	-17.698	0.000
CuCl3-2	4.420e-019	2.406e-019	-18.355	-18.619	-0.264
HgCl3-	3.696e-019	3.047e-019	-18.432	-18.516	-0.084
HgCl4-2	3.991e-020	1.843e-020	-19.399	-19.734	-0.336
CuCl+	7.028e-021	5.996e-021	-20.153	-20.222	-0.069
CrOHCl2	1.473e-021	1.473e-021	-20.832	-20.832	0.000
CrCl+2	3.554e-022	1.641e-022	-21.449	-21.785	-0.336
CoCl+	5.194e-023	4.282e-023	-22.284	-22.368	-0.084
HgCl+	3.194e-023	2.633e-023	-22.496	-22.579	-0.084
CuCl2	3.159e-023	3.159e-023	-22.500	-22.500	0.000
CrCl2+	2.870e-025	2.366e-025	-24.542	-24.626	-0.084
VOCl+	2.180e-025	1.797e-025	-24.662	-24.745	-0.084
CuCl3-	5.250e-027	4.479e-027	-26.280	-26.349	-0.069
CrO3Cl-	3.082e-029	2.540e-029	-28.511	-28.595	-0.084
FeCl+2	5.602e-030	3.049e-030	-29.252	-29.516	-0.264
CuCl4-2	6.267e-031	3.411e-031	-30.203	-30.467	-0.264
FeCl2+	2.409e-031	2.069e-031	-30.618	-30.684	-0.066
TlOHCl+	3.505e-033	2.890e-033	-32.455	-32.539	-0.084
FeCl3	3.144e-034	3.144e-034	-33.503	-33.503	0.000
TlCl4-	3.649e-037	3.008e-037	-36.438	-36.522	-0.084
TlCl3	3.138e-037	3.138e-037	-36.503	-36.503	0.000
TlCl2+	2.392e-038	1.972e-038	-37.621	-37.705	-0.084
Cr(NH3)6Cl+2	9.681e-040	4.470e-040	-39.014	-39.350	-0.336
TlCl+2	0.000e+000	0.000e+000	-41.311	-41.647	-0.336
UCl+3	0.000e+000	0.000e+000	-45.793	-46.549	-0.755
SnCl+	0.000e+000	0.000e+000	-47.210	-47.294	-0.084
SnCl2	0.000e+000	0.000e+000	-48.323	-48.323	0.000
CoCl+2	0.000e+000	0.000e+000	-50.663	-50.999	-0.336
Co(NH3)5Cl+2	0.000e+000	0.000e+000	-51.006	-51.341	-0.336
SnCl3-	0.000e+000	0.000e+000	-51.231	-51.315	-0.084
Co(NH3)6Cl+2	0.000e+000	0.000e+000	-62.980	-63.316	-0.336
Co(2)	3.721e-021				
Co+2	1.764e-021	8.146e-022	-20.753	-21.089	-0.336
Co(OH)2	1.248e-021	1.248e-021	-20.904	-20.904	0.000
CoOH+	6.129e-022	5.053e-022	-21.213	-21.296	-0.084
CoCl+	5.194e-023	4.282e-023	-22.284	-22.368	-0.084
CoSO4	4.047e-023	4.047e-023	-22.393	-22.393	0.000
CoF+	1.432e-024	1.181e-024	-23.844	-23.928	-0.084
Co(NH3)+2	1.168e-024	5.393e-025	-23.933	-24.268	-0.336
Co(OH)3-	9.387e-025	7.738e-025	-24.027	-24.111	-0.084
CoOOH-	2.356e-025	1.942e-025	-24.628	-24.712	-0.084
Co(NH3)2+2	2.743e-028	1.267e-028	-27.562	-27.897	-0.336
CoNO2+	5.606e-029	4.621e-029	-28.251	-28.335	-0.084
Co(OH)4-2	8.256e-030	3.812e-030	-29.083	-29.419	-0.336
CoHPO4	8.099e-030	8.099e-030	-29.092	-29.092	0.000
CoSeO4	9.009e-032	9.009e-032	-31.045	-31.045	0.000
Co(NH3)3+2	1.902e-032	8.781e-033	-31.721	-32.056	-0.336
CoNO3+	3.236e-035	2.667e-035	-34.490	-34.574	-0.084
Co(NH3)4+2	5.496e-037	2.538e-037	-36.260	-36.596	-0.336
Co(NH3)5+2	0.000e+000	0.000e+000	-41.299	-41.635	-0.336
Co2OH+3	0.000e+000	0.000e+000	-42.930	-43.686	-0.755
Co(NO3)2	0.000e+000	0.000e+000	-47.950	-47.950	0.000
Co4(OH)4+4	0.000e+000	0.000e+000	-75.544	-76.886	-1.342
Co(3)	0.000e+000				
CoOH+2	0.000e+000	0.000e+000	-42.955	-43.290	-0.336
CoCl+2	0.000e+000	0.000e+000	-50.663	-50.999	-0.336

Co+3		0.000e+000	0.000e+000	-50.878	-51.489	-0.611
Co(NH3)5Cl+2		0.000e+000	0.000e+000	-51.006	-51.341	-0.336
Co(NH3)6SO4+		0.000e+000	0.000e+000	-60.092	-60.176	-0.084
Co(NH3)6OH+2		0.000e+000	0.000e+000	-61.469	-61.805	-0.336
Co(NH3)6Cl+2		0.000e+000	0.000e+000	-62.980	-63.316	-0.336
Cr(2)	4.318e-029					
Cr+2		4.318e-029	1.994e-029	-28.365	-28.700	-0.336
Cr(3)	1.099e-009					
CrO2-		4.463e-010	3.679e-010	-9.350	-9.434	-0.084
Cr(OH)4-		3.763e-010	3.102e-010	-9.424	-9.508	-0.084
Cr(OH)3		2.507e-010	2.507e-010	-9.601	-9.601	0.000
Cr(OH)2+		2.604e-011	2.147e-011	-10.584	-10.668	-0.084
Cr(OH)+2		1.229e-014	5.675e-015	-13.910	-14.246	-0.336
CrOHSO4		3.354e-016	3.354e-016	-15.474	-15.474	0.000
CrF+2		1.313e-019	6.062e-020	-18.882	-19.217	-0.336
Cr+3		4.748e-020	8.345e-021	-19.323	-20.079	-0.755
CrSO4+		5.887e-021	4.853e-021	-20.230	-20.314	-0.084
CrOHCl2		1.473e-021	1.473e-021	-20.832	-20.832	0.000
CrCl+2		3.554e-022	1.641e-022	-21.449	-21.785	-0.336
CrCl2+		2.870e-025	2.366e-025	-24.542	-24.626	-0.084
Cr2(OH)2SO4+2		3.726e-028	1.720e-028	-27.429	-27.764	-0.336
Cr2(OH)2(SO4)2		2.545e-030	2.545e-030	-29.594	-29.594	0.000
Cr(NH3)5OH+2		6.703e-031	3.095e-031	-30.174	-30.509	-0.336
CrH2PO4+2		4.898e-031	2.261e-031	-30.310	-30.646	-0.336
CrNO3+2		1.632e-035	7.537e-036	-34.787	-35.123	-0.336
Cr(NH3)6+3		1.324e-038	2.326e-039	-37.878	-38.633	-0.755
Cr(NH3)6Cl+2		9.681e-040	4.470e-040	-39.014	-39.350	-0.336
Cr(6)	1.476e-015					
CrO4-2		1.464e-015	7.833e-016	-14.835	-15.106	-0.272
NaCrO4-		7.331e-018	6.043e-018	-17.135	-17.219	-0.084
KCrO4-		3.765e-018	3.104e-018	-17.424	-17.508	-0.084
HCrO4-		9.956e-019	8.207e-019	-18.002	-18.086	-0.084
H2CrO4		2.154e-028	2.154e-028	-27.667	-27.667	0.000
CrO3SO4-2		4.367e-029	2.016e-029	-28.360	-28.695	-0.336
CrO3Cl-		3.082e-029	2.540e-029	-28.511	-28.595	-0.084
CrO3HPO4-2		3.277e-031	1.513e-031	-30.484	-30.820	-0.336
Cr2O7-2		5.060e-035	2.336e-035	-34.296	-34.631	-0.336
CrO3H2PO4-		2.863e-038	2.360e-038	-37.543	-37.627	-0.084
Cu(1)	1.120e-016					
CuCl2-		8.680e-017	7.405e-017	-16.061	-16.130	-0.069
CuCl		2.333e-017	2.333e-017	-16.632	-16.632	0.000
Cu+		1.479e-018	1.220e-018	-17.830	-17.914	-0.084
CuCl3-2		4.420e-019	2.406e-019	-18.355	-18.619	-0.264
Cu(2)	1.928e-016					
Cu(OH)2		1.518e-016	1.518e-016	-15.819	-15.819	0.000
CuOH+		2.869e-017	2.448e-017	-16.542	-16.611	-0.069
Cu(OH)3-		1.174e-017	9.680e-018	-16.930	-17.014	-0.084
Cu+2		4.653e-019	2.490e-019	-18.332	-18.604	-0.272
CuNH3+2		3.039e-020	1.403e-020	-19.517	-19.853	-0.336
CuSO4		1.420e-020	1.420e-020	-19.848	-19.848	0.000
CuCl+		7.028e-021	5.996e-021	-20.153	-20.222	-0.069
Cu(OH)4-2		5.129e-021	2.368e-021	-20.290	-20.626	-0.336
CuF+		8.735e-022	7.201e-022	-21.059	-21.143	-0.084
CuCl2		3.159e-023	3.159e-023	-22.500	-22.500	0.000
CuNO2+		2.546e-025	2.099e-025	-24.594	-24.678	-0.084
CuCl3-		5.250e-027	4.479e-027	-26.280	-26.349	-0.069
Cu2(OH)2+2		3.259e-029	1.505e-029	-28.487	-28.822	-0.336
CuCl4-2		6.267e-031	3.411e-031	-30.203	-30.467	-0.264
CuNO3+		1.974e-032	1.627e-032	-31.705	-31.789	-0.084
Cu(NO2)2		1.729e-032	1.729e-032	-31.762	-31.762	0.000
Cu(NO3)2		0.000e+000	0.000e+000	-46.374	-46.374	0.000
F	5.773e-005					
F-		5.359e-005	4.583e-005	-4.271	-4.339	-0.068

CaF+	2.272e-006	1.952e-006	-5.644	-5.710	-0.066
MgF+	1.826e-006	1.563e-006	-5.739	-5.806	-0.067
NaF	4.490e-008	4.490e-008	-7.348	-7.348	0.000
MnF+	2.050e-009	1.760e-009	-8.688	-8.754	-0.066
SrF+	2.171e-010	1.789e-010	-9.663	-9.747	-0.084
BF(OH)3-	9.825e-011	8.288e-011	-10.008	-10.082	-0.074
NiF+	8.807e-011	7.260e-011	-10.055	-10.139	-0.084
ZnF+	2.204e-011	1.816e-011	-10.657	-10.741	-0.084
HF	2.195e-011	2.195e-011	-10.659	-10.659	0.000
UO2F+	1.576e-013	1.299e-013	-12.803	-12.886	-0.084
CdF+	1.365e-013	1.126e-013	-12.865	-12.949	-0.084
PbF+	3.220e-014	2.654e-014	-13.492	-13.576	-0.084
TlF	2.963e-014	2.963e-014	-13.528	-13.528	0.000
UO2F2	1.717e-014	1.717e-014	-13.765	-13.765	0.000
HF2-	4.499e-015	3.825e-015	-14.347	-14.417	-0.071
UO2F3-	2.398e-016	1.977e-016	-15.620	-15.704	-0.084
BF2(OH)2-	1.559e-016	1.315e-016	-15.807	-15.881	-0.074
PbF2	2.394e-017	2.394e-017	-16.621	-16.621	0.000
CdF2	1.029e-017	1.029e-017	-16.987	-16.987	0.000
AlF2+	2.465e-018	2.123e-018	-17.608	-17.673	-0.065
AgF	1.472e-018	1.472e-018	-17.832	-17.832	0.000
AlF3	1.225e-018	1.225e-018	-17.912	-17.912	0.000
AlF+2	2.116e-019	1.163e-019	-18.674	-18.934	-0.260
UO2F4-2	1.559e-019	7.197e-020	-18.807	-19.143	-0.336
CrF+2	1.313e-019	6.062e-020	-18.882	-19.217	-0.336
AlF4-	3.287e-020	2.814e-020	-19.483	-19.551	-0.067
VO2F	4.040e-021	4.040e-021	-20.394	-20.394	0.000
PbF3-	2.525e-021	2.081e-021	-20.598	-20.682	-0.084
H2F2	1.291e-021	1.291e-021	-20.889	-20.889	0.000
CuF+	8.735e-022	7.201e-022	-21.059	-21.143	-0.084
VO2F2-	8.157e-023	6.724e-023	-22.088	-22.172	-0.084
CoF+	1.432e-024	1.181e-024	-23.844	-23.928	-0.084
VOF+	1.406e-024	1.159e-024	-23.852	-23.936	-0.084
BF3OH-	9.008e-025	7.598e-025	-24.045	-24.119	-0.074
PbF4-2	9.887e-026	4.565e-026	-25.005	-25.341	-0.336
VO2F3-2	8.325e-026	3.844e-026	-25.080	-25.415	-0.336
VOF2	1.992e-026	1.992e-026	-25.701	-25.701	0.000
Sb(OH)2F	5.266e-027	5.266e-027	-26.279	-26.279	0.000
SbOF	5.181e-027	5.181e-027	-26.286	-26.286	0.000
FeF+2	6.135e-028	3.339e-028	-27.212	-27.476	-0.264
FeF2+	4.768e-028	4.096e-028	-27.322	-27.388	-0.066
VOF3-	3.930e-029	3.239e-029	-28.406	-28.490	-0.084
FeF3	2.649e-029	2.649e-029	-28.577	-28.577	0.000
VO2F4-3	4.933e-030	8.669e-031	-29.307	-30.062	-0.755
HgF+	1.790e-031	1.476e-031	-30.747	-30.831	-0.084
BF4-	6.580e-032	5.551e-032	-31.182	-31.256	-0.074
VOF4-2	1.298e-032	5.993e-033	-31.887	-32.222	-0.336
UF3+	1.727e-038	1.423e-038	-37.763	-37.847	-0.084
UF2+2	4.244e-039	1.959e-039	-38.372	-38.708	-0.336
SiF6-2	2.196e-040	1.195e-040	-39.658	-39.923	-0.264
UF4	0.000e+000	0.000e+000	-40.146	-40.146	0.000
UF+3	0.000e+000	0.000e+000	-40.714	-41.469	-0.755
UF5-	0.000e+000	0.000e+000	-42.802	-42.886	-0.084
UF6-2	0.000e+000	0.000e+000	-44.410	-44.745	-0.336
SnF+	0.000e+000	0.000e+000	-46.883	-46.967	-0.084
SnF2	0.000e+000	0.000e+000	-48.502	-48.502	0.000
SnF3-	0.000e+000	0.000e+000	-49.937	-50.020	-0.084
SnF6-2	0.000e+000	0.000e+000	-61.523	-61.859	-0.336
Fe(2)	2.895e-018				
Fe+2	1.549e-018	7.153e-019	-17.810	-18.146	-0.336
FeOH+	1.031e-018	8.852e-019	-17.987	-18.053	-0.066
Fe(OH)3-	2.501e-019	2.148e-019	-18.602	-18.668	-0.066
FeSO4	4.372e-020	4.372e-020	-19.359	-19.359	0.000

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   Fe(OH)2              2.186e-020  2.186e-020   -19.660   -19.660     0.000
   FeHPO4               2.595e-026  2.595e-026   -25.586   -25.586     0.000
   FeH2PO4+             1.938e-029  1.669e-029   -28.713   -28.778    -0.065
Fe(3)           2.367e-013
   Fe(OH)4-             1.810e-013  1.558e-013   -12.742   -12.807    -0.065
   Fe(OH)3              5.384e-014  5.384e-014   -13.269   -13.269     0.000
   Fe(OH)2+             1.873e-015  1.613e-015   -14.727   -14.792    -0.065
   FeOH+2               2.450e-022  1.334e-022   -21.611   -21.875    -0.264
   FeF+2                6.135e-028  3.339e-028   -27.212   -27.476    -0.264
   FeF2+                4.768e-028  4.096e-028   -27.322   -27.388    -0.066
   Fe+3                 2.713e-029  6.645e-030   -28.567   -29.178    -0.611
   FeF3                 2.649e-029  2.649e-029   -28.577   -28.577     0.000
   FeSO4+               2.161e-029  1.857e-029   -28.665   -28.731    -0.066
   FeCl+2               5.602e-030  3.049e-030   -29.252   -29.516    -0.264
   FeHPO4+              5.809e-031  5.002e-031   -30.236   -30.301    -0.065
   FeCl2+               2.409e-031  2.069e-031   -30.618   -30.684    -0.066
   Fe(SO4)2-            1.199e-031  9.884e-032   -30.921   -31.005    -0.084
   FeCl3                3.144e-034  3.144e-034   -33.503   -33.503     0.000
   FeHSeO3+2            5.791e-035  2.674e-035   -34.237   -34.573    -0.336
   FeH2PO4+2            1.068e-038  5.874e-039   -37.971   -38.231    -0.260
   Fe2(OH)2+4           0.000e+000  0.000e+000   -40.888   -42.230    -1.342
   FeNO3+2              0.000e+000  0.000e+000   -41.527   -41.862    -0.336
   Fe3(OH)4+5           0.000e+000  0.000e+000   -53.765   -55.862    -2.098
H(0)            1.475e-026
   H2                   7.375e-027  7.421e-027   -26.132   -26.130     0.003
Hg(0)           8.017e-011
   Hg                   8.017e-011  8.017e-011   -10.096   -10.096     0.000
Hg(1)           2.048e-029
   Hg2+2                1.024e-029  4.728e-030   -28.990   -29.325    -0.336
Hg(2)           6.012e-016
   Hg(OH)2              5.263e-016  5.296e-016   -15.279   -15.276     0.003
   HgClOH               7.245e-017  7.245e-017   -16.140   -16.140     0.000
   HgCl2                2.005e-018  2.005e-018   -17.698   -17.698     0.000
   HgCl3-               3.696e-019  3.047e-019   -18.432   -18.516    -0.084
   HgCl4-2              3.991e-020  1.843e-020   -19.399   -19.734    -0.336
   Hg(NH3)2+2           3.599e-021  1.662e-021   -20.444   -20.779    -0.336
   Hg(OH)3-             2.514e-021  2.072e-021   -20.600   -20.684    -0.084
   HgOH+                1.304e-022  1.075e-022   -21.885   -21.969    -0.084
   HgCl+                3.194e-023  2.633e-023   -22.496   -22.579    -0.084
   HgNH3+2              6.536e-025  3.018e-025   -24.185   -24.520    -0.336
   Hg(NH3)3+2           7.889e-026  3.643e-026   -25.103   -25.439    -0.336
   Hg+2                 1.881e-028  8.686e-029   -27.726   -28.061    -0.336
   HgSO4                5.663e-030  5.663e-030   -29.247   -29.247     0.000
   Hg(NH3)4+2           3.451e-030  1.593e-030   -29.462   -29.798    -0.336
   HgF+                 1.790e-031  1.476e-031   -30.747   -30.831    -0.084
   HgNO3+               0.000e+000  0.000e+000   -42.095   -42.179    -0.084
   Hg(NO3)2             0.000e+000  0.000e+000   -56.245   -56.245     0.000
K               1.249e-003
   K+                   1.247e-003  1.066e-003    -2.904    -2.972    -0.068
   KSO4-                2.183e-006  1.880e-006    -5.661    -5.726    -0.065
   KHPO4-               8.562e-014  7.373e-014   -13.067   -13.132    -0.065
   KCrO4-               3.765e-018  3.104e-018   -17.424   -17.508    -0.084
Mg              5.880e-004
   Mg+2                 5.680e-004  3.039e-004    -3.246    -3.517    -0.272
   MgSO4                1.377e-005  1.377e-005    -4.861    -4.861     0.000
   MgOH+                4.339e-006  3.761e-006    -5.363    -5.425    -0.062
   MgF+                 1.826e-006  1.563e-006    -5.739    -5.806    -0.067
   MgH2BO3+             1.016e-007  8.566e-008    -6.993    -7.067    -0.074
   MgHPO4               1.748e-012  1.748e-012   -11.758   -11.758     0.000
   MgPO4-               1.889e-013  1.626e-013   -12.724   -12.789    -0.065
   MgH2PO4+             7.920e-016  6.820e-016   -15.101   -15.166    -0.065
Mn(2)           2.244e-006
   Mn+2                 2.089e-006  9.648e-007    -5.680    -6.016    -0.336
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MnOH+	8.770e-008	7.533e-008	-7.057	-7.123	-0.066
MnSO4	4.272e-008	4.272e-008	-7.369	-7.369	0.000
MnCl+	2.149e-008	1.845e-008	-7.668	-7.734	-0.066
MnF+	2.050e-009	1.760e-009	-8.688	-8.754	-0.066
MnCl2	3.961e-010	3.961e-010	-9.402	-9.402	0.000
MnCl3-	1.930e-012	1.657e-012	-11.715	-11.781	-0.066
Mn(OH)3-	5.237e-013	4.499e-013	-12.281	-12.347	-0.066
Mn(OH)4-2	8.295e-017	4.515e-017	-16.081	-16.345	-0.264
MnSeO4	5.730e-017	5.730e-017	-16.242	-16.242	0.000
MnNO3+	3.832e-020	3.159e-020	-19.417	-19.500	-0.084
Mn(NO3)2	1.640e-033	1.640e-033	-32.785	-32.785	0.000
MnSe	1.563e-035	1.563e-035	-34.806	-34.806	0.000
Mn(3)	1.760e-029				
Mn+3	1.760e-029	4.309e-030	-28.755	-29.366	-0.611
Mn(6)	0.000e+000				
MnO4-2	0.000e+000	0.000e+000	-40.256	-40.520	-0.264
Mn(7)	0.000e+000				
MnO4-	0.000e+000	0.000e+000	-47.820	-47.892	-0.072
Mo	9.076e-007				
MoO4-2	9.076e-007	4.857e-007	-6.042	-6.314	-0.272
HMoO4-	3.795e-012	3.129e-012	-11.421	-11.505	-0.084
H2MoO4	7.420e-018	7.420e-018	-17.130	-17.130	0.000
Ag2MoO4	3.004e-035	3.004e-035	-34.522	-34.522	0.000
AlMo6O21-3	0.000e+000	0.000e+000	-60.668	-61.423	-0.755
Mo7O24-6	0.000e+000	0.000e+000	-64.103	-67.123	-3.020
HMo7O24-5	0.000e+000	0.000e+000	-68.128	-70.226	-2.098
H2Mo7O24-4	0.000e+000	0.000e+000	-73.591	-74.933	-1.342
H3Mo7O24-3	0.000e+000	0.000e+000	-80.422	-81.177	-0.755
N(-3)	9.282e-006				
NH3	5.506e-006	5.506e-006	-5.259	-5.259	0.000
NH4+	3.707e-006	3.127e-006	-5.431	-5.505	-0.074
CaNH3+2	5.857e-008	2.705e-008	-7.232	-7.568	-0.336
NH4SO4-	9.713e-009	8.343e-009	-8.013	-8.079	-0.066
NiNH3+2	4.039e-010	1.865e-010	-9.394	-9.729	-0.336
SrNH3+2	1.047e-011	4.835e-012	-10.980	-11.316	-0.336
Ni(NH3)2+2	3.214e-013	1.484e-013	-12.493	-12.829	-0.336
Ca(NH3)2+2	1.284e-013	5.929e-014	-12.891	-13.227	-0.336
AgNH3+	1.743e-016	1.437e-016	-15.759	-15.843	-0.084
BaNH3+2	3.936e-017	1.818e-017	-16.405	-16.741	-0.336
Ag(NH3)2+	7.803e-018	6.432e-018	-17.108	-17.192	-0.084
CuNH3+2	3.039e-020	1.403e-020	-19.517	-19.853	-0.336
Hg(NH3)2+2	3.599e-021	1.662e-021	-20.444	-20.779	-0.336
Co(NH3)+2	1.168e-024	5.393e-025	-23.933	-24.268	-0.336
HgNH3+2	6.536e-025	3.018e-025	-24.185	-24.520	-0.336
Hg(NH3)3+2	7.889e-026	3.643e-026	-25.103	-25.439	-0.336
Co(NH3)2+2	2.743e-028	1.267e-028	-27.562	-27.897	-0.336
Hg(NH3)4+2	3.451e-030	1.593e-030	-29.462	-29.798	-0.336
Cr(NH3)5OH+2	6.703e-031	3.095e-031	-30.174	-30.509	-0.336
Co(NH3)3+2	1.902e-032	8.781e-033	-31.721	-32.056	-0.336
Co(NH3)4+2	5.496e-037	2.538e-037	-36.260	-36.596	-0.336
Cr(NH3)6+3	1.324e-038	2.326e-039	-37.878	-38.633	-0.755
Cr(NH3)6Cl+2	9.681e-040	4.470e-040	-39.014	-39.350	-0.336
Co(NH3)5+2	0.000e+000	0.000e+000	-41.299	-41.635	-0.336
Co(NH3)5Cl+2	0.000e+000	0.000e+000	-51.006	-51.341	-0.336
Co(NH3)6SO4+	0.000e+000	0.000e+000	-60.092	-60.176	-0.084
Co(NH3)6OH+2	0.000e+000	0.000e+000	-61.469	-61.805	-0.336
Co(NH3)6Cl+2	0.000e+000	0.000e+000	-62.980	-63.316	-0.336
N(3)	9.506e-009				
NO2-	9.506e-009	8.050e-009	-8.022	-8.094	-0.072
TlNO2	2.795e-017	2.795e-017	-16.554	-16.554	0.000
AgNO2	2.150e-020	2.150e-020	-19.668	-19.668	0.000
CuNO2+	2.546e-025	2.099e-025	-24.594	-24.678	-0.084
Ag(NO2)2-	3.252e-028	2.681e-028	-27.488	-27.572	-0.084

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   CoNO2+                5.606e-029  4.621e-029   -28.251   -28.335    -0.084
   Cu(NO2)2              1.729e-032  1.729e-032   -31.762   -31.762     0.000
N(5)            2.447e-014
   NO3-                  2.416e-014  2.066e-014   -13.617   -13.685    -0.068
   CaNO3+                3.092e-016  2.549e-016   -15.510   -15.594    -0.084
   SrNO3+                1.103e-019  9.093e-020   -18.957   -19.041    -0.084
   MnNO3+                3.832e-020  3.159e-020   -19.417   -19.500    -0.084
   NiNO3+                3.970e-021  3.273e-021   -20.401   -20.485    -0.084
   ZnNO3+                1.250e-021  1.031e-021   -20.903   -20.987    -0.084
   TlNO3                 2.269e-023  2.269e-023   -22.644   -22.644     0.000
   CdNO3+                1.228e-023  1.012e-023   -22.911   -22.995    -0.084
   PbNO3+                3.046e-024  2.511e-024   -23.516   -23.600    -0.084
   BaNO3+                6.572e-025  5.417e-025   -24.182   -24.266    -0.084
   UO2NO3+               1.027e-027  8.464e-028   -26.989   -27.072    -0.084
   AgNO3                 2.098e-028  2.098e-028   -27.678   -27.678     0.000
   CuNO3+                1.974e-032  1.627e-032   -31.705   -31.789    -0.084
   Mn(NO3)2              1.640e-033  1.640e-033   -32.785   -32.785     0.000
   VO2NO3                5.253e-034  5.253e-034   -33.280   -33.280     0.000
   CoNO3+                3.236e-035  2.667e-035   -34.490   -34.574    -0.084
   CrNO3+2               1.632e-035  7.537e-036   -34.787   -35.123    -0.336
   Zn(NO3)2              4.249e-036  4.249e-036   -35.372   -35.372     0.000
   Cd(NO3)2              1.048e-037  1.048e-037   -36.980   -36.980     0.000
   Pb(NO3)2              8.811e-038  8.811e-038   -37.055   -37.055     0.000
   FeNO3+2               0.000e+000  0.000e+000   -41.527   -41.862    -0.336
   HgNO3+                0.000e+000  0.000e+000   -42.095   -42.179    -0.084
   Cu(NO3)2              0.000e+000  0.000e+000   -46.374   -46.374     0.000
   Co(NO3)2              0.000e+000  0.000e+000   -47.950   -47.950     0.000
   Hg(NO3)2              0.000e+000  0.000e+000   -56.245   -56.245     0.000
   TlNO3+2               0.000e+000  0.000e+000   -57.181   -57.517    -0.336
   SnNO3+                0.000e+000  0.000e+000   -59.869   -59.953    -0.084
Na              1.818e-003
   Na+                   1.815e-003  1.552e-003    -2.741    -2.809    -0.068
   NaSO4-                2.411e-006  2.076e-006    -5.618    -5.683    -0.065
   NaF                   4.490e-008  4.490e-008    -7.348    -7.348     0.000
   NaH2BO3               2.000e-008  2.000e-008    -7.699    -7.699     0.000
   NaHPO4-               1.930e-013  1.662e-013   -12.714   -12.779    -0.065
   NaCrO4-               7.331e-018  6.043e-018   -17.135   -17.219    -0.084
Ni              2.176e-007
   Ni+2                  1.178e-007  6.306e-008    -6.929    -7.200    -0.272
   Ni(OH)2               6.093e-008  6.093e-008    -7.215    -7.215     0.000
   NiOH+                 2.994e-008  2.468e-008    -7.524    -7.608    -0.084
   NiSO4                 3.133e-009  3.133e-009    -8.504    -8.504     0.000
   NiCl+                 2.974e-009  2.451e-009    -8.527    -8.611    -0.084
   Ni(OH)3-              2.298e-009  1.894e-009    -8.639    -8.723    -0.084
   NiNH3+2               4.039e-010  1.865e-010    -9.394    -9.729    -0.336
   NiF+                  8.807e-011  7.260e-011   -10.055   -10.139    -0.084
   Ni(NH3)2+2            3.214e-013  1.484e-013   -12.493   -12.829    -0.336
   NiCl2                 1.875e-013  1.875e-013   -12.727   -12.727     0.000
   Ni(SO4)2-2            5.595e-014  2.583e-014   -13.252   -13.588    -0.336
   NiSeO4                6.509e-018  6.509e-018   -17.187   -17.187     0.000
   NiNO3+                3.970e-021  3.273e-021   -20.401   -20.485    -0.084
O(0)            0.000e+000
   O2                    0.000e+000  0.000e+000   -40.039   -40.036     0.003
P               1.904e-010
   CaPO4-                1.551e-010  1.336e-010    -9.809    -9.874    -0.065
   HPO4-2                1.674e-011  9.114e-012   -10.776   -11.040    -0.264
   CaHPO4                1.625e-011  1.625e-011   -10.789   -10.789     0.000
   MgHPO4                1.748e-012  1.748e-012   -11.758   -11.758     0.000
   NaHPO4-               1.930e-013  1.662e-013   -12.714   -12.779    -0.065
   MgPO4-                1.889e-013  1.626e-013   -12.724   -12.789    -0.065
   KHPO4-                8.562e-014  7.373e-014   -13.067   -13.132    -0.065
   H2PO4-                5.406e-014  4.655e-014   -13.267   -13.332    -0.065
   PO4-3                 4.847e-014  1.187e-014   -13.315   -13.926    -0.611
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UO2PO4-	5.257e-015	4.334e-015	-14.279	-14.363	-0.084
CaH2PO4+	4.722e-015	4.066e-015	-14.326	-14.391	-0.065
SrHPO4	3.170e-015	3.170e-015	-14.499	-14.499	0.000
MgH2PO4+	7.920e-016	6.820e-016	-15.101	-15.166	-0.065
UO2(HPO4)2-2	6.389e-018	2.950e-018	-17.195	-17.530	-0.336
UO2HPO4	3.565e-018	3.565e-018	-17.448	-17.448	0.000
SrH2PO4+	4.210e-019	3.470e-019	-18.376	-18.460	-0.084
H3PO4	2.119e-021	2.119e-021	-20.674	-20.674	0.000
UO2H2PO4+	2.110e-024	1.739e-024	-23.676	-23.760	-0.084
FeHPO4	2.595e-026	2.595e-026	-25.586	-25.586	0.000
FeH2PO4+	1.938e-029	1.669e-029	-28.713	-28.778	-0.065
CoHPO4	8.099e-030	8.099e-030	-29.092	-29.092	0.000
FeHPO4+	5.809e-031	5.002e-031	-30.236	-30.301	-0.065
CrH2PO4+2	4.898e-031	2.261e-031	-30.310	-30.646	-0.336
CrO3HPO4-2	3.277e-031	1.513e-031	-30.484	-30.820	-0.336
UO2(H2PO4)2	1.593e-035	1.593e-035	-34.798	-34.798	0.000
CrO3H2PO4-	2.863e-038	2.360e-038	-37.543	-37.627	-0.084
FeH2PO4+2	1.068e-038	5.874e-039	-37.971	-38.231	-0.260
UHPO4+2	0.000e+000	0.000e+000	-45.067	-45.403	-0.336
UO2(H2PO4)3-	0.000e+000	0.000e+000	-46.074	-46.158	-0.084
U(HPO4)2	0.000e+000	0.000e+000	-46.428	-46.428	0.000
U(HPO4)3-2	0.000e+000	0.000e+000	-48.777	-49.112	-0.336
U(HPO4)4-4	0.000e+000	0.000e+000	-50.266	-51.608	-1.342
Pb	1.455e-009				
PbOH+	7.784e-010	6.416e-010	-9.109	-9.193	-0.084
Pb(OH)2	6.307e-010	6.307e-010	-9.200	-9.200	0.000
Pb(OH)3-	2.378e-011	1.961e-011	-10.624	-10.708	-0.084
Pb+2	1.536e-011	8.218e-012	-10.814	-11.085	-0.272
PbCl+	5.374e-012	4.430e-012	-11.270	-11.354	-0.084
PbSO4	1.002e-012	1.002e-012	-11.999	-11.999	0.000
Pb(OH)4-2	3.233e-013	1.493e-013	-12.490	-12.826	-0.336
PbCl2	3.007e-013	3.007e-013	-12.522	-12.522	0.000
PbF+	3.220e-014	2.654e-014	-13.492	-13.576	-0.084
Pb(SO4)2-2	3.257e-015	1.504e-015	-14.487	-14.823	-0.336
PbCl3-	2.206e-015	1.819e-015	-14.656	-14.740	-0.084
PbCl4-2	2.735e-017	1.263e-017	-16.563	-16.899	-0.336
PbF2	2.394e-017	2.394e-017	-16.621	-16.621	0.000
Pb2OH+3	4.755e-019	8.357e-020	-18.323	-19.078	-0.755
Pb3(OH)4+2	1.413e-019	6.523e-020	-18.850	-19.186	-0.336
PbF3-	2.525e-021	2.081e-021	-20.598	-20.682	-0.084
PbNO3+	3.046e-024	2.511e-024	-23.516	-23.600	-0.084
PbF4-2	9.887e-026	4.565e-026	-25.005	-25.341	-0.336
Pb4(OH)4+4	9.367e-026	4.258e-027	-25.028	-26.371	-1.342
Pb(NO3)2	8.811e-038	8.811e-038	-37.055	-37.055	0.000
S(6)	7.064e-004				
SO4-2	4.653e-004	2.490e-004	-3.332	-3.604	-0.272
CaSO4	2.226e-004	2.226e-004	-3.653	-3.653	0.000
MgSO4	1.377e-005	1.377e-005	-4.861	-4.861	0.000
NaSO4-	2.411e-006	2.076e-006	-5.618	-5.683	-0.065
KSO4-	2.183e-006	1.880e-006	-5.661	-5.726	-0.065
SrSO4	5.493e-008	5.493e-008	-7.260	-7.260	0.000
MnSO4	4.272e-008	4.272e-008	-7.369	-7.369	0.000
NH4SO4-	9.713e-009	8.343e-009	-8.013	-8.079	-0.066
NiSO4	3.133e-009	3.133e-009	-8.504	-8.504	0.000
ZnSO4	1.082e-009	1.082e-009	-8.966	-8.966	0.000
HSO4-	9.203e-012	7.879e-012	-11.036	-11.104	-0.067
CdSO4	9.045e-012	9.045e-012	-11.044	-11.044	0.000
Zn(SO4)2-2	5.083e-012	2.347e-012	-11.294	-11.630	-0.336
TlSO4-	3.637e-012	2.998e-012	-11.439	-11.523	-0.084
PbSO4	1.002e-012	1.002e-012	-11.999	-11.999	0.000
Cd(SO4)2-2	6.580e-014	3.038e-014	-13.182	-13.517	-0.336
Ni(SO4)2-2	5.595e-014	2.583e-014	-13.252	-13.588	-0.336
UO2SO4	7.738e-015	7.738e-015	-14.111	-14.111	0.000

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   Pb(SO4)2-2            3.257e-015  1.504e-015   -14.487   -14.823    -0.336
   CrOHSO4               3.354e-016  3.354e-016   -15.474   -15.474     0.000
   AgSO4-                7.704e-017  6.351e-017   -16.113   -16.197    -0.084
   UO2(SO4)2-2           5.501e-017  2.540e-017   -16.260   -16.595    -0.336
   FeSO4                 4.372e-020  4.372e-020   -19.359   -19.359     0.000
   CuSO4                 1.420e-020  1.420e-020   -19.848   -19.848     0.000
   CrSO4+                5.887e-021  4.853e-021   -20.230   -20.314    -0.084
   AlSO4+                5.732e-022  4.907e-022   -21.242   -21.309    -0.067
   VO2SO4-               3.626e-022  2.989e-022   -21.441   -21.525    -0.084
   CoSO4                 4.047e-023  4.047e-023   -22.393   -22.393     0.000
   Al(SO4)2-             1.529e-024  1.309e-024   -23.816   -23.883    -0.067
   VOSO4                 2.892e-025  2.892e-025   -24.539   -24.539     0.000
   Cr2(OH)2SO4+2         3.726e-028  1.720e-028   -27.429   -27.764    -0.336
   CrO3SO4-2             4.367e-029  2.016e-029   -28.360   -28.695    -0.336
   FeSO4+                2.161e-029  1.857e-029   -28.665   -28.731    -0.066
   HgSO4                 5.663e-030  5.663e-030   -29.247   -29.247     0.000
   Cr2(OH)2(SO4)2        2.545e-030  2.545e-030   -29.594   -29.594     0.000
   Fe(SO4)2-             1.199e-031  9.884e-032   -30.921   -31.005    -0.084
   VSO4+                 3.131e-040  2.581e-040   -39.504   -39.588    -0.084
   USO4+2                0.000e+000  0.000e+000   -43.098   -43.434    -0.336
   U(SO4)2               0.000e+000  0.000e+000   -43.138   -43.138     0.000
   Co(NH3)6SO4+          0.000e+000  0.000e+000   -60.092   -60.176    -0.084
Sb(3)            4.509e-019
   Sb(OH)3               2.271e-019  2.271e-019   -18.644   -18.644     0.000
   HSbO2                 2.217e-019  2.217e-019   -18.654   -18.654     0.000
   SbO2-                 1.346e-021  1.109e-021   -20.871   -20.955    -0.084
   Sb(OH)4-              7.703e-022  6.350e-022   -21.113   -21.197    -0.084
   Sb(OH)2F              5.266e-027  5.266e-027   -26.279   -26.279     0.000
   SbOF                  5.181e-027  5.181e-027   -26.286   -26.286     0.000
   Sb(OH)2+              2.167e-027  1.786e-027   -26.664   -26.748    -0.084
   SbO+                  7.473e-028  6.160e-028   -27.127   -27.210    -0.084
Sb(5)            3.402e-008
   SbO3-                 3.398e-008  2.801e-008    -7.469    -7.553    -0.084
   Sb(OH)6-              3.825e-011  3.272e-011   -10.417   -10.485    -0.068
   SbO2+                 1.022e-027  8.426e-028   -26.990   -27.074    -0.084
Se(-2)           5.232e-017
   Ag2Se                 5.232e-017  5.232e-017   -16.281   -16.281     0.000
   HSe-                  1.544e-033  1.273e-033   -32.811   -32.895    -0.084
   MnSe                  1.563e-035  1.563e-035   -34.806   -34.806     0.000
   Se-2                  8.512e-039  3.930e-039   -38.070   -38.406    -0.336
   H2Se                  3.198e-039  3.198e-039   -38.495   -38.495     0.000
   AgOH(Se)2-4           0.000e+000  0.000e+000   -70.382   -71.724    -1.342
Se(4)            4.240e-008
   SeO3-2                4.055e-008  1.872e-008    -7.392    -7.728    -0.336
   HSeO3-                1.847e-009  1.523e-009    -8.733    -8.817    -0.084
   H2SeO3                2.103e-016  2.103e-016   -15.677   -15.677     0.000
   AgSeO3-               1.866e-019  1.538e-019   -18.729   -18.813    -0.084
   Cd(SeO3)2-2           9.697e-020  4.477e-020   -19.013   -19.349    -0.336
   Ag(SeO3)2-3           1.467e-025  2.579e-026   -24.833   -25.589    -0.755
   FeHSeO3+2             5.791e-035  2.674e-035   -34.237   -34.573    -0.336
Se(6)            4.124e-013
   SeO4-2                4.124e-013  2.207e-013   -12.385   -12.656    -0.272
   MnSeO4                5.730e-017  5.730e-017   -16.242   -16.242     0.000
   NiSeO4                6.509e-018  6.509e-018   -17.187   -17.187     0.000
   ZnSeO4                6.789e-019  6.789e-019   -18.168   -18.168     0.000
   CdSeO4                6.367e-021  6.367e-021   -20.196   -20.196     0.000
   HSeO4-                4.344e-021  3.581e-021   -20.362   -20.446    -0.084
   Zn(SeO4)2-2           3.289e-031  1.519e-031   -30.483   -30.818    -0.336
   CoSeO4                9.009e-032  9.009e-032   -31.045   -31.045     0.000
Si               1.174e-006
   H4SiO4                7.687e-007  7.735e-007    -6.114    -6.112     0.003
   H3SiO4-               4.048e-007  3.453e-007    -6.393    -6.462    -0.069
   H2SiO4-2              1.224e-010  6.730e-011    -9.912   -10.172    -0.260
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UO2H3SiO4+		7.302e-013	6.020e-013	-12.137	-12.220	-0.084
SiF6-2		2.196e-040	1.195e-040	-39.658	-39.923	-0.264
Sn(2)	3.847e-035					
HSnO2-		2.559e-035	2.109e-035	-34.592	-34.676	-0.084
Sn(OH)3-		7.007e-036	5.776e-036	-35.154	-35.238	-0.084
Sn(OH)2		5.876e-036	5.876e-036	-35.231	-35.231	0.000
SnOH+		0.000e+000	0.000e+000	-40.940	-41.023	-0.084
Sn+2		0.000e+000	0.000e+000	-46.780	-47.116	-0.336
SnF+		0.000e+000	0.000e+000	-46.883	-46.967	-0.084
SnCl+		0.000e+000	0.000e+000	-47.210	-47.294	-0.084
SnCl2		0.000e+000	0.000e+000	-48.323	-48.323	0.000
SnF2		0.000e+000	0.000e+000	-48.502	-48.502	0.000
SnF3-		0.000e+000	0.000e+000	-49.937	-50.020	-0.084
SnCl3-		0.000e+000	0.000e+000	-51.231	-51.315	-0.084
SnNO3+		0.000e+000	0.000e+000	-59.869	-59.953	-0.084
Sn2(OH)2+2		0.000e+000	0.000e+000	-79.711	-80.047	-0.336
Sn3(OH)4+2		0.000e+000	0.000e+000	-109.942	-110.278	-0.336
Sn(4)	6.338e-013					
Sn(OH)6-2		6.292e-013	3.367e-013	-12.201	-12.473	-0.272
SnO3-2		4.504e-015	2.080e-015	-14.346	-14.682	-0.336
Sn+4		0.000e+000	0.000e+000	-46.848	-48.191	-1.342
SnF6-2		0.000e+000	0.000e+000	-61.523	-61.859	-0.336
Sr	2.122e-006					
Sr+2		2.066e-006	1.105e-006	-5.685	-5.956	-0.272
SrSO4		5.493e-008	5.493e-008	-7.260	-7.260	0.000
SrH2BO3+		3.780e-010	3.188e-010	-9.423	-9.496	-0.074
SrOH+		2.643e-010	2.270e-010	-9.578	-9.644	-0.066
SrF+		2.171e-010	1.789e-010	-9.663	-9.747	-0.084
SrNH3+2		1.047e-011	4.835e-012	-10.980	-11.316	-0.336
SrHPO4		3.170e-015	3.170e-015	-14.499	-14.499	0.000
SrH2PO4+		4.210e-019	3.470e-019	-18.376	-18.460	-0.084
SrNO3+		1.103e-019	9.093e-020	-18.957	-19.041	-0.084
Tl(1)	6.523e-010					
Tl+		6.230e-010	5.136e-010	-9.205	-9.289	-0.084
TlCl		2.525e-011	2.525e-011	-10.598	-10.598	0.000
TlSO4-		3.637e-012	2.998e-012	-11.439	-11.523	-0.084
TlCl2-		2.741e-013	2.259e-013	-12.562	-12.646	-0.084
TlOH		9.844e-014	9.844e-014	-13.007	-13.007	0.000
TlF		2.963e-014	2.963e-014	-13.528	-13.528	0.000
TlNO2		2.795e-017	2.795e-017	-16.554	-16.554	0.000
TlNO3		2.269e-023	2.269e-023	-22.644	-22.644	0.000
Tl(3)	4.264e-023					
Tl(OH)3		4.232e-023	4.259e-023	-22.373	-22.371	0.003
Tl(OH)4-		3.204e-025	2.641e-025	-24.494	-24.578	-0.084
Tl(OH)2+		1.320e-030	1.088e-030	-29.879	-29.963	-0.084
TlOHCl+		3.505e-033	2.890e-033	-32.455	-32.539	-0.084
TlCl4-		3.649e-037	3.008e-037	-36.438	-36.522	-0.084
TlCl3		3.138e-037	3.138e-037	-36.503	-36.503	0.000
TlCl2+		2.392e-038	1.972e-038	-37.621	-37.705	-0.084
TlOH+2		4.784e-039	2.209e-039	-38.320	-38.656	-0.336
TlCl+2		0.000e+000	0.000e+000	-41.311	-41.647	-0.336
Tl+3		0.000e+000	0.000e+000	-46.793	-47.548	-0.755
TlNO3+2		0.000e+000	0.000e+000	-57.181	-57.517	-0.336
U(3)	0.000e+000					
U+3		0.000e+000	0.000e+000	-56.471	-57.226	-0.755
U(4)	9.581e-013					
U(OH)5-		9.581e-013	7.898e-013	-12.019	-12.102	-0.084
U(OH)4		1.071e-017	1.071e-017	-16.970	-16.970	0.000
U(OH)3+		1.539e-023	1.269e-023	-22.813	-22.897	-0.084
U(OH)2+2		4.116e-030	1.901e-030	-29.386	-29.721	-0.336
UOH+3		1.650e-037	2.899e-038	-36.783	-37.538	-0.755
UF3+		1.727e-038	1.423e-038	-37.763	-37.847	-0.084
UF2+2		4.244e-039	1.959e-039	-38.372	-38.708	-0.336

UF4		0.000e+000	0.000e+000	-40.146	-40.146	0.000
UF+3		0.000e+000	0.000e+000	-40.714	-41.469	-0.755
UF5-		0.000e+000	0.000e+000	-42.802	-42.886	-0.084
USO4+2		0.000e+000	0.000e+000	-43.098	-43.434	-0.336
U(SO4)2		0.000e+000	0.000e+000	-43.138	-43.138	0.000
UF6-2		0.000e+000	0.000e+000	-44.410	-44.745	-0.336
UHPO4+2		0.000e+000	0.000e+000	-45.067	-45.403	-0.336
U+4		0.000e+000	0.000e+000	-45.088	-46.430	-1.342
UCl+3		0.000e+000	0.000e+000	-45.793	-46.549	-0.755
U(HPO4)2		0.000e+000	0.000e+000	-46.428	-46.428	0.000
U(HPO4)3-2		0.000e+000	0.000e+000	-48.777	-49.112	-0.336
U(HPO4)4-4		0.000e+000	0.000e+000	-50.266	-51.608	-1.342
U6(OH)15+9		0.000e+000	0.000e+000	-146.597	-153.393	-6.796
U(5)	1.518e-013					
UO2+		1.518e-013	1.251e-013	-12.819	-12.903	-0.084
U(6)	2.395e-009					
(UO2)3(OH)5+		7.654e-010	6.309e-010	-9.116	-9.200	-0.084
UO2OH+		9.747e-011	8.035e-011	-10.011	-10.095	-0.084
UO2H3SiO4+		7.302e-013	6.020e-013	-12.137	-12.220	-0.084
UO2F+		1.576e-013	1.299e-013	-12.803	-12.886	-0.084
UO2+2		3.837e-014	2.053e-014	-13.416	-13.688	-0.272
(UO2)2(OH)2+2		2.320e-014	1.071e-014	-13.634	-13.970	-0.336
UO2F2		1.717e-014	1.717e-014	-13.765	-13.765	0.000
UO2SO4		7.738e-015	7.738e-015	-14.111	-14.111	0.000
UO2PO4-		5.257e-015	4.334e-015	-14.279	-14.363	-0.084
UO2Cl+		6.137e-016	5.059e-016	-15.212	-15.296	-0.084
UO2F3-		2.398e-016	1.977e-016	-15.620	-15.704	-0.084
UO2(SO4)2-2		5.501e-017	2.540e-017	-16.260	-16.595	-0.336
UO2(HPO4)2-2		6.389e-018	2.950e-018	-17.195	-17.530	-0.336
UO2HPO4		3.565e-018	3.565e-018	-17.448	-17.448	0.000
UO2F4-2		1.559e-019	7.197e-020	-18.807	-19.143	-0.336
UO2H2PO4+		2.110e-024	1.739e-024	-23.676	-23.760	-0.084
UO2NO3+		1.027e-027	8.464e-028	-26.989	-27.072	-0.084
UO2(H2PO4)2		1.593e-035	1.593e-035	-34.798	-34.798	0.000
UO2(H2PO4)3-		0.000e+000	0.000e+000	-46.074	-46.158	-0.084
V(2)	0.000e+000					
VOH+		0.000e+000	0.000e+000	-41.882	-41.966	-0.084
V+2		0.000e+000	0.000e+000	-44.633	-44.968	-0.336
V(3)	5.321e-014					
V(OH)3		5.321e-014	5.321e-014	-13.274	-13.274	0.000
V(OH)2+		1.351e-026	1.114e-026	-25.869	-25.953	-0.084
VOH+2		7.409e-032	3.421e-032	-31.130	-31.466	-0.336
V+3		1.249e-038	2.196e-039	-37.903	-38.658	-0.755
VSO4+		3.131e-040	2.581e-040	-39.504	-39.588	-0.084
V2(OH)3+3		0.000e+000	0.000e+000	-58.212	-58.967	-0.755
V2(OH)2+4		0.000e+000	0.000e+000	-60.789	-62.132	-1.342
V(4)	3.172e-020					
V(OH)3+		3.171e-020	2.614e-020	-19.499	-19.583	-0.084
VO+2		9.131e-024	4.216e-024	-23.039	-23.375	-0.336
VOF+		1.406e-024	1.159e-024	-23.852	-23.936	-0.084
VOSO4		2.892e-025	2.892e-025	-24.539	-24.539	0.000
VOCl+		2.180e-025	1.797e-025	-24.662	-24.745	-0.084
VOF2		1.992e-026	1.992e-026	-25.701	-25.701	0.000
VOF3-		3.930e-029	3.239e-029	-28.406	-28.490	-0.084
VOF4-2		1.298e-032	5.993e-033	-31.887	-32.222	-0.336
H2V2O4+2		7.423e-035	3.427e-035	-34.129	-34.465	-0.336
V(5)	4.326e-007					
HVO4-2		4.034e-007	1.863e-007	-6.394	-6.730	-0.336
H2VO4-		2.912e-008	2.401e-008	-7.536	-7.620	-0.084
VO4-3		1.641e-011	2.883e-012	-10.785	-11.540	-0.755
HV2O7-3		8.626e-012	1.516e-012	-11.064	-11.819	-0.755
V2O7-4		2.772e-012	1.260e-013	-11.557	-12.900	-1.342
H3VO4		7.773e-014	7.773e-014	-13.109	-13.109	0.000

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   H3V2O7-                1.462e-014  1.205e-014   -13.835   -13.919    -0.084
   V3O9-3                 8.257e-017  1.451e-017   -16.083   -16.838    -0.755
   VO2+                   5.877e-020  5.026e-020   -19.231   -19.299    -0.068
   VO2F                   4.040e-021  4.040e-021   -20.394   -20.394     0.000
   V4O12-4                3.197e-021  1.453e-022   -20.495   -21.838    -1.342
   VO2SO4-                3.626e-022  2.989e-022   -21.441   -21.525    -0.084
   VO2F2-                 8.157e-023  6.724e-023   -22.088   -22.172    -0.084
   VO2F3-2                8.325e-026  3.844e-026   -25.080   -25.415    -0.336
   VO2F4-3                4.933e-030  8.669e-031   -29.307   -30.062    -0.755
   VO2NO3                 5.253e-034  5.253e-034   -33.280   -33.280     0.000
   V10O28-6               0.000e+000  0.000e+000   -62.227   -65.247    -3.020
   HV10O28-5              0.000e+000  0.000e+000   -64.453   -66.550    -2.098
   H2V10O28-4             0.000e+000  0.000e+000   -69.490   -70.832    -1.342
Zn              5.067e-007
   Zn(OH)2                3.042e-007  3.042e-007    -6.517    -6.517     0.000
   ZnOH+                  7.490e-008  6.174e-008    -7.126    -7.209    -0.084
   Zn(OH)3-               5.749e-008  4.739e-008    -7.240    -7.324    -0.084
   Zn+2                   3.712e-008  1.986e-008    -7.430    -7.702    -0.272
   ZnOHCl                 3.085e-008  3.085e-008    -7.511    -7.511     0.000
   ZnSO4                  1.082e-009  1.082e-009    -8.966    -8.966     0.000
   ZnCl+                  8.886e-010  7.581e-010    -9.051    -9.120    -0.069
   Zn(OH)4-2              1.270e-010  5.865e-011    -9.896   -10.232    -0.336
   ZnF+                   2.204e-011  1.816e-011   -10.657   -10.741    -0.084
   ZnCl2                  1.825e-011  1.825e-011   -10.739   -10.739     0.000
   Zn(SO4)2-2             5.083e-012  2.347e-012   -11.294   -11.630    -0.336
   ZnCl3-                 2.582e-013  2.203e-013   -12.588   -12.657    -0.069
   ZnCl4-2                3.075e-015  1.674e-015   -14.512   -14.776    -0.264
   ZnSeO4                 6.789e-019  6.789e-019   -18.168   -18.168     0.000
   ZnNO3+                 1.250e-021  1.031e-021   -20.903   -20.987    -0.084
   Zn(SeO4)2-2            3.289e-031  1.519e-031   -30.483   -30.818    -0.336
   Zn(NO3)2               4.249e-036  4.249e-036   -35.372   -35.372     0.000

-----------------------------Saturation indices-----------------------------

       Phase               SI log IAP  log KT

       (Co(NH3)5Cl)(NO3)2 -67.04  -60.75    6.29  (Co(NH3)5Cl)(NO3)2
       (Co(NH3)5Cl)Cl2 -41.53  -37.02    4.51  (Co(NH3)5Cl)Cl2
       (Co(NH3)5OH2)Cl3 -48.76  -37.02   11.74  (Co(NH3)5OH2)Cl3
       (Co(NH3)6)(NO3)3 -86.57  -68.63   17.93  (Co(NH3)6)(NO3)3
       (Co(NH3)6)Cl3   -53.07  -33.03   20.03  (Co(NH3)6)Cl3
       (NH4)2CrO4      -26.52  -26.12    0.40  (NH4)2CrO4
       (NH4)2SeO4      -24.12  -23.67    0.45  (NH4)2SeO4
       (UO2)3(PO4)2    -19.51  -68.91  -49.40  (UO2)3(PO4)2
       (VO)3(PO4)2     -72.88  -97.98  -25.10  (VO)3(PO4)2
       Ag2CrO4         -31.30  -42.89  -11.59  Ag2CrO4
       Ag2HVO4         -20.10  -18.62    1.48  Ag2HVO4
       Ag2MoO4         -22.55  -34.10  -11.55  Ag2MoO4
       Ag2O            -21.38   -8.81   12.57  Ag2O
       Ag2Se            -2.49  -51.19  -48.70  Ag2Se
       Ag2SeO3         -19.96  -27.11   -7.15  Ag2SeO3
       Ag2SeO4         -31.53  -40.44   -8.91  Ag2SeO4
       Ag2SO4          -26.57  -31.39   -4.82  Ag2SO4
       Ag3AsO3         -35.45  -33.29    2.16  Ag3AsO3
       Ag3AsO4         -26.43  -29.21   -2.79  Ag3AsO4
       Ag3H2VO5        -28.20  -23.02    5.18  Ag3H2VO5
       Ag3PO4          -38.02  -55.61  -17.59  Ag3PO4
       AgF:4H2O        -19.28  -18.23    1.05  AgF:4H2O
       Agmetal          -2.39  -15.89  -13.51  Ag
       AgVO3           -14.98  -14.21    0.77  AgVO3
       Al(OH)3(am)      -3.93    6.87   10.80  Al(OH)3
       Al2(MoO4)3      -64.50  -62.13    2.37  Al2(MoO4)3
       Al2O3            -5.91   13.75   19.65  Al2O3
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Al4(OH)10SO4	-17.79	4.91	22.70	Al4(OH)10SO4
AlAsO4:2H2O	-13.93	-9.13	4.80	AlAsO4:2H2O
AlOHSO4	-12.48	-15.71	-3.23	AlOHSO4
AlSb	-146.33	-80.71	65.62	AlSb
Alunite	-16.63	-18.03	-1.40	KAl3(SO4)2(OH)6
Anglesite	-6.90	-14.69	-7.79	PbSO4
Anhydrite	-1.65	-6.01	-4.36	CaSO4
Antlerite	-30.24	-21.46	8.79	Cu3(OH)4SO4
Arsenolite	-77.57	-80.33	-2.76	As4O6
As2O5	-38.71	-32.00	6.71	As2O5
Atacamite	-17.95	-10.56	7.39	Cu2(OH)3Cl
Autunite	-13.71	-57.64	-43.93	Ca(UO2)2(PO4)2
Avicennite	-31.74	-44.74	-13.00	Tl2O3
Ba(OH)2:8H2O	-16.70	7.70	24.39	Ba(OH)2:8H2O
Ba2V2O7:2H2O	-20.09	-4.22	15.87	Ba2V2O7:2H2O
Ba3(AsO4)2	0.00	-8.91	-8.91	Ba3(AsO4)2
Ba3(VO4)2:4H2O	-29.47	3.47	32.94	Ba3(VO4)2:4H2O
BaCrO4	-16.72	-26.39	-9.67	BaCrO4
BaF2	-14.14	-19.96	-5.82	BaF2
BaHPO4	-14.92	-34.70	-19.77	BaHPO4
BaMoO4	-10.63	-17.60	-6.96	BaMoO4
Barite	-4.91	-14.89	-9.98	BaSO4
BaSeO3	-12.44	-10.61	1.83	BaSeO3
BaSeO4	-16.48	-23.94	-7.46	BaSeO4
Bassetite	-28.89	-73.37	-44.48	Fe(UO2)2(PO4)2
Bianchite	-9.54	-11.31	-1.76	ZnSO4:6H2O
Birnessite	-7.50	10.59	18.09	MnO2
Bixbyite	-1.15	-1.79	-0.64	Mn2O3
Boehmite	-1.70	6.87	8.58	AlOOH
Breithauptite	-45.79	-64.31	-18.52	NiSb
Brochantite	-36.30	-21.08	15.22	Cu4(OH)6SO4
Brucite	-1.38	15.46	16.84	Mg(OH)2
Bunsenite	-0.67	11.78	12.45	NiO
Ca(VO3)2	-8.71	-3.05	5.66	Ca(VO3)2
Ca2V2O7	-3.98	13.52	17.50	Ca2V2O7
Ca2V2O7:2H2O	-8.03	13.52	21.55	Ca2V2O7:2H2O
Ca3(AsO4)2:4H2O	-4.59	17.71	22.30	Ca3(AsO4)2:4H2O
Ca3(PO4)2(beta)	-6.16	-35.08	-28.92	Ca3(PO4)2
Ca3(VO4)2	-8.87	30.09	38.96	Ca3(VO4)2
Ca3(VO4)2:4H2O	-9.77	30.09	39.86	Ca3(VO4)2:4H2O
Ca3Sb2	-268.43	-125.45	142.97	Ca3Sb2
Ca4H(PO4)3:3H2O	-13.82	-60.90	-47.08	Ca4H(PO4)3:3H2O
CaCrO4	-15.25	-17.51	-2.27	CaCrO4
CaHPO4	-6.55	-25.82	-19.27	CaHPO4
CaHPO4:2H2O	-6.83	-25.82	-19.00	CaHPO4:2H2O
Calomel	-15.05	-32.96	-17.91	Hg2Cl2
CaMoO4	-0.77	-8.72	-7.95	CaMoO4
Carnotite	1.77	2.00	0.23	KUO2VO4
CaSeO3:2H2O	-4.55	-1.74	2.81	CaSeO3:2H2O
CaSeO4:2H2O	-12.05	-15.07	-3.02	CaSeO4:2H2O
Cd(BO2)2	-11.36	-1.52	9.84	Cd(BO2)2
Cd(OH)2	-4.47	9.17	13.64	Cd(OH)2
Cd(OH)2(am)	-4.56	9.17	13.73	Cd(OH)2
Cd3(OH)2(SO4)2	-24.37	-17.66	6.71	Cd3(OH)2(SO4)2
Cd3(OH)4SO4	-17.63	4.93	22.56	Cd3(OH)4SO4
Cd3(PO4)2	-24.68	-57.28	-32.60	Cd3(PO4)2
Cd4(OH)6SO4	-14.31	14.09	28.40	Cd4(OH)6SO4
CdCl2	-12.79	-13.45	-0.66	CdCl2
CdCl2:1H2O	-11.75	-13.45	-1.69	CdCl2:1H2O
CdCl2:2.5H2O	-11.53	-13.45	-1.91	CdCl2:2.5H2O
CdF2	-17.28	-18.49	-1.21	CdF2
Cdmetal(alpha)	-27.32	-13.81	13.51	Cd
Cdmetal(gamma)	-27.43	-13.81	13.62	Cd

CdMoO4	-1.97	-16.12	-14.15	CdMoO4
CdOHCl	-5.68	-2.14	3.54	CdOHCl
CdSb	-66.57	-66.92	-0.35	CdSb
CdSe	-13.02	-33.22	-20.20	CdSe
CdSeO4:2H2O	-20.62	-22.47	-1.85	CdSeO4:2H2O
CdSO4	-13.24	-13.41	-0.17	CdSO4
CdSO4:1H2O	-11.69	-13.41	-1.73	CdSO4:1H2O
CdSO4:2.67H2O	-11.54	-13.41	-1.87	CdSO4:2.67H2O
Celestite	-2.94	-9.56	-6.62	SrSO4
Cerargyrite	-5.96	-15.71	-9.75	AgCl
Chalcanthite	-19.57	-22.21	-2.64	CuSO4:5H2O
Chalcedony	-2.56	-6.11	-3.55	SiO2
Chrysotile	1.96	34.16	32.20	Mg3Si2O5(OH)4
Claudetite	-77.26	-80.33	-3.06	As4O6
Clausthalite	-7.39	-34.49	-27.10	PbSe
Co(BO2)2	-39.87	-12.80	27.07	Co(BO2)2
Co(OH)2	-15.20	-2.11	13.09	Co(OH)2
Co(OH)3	-20.71	-23.02	-2.31	Co(OH)3
Co3(AsO4)2	-51.37	-38.33	13.03	Co3(AsO4)2
Co3(PO4)2	-56.43	-91.12	-34.69	Co3(PO4)2
Co3O4	-37.65	-48.15	-10.50	Co3O4
CoCl2	-32.99	-24.73	8.27	CoCl2
CoCl2:6H2O	-27.26	-24.73	2.54	CoCl2:6H2O
CoF2	-28.17	-29.77	-1.60	CoF2
CoF3	-63.05	-64.51	-1.46	CoF3
CoFe2O4	0.00	-3.53	-3.53	CoFe2O4
CoHPO4	-25.44	-44.50	-19.06	CoHPO4
CoMoO4	-19.64	-27.40	-7.76	CoMoO4
CoO	-15.70	-2.11	13.59	CoO
CoSe	-28.29	-44.49	-16.20	CoSe
CoSeO3	-21.74	-20.42	1.32	CoSeO3
CoSeO4:6H2O	-32.22	-33.75	-1.53	CoSeO4:6H2O
CoSO4	-27.50	-24.69	2.80	CoSO4
CoSO4:6H2O	-22.22	-24.69	-2.47	CoSO4:6H2O
Cotunnite	-9.94	-14.72	-4.78	PbCl2
Cr(OH)2	-20.54	-9.72	10.82	Cr(OH)2
Cr(OH)3	-2.51	-1.18	1.34	Cr(OH)3
Cr(OH)3(am)	-0.43	-1.18	-0.75	Cr(OH)3
Cr2O3	0.00	-2.36	-2.36	Cr2O3
CrCl2	-46.43	-32.34	14.09	CrCl2
CrCl3	-50.22	-35.10	15.11	CrCl3
CrF3	-31.33	-42.66	-11.34	CrF3
Cristobalite	-2.76	-6.11	-3.35	SiO2
Crmetal	-63.18	-32.70	30.48	Cr
CrO3	-30.87	-34.09	-3.21	CrO3
Cryolite	-22.22	-56.06	-33.84	Na3AlF6
Cu(OH)2	-8.30	0.38	8.67	Cu(OH)2
Cu(SbO3)2	-36.16	9.05	45.21	Cu(SbO3)2
Cu2(OH)3NO3	-31.67	-22.42	9.25	Cu2(OH)3NO3
Cu2Sb:3H2O	-60.75	-95.63	-34.88	Cu2Sb:3H2O
Cu2Se(alpha)	-13.43	-59.23	-45.80	Cu2Se
Cu2SO4	-37.48	-39.43	-1.95	Cu2SO4
Cu3(AsO4)2:2H2O	-36.98	-30.88	6.10	Cu3(AsO4)2:2H2O
Cu3(PO4)2	-46.81	-83.66	-36.85	Cu3(PO4)2
Cu3(PO4)2:3H2O	-48.54	-83.66	-35.12	Cu3(PO4)2:3H2O
Cu3Sb	-70.26	-112.85	-42.59	Cu3Sb
Cu3Se2	-37.75	-101.24	-63.49	Cu3Se2
CuCrO4	-28.27	-33.71	-5.44	CuCrO4
CuF	-17.35	-22.25	-4.91	CuF
CuF2	-28.40	-27.28	1.12	CuF2
CuF2:2H2O	-22.73	-27.28	-4.55	CuF2:2H2O
Cumetal	-11.16	-19.91	-8.76	Cu
CuMoO4	-11.84	-24.92	-13.08	CuMoO4

CuOCuSO4	-32.14	-21.83	10.30	CuOCuSO4
Cupricferrite	-7.03	-1.04	5.99	CuFe2O4
Cuprite	-15.44	-16.85	-1.41	Cu2O
Cuprousferrite	-0.22	-9.13	-8.92	CuFeO2
CuSe	-8.91	-42.01	-33.10	CuSe
CuSe2	-28.05	-61.41	-33.37	CuSe2
CuSeO3:2H2O	-18.44	-17.93	0.51	CuSeO3:2H2O
CuSeO4:5H2O	-28.82	-31.26	-2.44	CuSeO4:5H2O
CuSO4	-25.15	-22.21	2.94	CuSO4
Diaspore	0.00	6.87	6.87	AlOOH
Epsomite	-5.00	-7.12	-2.13	MgSO4:7H2O
Fe(OH)2	-12.73	0.83	13.56	Fe(OH)2
Fe(OH)2.7Cl.3	-1.06	-4.10	-3.04	Fe(OH)2.7Cl.3
Fe(VO3)2	-15.06	-18.78	-3.72	Fe(VO3)2
Fe2(OH)4SeO3	-21.28	-19.72	1.55	Fe2(OH)4SeO3
Fe2(SeO3)3:2H2O	-35.71	-56.34	-20.63	Fe2(SeO3)3:2H2O
Fe2(SO4)3	-65.43	-69.17	-3.73	Fe2(SO4)3
Fe3(OH)8	-20.81	-0.58	20.22	Fe3(OH)8
FeAsO4:2H2O	-17.11	-16.71	0.40	FeAsO4:2H2O
FeCr2O4	-8.72	-1.52	7.20	FeCr2O4
FeMoO4	-14.37	-24.46	-10.09	FeMoO4
Ferrihydrite	-3.90	-0.71	3.19	Fe(OH)3
Ferroselite	-42.36	-60.96	-18.60	FeSe2
FeSe	-30.55	-41.55	-11.00	FeSe
Fluorite	-0.59	-11.09	-10.50	CaF2
Gibbsite	-1.42	6.87	8.29	Al(OH)3
Goethite	-1.20	-0.71	0.49	FeOOH
Goslarite	-9.30	-11.31	-2.01	ZnSO4:7H2O
Greenalite	-30.53	-9.72	20.81	Fe3Si2O5(OH)4
Gummite	-2.38	5.29	7.67	UO3
Gypsum	-1.40	-6.01	-4.61	CaSO4:2H2O
H-Autunite	-26.27	-74.21	-47.93	H2(UO2)2(PO4)2
H-Jarosite	-35.19	-47.29	-12.10	(H3O)Fe3(SO4)2(OH)6
H2MoO4	-12.42	-25.29	-12.88	H2MoO4
H2Se(g)	-37.43	-42.39	-4.96	H2Se
H2Sn(OH)6	-7.92	-31.45	-23.53	H2Sn(OH)6
Halite	-6.23	-4.63	1.60	NaCl
Halloysite	-8.05	1.52	9.57	Al2Si2O5(OH)4
Hausmannite	0.84	61.87	61.03	Mn3O4
Hematite	0.00	-1.42	-1.42	Fe2O3
Hercynite	-8.31	14.58	22.89	FeAl2O4
Hg(g)	-8.79	-16.66	-7.87	Hg
Hg(OH)2	-11.78	-15.28	-3.50	Hg(OH)2
Hg2(g)	-18.37	-33.33	-14.96	Hg2
Hg2(OH)2	-15.61	-10.35	5.26	Hg2(OH)2
Hg2CrO4	-35.73	-44.43	-8.70	Hg2CrO4
Hg2F2	-27.64	-38.00	-10.36	Hg2F2
Hg2HPO4	-27.97	-52.74	-24.77	Hg2HPO4
Hg2SeO3	-24.00	-28.65	-4.66	Hg2SeO3
Hg2SO4	-26.80	-32.93	-6.13	Hg2SO4
HgCl(g)	-35.98	-16.48	19.50	HgCl
HgCl2	-16.63	-37.89	-21.26	HgCl2
HgF(g)	-51.68	-19.00	32.68	HgF
HgF2(g)	-55.50	-42.93	12.57	HgF2
Hgmetal(l)	-3.21	-16.66	-13.45	Hg
HgSe	-1.97	-57.66	-55.69	HgSe
HgSeO3	-21.15	-33.58	-12.43	HgSeO3
HgSO4	-28.44	-37.86	-9.42	HgSO4
Hinsdalite	-33.96	-36.46	-2.50	PbAl3PO4SO4(OH)6
Hydroxylapatite	0.00	-44.33	-44.33	Ca5(PO4)3OH
Hydroxylpyromorphite	-24.92	-87.71	-62.79	Pb5(PO4)3OH
K-Alum	-26.61	-31.78	-5.17	KAl(SO4)2:12H2O
K-Autunite	-12.93	-61.17	-48.24	K2(UO2)2(PO4)2

K-Jarosite	-25.97	-40.77	-14.80	KFe3(SO4)2(OH)6
K2Cr2O7	-37.89	-55.14	-17.24	K2Cr2O7
K2CrO4	-20.54	-21.05	-0.51	K2CrO4
K2MoO4	-15.52	-12.26	3.26	K2MoO4
K2SeO4	-17.87	-18.60	-0.73	K2SeO4
Kaolinite	-5.91	1.52	7.43	Al2Si2O5(OH)4
Langite	-38.57	-21.08	17.49	Cu4(OH)6SO4:H2O
Larnakite	-6.36	-6.79	-0.43	PbO:PbSO4
Laurionite	-4.04	-3.41	0.62	PbOHCl
Lepidocrocite	-2.08	-0.71	1.37	FeOOH
Lime	-16.13	16.57	32.70	CaO
Litharge	-4.80	7.89	12.69	PbO
Maghemite	-7.80	-1.42	6.39	Fe2O3
Magnesioferrite	-2.81	14.04	16.86	Fe2MgO4
Magnetite	-3.99	-0.58	3.40	Fe3O4
Manganite	-0.89	24.45	25.34	MnOOH
Massicot	-5.00	7.89	12.89	PbO
Matlockite	-8.27	-17.24	-8.97	PbClF
Melanothallite	-28.50	-22.24	6.26	CuCl2
Melanterite	-19.54	-21.75	-2.21	FeSO4:7H2O
Mg(OH)2(active)	-3.33	15.46	18.79	Mg(OH)2
Mg(VO3)2	-15.44	-4.16	11.28	Mg(VO3)2
Mg2Sb3	-249.06	-174.37	74.68	Mg2Sb3
Mg2V2O7	-15.05	11.31	26.36	Mg2V2O7
Mg3(PO4)2	-15.12	-38.40	-23.28	Mg3(PO4)2
MgCr2O4	-3.10	13.11	16.20	MgCr2O4
MgCrO4	-24.00	-18.62	5.38	MgCrO4
MgF2	-4.06	-12.19	-8.13	MgF2
MgHPO4:3H2O	-8.76	-26.93	-18.18	MgHPO4:3H2O
MgMoO4	-7.98	-9.83	-1.85	MgMoO4
MgSeO3:6H2O	-5.90	-2.85	3.06	MgSeO3:6H2O
MgSeO4:6H2O	-14.97	-16.17	-1.20	MgSeO4:6H2O
Minium	-26.86	46.66	73.52	Pb3O4
Mirabilite	-8.11	-9.22	-1.11	Na2SO4:10H2O
Mn(VO3)2	-11.55	-6.65	4.90	Mn(VO3)2
Mn2(SO4)3	-63.83	-69.54	-5.71	Mn2(SO4)3
Mn2Sb	-134.22	-73.14	61.08	Mn2Sb
Mn3(AsO4)2:8H2O	-5.61	6.89	12.50	Mn3(AsO4)2:8H2O
Mn3(PO4)2	-22.07	-45.90	-23.83	Mn3(PO4)2
MnCl2:4H2O	-12.37	-9.65	2.72	MnCl2:4H2O
MnHPO4	-4.03	-29.43	-25.40	MnHPO4
MnSb	-85.57	-88.48	-2.91	MnSb
MnSe	-32.92	-29.42	3.50	MnSe
MnSeO3	-6.47	-5.34	1.13	MnSeO3
MnSeO3:2H2O	-6.33	-5.34	0.98	MnSeO3:2H2O
MnSeO4:5H2O	-16.62	-18.67	-2.05	MnSeO4:5H2O
MnSO4	-12.20	-9.62	2.58	MnSO4
Monteponite	-5.93	9.17	15.10	CdO
Montroydite	-11.64	-15.28	-3.64	HgO
MoO3	-17.29	-25.29	-8.00	MoO3
Morenosite	-8.66	-10.81	-2.14	NiSO4:7H2O
Na-Autunite	-13.44	-60.84	-47.41	Na2(UO2)2(PO4)2
Na-Jarosite	-29.41	-40.61	-11.20	NaFe3(SO4)2(OH)6
Na2Cr2O7	-44.91	-54.81	-9.90	Na2Cr2O7
Na2CrO4	-23.65	-20.72	2.93	Na2CrO4
Na2Mo2O7	-20.63	-37.22	-16.60	Na2Mo2O7
Na2MoO4	-13.42	-11.93	1.49	Na2MoO4
Na2MoO4:2H2O	-13.16	-11.93	1.22	Na2MoO4:2H2O
Na2SeO3:5H2O	-15.25	-4.95	10.30	Na2SeO3:5H2O
Na2SeO4	-19.55	-18.27	1.28	Na2SeO4
Na3Sb	-161.99	-67.54	94.45	Na3Sb
Na3VO4	-26.45	10.23	36.68	Na3VO4
Na4V2O7	-30.30	7.10	37.40	Na4V2O7

Nantokite	-13.00	-19.73	-6.73	CuCl
NaSb	-81.09	-57.92	23.17	NaSb
NaVO3	-6.99	-3.13	3.86	NaVO3
Ni(OH)2	-1.02	11.78	12.79	Ni(OH)2
Ni3(AsO4)2:8H2O	-12.37	3.33	15.70	Ni3(AsO4)2:8H2O
Ni3(PO4)2	-18.15	-49.45	-31.30	Ni3(PO4)2
Ni4(OH)6SO4	-7.47	24.53	32.00	Ni4(OH)6SO4
NiMoO4	-2.37	-13.51	-11.14	NiMoO4
Ningyoite	-22.78	-76.69	-53.91	CaU(PO4)2:2H2O
NiSe	-12.91	-30.61	-17.70	NiSe
NiSeO3:2H2O	-9.34	-6.53	2.81	NiSeO3:2H2O
NiSeO4:6H2O	-18.34	-19.86	-1.52	NiSeO4:6H2O
Nsutite	-6.91	10.59	17.50	MnO2
O2(g)	-37.13	45.96	83.09	O2
Pb(BO2)2	-9.31	-2.79	6.52	Pb(BO2)2
Pb(OH)2	-0.26	7.89	8.15	Pb(OH)2
Pb2(OH)3Cl	-4.31	4.48	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-10.40	15.79	26.19	Pb2O(OH)2
Pb2O3	-22.27	38.77	61.04	Pb2O3
Pb2V2O7	-1.93	-3.83	-1.90	Pb2V2O7
Pb3(AsO4)2	-14.12	-8.32	5.80	Pb3(AsO4)2
Pb3(PO4)2	-17.58	-61.11	-43.53	Pb3(PO4)2
Pb3(VO4)2	-2.08	4.06	6.14	Pb3(VO4)2
Pb3O2SO4	-9.59	1.10	10.69	Pb3O2SO4
Pb4(OH)6SO4	-12.11	8.99	21.10	Pb4(OH)6SO4
Pb4O3SO4	-12.88	8.99	21.88	Pb4O3SO4
PbCrO4	-13.59	-26.19	-12.60	PbCrO4
PbF2	-12.32	-19.76	-7.44	PbF2
PbHPO4	-10.70	-34.50	-23.81	PbHPO4
Pbmetal	-19.33	-15.09	4.25	Pb
PbMoO4	-1.78	-17.40	-15.62	PbMoO4
PbO:0.3H2O	-5.09	7.89	12.98	PbO:0.33H2O
PbSeO4	-16.90	-23.74	-6.84	PbSeO4
Periclase	-6.12	15.46	21.58	MgO
Plattnerite	-18.73	30.87	49.60	PbO2
Plumbgummite	-23.49	-56.28	-32.79	PbAl3(PO4)2(OH)5:H2O
Portlandite	-6.23	16.57	22.80	Ca(OH)2
Przhevalskite	-21.95	-66.31	-44.37	Pb(UO2)2(PO4)2
Pyrochroite	-2.23	12.96	15.19	Mn(OH)2
Pyrolusite	-5.44	35.94	41.38	MnO2
Pyromorphite	-14.59	-99.02	-84.43	Pb5(PO4)3Cl
Quartz	-2.11	-6.11	-4.00	SiO2
Retgersite	-8.77	-10.81	-2.04	NiSO4:6H2O
Saleeite	-15.10	-58.74	-43.65	Mg(UO2)2(PO4)2
Sb(OH)3	-11.53	-18.64	-7.11	Sb(OH)3
Sb2O4	-17.71	-14.31	3.40	Sb2O4
Sb2O5	-30.28	-39.95	-9.67	Sb2O5
Sb2Se3	-96.68	-164.44	-67.76	Sb2Se3
Sb4O6(cubic)	-56.31	-74.57	-18.26	Sb4O6
Sb4O6(orth)	-56.67	-74.57	-17.90	Sb4O6
SbCl3	-53.14	-52.57	0.57	SbCl3
SbF3	-49.90	-60.13	-10.23	SbF3
Sbmetal	-41.42	-53.11	-11.69	Sb
SbO2	-3.64	-31.46	-27.82	SbO2
Schoepite	-0.70	5.29	5.99	UO2(OH)2:H2O
Semetal(am)	-12.30	-19.41	-7.11	Se
Semetal(hex	-11.70	-19.41	-7.71	Se
Senarmontite	-24.92	-37.29	-12.37	Sb2O3
SeO2	-18.43	-18.31	0.12	SeO2
SeO3	-52.68	-31.64	21.04	SeO3
Sepiolite	-3.17	12.59	15.76	Mg2Si3O7.5OH:3H2O
Sepiolite(A)	-6.19	12.59	18.78	Mg2Si3O7.5OH:3H2O
SiO2(am-gel)	-3.40	-6.11	-2.71	SiO2

SiO2(am-ppt)	-3.37	-6.11	-2.74	SiO2
Sn(OH)2	-29.80	-35.23	-5.43	Sn(OH)2
Sn(OH)4	-9.17	-31.45	-22.28	Sn(OH)4
Sn(SO4)2	-61.41	-76.62	-15.21	Sn(SO4)2
SnCl2	-48.57	-57.85	-9.28	SnCl2
Snmetal(wht)	-55.88	-58.21	-2.33	Sn
SnO	-30.32	-35.23	-4.91	SnO
SnO2	-2.48	-31.45	-28.97	SnO2
SnSe	-47.12	-77.62	-30.49	SnSe
SnSe2	-51.10	-116.22	-65.12	SnSe2
SnSO4	-0.84	-57.81	-56.97	SnSO4
Spinel	-7.64	29.21	36.85	MgAl2O4
Sr-Autunite	-16.73	-61.18	-44.46	Sr(UO2)2(PO4)2
SrCrO4	-16.41	-21.06	-4.65	SrCrO4
SrF2	-6.05	-14.63	-8.58	SrF2
SrHPO4	-10.08	-29.37	-19.30	SrHPO4
SrSeO3	-7.58	-5.28	2.30	SrSeO3
SrSeO4	-14.21	-18.61	-4.40	SrSeO4
Strengite	-16.70	-43.10	-26.40	FePO4:2H2O
Tenorite	-7.27	0.38	7.64	CuO
Thenardite	-9.54	-9.22	0.32	Na2SO4
Tl(OH)3	-16.93	-22.37	-5.44	Tl(OH)3
Tl2CrO4	-21.67	-33.68	-12.01	Tl2CrO4
Tl2MoO4	-16.90	-24.89	-7.99	Tl2MoO4
Tl2O	-26.69	0.40	27.09	Tl2O
Tl2Se	-23.88	-41.98	-18.10	Tl2Se
Tl2SeO4	-27.14	-31.24	-4.10	Tl2SeO4
Tl2SO4	-18.40	-22.18	-3.79	Tl2SO4
TlCl	-7.37	-11.11	-3.74	TlCl
Tlmetal	-16.97	-11.29	5.68	Tl
TlNO3	-21.36	-22.97	-1.61	TlNO3
TlOH	-12.72	0.20	12.92	TlOH
Torbernite	-28.55	-73.83	-45.28	Cu(UO2)2(PO4)2
Tsumebite	-16.44	-26.23	-9.79	Pb2CuPO4(OH)3:3H2O
Tyuyamunite	3.46	7.54	4.08	Ca(UO2)2(VO4)2
U(HPO4)2:4H2O	-41.68	-93.26	-51.58	U(HPO4)2:4H2O
U3O8	-0.54	20.54	21.08	U3O8
U3Sb4	-528.12	-375.74	152.38	U3Sb4
U4O9	-7.89	-10.91	-3.02	U4O9
UF4	-34.25	-63.79	-29.54	UF4
UF4:2.5H2O	-31.07	-63.79	-32.72	UF4:2.5H2O
UO2(am)	-9.41	-8.47	0.93	UO2
UO2(NO3)2	-53.20	-41.06	12.15	UO2(NO3)2
UO2(NO3)2:2H2O	-45.91	-41.06	4.85	UO2(NO3)2:2H2O
UO2(NO3)2:3H2O	-44.45	-41.06	3.39	UO2(NO3)2:3H2O
UO2(NO3)2:6H2O	-43.11	-41.06	2.05	UO2(NO3)2:6H2O
UO2(OH)2(beta)	-0.32	5.29	5.61	UO2(OH)2
UO2HPO4	-12.88	-37.10	-24.23	UO2HPO4
UO2SeO4:4H2O	-24.09	-26.34	-2.25	UO2SeO4:4H2O
UO3	-2.41	5.29	7.70	UO3
Uramphite	-14.49	-66.24	-51.75	(NH4)2(UO2)2(PO4)2
Uraninite	-3.80	-8.47	-4.67	UO2
Uranocircite	-21.88	-66.51	-44.63	Ba(UO2)2(PO4)2
USb2	-199.45	-169.87	29.58	USb2
V(OH)3	-17.78	-10.19	7.59	V(OH)3
V2O5	-18.26	-19.62	-1.36	V2O5
V3O5	-38.00	-36.17	1.84	V3O5
V4O7	-47.75	-40.56	7.19	V4O7
V6O13	-43.95	-104.81	-60.86	V6O13
Valentinite	-28.81	-37.29	-8.48	Sb2O3
VCl2	-63.17	-44.30	18.87	VCl2
VCl3	-67.55	-44.11	23.43	VCl3
VF4	-74.64	-59.71	14.93	VF4

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      Vivianite        -46.29  -82.29  -36.00  Fe3(PO4)2:8H2O
      Vmetal           -88.68  -44.66   44.03  V
      VO               -36.44  -21.68   14.76  VO
      VO(OH)2           -9.55   -4.40    5.15  VO(OH)2
      VO2Cl            -23.96  -21.12    2.84  VO2Cl
      VOCl             -32.65  -21.50   11.15  VOCl
      VOCl2            -39.77  -27.01   12.76  VOCl2
      VOSO4            -30.59  -26.98    3.61  VOSO4
      Zincite           -0.06   11.28   11.33  ZnO
      Zincosite        -15.24  -11.31    3.93  ZnSO4
      Zn(BO2)2          -7.70    0.59    8.29  Zn(BO2)2
      Zn(NO3)2:6H2O    -38.39  -35.07    3.32  Zn(NO3)2:6H2O
      Zn(OH)2           -0.92   11.28   12.20  Zn(OH)2
      Zn(OH)2(am)       -1.20   11.28   12.47  Zn(OH)2
      Zn(OH)2(beta)     -0.48   11.28   11.75  Zn(OH)2
      Zn(OH)2(epsilon)  -0.26   11.28   11.53  Zn(OH)2
      Zn(OH)2(gamma)    -0.46   11.28   11.73  Zn(OH)2
      Zn2(OH)2SO4       -7.53   -0.03    7.50  Zn2(OH)2SO4
      Zn2(OH)3Cl        -3.94   11.25   15.19  Zn2(OH)3Cl
      Zn3(AsO4)2:2.5H2O -11.82    1.83   13.65  Zn3(AsO4)2:2.5H2O
      Zn3(PO4)2:4H2O   -15.54  -50.96  -35.42  Zn3(PO4)2:4H2O
      Zn3O(SO4)2       -30.25  -11.33   18.91  Zn3O(SO4)2
      Zn4(OH)6SO4       -5.87   22.53   28.40  Zn4(OH)6SO4
      Zn5(OH)8Cl2       -4.73   33.77   38.50  Zn5(OH)8Cl2
      ZnCl2            -18.39  -11.34    7.05  ZnCl2
      ZnF2             -15.85  -16.38   -0.53  ZnF2
      Znmetal          -37.49  -11.70   25.79  Zn
      ZnMoO4            -3.89  -14.02  -10.13  ZnMoO4
      ZnO(active)        0.09   11.28   11.19  ZnO
      ZnSb             -75.83  -64.81   11.01  ZnSb
      ZnSe             -16.71  -31.11  -14.40  ZnSe
      ZnSeO4:6H2O      -18.84  -20.36   -1.52  ZnSeO4:6H2O
      ZnSO4:1H2O       -10.67  -11.31   -0.64  ZnSO4:1H2O

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End of simulation.
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Reading input data for simulation 3.
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      SOLUTION  3
      pH   7    charge
      S(6) 0.0000000001
      Cl   0.0000000001
      F    0.0000000001
      N    0.0000000001
      Ag   0.0000000001
      Al   0.0000000001
      As   0.0000000001
      B    0.0000000001
      Ba   0.0000000001
      Ca   0.0000000001
      Cd   0.0000000001
      Co   0.0000000001
      Cr   0.0000000001
      Cu   0.0000000001
      Fe   0.0000000001
      Hg   0.0000000001
      K    0.0000000001
      Mg   0.0000000001
      Mn   0.0000000001
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```
      Mo   0.0000000001
      Na   0.0000000001
      Ni   0.0000000001
      P    0.0000000001
      Pb   0.0000000001
      Se   0.0000000001
      Sb   0.0000000001
      Si   0.0000000001
      Sn   0.0000000001
      Sr   0.0000000001
      Tl   0.0000000001
      U    0.0000000001
      V    0.0000000001
      Zn   0.0000000001
      pe   12
      UNITS     mg/l
      END
-------------------------------------------
Beginning of initial solution calculations.
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Initial solution 3.

-----------------------------Solution composition------------------------------

      Elements           Molality       Moles

      Ag               9.271e-016  9.271e-016
      Al               3.706e-015  3.706e-015
      As               1.335e-015  1.335e-015
      B                9.251e-015  9.251e-015
      Ba               7.282e-016  7.282e-016
      Ca               2.495e-015  2.495e-015
      Cd               8.896e-016  8.896e-016
      Cl               2.821e-015  2.821e-015
      Co               1.697e-015  1.697e-015
      Cr               1.923e-015  1.923e-015
      Cu               1.574e-015  1.574e-015
      F                5.264e-015  5.264e-015
      Fe               1.791e-015  1.791e-015
      Hg               4.985e-016  4.985e-016
      K                2.558e-015  2.558e-015
      Mg               4.114e-015  4.114e-015
      Mn               1.820e-015  1.820e-015
      Mo               1.042e-015  1.042e-015
      N                7.139e-015  7.139e-015
      Na               4.350e-015  4.350e-015
      Ni               1.704e-015  1.704e-015
      P                3.229e-015  3.229e-015
      Pb               4.826e-016  4.826e-016
      S(6)             1.041e-015  1.041e-015
      Sb               8.214e-016  8.214e-016
      Se               1.266e-015  1.266e-015
      Si               1.664e-015  1.664e-015
      Sn               8.424e-016  8.424e-016
      Sr               1.141e-015  1.141e-015
      Tl               4.893e-016  4.893e-016
      U                4.201e-016  4.201e-016
      V                1.963e-015  1.963e-015
      Zn               1.529e-015  1.529e-015

----------------------------Description of solution----------------------------
```

```
                                        pH  =   6.999      Charge balance
                                        pe  =  12.000
                          Activity of water  =   1.000
                             Ionic strength  =  1.004e-007
                        Mass of water (kg)   =  1.000e+000
                  Total alkalinity (eq/kg)   =  2.544e-014
                     Total carbon (mol/kg)   =  0.000e+000
                        Total CO2 (mol/kg)   =  0.000e+000
                      Temperature (deg C)    =  25.000
                  Electrical balance (eq)    =  2.795e-023
 Percent error, 100*(Cat-|An|)/(Cat+|An|)   =   0.00
                                Iterations   =  10
                                   Total H   = 1.110137e+002
                                   Total O   = 5.550683e+001

----------------------------Distribution of species----------------------------

                                                     Log        Log         Log
   Species                  Molality    Activity  Molality  Activity     Gamma

   OH-                    1.004e-007  1.003e-007    -6.998    -6.998    -0.000
   H+                     1.004e-007  1.003e-007    -6.998    -6.999    -0.000
   H2O                    5.551e+001  1.000e+000     1.744    -0.000     0.000
Ag                9.271e-016
   Ag+                    9.270e-016  9.267e-016   -15.033   -15.033    -0.000
   AgOH                   9.299e-021  9.299e-021   -20.032   -20.032     0.000
   Ag(OH)2-               9.122e-026  9.119e-026   -25.040   -25.040    -0.000
   AgCl                   5.335e-027  5.335e-027   -26.273   -26.273     0.000
   AgSO4-                 1.923e-029  1.922e-029   -28.716   -28.716    -0.000
   AgF                    1.225e-029  1.225e-029   -28.912   -28.912     0.000
   AgNO3                  5.253e-030  5.253e-030   -29.280   -29.280     0.000
   AgH2BO3                7.818e-031  7.818e-031   -30.107   -30.107     0.000
   AgNO2                  5.169e-037  5.169e-037   -36.287   -36.287     0.000
   AgSeO3-                6.138e-038  6.136e-038   -37.212   -37.212    -0.000
   AgCl2-                 1.311e-039  1.310e-039   -38.883   -38.883    -0.000
   Ag2MoO4                0.000e+000  0.000e+000   -45.472   -45.472     0.000
   AgCl3-2                0.000e+000  0.000e+000   -53.482   -53.483    -0.001
   Ag(NO2)2-              0.000e+000  0.000e+000   -59.670   -59.670    -0.000
   Ag(SeO3)2-3            0.000e+000  0.000e+000   -61.246   -61.247    -0.001
   AgCl4-3                0.000e+000  0.000e+000   -67.721   -67.722    -0.001
   AgNH3+                 0.000e+000  0.000e+000   -75.023   -75.023    -0.000
   Ag2Se                  0.000e+000  0.000e+000   -80.873   -80.873     0.000
   Ag(NH3)2+              0.000e+000  0.000e+000  -134.413  -134.413    -0.000
   AgOH(Se)2-4            0.000e+000  0.000e+000  -199.977  -199.980    -0.003
Al                3.706e-015
   Al(OH)4-               3.312e-015  3.310e-015   -14.480   -14.480    -0.000
   Al(OH)3                2.620e-016  2.620e-016   -15.582   -15.582     0.000
   Al(OH)2+               1.309e-016  1.309e-016   -15.883   -15.883    -0.000
   AlOH+2                 1.644e-018  1.642e-018   -17.784   -17.785    -0.001
   Al+3                   1.642e-020  1.636e-020   -19.785   -19.786    -0.001
   AlF+2                  8.621e-028  8.609e-028   -27.064   -27.065    -0.001
   AlSO4+                 1.321e-031  1.320e-031   -30.879   -30.879    -0.000
   AlF2+                  1.804e-036  1.803e-036   -35.744   -35.744    -0.000
   Al(SO4)2-              0.000e+000  0.000e+000   -44.832   -44.833    -0.000
   AlF3                   0.000e+000  0.000e+000   -45.923   -45.923     0.000
   AlF4-                  0.000e+000  0.000e+000   -57.502   -57.502    -0.000
   AlMo6O21-3             0.000e+000  0.000e+000   -96.684   -96.686    -0.001
As(3)             8.846e-040
   H3AsO3                 8.846e-040  8.846e-040   -39.053   -39.053     0.000
   H2AsO3-                0.000e+000  0.000e+000   -41.345   -41.345    -0.000
   H4AsO3+                0.000e+000  0.000e+000   -46.357   -46.357    -0.000
   HAsO3-2                0.000e+000  0.000e+000   -46.386   -46.386    -0.001
   AsO3-3                 0.000e+000  0.000e+000   -52.800   -52.802    -0.001
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As(5)	1.335e-015					
HAsO4-2		6.973e-016	6.962e-016	-15.157	-15.157	-0.001
H2AsO4-		6.374e-016	6.372e-016	-15.196	-15.196	-0.000
AsO4-3		2.201e-020	2.194e-020	-19.657	-19.659	-0.001
H3AsO4		1.111e-020	1.111e-020	-19.954	-19.954	0.000
B	9.251e-015					
H3BO3		9.197e-015	9.197e-015	-14.036	-14.036	0.000
H2BO3-		5.325e-017	5.323e-017	-16.274	-16.274	-0.000
BF(OH)3-		1.931e-029	1.931e-029	-28.714	-28.714	-0.000
CaH2BO3+		7.634e-030	7.632e-030	-29.117	-29.117	-0.000
MgH2BO3+		7.585e-030	7.582e-030	-29.120	-29.120	-0.000
SrH2BO3+		2.153e-030	2.152e-030	-29.667	-29.667	-0.000
BaH2BO3+		1.197e-030	1.196e-030	-29.922	-29.922	-0.000
AgH2BO3		7.818e-031	7.818e-031	-30.107	-30.107	0.000
H5(BO3)2-		4.169e-031	4.167e-031	-30.380	-30.380	-0.000
NaH2BO3		3.668e-031	3.668e-031	-30.436	-30.436	0.000
BF2(OH)2-		0.000e+000	0.000e+000	-41.963	-41.963	-0.000
H8(BO3)3-		0.000e+000	0.000e+000	-42.416	-42.416	-0.000
BF3OH-		0.000e+000	0.000e+000	-57.650	-57.650	-0.000
BF4-		0.000e+000	0.000e+000	-72.235	-72.236	-0.000
Ba	7.282e-016					
Ba+2		7.282e-016	7.271e-016	-15.138	-15.138	-0.001
BaOH+		3.186e-022	3.185e-022	-21.497	-21.497	-0.000
BaNO3+		2.602e-029	2.601e-029	-28.585	-28.585	-0.000
BaH2BO3+		1.197e-030	1.196e-030	-29.922	-29.922	-0.000
BaNH3+2		0.000e+000	0.000e+000	-78.638	-78.638	-0.001
Ca	2.495e-015					
Ca+2		2.495e-015	2.491e-015	-14.603	-14.604	-0.001
CaOH+		4.990e-021	4.988e-021	-20.302	-20.302	-0.000
CaHPO4		1.422e-027	1.422e-027	-26.847	-26.847	0.000
CaSO4		5.932e-028	5.932e-028	-27.227	-27.227	0.000
CaF+		1.431e-028	1.431e-028	-27.844	-27.844	-0.000
CaH2PO4+		1.103e-028	1.103e-028	-27.957	-27.958	-0.000
CaNO3+		5.625e-029	5.623e-029	-28.250	-28.250	-0.000
CaPO4-		3.772e-029	3.771e-029	-28.423	-28.424	-0.000
CaH2BO3+		7.634e-030	7.632e-030	-29.117	-29.117	-0.000
CaNH3+2		0.000e+000	0.000e+000	-77.803	-77.804	-0.001
Ca(NH3)2+2		0.000e+000	0.000e+000	-141.503	-141.504	-0.001
Cd	8.896e-016					
Cd+2		8.889e-016	8.876e-016	-15.051	-15.052	-0.001
CdOH+		7.077e-019	7.075e-019	-18.150	-18.150	-0.000
Cd(OH)2		4.479e-022	4.479e-022	-21.349	-21.349	0.000
Cd(OH)3-		2.747e-027	2.746e-027	-26.561	-26.561	-0.000
CdCl+		2.391e-028	2.390e-028	-27.621	-27.622	-0.000
CdSO4		2.163e-028	2.163e-028	-27.665	-27.665	0.000
CdSeO4		2.090e-028	2.090e-028	-27.680	-27.680	0.000
CdF+		7.403e-029	7.401e-029	-28.131	-28.131	-0.000
CdNO3+		2.004e-029	2.003e-029	-28.698	-28.698	-0.000
CdOHCl		9.838e-031	9.838e-031	-30.007	-30.007	0.000
Cd2OH+3		3.158e-033	3.147e-033	-32.501	-32.502	-0.001
Cd(OH)4-2		4.517e-035	4.510e-035	-34.345	-34.346	-0.001
Cd(SO4)2-2		0.000e+000	0.000e+000	-41.518	-41.518	-0.001
CdCl2		0.000e+000	0.000e+000	-41.551	-41.551	0.000
CdF2		0.000e+000	0.000e+000	-42.110	-42.110	0.000
Cd(NO3)2		0.000e+000	0.000e+000	-43.145	-43.145	0.000
CdCl3-		0.000e+000	0.000e+000	-56.301	-56.301	-0.000
Cd(SeO3)2-2		0.000e+000	0.000e+000	-59.109	-59.110	-0.001
Cl	2.821e-015					
Cl-		2.821e-015	2.820e-015	-14.550	-14.550	-0.000
AgCl		5.335e-027	5.335e-027	-26.273	-26.273	0.000
HgClOH		3.921e-027	3.921e-027	-26.407	-26.407	0.000
CdCl+		2.391e-028	2.390e-028	-27.621	-27.622	-0.000
PbCl+		3.850e-029	3.849e-029	-28.414	-28.415	-0.000

CoCl+	1.650e-029	1.649e-029	-28.783	-28.783	-0.000
NiCl+	1.226e-029	1.226e-029	-28.911	-28.912	-0.000
ZnCl+	1.071e-029	1.071e-029	-28.970	-28.970	-0.000
MnCl+	6.452e-030	6.450e-030	-29.190	-29.190	-0.000
CuCl+	5.308e-030	5.306e-030	-29.275	-29.275	-0.000
TlCl	3.490e-030	3.490e-030	-29.457	-29.457	0.000
ZnOHCl	1.406e-030	1.406e-030	-29.852	-29.852	0.000
CdOHCl	9.838e-031	9.838e-031	-30.007	-30.007	0.000
HgCl+	4.416e-031	4.414e-031	-30.355	-30.355	-0.000
UO2Cl+	1.409e-031	1.409e-031	-30.851	-30.851	-0.000
TlOHCl+	1.290e-034	1.289e-034	-33.890	-33.890	-0.000
CuCl	2.064e-036	2.064e-036	-35.685	-35.685	0.000
CrO3Cl-	8.382e-037	8.379e-037	-36.077	-36.077	-0.000
FeCl+2	5.443e-038	5.435e-038	-37.264	-37.265	-0.001
HgCl2	6.238e-039	6.238e-039	-38.205	-38.205	0.000
AgCl2-	1.311e-039	1.310e-039	-38.883	-38.883	-0.000
TlCl+2	0.000e+000	0.000e+000	-40.506	-40.506	-0.001
CdCl2	0.000e+000	0.000e+000	-41.551	-41.551	0.000
PbCl2	0.000e+000	0.000e+000	-42.314	-42.314	0.000
ZnCl2	0.000e+000	0.000e+000	-43.320	-43.320	0.000
MnCl2	0.000e+000	0.000e+000	-43.590	-43.590	0.000
TlCl2-	0.000e+000	0.000e+000	-44.237	-44.237	-0.000
CuCl2	0.000e+000	0.000e+000	-44.285	-44.285	0.000
CrCl+2	0.000e+000	0.000e+000	-44.319	-44.320	-0.001
VOCl+	0.000e+000	0.000e+000	-44.611	-44.611	-0.000
NiCl2	0.000e+000	0.000e+000	-45.759	-45.759	0.000
CoCl+2	0.000e+000	0.000e+000	-47.413	-47.413	-0.001
CuCl2-	0.000e+000	0.000e+000	-47.915	-47.915	-0.000
TlCl2+	0.000e+000	0.000e+000	-49.296	-49.296	-0.000
FeCl2+	0.000e+000	0.000e+000	-51.164	-51.165	-0.000
HgCl3-	0.000e+000	0.000e+000	-51.755	-51.755	-0.000
AgCl3-2	0.000e+000	0.000e+000	-53.482	-53.483	-0.001
CdCl3-	0.000e+000	0.000e+000	-56.301	-56.301	-0.000
PbCl3-	0.000e+000	0.000e+000	-57.264	-57.264	-0.000
ZnCl3-	0.000e+000	0.000e+000	-57.970	-57.970	-0.000
CrOHCl2	0.000e+000	0.000e+000	-58.589	-58.589	0.000
MnCl3-	0.000e+000	0.000e+000	-58.700	-58.700	-0.000
CrCl2+	0.000e+000	0.000e+000	-59.892	-59.892	-0.000
TlCl3	0.000e+000	0.000e+000	-60.826	-60.826	0.000
CuCl3-	0.000e+000	0.000e+000	-60.865	-60.865	-0.000
CuCl3-2	0.000e+000	0.000e+000	-63.134	-63.135	-0.001
HgCl4-2	0.000e+000	0.000e+000	-65.704	-65.705	-0.001
FeCl3	0.000e+000	0.000e+000	-66.714	-66.714	0.000
SnCl+	0.000e+000	0.000e+000	-67.684	-67.685	-0.000
AgCl4-3	0.000e+000	0.000e+000	-67.721	-67.722	-0.001
UCl+3	0.000e+000	0.000e+000	-72.138	-72.139	-0.001
PbCl4-2	0.000e+000	0.000e+000	-72.153	-72.154	-0.001
ZnCl4-2	0.000e+000	0.000e+000	-72.820	-72.821	-0.001
TlCl4-	0.000e+000	0.000e+000	-73.576	-73.576	-0.000
CuCl4-2	0.000e+000	0.000e+000	-77.714	-77.715	-0.001
SnCl2	0.000e+000	0.000e+000	-81.444	-81.444	0.000
SnCl3-	0.000e+000	0.000e+000	-97.168	-97.168	-0.000
Co(NH3)5Cl+2	0.000e+000	0.000e+000	-337.959	-337.960	-0.001
Co(NH3)6Cl+2	0.000e+000	0.000e+000	-407.975	-407.976	-0.001
Cr(NH3)6Cl+2	0.000e+000	0.000e+000	-410.129	-410.130	-0.001
Co(2)	1.697e-015				
Co+2	1.693e-015	1.691e-015	-14.771	-14.772	-0.001
CoOH+	3.387e-018	3.385e-018	-17.470	-17.470	-0.000
Co(OH)2	2.698e-020	2.698e-020	-19.569	-19.569	0.000
Co(OH)3-	5.405e-026	5.403e-026	-25.267	-25.267	-0.000
CoOOH-	1.356e-026	1.356e-026	-25.868	-25.868	-0.000
CoHPO4	2.304e-027	2.304e-027	-26.638	-26.638	0.000
CoSeO4	1.072e-027	1.072e-027	-26.970	-26.970	0.000

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   CoSO4                 3.507e-028  3.507e-028   -27.455   -27.455     0.000
   CoF+                  2.814e-028  2.813e-028   -27.551   -27.551    -0.000
   CoNO3+                1.913e-029  1.913e-029   -28.718   -28.718    -0.000
   CoCl+                 1.650e-029  1.649e-029   -28.783   -28.783    -0.000
   Co(OH)4-2             8.605e-034  8.593e-034   -33.065   -33.066    -0.001
   Co2OH+3               2.879e-034  2.869e-034   -33.541   -33.542    -0.001
   CoNO2+                3.183e-038  3.181e-038   -37.497   -37.497    -0.000
   Co(NO3)2              0.000e+000  0.000e+000   -42.556   -42.556     0.000
   Co4(OH)4+4            0.000e+000  0.000e+000   -61.579   -61.582    -0.003
   Co(NH3)+2             0.000e+000  0.000e+000   -75.991   -75.992    -0.001
   Co(NH3)2+2            0.000e+000  0.000e+000  -137.661  -137.662    -0.001
   Co(NH3)3+2            0.000e+000  0.000e+000  -199.861  -199.862    -0.001
   Co(NH3)4+2            0.000e+000  0.000e+000  -262.441  -262.442    -0.001
   Co(NH3)5+2            0.000e+000  0.000e+000  -325.521  -325.522    -0.001
Co(3)            3.438e-030
   CoOH+2                3.438e-030  3.433e-030   -29.464   -29.464    -0.001
   Co+3                  6.754e-036  6.732e-036   -35.170   -35.172    -0.001
   CoCl+2                0.000e+000  0.000e+000   -47.413   -47.413    -0.001
   Co(NH3)5Cl+2          0.000e+000  0.000e+000  -337.959  -337.960    -0.001
   Co(NH3)6OH+2          0.000e+000  0.000e+000  -396.224  -396.224    -0.001
   Co(NH3)6SO4+          0.000e+000  0.000e+000  -403.484  -403.484    -0.000
   Co(NH3)6Cl+2          0.000e+000  0.000e+000  -407.975  -407.976    -0.001
Cr(2)            0.000e+000
   Cr+2                  0.000e+000  0.000e+000   -48.503   -48.504    -0.001
Cr(3)            3.943e-026
   Cr(OH)2+              3.520e-026  3.519e-026   -25.453   -25.454    -0.000
   Cr(OH)+2              2.886e-027  2.882e-027   -26.540   -26.540    -0.001
   Cr(OH)3               1.326e-027  1.326e-027   -26.877   -26.877     0.000
   CrO2-                 6.280e-030  6.277e-030   -29.202   -29.202    -0.000
   Cr(OH)4-              5.301e-030  5.299e-030   -29.276   -29.276    -0.000
   Cr+3                  1.317e-030  1.313e-030   -29.880   -29.882    -0.001
   CrF+2                 1.096e-039  1.095e-039   -38.960   -38.961    -0.001
   CrOHSO4               7.108e-040  7.108e-040   -39.148   -39.148     0.000
   CrSO4+                0.000e+000  0.000e+000   -41.497   -41.497    -0.000
   CrH2PO4+2             0.000e+000  0.000e+000   -41.820   -41.821    -0.001
   CrCl+2                0.000e+000  0.000e+000   -44.319   -44.320    -0.001
   CrNO3+2               0.000e+000  0.000e+000   -45.387   -45.388    -0.001
   CrOHCl2               0.000e+000  0.000e+000   -58.589   -58.589     0.000
   CrCl2+                0.000e+000  0.000e+000   -59.892   -59.892    -0.000
   Cr2(OH)2SO4+2         0.000e+000  0.000e+000   -63.732   -63.732    -0.001
   Cr2(OH)2(SO4)2        0.000e+000  0.000e+000   -76.942   -76.942     0.000
   Cr(NH3)5OH+2          0.000e+000  0.000e+000  -333.007  -333.008    -0.001
   Cr(NH3)6+3            0.000e+000  0.000e+000  -396.680  -396.682    -0.001
   Cr(NH3)6Cl+2          0.000e+000  0.000e+000  -410.129  -410.130    -0.001
Cr(6)            1.923e-015
   CrO4-2                1.452e-015  1.450e-015   -14.838   -14.839    -0.001
   HCrO4-                4.710e-016  4.708e-016   -15.327   -15.327    -0.000
   H2CrO4                3.830e-023  3.830e-023   -22.417   -22.417     0.000
   NaCrO4-               3.134e-029  3.133e-029   -28.504   -28.504    -0.000
   KCrO4-                1.378e-029  1.377e-029   -28.861   -28.861    -0.000
   Cr2O7-2               7.699e-030  7.687e-030   -29.114   -29.114    -0.001
   CrO3HPO4-2            3.691e-030  3.686e-030   -29.433   -29.434    -0.001
   CrO3H2PO4-            1.782e-034  1.782e-034   -33.749   -33.749    -0.000
   CrO3SO4-2             1.498e-035  1.496e-035   -34.824   -34.825    -0.001
   CrO3Cl-               8.382e-037  8.379e-037   -36.077   -36.077    -0.000
Cu(1)            5.818e-025
   Cu+                   5.818e-025  5.816e-025   -24.235   -24.235    -0.000
   CuCl                  2.064e-036  2.064e-036   -35.685   -35.685     0.000
   CuCl2-                0.000e+000  0.000e+000   -47.915   -47.915    -0.000
   CuCl3-2               0.000e+000  0.000e+000   -63.134   -63.135    -0.001
Cu(2)            1.574e-015
   Cu+2                  1.189e-015  1.187e-015   -14.925   -14.925    -0.001
   CuOH+                 3.769e-016  3.768e-016   -15.424   -15.424    -0.000
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Cu(OH)2	7.544e-018	7.544e-018	-17.122	-17.122	0.000
Cu(OH)3-	1.553e-021	1.553e-021	-20.809	-20.809	-0.000
Cu2(OH)2+2	3.572e-027	3.566e-027	-26.447	-26.448	-0.001
Cu(OH)4-2	1.228e-027	1.226e-027	-26.911	-26.911	-0.001
CuF+	3.943e-028	3.941e-028	-27.404	-27.404	-0.000
CuSO4	2.827e-028	2.827e-028	-27.549	-27.549	0.000
CuNO3+	2.681e-029	2.680e-029	-28.572	-28.572	-0.000
CuCl+	5.308e-030	5.306e-030	-29.275	-29.275	-0.000
CuNO2+	3.321e-037	3.320e-037	-36.479	-36.479	-0.000
Cu(NO3)2	0.000e+000	0.000e+000	-43.618	-43.618	0.000
CuCl2	0.000e+000	0.000e+000	-44.285	-44.285	0.000
Cu(NO2)2	0.000e+000	0.000e+000	-59.042	-59.042	0.000
CuCl3-	0.000e+000	0.000e+000	-60.865	-60.865	-0.000
CuNH3+2	0.000e+000	0.000e+000	-74.215	-74.215	-0.001
CuCl4-2	0.000e+000	0.000e+000	-77.714	-77.715	-0.001
F	5.264e-015				
F-	5.263e-015	5.261e-015	-14.279	-14.279	-0.000
HF	7.808e-019	7.808e-019	-18.107	-18.107	0.000
UO2F+	2.238e-026	2.237e-026	-25.650	-25.650	-0.000
MgF+	2.426e-027	2.425e-027	-26.615	-26.615	-0.000
AlF+2	8.621e-028	8.609e-028	-27.064	-27.065	-0.001
CuF+	3.943e-028	3.941e-028	-27.404	-27.404	-0.000
MnF+	3.807e-028	3.806e-028	-27.419	-27.420	-0.000
CoF+	2.814e-028	2.813e-028	-27.551	-27.551	-0.000
NiF+	2.246e-028	2.245e-028	-27.649	-27.649	-0.000
ZnF+	1.587e-028	1.587e-028	-27.799	-27.799	-0.000
CaF+	1.431e-028	1.431e-028	-27.844	-27.844	-0.000
PbF+	1.427e-028	1.426e-028	-27.846	-27.846	-0.000
CdF+	7.403e-029	7.401e-029	-28.131	-28.131	-0.000
SrF+	2.118e-029	2.117e-029	-28.674	-28.674	-0.000
BF(OH)3-	1.931e-029	1.931e-029	-28.714	-28.714	-0.000
NaF	1.443e-029	1.443e-029	-28.841	-28.841	0.000
AgF	1.225e-029	1.225e-029	-28.912	-28.912	0.000
TlF	2.533e-030	2.533e-030	-29.596	-29.596	0.000
HF2-	1.562e-032	1.562e-032	-31.806	-31.806	-0.000
FeF+2	3.687e-033	3.682e-033	-32.433	-32.434	-0.001
VO2F	3.545e-033	3.545e-033	-32.450	-32.450	0.000
AlF2+	1.804e-036	1.803e-036	-35.744	-35.744	-0.000
H2F2	1.633e-036	1.633e-036	-35.787	-35.787	0.000
HgF+	1.531e-036	1.530e-036	-35.815	-35.815	-0.000
UO2F2	3.394e-037	3.394e-037	-36.469	-36.469	0.000
CrF+2	1.096e-039	1.095e-039	-38.960	-38.961	-0.001
PbF2	0.000e+000	0.000e+000	-40.831	-40.831	0.000
VOF+	0.000e+000	0.000e+000	-41.010	-41.010	-0.000
BF2(OH)2-	0.000e+000	0.000e+000	-41.963	-41.963	-0.000
CdF2	0.000e+000	0.000e+000	-42.110	-42.110	0.000
FeF2+	0.000e+000	0.000e+000	-42.285	-42.285	-0.000
VO2F2-	0.000e+000	0.000e+000	-44.169	-44.169	-0.000
AlF3	0.000e+000	0.000e+000	-45.923	-45.923	0.000
UO2F3-	0.000e+000	0.000e+000	-48.348	-48.348	-0.000
VOF2	0.000e+000	0.000e+000	-52.715	-52.715	0.000
FeF3	0.000e+000	0.000e+000	-53.415	-53.415	0.000
Sb(OH)2F	0.000e+000	0.000e+000	-53.787	-53.787	0.000
SbOF	0.000e+000	0.000e+000	-53.795	-53.795	0.000
PbF3-	0.000e+000	0.000e+000	-54.832	-54.832	-0.000
VO2F3-2	0.000e+000	0.000e+000	-57.352	-57.352	-0.001
AlF4-	0.000e+000	0.000e+000	-57.502	-57.502	-0.000
BF3OH-	0.000e+000	0.000e+000	-57.650	-57.650	-0.000
UO2F4-2	0.000e+000	0.000e+000	-61.727	-61.727	-0.001
UF+3	0.000e+000	0.000e+000	-64.267	-64.268	-0.001
SnF+	0.000e+000	0.000e+000	-64.566	-64.566	-0.000
VOF3-	0.000e+000	0.000e+000	-65.444	-65.444	-0.000
PbF4-2	0.000e+000	0.000e+000	-69.430	-69.431	-0.001

UF2+2		0.000e+000	0.000e+000	-71.447	-71.447	-0.001
VO2F4-3		0.000e+000	0.000e+000	-71.938	-71.939	-0.001
BF4-		0.000e+000	0.000e+000	-72.235	-72.236	-0.000
SnF2		0.000e+000	0.000e+000	-76.041	-76.041	0.000
VOF4-2		0.000e+000	0.000e+000	-79.117	-79.117	-0.001
UF3+		0.000e+000	0.000e+000	-80.526	-80.526	-0.000
SnF3-		0.000e+000	0.000e+000	-87.499	-87.500	-0.000
UF4		0.000e+000	0.000e+000	-92.765	-92.765	0.000
SiF6-2		0.000e+000	0.000e+000	-98.266	-98.267	-0.001
UF5-		0.000e+000	0.000e+000	-105.446	-105.446	-0.000
SnF6-2		0.000e+000	0.000e+000	-109.157	-109.158	-0.001
UF6-2		0.000e+000	0.000e+000	-117.244	-117.245	-0.001
Fe(2)	6.908e-024					
Fe+2		6.881e-024	6.871e-024	-23.162	-23.163	-0.001
FeOH+		2.746e-026	2.745e-026	-25.561	-25.561	-0.000
Fe(OH)2		2.188e-030	2.188e-030	-29.660	-29.660	0.000
Fe(OH)3-		6.945e-032	6.942e-032	-31.158	-31.158	-0.000
FeHPO4		3.416e-035	3.416e-035	-34.466	-34.466	0.000
FeH2PO4+		6.810e-036	6.808e-036	-35.167	-35.167	-0.000
FeSO4		1.753e-036	1.753e-036	-35.756	-35.756	0.000
Fe(3)	1.791e-015					
Fe(OH)2+		1.615e-015	1.614e-015	-14.792	-14.792	-0.000
Fe(OH)3		1.740e-016	1.740e-016	-15.759	-15.759	0.000
Fe(OH)4-		1.626e-018	1.626e-018	-17.789	-17.789	-0.000
FeOH+2		4.141e-020	4.135e-020	-19.383	-19.383	-0.001
Fe+3		6.404e-025	6.383e-025	-24.194	-24.195	-0.001
FeHPO4+		6.587e-030	6.584e-030	-29.181	-29.181	-0.000
FeF+2		3.687e-033	3.682e-033	-32.433	-32.434	-0.001
FeH2PO4+2		2.400e-035	2.396e-035	-34.620	-34.620	-0.001
FeSO4+		7.446e-036	7.444e-036	-35.128	-35.128	-0.000
Fe2(OH)2+4		5.696e-038	5.662e-038	-37.244	-37.247	-0.003
FeCl+2		5.443e-038	5.435e-038	-37.264	-37.265	-0.001
FeNO3+2		4.562e-038	4.555e-038	-37.341	-37.341	-0.001
FeF2+		0.000e+000	0.000e+000	-42.285	-42.285	-0.000
FeHSeO3+2		0.000e+000	0.000e+000	-44.358	-44.359	-0.001
Fe(SO4)2-		0.000e+000	0.000e+000	-48.781	-48.781	-0.000
Fe3(OH)4+5		0.000e+000	0.000e+000	-50.875	-50.879	-0.004
FeCl2+		0.000e+000	0.000e+000	-51.164	-51.165	-0.000
FeF3		0.000e+000	0.000e+000	-53.415	-53.415	0.000
FeCl3		0.000e+000	0.000e+000	-66.714	-66.714	0.000
H(0)	0.000e+000					
H2		0.000e+000	0.000e+000	-41.147	-41.147	0.000
Hg(0)	7.242e-026					
Hg		7.242e-026	7.242e-026	-25.140	-25.140	0.000
Hg(1)	7.727e-040					
Hg2+2		3.863e-040	3.858e-040	-39.413	-39.414	-0.001
Hg(2)	4.985e-016					
Hg(OH)2		4.985e-016	4.985e-016	-15.302	-15.302	0.000
HgOH+		3.136e-020	3.134e-020	-19.504	-19.504	-0.000
Hg+2		7.858e-024	7.846e-024	-23.105	-23.105	-0.001
Hg(OH)3-		6.300e-024	6.297e-024	-23.201	-23.201	-0.000
HgClOH		3.921e-027	3.921e-027	-26.407	-26.407	0.000
HgCl+		4.416e-031	4.414e-031	-30.355	-30.355	-0.000
HgSO4		2.135e-036	2.135e-036	-35.671	-35.671	0.000
HgF+		1.531e-036	1.530e-036	-35.815	-35.815	-0.000
HgNO3+		2.068e-038	2.068e-038	-37.684	-37.685	-0.000
HgCl2		6.238e-039	6.238e-039	-38.205	-38.205	0.000
HgCl3-		0.000e+000	0.000e+000	-51.755	-51.755	-0.000
Hg(NO3)2		0.000e+000	0.000e+000	-52.212	-52.212	0.000
HgCl4-2		0.000e+000	0.000e+000	-65.704	-65.705	-0.001
HgNH3+2		0.000e+000	0.000e+000	-77.605	-77.605	-0.001
Hg(NH3)2+2		0.000e+000	0.000e+000	-131.905	-131.905	-0.001
Hg(NH3)3+2		0.000e+000	0.000e+000	-194.605	-194.605	-0.001

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   Hg(NH3)4+2            0.000e+000  0.000e+000  -257.005  -257.005    -0.001
K                2.558e-015
   K+                    2.558e-015  2.557e-015   -14.592   -14.592    -0.000
   KHPO4-                2.423e-029  2.422e-029   -28.616   -28.616    -0.000
   KSO4-                 1.882e-029  1.881e-029   -28.725   -28.726    -0.000
   KCrO4-                1.378e-029  1.377e-029   -28.861   -28.861    -0.000
Mg               4.114e-015
   Mg+2                  4.114e-015  4.108e-015   -14.386   -14.386    -0.001
   MgOH+                 1.642e-019  1.641e-019   -18.785   -18.785    -0.000
   MgHPO4                3.237e-027  3.237e-027   -26.490   -26.490     0.000
   MgF+                  2.426e-027  2.425e-027   -26.615   -26.615    -0.000
   MgSO4                 7.770e-028  7.770e-028   -27.110   -27.110     0.000
   MgH2PO4+              3.917e-028  3.915e-028   -27.407   -27.407    -0.000
   MgH2BO3+              7.585e-030  7.582e-030   -29.120   -29.120    -0.000
   MgPO4-                9.723e-031  9.720e-031   -30.012   -30.012    -0.000
Mn(2)            1.820e-015
   Mn+2                  1.820e-015  1.817e-015   -14.740   -14.741    -0.001
   MnOH+                 4.582e-019  4.580e-019   -18.339   -18.339    -0.000
   MnSeO4                6.185e-028  6.185e-028   -27.209   -27.209     0.000
   MnF+                  3.807e-028  3.806e-028   -27.419   -27.420    -0.000
   MnSO4                 3.359e-028  3.359e-028   -27.474   -27.474     0.000
   Mn(OH)3-              2.851e-029  2.850e-029   -28.545   -28.545    -0.000
   MnNO3+                2.056e-029  2.055e-029   -28.687   -28.687    -0.000
   MnCl+                 6.452e-030  6.450e-030   -29.190   -29.190    -0.000
   Mn(OH)4-2             9.247e-036  9.234e-036   -35.034   -35.035    -0.001
   Mn(NO3)2              0.000e+000  0.000e+000   -42.434   -42.434     0.000
   MnCl2                 0.000e+000  0.000e+000   -43.590   -43.590     0.000
   MnCl3-                0.000e+000  0.000e+000   -58.700   -58.700    -0.000
   MnSe                  0.000e+000  0.000e+000  -105.844  -105.844     0.000
Mn(3)            8.144e-029
   Mn+3                  8.144e-029  8.117e-029   -28.089   -28.091    -0.001
Mn(6)            6.699e-030
   MnO4-2                6.699e-030  6.689e-030   -29.174   -29.175    -0.001
Mn(7)            2.841e-027
   MnO4-                 2.841e-027  2.840e-027   -26.546   -26.547    -0.000
Mo               1.042e-015
   MoO4-2                1.040e-015  1.039e-015   -14.983   -14.984    -0.001
   HMoO4-                2.075e-018  2.074e-018   -17.683   -17.683    -0.000
   H2MoO4                1.524e-021  1.524e-021   -20.817   -20.817     0.000
   Ag2MoO4               0.000e+000  0.000e+000   -45.472   -45.472     0.000
   AlMo6O21-3            0.000e+000  0.000e+000   -96.684   -96.686    -0.001
   Mo7O24-6              0.000e+000  0.000e+000  -107.877  -107.883    -0.006
   HMo7O24-5             0.000e+000  0.000e+000  -108.490  -108.494    -0.004
   H2Mo7O24-4            0.000e+000  0.000e+000  -110.708  -110.711    -0.003
   H3Mo7O24-3            0.000e+000  0.000e+000  -114.462  -114.463    -0.001
N(-3)            0.000e+000
   NH4+                  0.000e+000  0.000e+000   -61.054   -61.054    -0.000
   NH3                   0.000e+000  0.000e+000   -63.300   -63.300     0.000
   CuNH3+2               0.000e+000  0.000e+000   -74.215   -74.215    -0.001
   NH4SO4-               0.000e+000  0.000e+000   -75.008   -75.008    -0.000
   AgNH3+                0.000e+000  0.000e+000   -75.023   -75.023    -0.000
   NiNH3+2               0.000e+000  0.000e+000   -75.339   -75.340    -0.001
   Co(NH3)+2             0.000e+000  0.000e+000   -75.991   -75.992    -0.001
   HgNH3+2               0.000e+000  0.000e+000   -77.605   -77.605    -0.001
   CaNH3+2               0.000e+000  0.000e+000   -77.803   -77.804    -0.001
   SrNH3+2               0.000e+000  0.000e+000   -78.343   -78.343    -0.001
   BaNH3+2               0.000e+000  0.000e+000   -78.638   -78.638    -0.001
   Hg(NH3)2+2            0.000e+000  0.000e+000  -131.905  -131.905    -0.001
   Ag(NH3)2+             0.000e+000  0.000e+000  -134.413  -134.413    -0.000
   Ni(NH3)2+2            0.000e+000  0.000e+000  -136.479  -136.480    -0.001
   Co(NH3)2+2            0.000e+000  0.000e+000  -137.661  -137.662    -0.001
   Ca(NH3)2+2            0.000e+000  0.000e+000  -141.503  -141.504    -0.001
   Hg(NH3)3+2            0.000e+000  0.000e+000  -194.605  -194.605    -0.001
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   Co(NH3)3+2            0.000e+000  0.000e+000  -199.861  -199.862    -0.001
   Hg(NH3)4+2            0.000e+000  0.000e+000  -257.005  -257.005    -0.001
   Co(NH3)4+2            0.000e+000  0.000e+000  -262.441  -262.442    -0.001
   Co(NH3)5+2            0.000e+000  0.000e+000  -325.521  -325.522    -0.001
   Cr(NH3)5OH+2          0.000e+000  0.000e+000  -333.007  -333.008    -0.001
   Co(NH3)5Cl+2          0.000e+000  0.000e+000  -337.959  -337.960    -0.001
   Co(NH3)6OH+2          0.000e+000  0.000e+000  -396.224  -396.224    -0.001
   Cr(NH3)6+3            0.000e+000  0.000e+000  -396.680  -396.682    -0.001
   Co(NH3)6SO4+          0.000e+000  0.000e+000  -403.484  -403.484    -0.000
   Co(NH3)6Cl+2          0.000e+000  0.000e+000  -407.975  -407.976    -0.001
   Cr(NH3)6Cl+2          0.000e+000  0.000e+000  -410.129  -410.130    -0.001
N(3)            2.671e-024
   NO2-                  2.671e-024  2.670e-024   -23.573   -23.573    -0.000
   AgNO2                 5.169e-037  5.169e-037   -36.287   -36.287     0.000
   CuNO2+                3.321e-037  3.320e-037   -36.479   -36.479    -0.000
   CoNO2+                3.183e-038  3.181e-038   -37.497   -37.497    -0.000
   TlNO2                 6.904e-039  6.904e-039   -38.161   -38.161     0.000
   Cu(NO2)2              0.000e+000  0.000e+000   -59.042   -59.042     0.000
   Ag(NO2)2-             0.000e+000  0.000e+000   -59.670   -59.670    -0.000
N(5)            7.139e-015
   NO3-                  7.139e-015  7.137e-015   -14.146   -14.146    -0.000
   CaNO3+                5.625e-029  5.623e-029   -28.250   -28.250    -0.000
   PbNO3+                4.063e-029  4.061e-029   -28.391   -28.391    -0.000
   SrNO3+                3.239e-029  3.238e-029   -28.490   -28.490    -0.000
   NiNO3+                3.047e-029  3.046e-029   -28.516   -28.516    -0.000
   ZnNO3+                2.711e-029  2.710e-029   -28.567   -28.567    -0.000
   CuNO3+                2.681e-029  2.680e-029   -28.572   -28.572    -0.000
   BaNO3+                2.602e-029  2.601e-029   -28.585   -28.585    -0.000
   MnNO3+                2.056e-029  2.055e-029   -28.687   -28.687    -0.000
   CdNO3+                2.004e-029  2.003e-029   -28.698   -28.698    -0.000
   CoNO3+                1.913e-029  1.913e-029   -28.718   -28.718    -0.000
   TlNO3                 5.836e-030  5.836e-030   -29.234   -29.234     0.000
   AgNO3                 5.253e-030  5.253e-030   -29.280   -29.280     0.000
   UO2NO3+               4.388e-031  4.386e-031   -30.358   -30.358    -0.000
   VO2NO3                1.387e-036  1.387e-036   -35.858   -35.858     0.000
   FeNO3+2               4.562e-038  4.555e-038   -37.341   -37.341    -0.001
   HgNO3+                2.068e-038  2.068e-038   -37.684   -37.685    -0.000
   Pb(NO3)2              0.000e+000  0.000e+000   -42.308   -42.308     0.000
   Mn(NO3)2              0.000e+000  0.000e+000   -42.434   -42.434     0.000
   Co(NO3)2              0.000e+000  0.000e+000   -42.556   -42.556     0.000
   Cd(NO3)2              0.000e+000  0.000e+000   -43.145   -43.145     0.000
   Zn(NO3)2              0.000e+000  0.000e+000   -43.414   -43.414     0.000
   Cu(NO3)2              0.000e+000  0.000e+000   -43.618   -43.618     0.000
   TlNO3+2               0.000e+000  0.000e+000   -44.106   -44.107    -0.001
   CrNO3+2               0.000e+000  0.000e+000   -45.387   -45.388    -0.001
   Hg(NO3)2              0.000e+000  0.000e+000   -52.212   -52.212     0.000
   SnNO3+                0.000e+000  0.000e+000   -68.073   -68.073    -0.000
Na              4.350e-015
   Na+                   4.350e-015  4.348e-015   -14.362   -14.362    -0.000
   NaHPO4-               6.382e-029  6.380e-029   -28.195   -28.195    -0.000
   NaCrO4-               3.134e-029  3.133e-029   -28.504   -28.504    -0.000
   NaSO4-                2.428e-029  2.427e-029   -28.615   -28.615    -0.000
   NaF                   1.443e-029  1.443e-029   -28.841   -28.841     0.000
   NaH2BO3               3.668e-031  3.668e-031   -30.436   -30.436     0.000
Ni              1.704e-015
   Ni+2                  1.702e-015  1.699e-015   -14.769   -14.770    -0.001
   NiOH+                 2.147e-018  2.147e-018   -17.668   -17.668    -0.000
   Ni(OH)2               1.711e-020  1.711e-020   -19.767   -19.767     0.000
   Ni(OH)3-              1.718e-024  1.717e-024   -23.765   -23.765    -0.000
   NiSeO4                1.005e-027  1.005e-027   -26.998   -26.998     0.000
   NiSO4                 3.524e-028  3.524e-028   -27.453   -27.453     0.000
   NiF+                  2.246e-028  2.245e-028   -27.649   -27.649    -0.000
   NiNO3+                3.047e-029  3.046e-029   -28.516   -28.516    -0.000
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   NiCl+                  1.226e-029  1.226e-029   -28.911   -28.912    -0.000
   Ni(SO4)2-2             0.000e+000  0.000e+000   -43.916   -43.916    -0.001
   NiCl2                  0.000e+000  0.000e+000   -45.759   -45.759     0.000
   NiNH3+2                0.000e+000  0.000e+000   -75.339   -75.340    -0.001
   Ni(NH3)2+2             0.000e+000  0.000e+000  -136.479  -136.480    -0.001
O(0)            1.995e-010
   O2                     9.975e-011  9.975e-011   -10.001   -10.001     0.000
P               3.229e-015
   H2PO4-                 1.978e-015  1.977e-015   -14.704   -14.704    -0.000
   HPO4-2                 1.251e-015  1.249e-015   -14.903   -14.903    -0.001
   H3PO4                  2.789e-020  2.789e-020   -19.554   -19.554     0.000
   PO4-3                  5.266e-021  5.248e-021   -20.279   -20.280    -0.001
   UO2PO4-                2.876e-024  2.875e-024   -23.541   -23.541    -0.000
   UO2HPO4                7.330e-025  7.330e-025   -24.135   -24.135     0.000
   MgHPO4                 3.237e-027  3.237e-027   -26.490   -26.490     0.000
   CoHPO4                 2.304e-027  2.304e-027   -26.638   -26.638     0.000
   CaHPO4                 1.422e-027  1.422e-027   -26.847   -26.847     0.000
   SrHPO4                 4.478e-028  4.478e-028   -27.349   -27.349     0.000
   MgH2PO4+               3.917e-028  3.915e-028   -27.407   -27.407    -0.000
   UO2H2PO4+              1.109e-028  1.108e-028   -27.955   -27.955    -0.000
   CaH2PO4+               1.103e-028  1.103e-028   -27.957   -27.958    -0.000
   UO2(HPO4)2-2           8.323e-029  8.310e-029   -28.080   -28.080    -0.001
   NaHPO4-                6.382e-029  6.380e-029   -28.195   -28.195    -0.000
   CaPO4-                 3.772e-029  3.771e-029   -28.423   -28.424    -0.000
   KHPO4-                 2.423e-029  2.422e-029   -28.616   -28.616    -0.000
   SrH2PO4+               1.520e-029  1.519e-029   -28.818   -28.818    -0.000
   FeHPO4+                6.587e-030  6.584e-030   -29.181   -29.181    -0.000
   CrO3HPO4-2             3.691e-030  3.686e-030   -29.433   -29.434    -0.001
   MgPO4-                 9.723e-031  9.720e-031   -30.012   -30.012    -0.000
   CrO3H2PO4-             1.782e-034  1.782e-034   -33.749   -33.749    -0.000
   FeHPO4                 3.416e-035  3.416e-035   -34.466   -34.466     0.000
   FeH2PO4+2              2.400e-035  2.396e-035   -34.620   -34.620    -0.001
   FeH2PO4+               6.810e-036  6.808e-036   -35.167   -35.167    -0.000
   UO2(H2PO4)2            0.000e+000  0.000e+000   -40.365   -40.365     0.000
   CrH2PO4+2              0.000e+000  0.000e+000   -41.820   -41.821    -0.001
   UO2(H2PO4)3-           0.000e+000  0.000e+000   -53.097   -53.097    -0.000
   UHPO4+2                0.000e+000  0.000e+000   -62.124   -62.125    -0.001
   U(HPO4)2               0.000e+000  0.000e+000   -67.013   -67.013     0.000
   U(HPO4)3-2             0.000e+000  0.000e+000   -73.560   -73.561    -0.001
   U(HPO4)4-4             0.000e+000  0.000e+000   -79.918   -79.920    -0.003
Pb              4.826e-016
   Pb+2                   3.853e-016  3.847e-016   -15.414   -15.415    -0.001
   PbOH+                  9.701e-017  9.698e-017   -16.013   -16.013    -0.000
   Pb(OH)2                3.077e-019  3.077e-019   -18.512   -18.512     0.000
   Pb(OH)3-               3.089e-023  3.088e-023   -22.510   -22.510    -0.000
   Pb(OH)4-2              7.600e-028  7.589e-028   -27.119   -27.120    -0.001
   PbSO4                  1.959e-028  1.959e-028   -27.708   -27.708     0.000
   PbF+                   1.427e-028  1.426e-028   -27.846   -27.846    -0.000
   PbNO3+                 4.063e-029  4.061e-029   -28.391   -28.391    -0.000
   PbCl+                  3.850e-029  3.849e-029   -28.414   -28.415    -0.000
   Pb2OH+3                5.933e-031  5.913e-031   -30.227   -30.228    -0.001
   PbF2                   0.000e+000  0.000e+000   -40.831   -40.831     0.000
   Pb(SO4)2-2             0.000e+000  0.000e+000   -41.911   -41.911    -0.001
   Pb3(OH)4+2             0.000e+000  0.000e+000   -42.138   -42.139    -0.001
   Pb(NO3)2               0.000e+000  0.000e+000   -42.308   -42.308     0.000
   PbCl2                  0.000e+000  0.000e+000   -42.314   -42.314     0.000
   Pb4(OH)4+4             0.000e+000  0.000e+000   -53.651   -53.653    -0.003
   PbF3-                  0.000e+000  0.000e+000   -54.832   -54.832    -0.000
   PbCl3-                 0.000e+000  0.000e+000   -57.264   -57.264    -0.000
   PbF4-2                 0.000e+000  0.000e+000   -69.430   -69.431    -0.001
   PbCl4-2                0.000e+000  0.000e+000   -72.153   -72.154    -0.001
S(6)            1.041e-015
   SO4-2                  1.041e-015  1.039e-015   -14.983   -14.983    -0.001
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HSO4-	1.020e-020	1.019e-020	-19.992	-19.992	-0.000
MgSO4	7.770e-028	7.770e-028	-27.110	-27.110	0.000
CaSO4	5.932e-028	5.932e-028	-27.227	-27.227	0.000
NiSO4	3.524e-028	3.524e-028	-27.453	-27.453	0.000
CoSO4	3.507e-028	3.507e-028	-27.455	-27.455	0.000
ZnSO4	3.437e-028	3.437e-028	-27.464	-27.464	0.000
MnSO4	3.359e-028	3.359e-028	-27.474	-27.474	0.000
CuSO4	2.827e-028	2.827e-028	-27.549	-27.549	0.000
SrSO4	2.363e-028	2.363e-028	-27.626	-27.626	0.000
CdSO4	2.163e-028	2.163e-028	-27.665	-27.665	0.000
PbSO4	1.959e-028	1.959e-028	-27.708	-27.708	0.000
UO2SO4	4.846e-029	4.846e-029	-28.315	-28.315	0.000
NaSO4-	2.428e-029	2.427e-029	-28.615	-28.615	-0.000
AgSO4-	1.923e-029	1.922e-029	-28.716	-28.716	-0.000
KSO4-	1.882e-029	1.881e-029	-28.725	-28.726	-0.000
TlSO4-	9.322e-030	9.319e-030	-29.030	-29.031	-0.000
AlSO4+	1.321e-031	1.320e-031	-30.879	-30.879	-0.000
CrO3SO4-2	1.498e-035	1.496e-035	-34.824	-34.825	-0.001
VO2SO4-	9.540e-036	9.536e-036	-35.020	-35.021	-0.000
FeSO4+	7.446e-036	7.444e-036	-35.128	-35.128	-0.000
HgSO4	2.135e-036	2.135e-036	-35.671	-35.671	0.000
FeSO4	1.753e-036	1.753e-036	-35.756	-35.756	0.000
CrOHSO4	7.108e-040	7.108e-040	-39.148	-39.148	0.000
CrSO4+	0.000e+000	0.000e+000	-41.497	-41.497	-0.000
Zn(SO4)2-2	0.000e+000	0.000e+000	-41.506	-41.507	-0.001
Cd(SO4)2-2	0.000e+000	0.000e+000	-41.518	-41.518	-0.001
Pb(SO4)2-2	0.000e+000	0.000e+000	-41.911	-41.911	-0.001
UO2(SO4)2-2	0.000e+000	0.000e+000	-42.177	-42.178	-0.001
VOSO4	0.000e+000	0.000e+000	-43.053	-43.053	0.000
Ni(SO4)2-2	0.000e+000	0.000e+000	-43.916	-43.916	-0.001
Al(SO4)2-	0.000e+000	0.000e+000	-44.832	-44.833	-0.000
Fe(SO4)2-	0.000e+000	0.000e+000	-48.781	-48.781	-0.000
VSO4+	0.000e+000	0.000e+000	-63.119	-63.120	-0.000
Cr2(OH)2SO4+2	0.000e+000	0.000e+000	-63.732	-63.732	-0.001
USO4+2	0.000e+000	0.000e+000	-67.672	-67.673	-0.001
NH4SO4-	0.000e+000	0.000e+000	-75.008	-75.008	-0.000
Cr2(OH)2(SO4)2	0.000e+000	0.000e+000	-76.942	-76.942	0.000
U(SO4)2	0.000e+000	0.000e+000	-78.756	-78.756	0.000
Co(NH3)6SO4+	0.000e+000	0.000e+000	-403.484	-403.484	-0.000
Sb(3)	3.911e-039				
Sb(OH)3	1.979e-039	1.979e-039	-38.704	-38.704	0.000
HSbO2	1.932e-039	1.932e-039	-38.714	-38.714	0.000
SbO2-	0.000e+000	0.000e+000	-43.506	-43.506	-0.000
Sb(OH)4-	0.000e+000	0.000e+000	-43.748	-43.748	-0.000
Sb(OH)2+	0.000e+000	0.000e+000	-44.317	-44.317	-0.000
SbO+	0.000e+000	0.000e+000	-44.779	-44.779	-0.000
Sb(OH)2F	0.000e+000	0.000e+000	-53.787	-53.787	0.000
SbOF	0.000e+000	0.000e+000	-53.795	-53.795	0.000
Sb(5)	8.214e-016				
SbO3-	8.204e-016	8.201e-016	-15.086	-15.086	-0.000
Sb(OH)6-	9.597e-019	9.593e-019	-18.018	-18.018	-0.000
SbO2+	2.369e-030	2.368e-030	-29.625	-29.626	-0.000
Se(-2)	0.000e+000				
Ag2Se	0.000e+000	0.000e+000	-80.873	-80.873	0.000
HSe-	0.000e+000	0.000e+000	-92.716	-92.717	-0.000
H2Se	0.000e+000	0.000e+000	-95.825	-95.825	0.000
Se-2	0.000e+000	0.000e+000	-100.717	-100.718	-0.001
MnSe	0.000e+000	0.000e+000	-105.844	-105.844	0.000
AgOH(Se)2-4	0.000e+000	0.000e+000	-199.977	-199.980	-0.003
Se(4)	2.701e-024				
HSeO3-	2.598e-024	2.597e-024	-23.585	-23.586	-0.000
SeO3-2	1.032e-025	1.030e-025	-24.986	-24.987	-0.001
H2SeO3	1.112e-028	1.112e-028	-27.954	-27.954	0.000

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   AgSeO3-              6.138e-038  6.136e-038   -37.212   -37.212    -0.000
   FeHSeO3+2            0.000e+000  0.000e+000   -44.358   -44.359    -0.001
   Cd(SeO3)2-2          0.000e+000  0.000e+000   -59.109   -59.110    -0.001
   Ag(SeO3)2-3          0.000e+000  0.000e+000   -61.246   -61.247    -0.001
Se(6)           1.266e-015
   SeO4-2               1.266e-015  1.265e-015   -14.897   -14.898    -0.001
   HSeO4-               6.362e-021  6.360e-021   -20.196   -20.197    -0.000
   CoSeO4               1.072e-027  1.072e-027   -26.970   -26.970     0.000
   NiSeO4               1.005e-027  1.005e-027   -26.998   -26.998     0.000
   MnSeO4               6.185e-028  6.185e-028   -27.209   -27.209     0.000
   ZnSeO4               2.961e-028  2.961e-028   -27.529   -27.529     0.000
   CdSeO4               2.090e-028  2.090e-028   -27.680   -27.680     0.000
   Zn(SeO4)2-2          0.000e+000  0.000e+000   -42.420   -42.421    -0.001
Si              1.664e-015
   H4SiO4               1.662e-015  1.662e-015   -14.779   -14.779     0.000
   H3SiO4-              2.395e-018  2.394e-018   -17.621   -17.621    -0.000
   H2SiO4-2             1.508e-024  1.505e-024   -23.822   -23.822    -0.001
   UO2H3SiO4+           6.263e-027  6.260e-027   -26.203   -26.203    -0.000
   SiF6-2               0.000e+000  0.000e+000   -98.266   -98.267    -0.001
Sn(2)           0.000e+000
   Sn(OH)2              0.000e+000  0.000e+000   -47.872   -47.872     0.000
   HSnO2-               0.000e+000  0.000e+000   -49.808   -49.808    -0.000
   Sn(OH)3-             0.000e+000  0.000e+000   -50.370   -50.370    -0.000
   SnOH+                0.000e+000  0.000e+000   -51.173   -51.173    -0.000
   Sn+2                 0.000e+000  0.000e+000   -54.774   -54.775    -0.001
   SnF+                 0.000e+000  0.000e+000   -64.566   -64.566    -0.000
   SnCl+                0.000e+000  0.000e+000   -67.684   -67.685    -0.000
   SnNO3+               0.000e+000  0.000e+000   -68.073   -68.073    -0.000
   SnF2                 0.000e+000  0.000e+000   -76.041   -76.041     0.000
   SnCl2                0.000e+000  0.000e+000   -81.444   -81.444     0.000
   SnF3-                0.000e+000  0.000e+000   -87.499   -87.500    -0.000
   SnCl3-               0.000e+000  0.000e+000   -97.168   -97.168    -0.000
   Sn2(OH)2+2           0.000e+000  0.000e+000  -100.346  -100.347    -0.001
   Sn3(OH)4+2           0.000e+000  0.000e+000  -143.218  -143.218    -0.001
Sn(4)           8.424e-016
   Sn(OH)6-2            8.372e-016  8.360e-016   -15.077   -15.078    -0.001
   SnO3-2               5.163e-018  5.156e-018   -17.287   -17.288    -0.001
   Sn+4                 1.423e-036  1.414e-036   -35.847   -35.849    -0.003
   SnF6-2               0.000e+000  0.000e+000  -109.157  -109.158    -0.001
Sr              1.141e-015
   Sr+2                 1.141e-015  1.140e-015   -14.943   -14.943    -0.001
   SrOH+                7.558e-022  7.555e-022   -21.122   -21.122    -0.000
   SrHPO4               4.478e-028  4.478e-028   -27.349   -27.349     0.000
   SrSO4                2.363e-028  2.363e-028   -27.626   -27.626     0.000
   SrNO3+               3.239e-029  3.238e-029   -28.490   -28.490    -0.000
   SrF+                 2.118e-029  2.117e-029   -28.674   -28.674    -0.000
   SrH2PO4+             1.520e-029  1.519e-029   -28.818   -28.818    -0.000
   SrH2BO3+             2.153e-030  2.152e-030   -29.667   -29.667    -0.000
   SrNH3+2              0.000e+000  0.000e+000   -78.343   -78.343    -0.001
Tl(1)           3.826e-016
   Tl+                  3.826e-016  3.825e-016   -15.417   -15.417    -0.000
   TlOH                 2.366e-022  2.366e-022   -21.626   -21.626     0.000
   TlSO4-               9.322e-030  9.319e-030   -29.030   -29.031    -0.000
   TlNO3                5.836e-030  5.836e-030   -29.234   -29.234     0.000
   TlCl                 3.490e-030  3.490e-030   -29.457   -29.457     0.000
   TlF                  2.533e-030  2.533e-030   -29.596   -29.596     0.000
   TlNO2                6.904e-039  6.904e-039   -38.161   -38.161     0.000
   TlCl2-               0.000e+000  0.000e+000   -44.237   -44.237    -0.000
Tl(3)           1.067e-016
   Tl(OH)3              1.067e-016  1.067e-016   -15.972   -15.972     0.000
   Tl(OH)4-             2.137e-021  2.136e-021   -20.670   -20.670    -0.000
   Tl(OH)2+             8.448e-022  8.445e-022   -21.073   -21.073    -0.000
   TlOH+2               5.318e-028  5.310e-028   -27.274   -27.275    -0.001
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   Tl+3                  2.114e-034  2.107e-034   -33.675   -33.676    -0.001
   TlOHCl+               1.290e-034  1.289e-034   -33.890   -33.890    -0.000
   TlCl+2                0.000e+000  0.000e+000   -40.506   -40.506    -0.001
   TlNO3+2               0.000e+000  0.000e+000   -44.106   -44.107    -0.001
   TlCl2+                0.000e+000  0.000e+000   -49.296   -49.296    -0.000
   TlCl3                 0.000e+000  0.000e+000   -60.826   -60.826     0.000
   TlCl4-                0.000e+000  0.000e+000   -73.576   -73.576    -0.000
U(3)            0.000e+000
   U+3                   0.000e+000  0.000e+000   -80.084   -80.085    -0.001
U(4)            3.847e-038
   U(OH)5-               3.830e-038  3.829e-038   -37.417   -37.417    -0.000
   U(OH)4                1.609e-040  1.609e-040   -39.793   -39.793     0.000
   U(OH)3+               0.000e+000  0.000e+000   -43.229   -43.229    -0.000
   U(OH)2+2              0.000e+000  0.000e+000   -47.562   -47.562    -0.001
   UOH+3                 0.000e+000  0.000e+000   -52.886   -52.888    -0.001
   U+4                   0.000e+000  0.000e+000   -59.287   -59.289    -0.003
   UHPO4+2               0.000e+000  0.000e+000   -62.124   -62.125    -0.001
   UF+3                  0.000e+000  0.000e+000   -64.267   -64.268    -0.001
   U(HPO4)2              0.000e+000  0.000e+000   -67.013   -67.013     0.000
   USO4+2                0.000e+000  0.000e+000   -67.672   -67.673    -0.001
   UF2+2                 0.000e+000  0.000e+000   -71.447   -71.447    -0.001
   UCl+3                 0.000e+000  0.000e+000   -72.138   -72.139    -0.001
   U(HPO4)3-2            0.000e+000  0.000e+000   -73.560   -73.561    -0.001
   U(SO4)2               0.000e+000  0.000e+000   -78.756   -78.756     0.000
   U(HPO4)4-4            0.000e+000  0.000e+000   -79.918   -79.920    -0.003
   UF3+                  0.000e+000  0.000e+000   -80.526   -80.526    -0.000
   UF4                   0.000e+000  0.000e+000   -92.765   -92.765     0.000
   UF5-                  0.000e+000  0.000e+000  -105.446  -105.446    -0.000
   UF6-2                 0.000e+000  0.000e+000  -117.244  -117.245    -0.001
   U6(OH)15+9            0.000e+000  0.000e+000  -267.901  -267.914    -0.013
U(5)            1.878e-026
   UO2+                  1.878e-026  1.878e-026   -25.726   -25.726    -0.000
U(6)            4.201e-016
   UO2OH+                3.893e-016  3.891e-016   -15.410   -15.410    -0.000
   UO2+2                 3.085e-017  3.080e-017   -16.511   -16.511    -0.001
   UO2PO4-               2.876e-024  2.875e-024   -23.541   -23.541    -0.000
   UO2HPO4               7.330e-025  7.330e-025   -24.135   -24.135     0.000
   (UO2)2(OH)2+2         2.517e-025  2.513e-025   -24.599   -24.600    -0.001
   UO2F+                 2.238e-026  2.237e-026   -25.650   -25.650    -0.000
   UO2H3SiO4+            6.263e-027  6.260e-027   -26.203   -26.203    -0.000
   UO2H2PO4+             1.109e-028  1.108e-028   -27.955   -27.955    -0.000
   UO2(HPO4)2-2          8.323e-029  8.310e-029   -28.080   -28.080    -0.001
   UO2SO4                4.846e-029  4.846e-029   -28.315   -28.315     0.000
   (UO2)3(OH)5+          7.472e-031  7.469e-031   -30.127   -30.127    -0.000
   UO2NO3+               4.388e-031  4.386e-031   -30.358   -30.358    -0.000
   UO2Cl+                1.409e-031  1.409e-031   -30.851   -30.851    -0.000
   UO2F2                 3.394e-037  3.394e-037   -36.469   -36.469     0.000
   UO2(H2PO4)2           0.000e+000  0.000e+000   -40.365   -40.365     0.000
   UO2(SO4)2-2           0.000e+000  0.000e+000   -42.177   -42.178    -0.001
   UO2F3-                0.000e+000  0.000e+000   -48.348   -48.348    -0.000
   UO2(H2PO4)3-          0.000e+000  0.000e+000   -53.097   -53.097    -0.000
   UO2F4-2               0.000e+000  0.000e+000   -61.727   -61.727    -0.001
V(2)            0.000e+000
   VOH+                  0.000e+000  0.000e+000   -66.609   -66.609    -0.000
   V+2                   0.000e+000  0.000e+000   -67.120   -67.120    -0.001
V(3)            1.261e-033
   V(OH)3                1.261e-033  1.261e-033   -32.899   -32.899     0.000
   V(OH)2+               0.000e+000  0.000e+000   -43.087   -43.087    -0.000
   VOH+2                 0.000e+000  0.000e+000   -46.108   -46.109    -0.001
   V+3                   0.000e+000  0.000e+000   -50.809   -50.810    -0.001
   VSO4+                 0.000e+000  0.000e+000   -63.119   -63.120    -0.000
   V2(OH)3+3             0.000e+000  0.000e+000   -90.743   -90.744    -0.001
   V2(OH)2+4             0.000e+000  0.000e+000   -91.415   -91.418    -0.003
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V(4)            6.508e-030
   V(OH)3+              6.198e-030  6.196e-030   -29.208   -29.208    -0.000
   VO+2                 3.099e-031  3.095e-031   -30.509   -30.509    -0.001
   VOF+                 0.000e+000  0.000e+000   -41.010   -41.010    -0.000
   VOSO4                0.000e+000  0.000e+000   -43.053   -43.053     0.000
   VOCl+                0.000e+000  0.000e+000   -44.611   -44.611    -0.000
   VOF2                 0.000e+000  0.000e+000   -52.715   -52.715     0.000
   H2V2O4+2             0.000e+000  0.000e+000   -53.715   -53.716    -0.001
   VOF3-                0.000e+000  0.000e+000   -65.444   -65.444    -0.000
   VOF4-2               0.000e+000  0.000e+000   -79.117   -79.117    -0.001
V(5)            1.963e-015
   H2VO4-               1.913e-015  1.913e-015   -14.718   -14.718    -0.000
   HVO4-2               4.795e-017  4.787e-017   -16.319   -16.320    -0.001
   H3VO4                1.919e-018  1.919e-018   -17.717   -17.717     0.000
   VO2+                 3.844e-022  3.842e-022   -21.415   -21.415    -0.000
   VO4-3                2.399e-024  2.391e-024   -23.620   -23.621    -0.001
   H3V2O7-              2.371e-026  2.370e-026   -25.625   -25.625    -0.000
   HV2O7-3              3.113e-029  3.102e-029   -28.507   -28.508    -0.001
   V2O7-4               8.371e-033  8.322e-033   -32.077   -32.080    -0.003
   VO2F                 3.545e-033  3.545e-033   -32.450   -32.450     0.000
   VO2SO4-              9.540e-036  9.536e-036   -35.020   -35.021    -0.000
   VO2NO3               1.387e-036  1.387e-036   -35.858   -35.858     0.000
   V3O9-3               7.350e-039  7.325e-039   -38.134   -38.135    -0.001
   VO2F2-               0.000e+000  0.000e+000   -44.169   -44.169    -0.000
   V4O12-4              0.000e+000  0.000e+000   -50.231   -50.234    -0.003
   VO2F3-2              0.000e+000  0.000e+000   -57.352   -57.352    -0.001
   VO2F4-3              0.000e+000  0.000e+000   -71.938   -71.939    -0.001
   HV10O28-5            0.000e+000  0.000e+000  -125.080  -125.084    -0.004
   V10O28-6             0.000e+000  0.000e+000  -126.266  -126.272    -0.006
   H2V10O28-4           0.000e+000  0.000e+000  -126.872  -126.875    -0.003
Zn              1.529e-015
   Zn+2                 1.514e-015  1.512e-015   -14.820   -14.821    -0.001
   ZnOH+                1.517e-017  1.517e-017   -16.819   -16.819    -0.000
   Zn(OH)2              2.412e-019  2.412e-019   -18.618   -18.618     0.000
   Zn(OH)3-             1.214e-022  1.213e-022   -21.916   -21.916    -0.000
   Zn(OH)4-2            4.854e-028  4.847e-028   -27.314   -27.315    -0.001
   ZnSO4                3.437e-028  3.437e-028   -27.464   -27.464     0.000
   ZnSeO4               2.961e-028  2.961e-028   -27.529   -27.529     0.000
   ZnF+                 1.587e-028  1.587e-028   -27.799   -27.799    -0.000
   ZnNO3+               2.711e-029  2.710e-029   -28.567   -28.567    -0.000
   ZnCl+                1.071e-029  1.071e-029   -28.970   -28.970    -0.000
   ZnOHCl               1.406e-030  1.406e-030   -29.852   -29.852     0.000
   Zn(SO4)2-2           0.000e+000  0.000e+000   -41.506   -41.507    -0.001
   Zn(SeO4)2-2          0.000e+000  0.000e+000   -42.420   -42.421    -0.001
   ZnCl2                0.000e+000  0.000e+000   -43.320   -43.320     0.000
   Zn(NO3)2             0.000e+000  0.000e+000   -43.414   -43.414     0.000
   ZnCl3-               0.000e+000  0.000e+000   -57.970   -57.970    -0.000
   ZnCl4-2              0.000e+000  0.000e+000   -72.820   -72.821    -0.001

-----------------------------Saturation indices-----------------------------

      Phase               SI log IAP  log KT

      (Co(NH3)5Cl)(NO3)2-354.58 -348.29    6.29  (Co(NH3)5Cl)(NO3)2
      (Co(NH3)5Cl)Cl2-353.61 -349.10    4.51  (Co(NH3)5Cl)Cl2
      (Co(NH3)5OH2)Cl3-360.84 -349.10   11.74  (Co(NH3)5OH2)Cl3
      (Co(NH3)6)(NO3)3-419.88 -401.95   17.93  (Co(NH3)6)(NO3)3
      (Co(NH3)6)Cl3  -423.19 -403.16   20.03  (Co(NH3)6)Cl3
      (NH4)2CrO4     -137.35 -136.95    0.40  (NH4)2CrO4
      (NH4)2SeO4     -137.46 -137.01    0.45  (NH4)2SeO4
      (UO2)3(PO4)2    -40.69  -90.09  -49.40  (UO2)3(PO4)2
      (VO)3(PO4)2    -106.99 -132.09  -25.10  (VO)3(PO4)2
      Ag2CrO4         -33.31  -44.90  -11.59  Ag2CrO4
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Ag2HVO4	-31.97	-30.49	1.48	Ag2HVO4
Ag2MoO4	-33.50	-45.05	-11.55	Ag2MoO4
Ag2O	-28.64	-16.07	12.57	Ag2O
Ag2Se	-67.08	-115.78	-48.70	Ag2Se
Ag2SeO3	-39.50	-46.65	-7.15	Ag2SeO3
Ag2SeO4	-36.05	-44.96	-8.91	Ag2SeO4
Ag2SO4	-40.23	-45.05	-4.82	Ag2SO4
Ag3AsO3	-65.31	-63.16	2.16	Ag3AsO3
Ag3AsO4	-41.27	-44.06	-2.79	Ag3AsO4
Ag3H2VO5	-43.70	-38.52	5.18	Ag3H2VO5
Ag3PO4	-47.79	-65.38	-17.59	Ag3PO4
AgF:4H2O	-30.36	-29.31	1.05	AgF:4H2O
Agmetal	-13.53	-27.03	-13.51	Ag
AgVO3	-23.22	-22.45	0.77	AgVO3
Al(OH)3(am)	-9.59	1.21	10.80	Al(OH)3
Al2(MoO4)3	-86.89	-84.52	2.37	Al2(MoO4)3
Al2O3	-17.23	2.42	19.65	Al2O3
Al4(OH)10SO4	-46.84	-24.14	22.70	Al4(OH)10SO4
AlAsO4:2H2O	-23.54	-18.74	4.80	AlAsO4:2H2O
AlOHSO4	-24.54	-27.77	-3.23	AlOHSO4
AlSb	-217.11	-151.49	65.62	AlSb
Alunite	-60.53	-61.93	-1.40	KAl3(SO4)2(OH)6
Anglesite	-22.61	-30.40	-7.79	PbSO4
Anhydrite	-25.23	-29.59	-4.36	CaSO4
Antlerite	-40.55	-31.77	8.79	Cu3(OH)4SO4
Arsenolite	-153.45	-156.21	-2.76	As4O6
As2O5	-46.61	-39.91	6.71	As2O5
Atacamite	-30.80	-23.41	7.39	Cu2(OH)3Cl
Autunite	-44.26	-88.19	-43.93	Ca(UO2)2(PO4)2
Avicennite	-18.94	-31.94	-13.00	Tl2O3
Ba(OH)2:8H2O	-25.54	-1.14	24.39	Ba(OH)2:8H2O
Ba2V2O7:2H2O	-46.99	-31.12	15.87	Ba2V2O7:2H2O
Ba3(AsO4)2	-34.42	-43.33	-8.91	Ba3(AsO4)2
Ba3(VO4)2:4H2O	-65.20	-32.26	32.94	Ba3(VO4)2:4H2O
BaCrO4	-20.31	-29.98	-9.67	BaCrO4
BaF2	-37.88	-43.70	-5.82	BaF2
BaHPO4	-22.64	-42.42	-19.77	BaHPO4
BaMoO4	-23.16	-30.12	-6.96	BaMoO4
Barite	-20.14	-30.12	-9.98	BaSO4
BaSeO3	-33.56	-31.73	1.83	BaSeO3
BaSeO4	-22.58	-30.04	-7.46	BaSeO4
Bassetite	-52.26	-96.75	-44.48	Fe(UO2)2(PO4)2
Bianchite	-28.04	-29.80	-1.76	ZnSO4:6H2O
Birnessite	-6.19	11.90	18.09	MnO2
Bixbyite	-13.55	-14.19	-0.64	Mn2O3
Boehmite	-7.37	1.21	8.58	AlOOH
Breithauptite	-115.95	-134.47	-18.52	NiSb
Brochantite	-47.92	-32.69	15.22	Cu4(OH)6SO4
Brucite	-17.23	-0.39	16.84	Mg(OH)2
Bunsenite	-13.22	-0.77	12.45	NiO
Ca(VO3)2	-35.10	-29.44	5.66	Ca(VO3)2
Ca2V2O7	-47.55	-30.05	17.50	Ca2V2O7
Ca2V2O7:2H2O	-51.60	-30.05	21.55	Ca2V2O7:2H2O
Ca3(AsO4)2:4H2O	-64.03	-41.73	22.30	Ca3(AsO4)2:4H2O
Ca3(PO4)2(beta)	-55.45	-84.37	-28.92	Ca3(PO4)2
Ca3(VO4)2	-69.61	-30.65	38.96	Ca3(VO4)2
Ca3(VO4)2:4H2O	-70.51	-30.65	39.86	Ca3(VO4)2:4H2O
Ca3Sb2	-450.18	-307.21	142.97	Ca3Sb2
Ca4H(PO4)3:3H2O	-79.17	-126.25	-47.08	Ca4H(PO4)3:3H2O
CaCrO4	-27.18	-29.44	-2.27	CaCrO4
CaHPO4	-22.61	-41.88	-19.27	CaHPO4
CaHPO4:2H2O	-22.89	-41.88	-19.00	CaHPO4:2H2O
Calomel	-50.60	-68.51	-17.91	Hg2Cl2

CaMoO4	-21.64	-29.59	-7.95	CaMoO4
Carnotite	-24.76	-24.53	0.23	KUO2VO4
CaSeO3:2H2O	-34.00	-31.19	2.81	CaSeO3:2H2O
CaSeO4:2H2O	-26.48	-29.50	-3.02	CaSeO4:2H2O
Cd(BO2)2	-38.97	-29.13	9.84	Cd(BO2)2
Cd(OH)2	-14.70	-1.05	13.64	Cd(OH)2
Cd(OH)2(am)	-14.78	-1.05	13.73	Cd(OH)2
Cd3(OH)2(SO4)2	-67.83	-61.12	6.71	Cd3(OH)2(SO4)2
Cd3(OH)4SO4	-54.70	-32.14	22.56	Cd3(OH)4SO4
Cd3(PO4)2	-53.12	-85.72	-32.60	Cd3(PO4)2
Cd4(OH)6SO4	-61.60	-33.20	28.40	Cd4(OH)6SO4
CdCl2	-43.49	-44.15	-0.66	CdCl2
CdCl2:1H2O	-42.46	-44.15	-1.69	CdCl2:1H2O
CdCl2:2.5H2O	-42.24	-44.15	-1.91	CdCl2:2.5H2O
CdF2	-42.40	-43.61	-1.21	CdF2
Cdmetal(alpha)	-52.57	-39.05	13.51	Cd
Cdmetal(gamma)	-52.67	-39.05	13.62	Cd
CdMoO4	-15.89	-30.04	-14.15	CdMoO4
CdOHCl	-26.14	-22.60	3.54	CdOHCl
CdSb	-134.40	-134.75	-0.35	CdSb
CdSe	-80.57	-100.77	-20.20	CdSe
CdSeO4:2H2O	-28.10	-29.95	-1.85	CdSeO4:2H2O
CdSO4	-29.86	-30.04	-0.17	CdSO4
CdSO4:1H2O	-28.31	-30.04	-1.73	CdSO4:1H2O
CdSO4:2.67H2O	-28.16	-30.04	-1.87	CdSO4:2.67H2O
Celestite	-23.31	-29.93	-6.62	SrSO4
Cerargyrite	-19.83	-29.58	-9.75	AgCl
Chalcanthite	-27.27	-29.91	-2.64	CuSO4:5H2O
Chalcedony	-11.23	-14.78	-3.55	SiO2
Chrysotile	-62.93	-30.73	32.20	Mg3Si2O5(OH)4
Claudetite	-153.15	-156.21	-3.06	As4O6
Clausthalite	-74.03	-101.13	-27.10	PbSe
Co(BO2)2	-55.92	-28.85	27.07	Co(BO2)2
Co(OH)2	-13.87	-0.77	13.09	Co(OH)2
Co(OH)3	-11.87	-14.18	-2.31	Co(OH)3
Co3(AsO4)2	-55.27	-42.23	13.03	Co3(AsO4)2
Co3(PO4)2	-50.19	-84.88	-34.69	Co3(PO4)2
Co3O4	-18.63	-29.13	-10.50	Co3O4
CoCl2	-52.14	-43.87	8.27	CoCl2
CoCl2:6H2O	-46.41	-43.87	2.54	CoCl2:6H2O
CoF2	-41.73	-43.33	-1.60	CoF2
CoF3	-76.55	-78.01	-1.46	CoF3
CoFe2O4	-3.65	-7.17	-3.53	CoFe2O4
CoHPO4	-22.99	-42.05	-19.06	CoHPO4
CoMoO4	-21.99	-29.76	-7.76	CoMoO4
CoO	-14.36	-0.77	13.59	CoO
CoSe	-84.29	-100.49	-16.20	CoSe
CoSeO3	-32.68	-31.36	1.32	CoSeO3
CoSeO4:6H2O	-28.14	-29.67	-1.53	CoSeO4:6H2O
CoSO4	-32.56	-29.76	2.80	CoSO4
CoSO4:6H2O	-27.28	-29.76	-2.47	CoSO4:6H2O
Cotunnite	-39.73	-44.51	-4.78	PbCl2
Cr(OH)2	-45.33	-34.51	10.82	Cr(OH)2
Cr(OH)3	-19.79	-18.46	1.34	Cr(OH)3
Cr(OH)3(am)	-17.71	-18.46	-0.75	Cr(OH)3
Cr2O3	-34.55	-36.91	-2.36	Cr2O3
CrCl2	-91.69	-77.60	14.09	CrCl2
CrCl3	-98.21	-83.10	15.11	CrCl3
CrF3	-70.95	-82.29	-11.34	CrF3
Cristobalite	-11.43	-14.78	-3.35	SiO2
Crmetal	-102.99	-72.50	30.48	Cr
CrO3	-25.63	-28.84	-3.21	CrO3
Cryolite	-114.70	-148.54	-33.84	Na3AlF6

Cu(OH)2	-9.60	-0.93	8.67	Cu(OH)2
Cu(SbO3)2	-47.55	-2.34	45.21	Cu(SbO3)2
Cu2(OH)3NO3	-32.25	-23.00	9.25	Cu2(OH)3NO3
Cu2Sb:3H2O	-135.98	-170.86	-34.88	Cu2Sb:3H2O
Cu2Se(alpha)	-88.39	-134.19	-45.80	Cu2Se
Cu2SO4	-61.50	-63.45	-1.95	Cu2SO4
Cu3(AsO4)2:2H2O	-48.79	-42.69	6.10	Cu3(AsO4)2:2H2O
Cu3(PO4)2	-48.49	-85.34	-36.85	Cu3(PO4)2
Cu3(PO4)2:3H2O	-50.22	-85.34	-35.12	Cu3(PO4)2:3H2O
Cu3Sb	-161.81	-204.41	-42.59	Cu3Sb
Cu3Se2	-171.34	-234.83	-63.49	Cu3Se2
CuCrO4	-24.32	-29.76	-5.44	CuCrO4
CuF	-33.61	-38.51	-4.91	CuF
CuF2	-44.60	-43.48	1.12	CuF2
CuF2:2H2O	-38.93	-43.48	-4.55	CuF2:2H2O
Cumetal	-27.48	-36.24	-8.76	Cu
CuMoO4	-16.83	-29.91	-13.08	CuMoO4
CuOCuSO4	-41.14	-30.84	10.30	CuOCuSO4
Cupricferrite	-13.32	-7.33	5.99	CuFe2O4
Cuprite	-33.07	-34.47	-1.41	Cu2O
Cuprousferrite	-11.52	-20.44	-8.92	CuFeO2
CuSe	-67.54	-100.64	-33.10	CuSe
CuSe2	-129.00	-162.36	-33.37	CuSe2
CuSeO3:2H2O	-32.02	-31.51	0.51	CuSeO3:2H2O
CuSeO4:5H2O	-27.38	-29.82	-2.44	CuSeO4:5H2O
CuSO4	-32.85	-29.91	2.94	CuSO4
Diaspore	-5.66	1.21	6.87	AlOOH
Epsomite	-27.24	-29.37	-2.13	MgSO4:7H2O
Fe(OH)2	-22.73	-9.17	13.56	Fe(OH)2
Fe(OH)2.7Cl.3	-6.62	-9.66	-3.04	Fe(OH)2.7Cl.3
Fe(VO3)2	-34.28	-38.00	-3.72	Fe(VO3)2
Fe2(OH)4SeO3	-38.54	-36.98	1.55	Fe2(OH)4SeO3
Fe2(SeO3)3:2H2O	-77.52	-98.15	-20.63	Fe2(SeO3)3:2H2O
Fe2(SO4)3	-89.61	-93.34	-3.73	Fe2(SO4)3
Fe3(OH)8	-35.79	-15.56	20.22	Fe3(OH)8
FeAsO4:2H2O	-23.55	-23.15	0.40	FeAsO4:2H2O
FeCr2O4	-53.28	-46.08	7.20	FeCr2O4
FeMoO4	-28.06	-38.15	-10.09	FeMoO4
Ferrihydrite	-6.39	-3.20	3.19	Fe(OH)3
Ferroselite	-152.00	-170.60	-18.60	FeSe2
FeSe	-97.88	-108.88	-11.00	FeSe
Fluorite	-32.66	-43.16	-10.50	CaF2
Gibbsite	-7.08	1.21	8.29	Al(OH)3
Goethite	-3.69	-3.20	0.49	FeOOH
Goslarite	-27.79	-29.80	-2.01	ZnSO4:7H2O
Greenalite	-77.87	-57.06	20.81	Fe3Si2O5(OH)4
Gummite	-10.19	-2.51	7.67	UO3
Gypsum	-24.98	-29.59	-4.61	CaSO4:2H2O
H-Autunite	-39.65	-87.58	-47.93	H2(UO2)2(PO4)2
H-Jarosite	-55.46	-67.56	-12.10	(H3O)Fe3(SO4)2(OH)6
H2MoO4	-16.10	-28.98	-12.88	H2MoO4
H2Se(g)	-94.76	-99.72	-4.96	H2Se
H2Sn(OH)6	-5.55	-29.07	-23.53	H2Sn(OH)6
Halite	-30.51	-28.91	1.60	NaCl
Halloysite	-36.71	-27.14	9.57	Al2Si2O5(OH)4
Hausmannite	-25.26	35.77	61.03	Mn3O4
Hematite	-4.98	-6.40	-1.42	Fe2O3
Hercynite	-29.64	-6.75	22.89	FeAl2O4
Hg(g)	-23.83	-31.71	-7.87	Hg
Hg(OH)2	-11.81	-15.30	-3.50	Hg(OH)2
Hg2(g)	-48.46	-63.41	-14.96	Hg2
Hg2(OH)2	-30.68	-25.42	5.26	Hg2(OH)2
Hg2CrO4	-45.55	-54.25	-8.70	Hg2CrO4

Hg2F2	-57.61	-67.97	-10.36	Hg2F2
Hg2HPO4	-41.92	-66.69	-24.77	Hg2HPO4
Hg2SeO3	-51.34	-56.00	-4.66	Hg2SeO3
Hg2SO4	-48.27	-54.40	-6.13	Hg2SO4
HgCl(g)	-53.75	-34.26	19.50	HgCl
HgCl2	-37.14	-58.40	-21.26	HgCl2
HgF(g)	-66.66	-33.99	32.68	HgF
HgF2(g)	-70.42	-57.86	12.57	HgF2
Hgmetal(l)	-18.26	-31.71	-13.45	Hg
HgSe	-59.32	-115.02	-55.69	HgSe
HgSeO3	-33.46	-45.89	-12.43	HgSeO3
HgSO4	-34.86	-44.28	-9.42	HgSO4
Hinsdalite	-65.55	-68.05	-2.50	PbAl3PO4SO4(OH)6
Hydroxylapatite	-82.53	-126.86	-44.33	Ca5(PO4)3OH
Hydroxylpyromorphite	-68.13	-130.92	-62.79	Pb5(PO4)3OH
K-Alum	-59.17	-64.34	-5.17	KAl(SO4)2:12H2O
K-Autunite	-54.52	-102.77	-48.24	K2(UO2)2(PO4)2
K-Jarosite	-60.35	-75.15	-14.80	KFe3(SO4)2(OH)6
K2Cr2O7	-55.62	-72.86	-17.24	K2Cr2O7
K2CrO4	-43.51	-44.02	-0.51	K2CrO4
K2MoO4	-47.43	-44.17	3.26	K2MoO4
K2SeO4	-43.35	-44.08	-0.73	K2SeO4
Kaolinite	-34.58	-27.14	7.43	Al2Si2O5(OH)4
Langite	-50.18	-32.69	17.49	Cu4(OH)6SO4:H2O
Larnakite	-31.38	-31.82	-0.43	PbO:PbSO4
Laurionite	-23.59	-22.97	0.62	PbOHCl
Lepidocrocite	-4.57	-3.20	1.37	FeOOH
Lime	-33.31	-0.61	32.70	CaO
Litharge	-14.11	-1.42	12.69	PbO
Maghemite	-12.78	-6.40	6.39	Fe2O3
Magnesioferrite	-23.65	-6.79	16.86	Fe2MgO4
Magnetite	-18.97	-15.56	3.40	Fe3O4
Manganite	-7.09	18.25	25.34	MnOOH
Massicot	-14.31	-1.42	12.89	PbO
Matlockite	-35.27	-44.24	-8.97	PbClF
Melanothallite	-50.28	-44.03	6.26	CuCl2
Melanterite	-35.94	-38.15	-2.21	FeSO4:7H2O
Mg(OH)2(active)	-19.18	-0.39	18.79	Mg(OH)2
Mg(VO3)2	-40.50	-29.22	11.28	Mg(VO3)2
Mg2Sb3	-438.55	-363.87	74.68	Mg2Sb3
Mg2V2O7	-55.97	-29.61	26.36	Mg2V2O7
Mg3(PO4)2	-60.44	-83.72	-23.28	Mg3(PO4)2
MgCr2O4	-53.50	-37.30	16.20	MgCr2O4
MgCrO4	-34.61	-29.22	5.38	MgCrO4
MgF2	-34.81	-42.94	-8.13	MgF2
MgHPO4:3H2O	-23.49	-41.66	-18.18	MgHPO4:3H2O
MgMoO4	-27.52	-29.37	-1.85	MgMoO4
MgSeO3:6H2O	-34.03	-30.97	3.06	MgSeO3:6H2O
MgSeO4:6H2O	-28.08	-29.28	-1.20	MgSeO4:6H2O
Minium	-39.78	33.74	73.52	Pb3O4
Mirabilite	-42.59	-43.71	-1.11	Na2SO4:10H2O
Mn(VO3)2	-34.48	-29.58	4.90	Mn(VO3)2
Mn2(SO4)3	-95.42	-101.13	-5.71	Mn2(SO4)3
Mn2Sb	-234.26	-173.18	61.08	Mn2Sb
Mn3(AsO4)2:8H2O	-54.64	-42.14	12.50	Mn3(AsO4)2:8H2O
Mn3(PO4)2	-60.95	-84.78	-23.83	Mn3(PO4)2
MnCl2:4H2O	-46.56	-43.84	2.72	MnCl2:4H2O
MnHPO4	-16.62	-42.02	-25.40	MnHPO4
MnSb	-156.88	-159.79	-2.91	MnSb
MnSe	-103.96	-100.46	3.50	MnSe
MnSeO3	-32.46	-31.33	1.13	MnSeO3
MnSeO3:2H2O	-32.31	-31.33	0.98	MnSeO3:2H2O
MnSeO4:5H2O	-27.59	-29.64	-2.05	MnSeO4:5H2O

MnSO4	-32.31	-29.72	2.58	MnSO4
Monteponite	-16.16	-1.05	15.10	CdO
Montroydite	-11.66	-15.30	-3.64	HgO
MoO3	-20.98	-28.98	-8.00	MoO3
Morenosite	-27.61	-29.75	-2.14	NiSO4:7H2O
Na-Autunite	-54.90	-102.31	-47.41	Na2(UO2)2(PO4)2
Na-Jarosite	-63.72	-74.92	-11.20	NaFe3(SO4)2(OH)6
Na2Cr2O7	-62.50	-72.40	-9.90	Na2Cr2O7
Na2CrO4	-46.49	-43.56	2.93	Na2CrO4
Na2Mo2O7	-56.09	-72.69	-16.60	Na2Mo2O7
Na2MoO4	-45.20	-43.71	1.49	Na2MoO4
Na2MoO4:2H2O	-44.93	-43.71	1.22	Na2MoO4:2H2O
Na2SeO3:5H2O	-55.61	-45.31	10.30	Na2SeO3:5H2O
Na2SeO4	-44.90	-43.62	1.28	Na2SeO4
Na3Sb	-269.24	-174.78	94.45	Na3Sb
Na3VO4	-73.19	-36.51	36.68	Na3VO4
Na4V2O7	-95.69	-58.29	37.40	Na4V2O7
Nantokite	-32.06	-38.79	-6.73	CuCl
NaSb	-145.23	-122.06	23.17	NaSb
NaVO3	-25.64	-21.78	3.86	NaVO3
Ni(OH)2	-13.57	-0.77	12.79	Ni(OH)2
Ni3(AsO4)2:8H2O	-57.93	-42.23	15.70	Ni3(AsO4)2:8H2O
Ni3(PO4)2	-53.57	-84.87	-31.30	Ni3(PO4)2
Ni4(OH)6SO4	-64.07	-32.07	32.00	Ni4(OH)6SO4
NiMoO4	-18.61	-29.75	-11.14	NiMoO4
Ningyoite	-60.55	-114.45	-53.91	CaU(PO4)2:2H2O
NiSe	-82.79	-100.49	-17.70	NiSe
NiSeO3:2H2O	-34.17	-31.36	2.81	NiSeO3:2H2O
NiSeO4:6H2O	-28.15	-29.67	-1.52	NiSeO4:6H2O
Nsutite	-5.60	11.90	17.50	MnO2
O2(g)	-7.10	75.99	83.09	O2
Pb(BO2)2	-36.01	-29.49	6.52	Pb(BO2)2
Pb(OH)2	-9.57	-1.42	8.15	Pb(OH)2
Pb2(OH)3Cl	-33.18	-24.38	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-29.02	-2.84	26.19	Pb2O(OH)2
Pb2O3	-25.88	35.16	61.04	Pb2O3
Pb2V2O7	-29.77	-31.67	-1.90	Pb2V2O7
Pb3(AsO4)2	-49.96	-44.16	5.80	Pb3(AsO4)2
Pb3(PO4)2	-43.27	-86.80	-43.53	Pb3(PO4)2
Pb3(VO4)2	-39.23	-33.09	6.14	Pb3(VO4)2
Pb3O2SO4	-43.92	-33.23	10.69	Pb3O2SO4
Pb4(OH)6SO4	-55.75	-34.65	21.10	Pb4(OH)6SO4
Pb4O3SO4	-56.53	-34.65	21.88	Pb4O3SO4
PbCrO4	-17.65	-30.25	-12.60	PbCrO4
PbF2	-36.53	-43.97	-7.44	PbF2
PbHPO4	-18.89	-42.69	-23.81	PbHPO4
Pbmetal	-43.66	-39.41	4.25	Pb
PbMoO4	-14.78	-30.40	-15.62	PbMoO4
PbO:0.3H2O	-14.40	-1.42	12.98	PbO:0.33H2O
PbSeO4	-23.47	-30.31	-6.84	PbSeO4
Periclase	-21.97	-0.39	21.58	MgO
Plattnerite	-13.02	36.58	49.60	PbO2
Plumbgummite	-47.55	-80.34	-32.79	PbAl3(PO4)2(OH)5:H2O
Portlandite	-23.41	-0.61	22.80	Ca(OH)2
Przhevalskite	-44.63	-89.00	-44.37	Pb(UO2)2(PO4)2
Pyrochroite	-15.94	-0.74	15.19	Mn(OH)2
Pyrolusite	-4.13	37.25	41.38	MnO2
Pyromorphite	-68.03	-152.46	-84.43	Pb5(PO4)3Cl
Quartz	-10.78	-14.78	-4.00	SiO2
Retgersite	-27.71	-29.75	-2.04	NiSO4:6H2O
Saleeite	-44.32	-87.97	-43.65	Mg(UO2)2(PO4)2
Sb(OH)3	-31.59	-38.70	-7.11	Sb(OH)3
Sb2O4	-42.81	-39.41	3.40	Sb2O4

Sb2O5	-40.37	-50.03	-9.67	Sb2O5
Sb2Se3	-308.80	-376.55	-67.76	Sb2Se3
Sb4O6(cubic)	-136.55	-154.81	-18.26	Sb4O6
Sb4O6(orth)	-136.91	-154.81	-17.90	Sb4O6
SbCl3	-103.92	-103.35	0.57	SbCl3
SbF3	-92.31	-102.54	-10.23	SbF3
Sbmetal	-84.01	-95.70	-11.69	Sb
SbO2	-16.19	-44.02	-27.82	SbO2
Schoepite	-8.51	-2.51	5.99	UO2(OH)2:H2O
Semetal(am)	-54.61	-61.72	-7.11	Se
Semetal(hex	-54.01	-61.72	-7.71	Se
Senarmontite	-65.04	-77.41	-12.37	Sb2O3
SeO2	-30.71	-30.58	0.12	SeO2
SeO3	-49.94	-28.90	21.04	SeO3
Sepiolite	-60.88	-45.12	15.76	Mg2Si3O7.5OH:3H2O
Sepiolite(A)	-63.90	-45.12	18.78	Mg2Si3O7.5OH:3H2O
SiO2(am-gel)	-12.07	-14.78	-2.71	SiO2
SiO2(am-ppt)	-12.04	-14.78	-2.74	SiO2
Sn(OH)2	-42.44	-47.87	-5.43	Sn(OH)2
Sn(OH)4	-6.79	-29.07	-22.28	Sn(OH)4
Sn(SO4)2	-71.82	-87.04	-15.21	Sn(SO4)2
SnCl2	-81.69	-90.97	-9.28	SnCl2
Snmetal(wht)	-83.54	-85.87	-2.33	Sn
SnO	-42.96	-47.87	-4.91	SnO
SnO2	-0.10	-29.07	-28.97	SnO2
SnSe	-117.09	-147.59	-30.49	SnSe
SnSe2	-163.39	-228.50	-65.12	SnSe2
SnSO4	-19.88	-76.85	-56.97	SnSO4
Spinel	-34.82	2.03	36.85	MgAl2O4
Sr-Autunite	-44.07	-88.53	-44.46	Sr(UO2)2(PO4)2
SrCrO4	-25.13	-29.78	-4.65	SrCrO4
SrF2	-34.92	-43.50	-8.58	SrF2
SrHPO4	-22.93	-42.22	-19.30	SrHPO4
SrSeO3	-33.83	-31.53	2.30	SrSeO3
SrSeO4	-25.44	-29.84	-4.40	SrSeO4
Strengite	-18.07	-44.47	-26.40	FePO4:2H2O
Tenorite	-8.57	-0.93	7.64	CuO
Thenardite	-44.03	-43.71	0.32	Na2SO4
Tl(OH)3	-10.53	-15.97	-5.44	Tl(OH)3
Tl2CrO4	-33.66	-45.67	-12.01	Tl2CrO4
Tl2MoO4	-37.83	-45.82	-7.99	Tl2MoO4
Tl2O	-43.93	-16.84	27.09	Tl2O
Tl2Se	-98.45	-116.55	-18.10	Tl2Se
Tl2SeO4	-41.63	-45.73	-4.10	Tl2SeO4
Tl2SO4	-42.03	-45.82	-3.79	Tl2SO4
TlCl	-26.23	-29.97	-3.74	TlCl
Tlmetal	-33.09	-27.42	5.68	Tl
TlNO3	-27.95	-29.56	-1.61	TlNO3
TlOH	-21.34	-8.42	12.92	TlOH
Torbernite	-43.23	-88.51	-45.28	Cu(UO2)2(PO4)2
Tsumebite	-35.25	-45.04	-9.79	Pb2CuPO4(OH)3:3H2O
Tyuyamunite	-38.55	-34.47	4.08	Ca(UO2)2(VO4)2
U(HPO4)2:4H2O	-62.26	-113.85	-51.58	U(HPO4)2:4H2O
U3O8	-38.98	-17.89	21.08	U3O8
U3Sb4	-857.05	-704.66	152.38	U3Sb4
U4O9	-84.16	-87.18	-3.02	U4O9
UF4	-86.87	-116.41	-29.54	UF4
UF4:2.5H2O	-83.69	-116.41	-32.72	UF4:2.5H2O
UO2(am)	-32.23	-31.30	0.93	UO2
UO2(NO3)2	-56.95	-44.80	12.15	UO2(NO3)2
UO2(NO3)2:2H2O	-49.66	-44.80	4.85	UO2(NO3)2:2H2O
UO2(NO3)2:3H2O	-48.19	-44.80	3.39	UO2(NO3)2:3H2O
UO2(NO3)2:6H2O	-46.85	-44.80	2.05	UO2(NO3)2:6H2O

```
      UO2(OH)2(beta)   -8.13   -2.51    5.61  UO2(OH)2
      UO2HPO4         -19.56  -43.79  -24.23  UO2HPO4
      UO2SeO4:4H2O    -29.16  -31.41   -2.25  UO2SeO4:4H2O
      UO3             -10.21   -2.51    7.70  UO3
      Uramphite      -143.94 -195.69  -51.75  (NH4)2(UO2)2(PO4)2
      Uraninite       -26.63  -31.30   -4.67  UO2
      Uranocircite    -44.09  -88.72  -44.63  Ba(UO2)2(PO4)2
      USb2           -337.48 -307.90   29.58  USb2
      V(OH)3          -37.41  -29.81    7.59  V(OH)3
      V2O5            -27.47  -28.83   -1.36  V2O5
      V3O5            -89.37  -87.53    1.84  V3O5
      V4O7           -111.23 -104.05    7.19  V4O7
      V6O13          -101.64 -162.50  -60.86  V6O13
      Valentinite     -68.93  -77.41   -8.48  Sb2O3
      VCl2           -110.78  -91.91   18.87  VCl2
      VCl3           -117.89  -94.46   23.43  VCl3
      VF4            -116.55 -101.62   14.93  VF4
      Vivianite       -74.05 -110.05  -36.00  Fe3(PO4)2:8H2O
      Vmetal         -130.84  -86.81   44.03  V
      VO              -63.57  -48.81   14.76  VO
      VO(OH)2         -21.66  -16.51    5.15  VO(OH)2
      VO2Cl           -38.81  -35.97    2.84  VO2Cl
      VOCl            -62.52  -51.36   11.15  VOCl
      VOCl2           -72.37  -59.61   12.76  VOCl2
      VOSO4           -49.10  -45.49    3.61  VOSO4
      Zincite         -12.16   -0.82   11.33  ZnO
      Zincosite       -33.73  -29.80    3.93  ZnSO4
      Zn(BO2)2        -37.19  -28.90    8.29  Zn(BO2)2
      Zn(NO3)2:6H2O   -46.43  -43.11    3.32  Zn(NO3)2:6H2O
      Zn(OH)2         -13.02   -0.82   12.20  Zn(OH)2
      Zn(OH)2(am)     -13.30   -0.82   12.47  Zn(OH)2
      Zn(OH)2(beta)   -12.58   -0.82   11.75  Zn(OH)2
      Zn(OH)2(epsilon) -12.36   -0.82   11.53  Zn(OH)2
      Zn(OH)2(gamma)  -12.56   -0.82   11.73  Zn(OH)2
      Zn2(OH)2SO4     -38.13  -30.63    7.50  Zn2(OH)2SO4
      Zn2(OH)3Cl      -38.39  -23.20   15.19  Zn2(OH)3Cl
      Zn3(AsO4)2:2.5H2O -56.03  -42.38   13.65  Zn3(AsO4)2:2.5H2O
      Zn3(PO4)2:4H2O  -49.60  -85.02  -35.42  Zn3(PO4)2:4H2O
      Zn3O(SO4)2      -79.34  -60.43   18.91  Zn3O(SO4)2
      Zn4(OH)6SO4     -60.67  -32.27   28.40  Zn4(OH)6SO4
      Zn5(OH)8Cl2     -85.71  -47.21   38.50  Zn5(OH)8Cl2
      ZnCl2           -50.97  -43.92    7.05  ZnCl2
      ZnF2            -42.84  -43.38   -0.53  ZnF2
      Znmetal         -64.61  -38.82   25.79  Zn
      ZnMoO4          -19.68  -29.80  -10.13  ZnMoO4
      ZnO(active)     -12.01   -0.82   11.19  ZnO
      ZnSb           -145.53 -134.52   11.01  ZnSb
      ZnSe            -86.14 -100.54  -14.40  ZnSe
      ZnSeO4:6H2O     -28.20  -29.72   -1.52  ZnSeO4:6H2O
      ZnSO4:1H2O      -29.17  -29.80   -0.64  ZnSO4:1H2O

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End of simulation.
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-------------------------------------
Reading input data for simulation 4.
-------------------------------------

      GAS_PHASE 1
      CO2(g)    0.000316
      O2(g)     0.2
      END
```

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End of simulation.
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-------------------------------------
Reading input data for simulation 5.
-------------------------------------

       MIX  4    Blend  leachate & pore water
       1    4.98785714404005E-03
       2    0.99501214285596
       SAVE SOLUTION 4
       END
-----------------------------------------
Beginning of batch-reaction calculations.
-----------------------------------------

Reaction step 1.

Using mix 4.  Blend  leachate & pore water

Mixture 4.   Blend  leachate & pore water

        4.988e-003 Solution 1     Leachate
        9.950e-001 Solution 2     Pore water

-----------------------------Solution composition------------------------------

       Elements           Molality       Moles

       Ag               1.443e-011  1.443e-011
       Al               1.519e-006  1.519e-006
       As               1.350e-006  1.350e-006
       B                1.656e-005  1.656e-005
       Ba               1.263e-009  1.263e-009
       Ca               7.569e-003  7.569e-003
       Cd               9.488e-010  9.488e-010
       Cl               1.788e-002  1.788e-002
       Co               2.036e-009  2.036e-009
       Cr               1.486e-009  1.486e-009
       Cu               6.206e-009  6.206e-009
       F                5.811e-005  5.811e-005
       Fe               7.008e-008  7.008e-008
       Hg               8.420e-011  8.420e-011
       K                1.261e-003  1.261e-003
       Mg               5.918e-004  5.918e-004
       Mn               2.297e-006  2.297e-006
       Mo               9.170e-007  9.170e-007
       N                9.348e-006  9.348e-006
       Na               1.831e-003  1.831e-003
       Ni               2.200e-007  2.200e-007
       P                6.597e-008  6.597e-008
       Pb               1.497e-009  1.497e-009
       S                7.128e-004  7.128e-004
       Sb               3.434e-008  3.434e-008
       Se               4.320e-008  4.320e-008
       Si               3.375e-006  3.375e-006
       Sn               8.648e-011  8.648e-011
       Sr               2.134e-006  2.134e-006
       Tl               6.588e-010  6.588e-010
       U                2.418e-009  2.418e-009
       V                4.353e-007  4.353e-007
       Zn               5.154e-007  5.154e-007
```

```
----------------------------Description of solution----------------------------

                                       pH  =   9.483      Charge balance
                                       pe  =   1.995      Adjusted to redox
equilibrium
                         Activity of water  =   0.999
                            Ionic strength  =  2.732e-002
                        Mass of water (kg)  =  1.000e+000
                  Total alkalinity (eq/kg)  =  7.112e-005
                     Total carbon (mol/kg)  =  0.000e+000
                        Total CO2 (mol/kg)  =  0.000e+000
                      Temperature (deg C)  =  25.000
                   Electrical balance (eq)  = -6.733e-018
 Percent error, 100*(Cat-|An|)/(Cat+|An|)  =  -0.00
                                Iterations  =  10
                                   Total H  = 1.110138e+002
                                   Total O  = 5.550981e+001

----------------------------Distribution of species----------------------------

                                                   Log       Log         Log
   Species                  Molality    Activity  Molality  Activity     Gamma

   OH-                    3.605e-005  3.063e-005    -4.443    -4.514    -0.071
   H+                     3.843e-010  3.286e-010    -9.415    -9.483    -0.068
   H2O                    5.551e+001  9.995e-001     1.744    -0.000     0.000
Ag               1.443e-011
   AgCl2-                 8.632e-012  7.111e-012   -11.064   -11.148    -0.084
   AgCl                   5.341e-012  5.341e-012   -11.272   -11.272     0.000
   AgCl3-2                2.103e-013  9.688e-014   -12.677   -13.014    -0.337
   Ag+                    2.002e-013  1.711e-013   -12.699   -12.767    -0.068
   AgCl4-3                1.730e-014  3.024e-015   -13.762   -14.519    -0.758
   Ag2Se                  1.120e-014  1.120e-014   -13.951   -13.951     0.000
   AgNH3+                 2.336e-015  1.924e-015   -14.632   -14.716    -0.084
   AgSO4-                 1.039e-015  8.558e-016   -14.983   -15.068    -0.084
   AgOH                   5.242e-016  5.242e-016   -15.281   -15.281     0.000
   Ag(NH3)2+              1.045e-016  8.612e-017   -15.981   -16.065    -0.084
   AgH2BO3                2.211e-017  2.211e-017   -16.655   -16.655     0.000
   AgF                    1.982e-017  1.982e-017   -16.703   -16.703     0.000
   AgSeO3-                2.539e-018  2.092e-018   -17.595   -17.679    -0.084
   Ag(OH)2-               1.904e-018  1.569e-018   -17.720   -17.804    -0.084
   AgNO2                  2.412e-019  2.412e-019   -18.618   -18.618     0.000
   Ag(SeO3)2-3            2.039e-024  3.563e-025   -23.691   -24.448    -0.758
   Ag(NO2)2-              3.060e-027  2.521e-027   -26.514   -26.598    -0.084
   AgNO3                  2.230e-027  2.230e-027   -26.652   -26.652     0.000
   Ag2MoO4                5.431e-033  5.431e-033   -32.265   -32.265     0.000
   AgOH(Se)2-4            0.000e+000  0.000e+000   -69.103   -70.449    -1.347
   AgHS                   0.000e+000  0.000e+000   -70.200   -70.200     0.000
   Ag(S4)2-3              0.000e+000  0.000e+000  -134.959  -135.305    -0.345
   Ag(HS)S4-2             0.000e+000  0.000e+000  -135.162  -135.348    -0.186
   AgS4S5-3               0.000e+000  0.000e+000  -135.287  -135.616    -0.329
   Ag(HS)2-               0.000e+000  0.000e+000  -137.264  -137.348    -0.084
Al               1.519e-006
   Al(OH)4-               1.518e-006  1.299e-006    -5.819    -5.886    -0.068
   Al(OH)3                3.369e-010  3.369e-010    -9.472    -9.472     0.000
   Al(OH)2+               6.405e-013  5.514e-013   -12.193   -12.259    -0.065
   AlOH+2                 4.128e-017  2.266e-017   -16.384   -16.645    -0.260
   AlF2+                  7.271e-018  6.259e-018   -17.138   -17.203    -0.065
   AlF3                   3.632e-018  3.632e-018   -17.440   -17.440     0.000
   AlF+2                  6.212e-019  3.411e-019   -18.207   -18.467    -0.260
   AlF4-                  9.807e-020  8.392e-020   -19.008   -19.076    -0.068
   Al+3                   3.032e-021  7.399e-022   -20.518   -21.131    -0.613
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   AlSO4+                1.682e-021  1.439e-021   -20.774   -20.842    -0.068
   Al(SO4)2-             4.517e-024  3.866e-024   -23.345   -23.413    -0.068
   AlMo6O21-3            0.000e+000  0.000e+000   -60.140   -60.897    -0.758
As(3)            2.632e-020
   H2AsO3-               1.717e-020  1.415e-020   -19.765   -19.849    -0.084
   H3AsO3                9.064e-021  9.064e-021   -20.043   -20.043     0.000
   HAsO3-2               8.525e-023  3.926e-023   -22.069   -22.406    -0.337
   AsO3-3                2.636e-026  4.606e-027   -25.579   -26.337    -0.758
   H4AsO3+               1.791e-030  1.476e-030   -29.747   -29.831    -0.084
As(5)            1.350e-006
   HAsO4-2               1.314e-006  6.052e-007    -5.881    -6.218    -0.337
   AsO4-3                3.333e-008  5.824e-009    -7.477    -8.235    -0.758
   H2AsO4-               2.202e-009  1.814e-009    -8.657    -8.741    -0.084
   H3AsO4                1.029e-016  1.036e-016   -15.988   -15.985     0.003
B                1.656e-005
   H2BO3-                9.670e-006  8.153e-006    -5.015    -5.089    -0.074
   H3BO3                 4.584e-006  4.613e-006    -5.339    -5.336     0.003
   CaH2BO3+              2.181e-006  1.839e-006    -5.661    -5.735    -0.074
   MgH2BO3+              1.024e-007  8.633e-008    -6.990    -7.064    -0.074
   NaH2BO3               2.020e-008  2.020e-008    -7.695    -7.695     0.000
   SrH2BO3+              3.809e-010  3.211e-010    -9.419    -9.493    -0.074
   BF(OH)3-              1.006e-010  8.485e-011    -9.997   -10.071    -0.074
   H5(BO3)2-             3.797e-011  3.201e-011   -10.421   -10.495    -0.074
   BaH2BO3+              2.015e-013  1.699e-013   -12.696   -12.770    -0.074
   H8(BO3)3-             1.751e-014  1.476e-014   -13.757   -13.831    -0.074
   BF2(OH)2-             1.630e-016  1.375e-016   -15.788   -15.862    -0.074
   AgH2BO3               2.211e-017  2.211e-017   -16.655   -16.655     0.000
   BF3OH-                9.613e-025  8.105e-025   -24.017   -24.091    -0.074
   BF4-                  7.168e-032  6.043e-032   -31.145   -31.219    -0.074
Ba               1.263e-009
   Ba+2                  1.262e-009  6.744e-010    -8.899    -9.171    -0.272
   BaH2BO3+              2.015e-013  1.699e-013   -12.696   -12.770    -0.074
   BaOH+                 1.050e-013  9.016e-014   -12.979   -13.045    -0.066
   BaNH3+2               5.087e-015  2.343e-015   -14.294   -14.630    -0.337
   BaNO3+                6.731e-023  5.545e-023   -22.172   -22.256    -0.084
Ca               7.569e-003
   Ca+2                  7.337e-003  3.920e-003    -2.134    -2.407    -0.272
   CaSO4                 2.250e-004  2.250e-004    -3.648    -3.648     0.000
   CaOH+                 2.773e-006  2.395e-006    -5.557    -5.621    -0.064
   CaF+                  2.297e-006  1.972e-006    -5.639    -5.705    -0.066
   CaH2BO3+              2.181e-006  1.839e-006    -5.661    -5.735    -0.074
   CaNH3+2               5.900e-008  2.717e-008    -7.229    -7.566    -0.337
   CaPO4-                5.360e-008  4.614e-008    -7.271    -7.336    -0.065
   CaHPO4                5.698e-009  5.698e-009    -8.244    -8.244     0.000
   CaH2PO4+              1.681e-012  1.447e-012   -11.774   -11.840    -0.065
   Ca(NH3)2+2            1.293e-013  5.957e-014   -12.888   -13.225    -0.337
   CaNO3+                2.469e-016  2.034e-016   -15.608   -15.692    -0.084
Cd               9.488e-010
   Cd+2                  2.972e-010  1.588e-010    -9.527    -9.799    -0.272
   CdOHCl                2.913e-010  2.913e-010    -9.536    -9.536     0.000
   CdCl+                 2.814e-010  2.318e-010    -9.551    -9.635    -0.084
   CdOH+                 4.690e-011  3.864e-011   -10.329   -10.413    -0.084
   CdCl2                 1.477e-011  1.477e-011   -10.831   -10.831     0.000
   CdSO4                 9.330e-012  9.330e-012   -11.030   -11.030     0.000
   Cd(OH)2               7.466e-012  7.466e-012   -11.127   -11.127     0.000
   CdCl3-                1.730e-013  1.425e-013   -12.762   -12.846    -0.084
   CdF+                  1.408e-013  1.160e-013   -12.851   -12.935    -0.084
   Cd(SO4)2-2            6.848e-014  3.154e-014   -13.164   -13.501    -0.337
   Cd(OH)3-              1.696e-014  1.397e-014   -13.771   -13.855    -0.084
   CdF2                  1.067e-017  1.067e-017   -16.972   -16.972     0.000
   Cd2OH+3               1.760e-019  3.075e-020   -18.755   -19.512    -0.758
   Cd(OH)4-2             1.521e-019  7.004e-020   -18.818   -19.155    -0.337
   Cd(SeO3)2-2           1.028e-019  4.735e-020   -18.988   -19.325    -0.337
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CdSeO4	6.280e-021	6.280e-021	-20.202	-20.202	0.000
CdNO3+	1.000e-023	8.239e-024	-23.000	-23.084	-0.084
Cd(NO3)2	6.774e-038	6.774e-038	-37.169	-37.169	0.000
CdHS+	0.000e+000	0.000e+000	-72.955	-73.039	-0.084
Cd(HS)2	0.000e+000	0.000e+000	-137.083	-137.083	0.000
Cd(HS)3-	0.000e+000	0.000e+000	-206.347	-206.431	-0.084
Cd(HS)4-2	0.000e+000	0.000e+000	-275.146	-275.483	-0.337
Cl	1.788e-002				
Cl-	1.788e-002	1.529e-002	-1.748	-1.816	-0.068
ZnOHCl	3.190e-008	3.190e-008	-7.496	-7.496	0.000
MnCl+	2.210e-008	1.897e-008	-7.656	-7.722	-0.066
NiCl+	3.056e-009	2.518e-009	-8.515	-8.599	-0.084
CuCl2-	1.828e-009	1.559e-009	-8.738	-8.807	-0.069
ZnCl+	9.329e-010	7.956e-010	-9.030	-9.099	-0.069
CuCl	4.880e-010	4.880e-010	-9.312	-9.312	0.000
MnCl2	4.097e-010	4.097e-010	-9.388	-9.388	0.000
CdOHCl	2.913e-010	2.913e-010	-9.536	-9.536	0.000
CdCl+	2.814e-010	2.318e-010	-9.551	-9.635	-0.084
CoCl+	2.892e-011	2.383e-011	-10.539	-10.623	-0.084
TlCl	2.563e-011	2.563e-011	-10.591	-10.591	0.000
ZnCl2	1.927e-011	1.927e-011	-10.715	-10.715	0.000
CdCl2	1.477e-011	1.477e-011	-10.831	-10.831	0.000
CuCl3-2	9.373e-012	5.094e-012	-11.028	-11.293	-0.265
AgCl2-	8.632e-012	7.111e-012	-11.064	-11.148	-0.084
PbCl+	5.685e-012	4.683e-012	-11.245	-11.329	-0.084
AgCl	5.341e-012	5.341e-012	-11.272	-11.272	0.000
MnCl3-	2.009e-012	1.725e-012	-11.697	-11.763	-0.066
PbCl2	3.198e-013	3.198e-013	-12.495	-12.495	0.000
TlCl2-	2.801e-013	2.307e-013	-12.553	-12.637	-0.084
ZnCl3-	2.744e-013	2.340e-013	-12.562	-12.631	-0.069
AgCl3-2	2.103e-013	9.688e-014	-12.677	-13.014	-0.337
NiCl2	1.938e-013	1.938e-013	-12.713	-12.713	0.000
CdCl3-	1.730e-013	1.425e-013	-12.762	-12.846	-0.084
CuCl+	1.453e-013	1.239e-013	-12.838	-12.907	-0.069
AgCl4-3	1.730e-014	3.024e-015	-13.762	-14.519	-0.758
ZnCl4-2	3.292e-015	1.789e-015	-14.483	-14.747	-0.265
PbCl3-	2.362e-015	1.946e-015	-14.627	-14.711	-0.084
CuCl2	6.569e-016	6.569e-016	-15.183	-15.183	0.000
UO2Cl+	6.347e-016	5.229e-016	-15.197	-15.282	-0.084
HgClOH	7.361e-017	7.361e-017	-16.133	-16.133	0.000
PbCl4-2	2.952e-017	1.360e-017	-16.530	-16.867	-0.337
HgCl2	2.080e-018	2.080e-018	-17.682	-17.682	0.000
HgCl3-	3.860e-019	3.180e-019	-18.413	-18.498	-0.084
CuCl3-	1.099e-019	9.371e-020	-18.959	-19.028	-0.069
HgCl4-2	4.201e-020	1.935e-020	-19.377	-19.713	-0.337
CrOHCl2	2.097e-021	2.097e-021	-20.678	-20.678	0.000
CrCl+2	5.116e-022	2.356e-022	-21.291	-21.628	-0.337
HgCl+	3.296e-023	2.715e-023	-22.482	-22.566	-0.084
CuCl4-2	1.321e-023	7.179e-024	-22.879	-23.144	-0.265
FeCl+2	1.766e-024	9.598e-025	-23.753	-24.018	-0.265
CrCl2+	4.149e-025	3.418e-025	-24.382	-24.466	-0.084
VOCl+	2.400e-025	1.977e-025	-24.620	-24.704	-0.084
FeCl2+	7.633e-026	6.553e-026	-25.117	-25.184	-0.066
FeCl3	1.002e-028	1.002e-028	-27.999	-27.999	0.000
CrO3Cl-	3.906e-029	3.218e-029	-28.408	-28.492	-0.084
TlOHCl+	3.424e-033	2.821e-033	-32.465	-32.550	-0.084
TlCl4-	3.684e-037	3.035e-037	-36.434	-36.518	-0.084
TlCl3	3.146e-037	3.146e-037	-36.502	-36.502	0.000
TlCl2+	2.386e-038	1.966e-038	-37.622	-37.706	-0.084
Cr(NH3)6Cl+2	1.394e-039	6.421e-040	-38.856	-39.192	-0.337
CoCl+2	1.197e-039	5.512e-040	-38.922	-39.259	-0.337
Co(NH3)5Cl+2	5.439e-040	2.505e-040	-39.264	-39.601	-0.337
TlCl+2	0.000e+000	0.000e+000	-41.314	-41.651	-0.337

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   SnCl+                  0.000e+000  0.000e+000   -45.024   -45.108    -0.084
   UCl+3                  0.000e+000  0.000e+000   -45.740   -46.498    -0.758
   SnCl2                  0.000e+000  0.000e+000   -46.134   -46.134     0.000
   SnCl3-                 0.000e+000  0.000e+000   -49.039   -49.123    -0.084
   Co(NH3)6Cl+2           0.000e+000  0.000e+000   -51.239   -51.576    -0.337
Co(2)            2.036e-009
   Co+2                   9.783e-010  4.506e-010    -9.010    -9.346    -0.337
   Co(OH)2                6.699e-010  6.699e-010    -9.174    -9.174     0.000
   CoOH+                  3.342e-010  2.754e-010    -9.476    -9.560    -0.084
   CoCl+                  2.892e-011  2.383e-011   -10.539   -10.623    -0.084
   CoSO4                  2.253e-011  2.253e-011   -10.647   -10.647     0.000
   CoF+                   7.973e-013  6.568e-013   -12.098   -12.183    -0.084
   Co(NH3)+2              6.477e-013  2.983e-013   -12.189   -12.525    -0.337
   Co(OH)3-               4.970e-013  4.094e-013   -12.304   -12.388    -0.084
   CoOOH-                 1.247e-013  1.028e-013   -12.904   -12.988    -0.084
   CoHPO4                 1.563e-015  1.563e-015   -14.806   -14.806     0.000
   Co(NH3)2+2             1.521e-016  7.007e-017   -15.818   -16.154    -0.337
   CoNO2+                 2.600e-017  2.142e-017   -16.585   -16.669    -0.084
   Co(OH)4-2              4.315e-018  1.987e-018   -17.365   -17.702    -0.337
   CoSeO4                 4.796e-020  4.796e-020   -19.319   -19.319     0.000
   Co2OH+3                3.558e-020  6.218e-021   -19.449   -20.206    -0.758
   Co(NH3)3+2             1.055e-020  4.858e-021   -19.977   -20.314    -0.337
   CoNO3+                 1.422e-023  1.172e-023   -22.847   -22.931    -0.084
   Co(NH3)4+2             3.048e-025  1.404e-025   -24.516   -24.853    -0.337
   Co4(OH)4+4             2.549e-029  1.147e-030   -28.594   -29.940    -1.347
   Co(NH3)5+2             2.785e-030  1.283e-030   -29.555   -29.892    -0.337
   Co(NO3)2               3.911e-037  3.911e-037   -36.408   -36.408     0.000
Co(3)            5.988e-032
   CoOH+2                 5.988e-032  2.758e-032   -31.223   -31.559    -0.337
   CoCl+2                 1.197e-039  5.512e-040   -38.922   -39.259    -0.337
   Co+3                   7.262e-040  1.772e-040   -39.139   -39.752    -0.613
   Co(NH3)5Cl+2           5.439e-040  2.505e-040   -39.264   -39.601    -0.337
   Co(NH3)6SO4+           0.000e+000  0.000e+000   -48.352   -48.436    -0.084
   Co(NH3)6OH+2           0.000e+000  0.000e+000   -49.737   -50.074    -0.337
   Co(NH3)6Cl+2           0.000e+000  0.000e+000   -51.239   -51.576    -0.337
Cr(2)            6.254e-029
   Cr+2                   6.254e-029  2.880e-029   -28.204   -28.541    -0.337
Cr(3)            1.486e-009
   CrO2-                  6.007e-010  4.949e-010    -9.221    -9.305    -0.084
   Cr(OH)4-               5.066e-010  4.173e-010    -9.295    -9.380    -0.084
   Cr(OH)3                3.422e-010  3.422e-010    -9.466    -9.466     0.000
   Cr(OH)2+               3.611e-011  2.975e-011   -10.442   -10.527    -0.084
   Cr(OH)+2               1.733e-014  7.982e-015   -13.761   -14.098    -0.337
   CrOHSO4                4.747e-016  4.747e-016   -15.324   -15.324     0.000
   CrF+2                  1.889e-019  8.702e-020   -18.724   -19.060    -0.337
   Cr+3                   6.816e-020  1.191e-020   -19.166   -19.924    -0.758
   CrSO4+                 8.462e-021  6.971e-021   -20.073   -20.157    -0.084
   CrOHCl2                2.097e-021  2.097e-021   -20.678   -20.678     0.000
   CrCl+2                 5.116e-022  2.356e-022   -21.291   -21.628    -0.337
   CrCl2+                 4.149e-025  3.418e-025   -24.382   -24.466    -0.084
   Cr2(OH)2SO4+2          7.435e-028  3.424e-028   -27.129   -27.465    -0.337
   CrH2PO4+2              2.482e-028  1.143e-028   -27.605   -27.942    -0.337
   Cr2(OH)2(SO4)2         5.098e-030  5.098e-030   -29.293   -29.293     0.000
   Cr(NH3)5OH+2           9.452e-031  4.353e-031   -30.024   -30.361    -0.337
   CrNO3+2                1.855e-035  8.542e-036   -34.732   -35.068    -0.337
   Cr(NH3)6+3             1.900e-038  3.321e-039   -37.721   -38.479    -0.758
   Cr(NH3)6Cl+2           1.394e-039  6.421e-040   -38.856   -39.192    -0.337
Cr(6)            1.807e-015
   CrO4-2                 1.792e-015  9.576e-016   -14.747   -15.019    -0.272
   NaCrO4-                9.028e-018  7.437e-018   -17.044   -17.129    -0.084
   KCrO4-                 4.649e-018  3.830e-018   -17.333   -17.417    -0.084
   HCrO4-                 1.236e-018  1.018e-018   -17.908   -17.992    -0.084
   H2CrO4                 2.712e-028  2.712e-028   -27.567   -27.567     0.000
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CrO3HPO4-2	1.444e-028	6.650e-029	-27.841	-28.177	-0.337
CrO3SO4-2	5.548e-029	2.555e-029	-28.256	-28.593	-0.337
CrO3Cl-	3.906e-029	3.218e-029	-28.408	-28.492	-0.084
Cr2O7-2	7.809e-035	3.597e-035	-34.107	-34.444	-0.337
CrO3H2PO4-	1.278e-035	1.053e-035	-34.894	-34.978	-0.084
Cu(1)	2.356e-009				
CuCl2-	1.828e-009	1.559e-009	-8.738	-8.807	-0.069
CuCl	4.880e-010	4.880e-010	-9.312	-9.312	0.000
Cu+	3.079e-011	2.536e-011	-10.512	-10.596	-0.084
CuCl3-2	9.373e-012	5.094e-012	-11.028	-11.293	-0.265
Cu(S4)2-3	0.000e+000	0.000e+000	-130.398	-130.735	-0.337
CuS4S5-3	0.000e+000	0.000e+000	-131.143	-131.465	-0.321
Cu(2)	3.850e-009				
Cu(OH)2	3.028e-009	3.028e-009	-8.519	-8.519	0.000
CuOH+	5.810e-010	4.954e-010	-9.236	-9.305	-0.069
Cu(OH)3-	2.309e-010	1.902e-010	-9.637	-9.721	-0.084
Cu+2	9.575e-012	5.115e-012	-11.019	-11.291	-0.272
CuNH3+2	6.258e-013	2.882e-013	-12.204	-12.540	-0.337
CuSO4	2.937e-013	2.937e-013	-12.532	-12.532	0.000
CuCl+	1.453e-013	1.239e-013	-12.838	-12.907	-0.069
Cu(OH)4-2	9.956e-014	4.585e-014	-13.002	-13.339	-0.337
CuF+	1.806e-014	1.488e-014	-13.743	-13.827	-0.084
Cu2(OH)2+2	1.339e-014	6.166e-015	-13.873	-14.210	-0.337
CuCl2	6.569e-016	6.569e-016	-15.183	-15.183	0.000
CuNO2+	4.387e-018	3.614e-018	-17.358	-17.442	-0.084
CuCl3-	1.099e-019	9.371e-020	-18.959	-19.028	-0.069
CuCl4-2	1.321e-023	7.179e-024	-22.879	-23.144	-0.265
CuNO3+	3.221e-025	2.654e-025	-24.492	-24.576	-0.084
Cu(NO2)2	2.495e-025	2.495e-025	-24.603	-24.603	0.000
Cu(NO3)2	5.481e-040	5.481e-040	-39.261	-39.261	0.000
Cu(HS)3-	0.000e+000	0.000e+000	-199.052	-199.136	-0.084
F	5.811e-005				
F-	5.392e-005	4.610e-005	-4.268	-4.336	-0.068
CaF+	2.297e-006	1.972e-006	-5.639	-5.705	-0.066
MgF+	1.846e-006	1.580e-006	-5.734	-5.801	-0.068
NaF	4.546e-008	4.546e-008	-7.342	-7.342	0.000
MnF+	2.107e-009	1.809e-009	-8.676	-8.742	-0.066
SrF+	2.194e-010	1.807e-010	-9.659	-9.743	-0.084
BF(OH)3-	1.006e-010	8.485e-011	-9.997	-10.071	-0.074
NiF+	9.048e-011	7.454e-011	-10.043	-10.128	-0.084
ZnF+	2.313e-011	1.906e-011	-10.636	-10.720	-0.084
HF	2.240e-011	2.240e-011	-10.650	-10.650	0.000
CoF+	7.973e-013	6.568e-013	-12.098	-12.183	-0.084
UO2F+	1.629e-013	1.342e-013	-12.788	-12.872	-0.084
CdF+	1.408e-013	1.160e-013	-12.851	-12.935	-0.084
PbF+	3.405e-014	2.805e-014	-13.468	-13.552	-0.084
TlF	3.007e-014	3.007e-014	-13.522	-13.522	0.000
CuF+	1.806e-014	1.488e-014	-13.743	-13.827	-0.084
UO2F2	1.784e-014	1.784e-014	-13.749	-13.749	0.000
HF2-	4.621e-015	3.926e-015	-14.335	-14.406	-0.071
UO2F3-	2.508e-016	2.066e-016	-15.601	-15.685	-0.084
BF2(OH)2-	1.630e-016	1.375e-016	-15.788	-15.862	-0.074
PbF2	2.545e-017	2.545e-017	-16.594	-16.594	0.000
AgF	1.982e-017	1.982e-017	-16.703	-16.703	0.000
CdF2	1.067e-017	1.067e-017	-16.972	-16.972	0.000
AlF2+	7.271e-018	6.259e-018	-17.138	-17.203	-0.065
AlF3	3.632e-018	3.632e-018	-17.440	-17.440	0.000
AlF+2	6.212e-019	3.411e-019	-18.207	-18.467	-0.260
CrF+2	1.889e-019	8.702e-020	-18.724	-19.060	-0.337
UO2F4-2	1.642e-019	7.564e-020	-18.785	-19.121	-0.337
AlF4-	9.807e-020	8.392e-020	-19.008	-19.076	-0.068
VO2F	4.261e-021	4.261e-021	-20.370	-20.370	0.000
PbF3-	2.701e-021	2.225e-021	-20.569	-20.653	-0.084

H2F2		1.345e-021	1.345e-021	-20.871	-20.871	0.000
FeF+2		1.934e-022	1.051e-022	-21.714	-21.978	-0.265
FeF2+		1.510e-022	1.296e-022	-21.821	-21.887	-0.066
VO2F2-		8.657e-023	7.132e-023	-22.063	-22.147	-0.084
FeF3		8.431e-024	8.431e-024	-23.074	-23.074	0.000
VOF+		1.547e-024	1.274e-024	-23.810	-23.895	-0.084
BF3OH-		9.613e-025	8.105e-025	-24.017	-24.091	-0.074
PbF4-2		1.066e-025	4.909e-026	-24.972	-25.309	-0.337
VO2F3-2		8.903e-026	4.101e-026	-25.050	-25.387	-0.337
VOF2		2.203e-026	2.203e-026	-25.657	-25.657	0.000
Sb(OH)2F		5.808e-027	5.808e-027	-26.236	-26.236	0.000
SbOF		5.714e-027	5.714e-027	-26.243	-26.243	0.000
VOF3-		4.374e-029	3.603e-029	-28.359	-28.443	-0.084
VO2F4-3		5.322e-030	9.301e-031	-29.274	-30.031	-0.758
HgF+		1.847e-031	1.521e-031	-30.734	-30.818	-0.084
BF4-		7.168e-032	6.043e-032	-31.145	-31.219	-0.074
VOF4-2		1.456e-032	6.704e-033	-31.837	-32.174	-0.337
UF3+		1.963e-038	1.617e-038	-37.707	-37.791	-0.084
UF2+2		4.806e-039	2.213e-039	-38.318	-38.655	-0.337
SiF6-2		6.979e-040	3.793e-040	-39.156	-39.421	-0.265
UF4		0.000e+000	0.000e+000	-40.088	-40.088	0.000
UF+3		0.000e+000	0.000e+000	-40.661	-41.419	-0.758
UF5-		0.000e+000	0.000e+000	-42.742	-42.826	-0.084
UF6-2		0.000e+000	0.000e+000	-44.346	-44.682	-0.337
SnF+		0.000e+000	0.000e+000	-44.697	-44.781	-0.084
SnF2		0.000e+000	0.000e+000	-46.313	-46.313	0.000
SnF3-		0.000e+000	0.000e+000	-47.745	-47.830	-0.084
SnF6-2		0.000e+000	0.000e+000	-59.334	-59.671	-0.337
Fe(2)	9.101e-013					
Fe+2		4.919e-013	2.265e-013	-12.308	-12.645	-0.337
FeOH+		3.217e-013	2.762e-013	-12.493	-12.559	-0.066
Fe(OH)3-		7.581e-014	6.509e-014	-13.120	-13.186	-0.066
FeSO4		1.394e-014	1.394e-014	-13.856	-13.856	0.000
Fe(OH)2		6.721e-015	6.721e-015	-14.173	-14.173	0.000
FeHPO4		2.868e-018	2.868e-018	-17.542	-17.542	0.000
FeH2PO4+		2.175e-021	1.872e-021	-20.663	-20.728	-0.065
Fe(HS)2		0.000e+000	0.000e+000	-146.191	-146.191	0.000
Fe(HS)3-		0.000e+000	0.000e+000	-215.317	-215.401	-0.084
Fe(3)	7.008e-008					
Fe(OH)4-		5.339e-008	4.596e-008	-7.273	-7.338	-0.065
Fe(OH)3		1.612e-008	1.612e-008	-7.793	-7.793	0.000
Fe(OH)2+		5.691e-010	4.899e-010	-9.245	-9.310	-0.065
FeOH+2		7.566e-017	4.111e-017	-16.121	-16.386	-0.265
FeF+2		1.934e-022	1.051e-022	-21.714	-21.978	-0.265
FeF2+		1.510e-022	1.296e-022	-21.821	-21.887	-0.066
FeHPO4+		6.345e-023	5.462e-023	-22.198	-22.263	-0.065
Fe+3		8.520e-024	2.079e-024	-23.070	-23.682	-0.613
FeF3		8.431e-024	8.431e-024	-23.074	-23.074	0.000
FeSO4+		6.809e-024	5.846e-024	-23.167	-23.233	-0.066
FeCl+2		1.766e-024	9.598e-025	-23.753	-24.018	-0.265
FeCl2+		7.633e-026	6.553e-026	-25.117	-25.184	-0.066
Fe(SO4)2-		3.803e-026	3.133e-026	-25.420	-25.504	-0.084
FeCl3		1.002e-028	1.002e-028	-27.999	-27.999	0.000
FeHSeO3+2		1.873e-029	8.625e-030	-28.728	-29.064	-0.337
Fe2(OH)2+4		1.244e-030	5.597e-032	-29.905	-31.252	-1.347
FeH2PO4+2		1.186e-030	6.509e-031	-29.926	-30.186	-0.260
FeNO3+2		7.406e-037	3.411e-037	-36.130	-36.467	-0.337
Fe3(OH)4+5		5.040e-038	3.964e-040	-37.298	-39.402	-2.104
H(0)	1.557e-026					
H2		7.783e-027	7.832e-027	-26.109	-26.106	0.003
Hg(0)	8.420e-011					
Hg		8.420e-011	8.420e-011	-10.075	-10.075	0.000
Hg(1)	2.210e-029					

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   Hg2+2                 1.105e-029  5.089e-030   -28.957   -29.293    -0.337
Hg(2)            5.998e-016
   Hg(OH)2               5.236e-016  5.269e-016   -15.281   -15.278     0.003
   HgClOH                7.361e-017  7.361e-017   -16.133   -16.133     0.000
   HgCl2                 2.080e-018  2.080e-018   -17.682   -17.682     0.000
   HgCl3-                3.860e-019  3.180e-019   -18.413   -18.498    -0.084
   HgCl4-2               4.201e-020  1.935e-020   -19.377   -19.713    -0.337
   Hg(NH3)2+2            3.698e-021  1.703e-021   -20.432   -20.769    -0.337
   Hg(OH)3-              2.466e-021  2.032e-021   -20.608   -20.692    -0.084
   HgOH+                 1.318e-022  1.086e-022   -21.880   -21.964    -0.084
   HgCl+                 3.296e-023  2.715e-023   -22.482   -22.566    -0.084
   HgNH3+2               6.716e-025  3.093e-025   -24.173   -24.510    -0.337
   Hg(NH3)3+2            8.107e-026  3.734e-026   -25.091   -25.428    -0.337
   Hg+2                  1.933e-028  8.903e-029   -27.714   -28.050    -0.337
   HgSO4                 5.842e-030  5.842e-030   -29.233   -29.233     0.000
   Hg(NH3)4+2            3.546e-030  1.633e-030   -29.450   -29.787    -0.337
   HgF+                  1.847e-031  1.521e-031   -30.734   -30.818    -0.084
   HgNO3+                0.000e+000  0.000e+000   -42.184   -42.268    -0.084
   Hg(NO3)2              0.000e+000  0.000e+000   -56.434   -56.434     0.000
   HgS2-2                0.000e+000  0.000e+000  -128.023  -128.360    -0.337
   HgHS2-                0.000e+000  0.000e+000  -129.051  -129.135    -0.084
   Hg(HS)2               0.000e+000  0.000e+000  -132.224  -132.224     0.000
K                1.261e-003
   K+                    1.259e-003  1.076e-003    -2.900    -2.968    -0.068
   KSO4-                 2.219e-006  1.910e-006    -5.654    -5.719    -0.065
   KHPO4-                3.017e-011  2.597e-011   -10.520   -10.586    -0.065
   KCrO4-                4.649e-018  3.830e-018   -17.333   -17.417    -0.084
Mg               5.918e-004
   Mg+2                  5.716e-004  3.054e-004    -3.243    -3.515    -0.272
   MgSO4                 1.393e-005  1.393e-005    -4.856    -4.856     0.000
   MgOH+                 4.297e-006  3.724e-006    -5.367    -5.429    -0.062
   MgF+                  1.846e-006  1.580e-006    -5.734    -5.801    -0.068
   MgH2BO3+              1.024e-007  8.633e-008    -6.990    -7.064    -0.074
   MgHPO4                6.128e-010  6.128e-010    -9.213    -9.213     0.000
   MgPO4-                6.528e-011  5.619e-011   -10.185   -10.250    -0.065
   MgH2PO4+              2.820e-013  2.427e-013   -12.550   -12.615    -0.065
Mn(2)            2.297e-006
   Mn+2                  2.141e-006  9.859e-007    -5.669    -6.006    -0.337
   MnOH+                 8.834e-008  7.585e-008    -7.054    -7.120    -0.066
   MnSO4                 4.394e-008  4.394e-008    -7.357    -7.357     0.000
   MnCl+                 2.210e-008  1.897e-008    -7.656    -7.722    -0.066
   MnF+                  2.107e-009  1.809e-009    -8.676    -8.742    -0.066
   MnCl2                 4.097e-010  4.097e-010    -9.388    -9.388     0.000
   MnCl3-                2.009e-012  1.725e-012   -11.697   -11.763    -0.066
   Mn(OH)3-              5.122e-013  4.398e-013   -12.291   -12.357    -0.066
   Mn(OH)4-2             8.002e-017  4.348e-017   -16.097   -16.362    -0.265
   MnSeO4                5.636e-017  5.636e-017   -16.249   -16.249     0.000
   MnNO3+                3.112e-020  2.564e-020   -19.507   -19.591    -0.084
   Mn(NO3)2              1.056e-033  1.056e-033   -32.976   -32.976     0.000
   MnSe                  1.907e-035  1.907e-035   -34.720   -34.720     0.000
Mn(3)            1.783e-029
   Mn+3                  1.783e-029  4.351e-030   -28.749   -29.361    -0.613
Mn(6)            0.000e+000
   MnO4-2                0.000e+000  0.000e+000   -40.319   -40.583    -0.265
Mn(7)            0.000e+000
   MnO4-                 0.000e+000  0.000e+000   -47.888   -47.961    -0.072
Mo               9.170e-007
   MoO4-2                9.170e-007  4.899e-007    -6.038    -6.310    -0.272
   HMoO4-                3.888e-012  3.203e-012   -11.410   -11.494    -0.084
   H2MoO4                7.709e-018  7.709e-018   -17.113   -17.113     0.000
   Ag2MoO4               5.431e-033  5.431e-033   -32.265   -32.265     0.000
   AlMo6O21-3            0.000e+000  0.000e+000   -60.140   -60.897    -0.758
   Mo7O24-6              0.000e+000  0.000e+000   -64.015   -67.045    -3.030
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HMo7O24-5		0.000e+000	0.000e+000	-68.037	-70.142	-2.104
H2Mo7O24-4		0.000e+000	0.000e+000	-73.496	-74.843	-1.347
H3Mo7O24-3		0.000e+000	0.000e+000	-80.323	-81.080	-0.758
N(-3)	9.340e-006					
NH3		5.507e-006	5.507e-006	-5.259	-5.259	0.000
NH4+		3.764e-006	3.174e-006	-5.424	-5.498	-0.074
CaNH3+2		5.900e-008	2.717e-008	-7.229	-7.566	-0.337
NH4SO4-		9.926e-009	8.522e-009	-8.003	-8.069	-0.066
NiNH3+2		4.133e-010	1.904e-010	-9.384	-9.720	-0.337
SrNH3+2		1.054e-011	4.856e-012	-10.977	-11.314	-0.337
Co(NH3)+2		6.477e-013	2.983e-013	-12.189	-12.525	-0.337
CuNH3+2		6.258e-013	2.882e-013	-12.204	-12.540	-0.337
Ni(NH3)2+2		3.290e-013	1.515e-013	-12.483	-12.820	-0.337
Ca(NH3)2+2		1.293e-013	5.957e-014	-12.888	-13.225	-0.337
BaNH3+2		5.087e-015	2.343e-015	-14.294	-14.630	-0.337
AgNH3+		2.336e-015	1.924e-015	-14.632	-14.716	-0.084
Co(NH3)2+2		1.521e-016	7.007e-017	-15.818	-16.154	-0.337
Ag(NH3)2+		1.045e-016	8.612e-017	-15.981	-16.065	-0.084
Co(NH3)3+2		1.055e-020	4.858e-021	-19.977	-20.314	-0.337
Hg(NH3)2+2		3.698e-021	1.703e-021	-20.432	-20.769	-0.337
HgNH3+2		6.716e-025	3.093e-025	-24.173	-24.510	-0.337
Co(NH3)4+2		3.048e-025	1.404e-025	-24.516	-24.853	-0.337
Hg(NH3)3+2		8.107e-026	3.734e-026	-25.091	-25.428	-0.337
Hg(NH3)4+2		3.546e-030	1.633e-030	-29.450	-29.787	-0.337
Co(NH3)5+2		2.785e-030	1.283e-030	-29.555	-29.892	-0.337
Cr(NH3)5OH+2		9.452e-031	4.353e-031	-30.024	-30.361	-0.337
Cr(NH3)6+3		1.900e-038	3.321e-039	-37.721	-38.479	-0.758
Cr(NH3)6Cl+2		1.394e-039	6.421e-040	-38.856	-39.192	-0.337
Co(NH3)5Cl+2		5.439e-040	2.505e-040	-39.264	-39.601	-0.337
Co(NH3)6SO4+		0.000e+000	0.000e+000	-48.352	-48.436	-0.084
Co(NH3)6OH+2		0.000e+000	0.000e+000	-49.737	-50.074	-0.337
Co(NH3)6Cl+2		0.000e+000	0.000e+000	-51.239	-51.576	-0.337
N(3)	7.971e-009					
NO2-		7.971e-009	6.747e-009	-8.098	-8.171	-0.072
CoNO2+		2.600e-017	2.142e-017	-16.585	-16.669	-0.084
TlNO2		2.364e-017	2.364e-017	-16.626	-16.626	0.000
CuNO2+		4.387e-018	3.614e-018	-17.358	-17.442	-0.084
AgNO2		2.412e-019	2.412e-019	-18.618	-18.618	0.000
Cu(NO2)2		2.495e-025	2.495e-025	-24.603	-24.603	0.000
Ag(NO2)2-		3.060e-027	2.521e-027	-26.514	-26.598	-0.084
N(5)	1.944e-014					
NO3-		1.919e-014	1.641e-014	-13.717	-13.785	-0.068
CaNO3+		2.469e-016	2.034e-016	-15.608	-15.692	-0.084
SrNO3+		8.801e-020	7.250e-020	-19.055	-19.140	-0.084
MnNO3+		3.112e-020	2.564e-020	-19.507	-19.591	-0.084
NiNO3+		3.220e-021	2.653e-021	-20.492	-20.576	-0.084
ZnNO3+		1.036e-021	8.539e-022	-20.984	-21.069	-0.084
BaNO3+		6.731e-023	5.545e-023	-22.172	-22.256	-0.084
TlNO3		1.818e-023	1.818e-023	-22.740	-22.740	0.000
CoNO3+		1.422e-023	1.172e-023	-22.847	-22.931	-0.084
CdNO3+		1.000e-023	8.239e-024	-23.000	-23.084	-0.084
PbNO3+		2.544e-024	2.095e-024	-23.595	-23.679	-0.084
CuNO3+		3.221e-025	2.654e-025	-24.492	-24.576	-0.084
AgNO3		2.230e-027	2.230e-027	-26.652	-26.652	0.000
UO2NO3+		8.380e-028	6.904e-028	-27.077	-27.161	-0.084
Mn(NO3)2		1.056e-033	1.056e-033	-32.976	-32.976	0.000
VO2NO3		4.374e-034	4.374e-034	-33.359	-33.359	0.000
CrNO3+2		1.855e-035	8.542e-036	-34.732	-35.068	-0.337
Zn(NO3)2		2.795e-036	2.795e-036	-35.554	-35.554	0.000
FeNO3+2		7.406e-037	3.411e-037	-36.130	-36.467	-0.337
Co(NO3)2		3.911e-037	3.911e-037	-36.408	-36.408	0.000
Cd(NO3)2		6.774e-038	6.774e-038	-37.169	-37.169	0.000
Pb(NO3)2		5.838e-038	5.838e-038	-37.234	-37.234	0.000

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   Cu(NO3)2              5.481e-040  5.481e-040   -39.261   -39.261     0.000
   HgNO3+                0.000e+000  0.000e+000   -42.184   -42.268    -0.084
   Hg(NO3)2              0.000e+000  0.000e+000   -56.434   -56.434     0.000
   TlNO3+2               0.000e+000  0.000e+000   -57.287   -57.624    -0.337
   SnNO3+                0.000e+000  0.000e+000   -57.785   -57.870    -0.084
Na              1.831e-003
   Na+                   1.828e-003  1.563e-003    -2.738    -2.806    -0.068
   NaSO4-                2.444e-006  2.104e-006    -5.612    -5.677    -0.065
   NaF                   4.546e-008  4.546e-008    -7.342    -7.342     0.000
   NaH2BO3               2.020e-008  2.020e-008    -7.695    -7.695     0.000
   NaHPO4-               6.785e-011  5.840e-011   -10.168   -10.234    -0.065
   NaCrO4-               9.028e-018  7.437e-018   -17.044   -17.129    -0.084
Ni              2.200e-007
   Ni+2                  1.205e-007  6.438e-008    -6.919    -7.191    -0.272
   Ni(OH)2               6.039e-008  6.039e-008    -7.219    -7.219     0.000
   NiOH+                 3.013e-008  2.482e-008    -7.521    -7.605    -0.084
   NiSO4                 3.219e-009  3.219e-009    -8.492    -8.492     0.000
   NiCl+                 3.056e-009  2.518e-009    -8.515    -8.599    -0.084
   Ni(OH)3-              2.245e-009  1.850e-009    -8.649    -8.733    -0.084
   NiNH3+2               4.133e-010  1.904e-010    -9.384    -9.720    -0.337
   NiF+                  9.048e-011  7.454e-011   -10.043   -10.128    -0.084
   Ni(NH3)2+2            3.290e-013  1.515e-013   -12.483   -12.820    -0.337
   NiCl2                 1.938e-013  1.938e-013   -12.713   -12.713     0.000
   Ni(SO4)2-2            5.800e-014  2.671e-014   -13.237   -13.573    -0.337
   NiSeO4                6.395e-018  6.395e-018   -17.194   -17.194     0.000
   NiNO3+                3.220e-021  2.653e-021   -20.492   -20.576    -0.084
O(0)            0.000e+000
   O2                    0.000e+000  0.000e+000   -40.086   -40.083     0.003
P               6.597e-008
   CaPO4-                5.360e-008  4.614e-008    -7.271    -7.336    -0.065
   HPO4-2                5.852e-009  3.180e-009    -8.233    -8.498    -0.265
   CaHPO4                5.698e-009  5.698e-009    -8.244    -8.244     0.000
   MgHPO4                6.128e-010  6.128e-010    -9.213    -9.213     0.000
   NaHPO4-               6.785e-011  5.840e-011   -10.168   -10.234    -0.065
   MgPO4-                6.528e-011  5.619e-011   -10.185   -10.250    -0.065
   KHPO4-                3.017e-011  2.597e-011   -10.520   -10.586    -0.065
   H2PO4-                1.915e-011  1.649e-011   -10.718   -10.783    -0.065
   PO4-3                 1.673e-011  4.082e-012   -10.777   -11.389    -0.613
   UO2PO4-               1.858e-012  1.531e-012   -11.731   -11.815    -0.084
   CaH2PO4+              1.681e-012  1.447e-012   -11.774   -11.840    -0.065
   SrHPO4                1.111e-012  1.111e-012   -11.954   -11.954     0.000
   UO2(HPO4)2-2          8.012e-013  3.690e-013   -12.096   -12.433    -0.337
   MgH2PO4+              2.820e-013  2.427e-013   -12.550   -12.615    -0.065
   CoHPO4                1.563e-015  1.563e-015   -14.806   -14.806     0.000
   UO2HPO4               1.278e-015  1.278e-015   -14.893   -14.893     0.000
   SrH2PO4+              1.498e-016  1.234e-016   -15.824   -15.909    -0.084
   FeHPO4                2.868e-018  2.868e-018   -17.542   -17.542     0.000
   H3PO4                 7.617e-019  7.617e-019   -18.118   -18.118     0.000
   FeH2PO4+              2.175e-021  1.872e-021   -20.663   -20.728    -0.065
   UO2H2PO4+             7.681e-022  6.327e-022   -21.115   -21.199    -0.084
   FeHPO4+               6.345e-023  5.462e-023   -22.198   -22.263    -0.065
   CrH2PO4+2             2.482e-028  1.143e-028   -27.605   -27.942    -0.337
   CrO3HPO4-2            1.444e-028  6.650e-029   -27.841   -28.177    -0.337
   UO2(H2PO4)2           2.053e-030  2.053e-030   -29.688   -29.688     0.000
   FeH2PO4+2             1.186e-030  6.509e-031   -29.926   -30.186    -0.260
   CrO3H2PO4-            1.278e-035  1.053e-035   -34.894   -34.978    -0.084
   UO2(H2PO4)3-          3.852e-039  3.173e-039   -38.414   -38.498    -0.084
   U(HPO4)4-4            0.000e+000  0.000e+000   -40.043   -41.389    -1.347
   U(HPO4)3-2            0.000e+000  0.000e+000   -41.099   -41.436    -0.337
   U(HPO4)2              0.000e+000  0.000e+000   -41.294   -41.294     0.000
   UHPO4+2               0.000e+000  0.000e+000   -42.475   -42.812    -0.337
Pb              1.497e-009
   PbOH+                 8.064e-010  6.644e-010    -9.093    -9.178    -0.084
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Pb(OH)2	6.435e-010	6.435e-010	-9.191	-9.191	0.000
Pb(OH)3-	2.392e-011	1.971e-011	-10.621	-10.705	-0.084
Pb+2	1.616e-011	8.635e-012	-10.791	-11.064	-0.272
PbCl+	5.685e-012	4.683e-012	-11.245	-11.329	-0.084
PbSO4	1.060e-012	1.060e-012	-11.975	-11.975	0.000
Pb(OH)4-2	3.210e-013	1.478e-013	-12.494	-12.830	-0.337
PbCl2	3.198e-013	3.198e-013	-12.495	-12.495	0.000
PbF+	3.405e-014	2.805e-014	-13.468	-13.552	-0.084
Pb(SO4)2-2	3.475e-015	1.601e-015	-14.459	-14.796	-0.337
PbCl3-	2.362e-015	1.946e-015	-14.627	-14.711	-0.084
PbCl4-2	2.952e-017	1.360e-017	-16.530	-16.867	-0.337
PbF2	2.545e-017	2.545e-017	-16.594	-16.594	0.000
Pb2OH+3	5.203e-019	9.092e-020	-18.284	-19.041	-0.758
Pb3(OH)4+2	1.549e-019	7.134e-020	-18.810	-19.147	-0.337
PbF3-	2.701e-021	2.225e-021	-20.569	-20.653	-0.084
PbNO3+	2.544e-024	2.095e-024	-23.595	-23.679	-0.084
Pb4(OH)4+4	1.087e-025	4.893e-027	-24.964	-26.310	-1.347
PbF4-2	1.066e-025	4.909e-026	-24.972	-25.309	-0.337
Pb(NO3)2	5.838e-038	5.838e-038	-37.234	-37.234	0.000
Pb(HS)2	0.000e+000	0.000e+000	-138.289	-138.289	0.000
Pb(HS)3-	0.000e+000	0.000e+000	-208.153	-208.237	-0.084
S(-2)	0.000e+000				
AgHS	0.000e+000	0.000e+000	-70.200	-70.200	0.000
S5-2	0.000e+000	0.000e+000	-70.793	-71.130	-0.337
HS-	0.000e+000	0.000e+000	-71.164	-71.248	-0.084
S6-2	0.000e+000	0.000e+000	-71.309	-71.646	-0.337
S4-2	0.000e+000	0.000e+000	-71.389	-71.725	-0.337
S3-2	0.000e+000	0.000e+000	-72.195	-72.531	-0.337
CdHS+	0.000e+000	0.000e+000	-72.955	-73.039	-0.084
S2-2	0.000e+000	0.000e+000	-73.211	-73.547	-0.337
H2S	0.000e+000	0.000e+000	-73.711	-73.711	0.000
TlHS	0.000e+000	0.000e+000	-78.059	-78.059	0.000
S-2	0.000e+000	0.000e+000	-78.800	-79.065	-0.265
Tl2HS+	0.000e+000	0.000e+000	-83.761	-83.845	-0.084
HgS2-2	0.000e+000	0.000e+000	-128.023	-128.360	-0.337
HgHS2-	0.000e+000	0.000e+000	-129.051	-129.135	-0.084
Cu(S4)2-3	0.000e+000	0.000e+000	-130.398	-130.735	-0.337
CuS4S5-3	0.000e+000	0.000e+000	-131.143	-131.465	-0.321
Hg(HS)2	0.000e+000	0.000e+000	-132.224	-132.224	0.000
ZnS(HS)-	0.000e+000	0.000e+000	-133.802	-133.886	-0.084
Ag(S4)2-3	0.000e+000	0.000e+000	-134.959	-135.305	-0.345
Ag(HS)S4-2	0.000e+000	0.000e+000	-135.162	-135.348	-0.186
AgS4S5-3	0.000e+000	0.000e+000	-135.287	-135.616	-0.329
Cd(HS)2	0.000e+000	0.000e+000	-137.083	-137.083	0.000
Ag(HS)2-	0.000e+000	0.000e+000	-137.264	-137.348	-0.084
Zn(HS)2	0.000e+000	0.000e+000	-137.359	-137.359	0.000
Pb(HS)2	0.000e+000	0.000e+000	-138.289	-138.289	0.000
Fe(HS)2	0.000e+000	0.000e+000	-146.191	-146.191	0.000
Tl2(OH)2(HS)2-2	0.000e+000	0.000e+000	-152.832	-153.169	-0.337
Cu(HS)3-	0.000e+000	0.000e+000	-199.052	-199.136	-0.084
Zn(HS)3-	0.000e+000	0.000e+000	-205.243	-205.327	-0.084
ZnS(HS)2-2	0.000e+000	0.000e+000	-205.487	-205.824	-0.337
Cd(HS)3-	0.000e+000	0.000e+000	-206.347	-206.431	-0.084
Pb(HS)3-	0.000e+000	0.000e+000	-208.153	-208.237	-0.084
Fe(HS)3-	0.000e+000	0.000e+000	-215.317	-215.401	-0.084
Tl2OH(HS)3-2	0.000e+000	0.000e+000	-221.490	-221.827	-0.337
Cd(HS)4-2	0.000e+000	0.000e+000	-275.146	-275.483	-0.337
Zn(HS)4-2	0.000e+000	0.000e+000	-277.698	-278.035	-0.337
Sb2S4-2	0.000e+000	0.000e+000	-291.452	-291.789	-0.337
S(6)	7.128e-004				
SO4-2	4.691e-004	2.506e-004	-3.329	-3.601	-0.272
CaSO4	2.250e-004	2.250e-004	-3.648	-3.648	0.000
MgSO4	1.393e-005	1.393e-005	-4.856	-4.856	0.000

NaSO4-	2.444e-006	2.104e-006	-5.612	-5.677	-0.065
KSO4-	2.219e-006	1.910e-006	-5.654	-5.719	-0.065
SrSO4	5.551e-008	5.551e-008	-7.256	-7.256	0.000
MnSO4	4.394e-008	4.394e-008	-7.357	-7.357	0.000
NH4SO4-	9.926e-009	8.522e-009	-8.003	-8.069	-0.066
NiSO4	3.219e-009	3.219e-009	-8.492	-8.492	0.000
ZnSO4	1.136e-009	1.136e-009	-8.945	-8.945	0.000
CoSO4	2.253e-011	2.253e-011	-10.647	-10.647	0.000
HSO4-	9.404e-012	8.048e-012	-11.027	-11.094	-0.068
CdSO4	9.330e-012	9.330e-012	-11.030	-11.030	0.000
Zn(SO4)2-2	5.384e-012	2.480e-012	-11.269	-11.606	-0.337
TlSO4-	3.696e-012	3.044e-012	-11.432	-11.516	-0.084
PbSO4	1.060e-012	1.060e-012	-11.975	-11.975	0.000
CuSO4	2.937e-013	2.937e-013	-12.532	-12.532	0.000
Cd(SO4)2-2	6.848e-014	3.154e-014	-13.164	-13.501	-0.337
Ni(SO4)2-2	5.800e-014	2.671e-014	-13.237	-13.573	-0.337
FeSO4	1.394e-014	1.394e-014	-13.856	-13.856	0.000
UO2SO4	8.000e-015	8.000e-015	-14.097	-14.097	0.000
Pb(SO4)2-2	3.475e-015	1.601e-015	-14.459	-14.796	-0.337
AgSO4-	1.039e-015	8.558e-016	-14.983	-15.068	-0.084
CrOHSO4	4.747e-016	4.747e-016	-15.324	-15.324	0.000
UO2(SO4)2-2	5.739e-017	2.643e-017	-16.241	-16.578	-0.337
CrSO4+	8.462e-021	6.971e-021	-20.073	-20.157	-0.084
AlSO4+	1.682e-021	1.439e-021	-20.774	-20.842	-0.068
VO2SO4-	3.829e-022	3.154e-022	-21.417	-21.501	-0.084
FeSO4+	6.809e-024	5.846e-024	-23.167	-23.233	-0.066
Al(SO4)2-	4.517e-024	3.866e-024	-23.345	-23.413	-0.068
VOSO4	3.182e-025	3.182e-025	-24.497	-24.497	0.000
Fe(SO4)2-	3.803e-026	3.133e-026	-25.420	-25.504	-0.084
Cr2(OH)2SO4+2	7.435e-028	3.424e-028	-27.129	-27.465	-0.337
CrO3SO4-2	5.548e-029	2.555e-029	-28.256	-28.593	-0.337
HgSO4	5.842e-030	5.842e-030	-29.233	-29.233	0.000
Cr2(OH)2(SO4)2	5.098e-030	5.098e-030	-29.293	-29.293	0.000
VSO4+	3.595e-040	2.961e-040	-39.444	-39.529	-0.084
USO4+2	0.000e+000	0.000e+000	-43.047	-43.383	-0.337
U(SO4)2	0.000e+000	0.000e+000	-43.084	-43.084	0.000
Co(NH3)6SO4+	0.000e+000	0.000e+000	-48.352	-48.436	-0.084
Sb(3)	4.872e-019				
Sb(OH)3	2.454e-019	2.454e-019	-18.610	-18.610	0.000
HSbO2	2.396e-019	2.396e-019	-18.620	-18.620	0.000
SbO2-	1.434e-021	1.181e-021	-20.844	-20.928	-0.084
Sb(OH)4-	8.207e-022	6.761e-022	-21.086	-21.170	-0.084
Sb(OH)2F	5.808e-027	5.808e-027	-26.236	-26.236	0.000
SbOF	5.714e-027	5.714e-027	-26.243	-26.243	0.000
Sb(OH)2+	2.378e-027	1.959e-027	-26.624	-26.708	-0.084
SbO+	8.201e-028	6.756e-028	-27.086	-27.170	-0.084
Sb2S4-2	0.000e+000	0.000e+000	-291.452	-291.789	-0.337
Sb(5)	3.434e-008				
SbO3-	3.430e-008	2.826e-008	-7.465	-7.549	-0.084
Sb(OH)6-	3.861e-011	3.301e-011	-10.413	-10.481	-0.068
SbO2+	1.063e-027	8.755e-028	-26.974	-27.058	-0.084
Se(-2)	1.120e-014				
Ag2Se	1.120e-014	1.120e-014	-13.951	-13.951	0.000
HSe-	1.872e-033	1.542e-033	-32.728	-32.812	-0.084
MnSe	1.907e-035	1.907e-035	-34.720	-34.720	0.000
Se-2	1.019e-038	4.694e-039	-37.992	-38.328	-0.337
H2Se	3.934e-039	3.934e-039	-38.405	-38.405	0.000
AgOH(Se)2-4	0.000e+000	0.000e+000	-69.103	-70.449	-1.347
Se(4)	4.320e-008				
SeO3-2	4.130e-008	1.902e-008	-7.384	-7.721	-0.337
HSeO3-	1.906e-009	1.570e-009	-8.720	-8.804	-0.084
H2SeO3	2.201e-016	2.201e-016	-15.657	-15.657	0.000
AgSeO3-	2.539e-018	2.092e-018	-17.595	-17.679	-0.084

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   Cd(SeO3)2-2          1.028e-019  4.735e-020   -18.988   -19.325    -0.337
   Ag(SeO3)2-3          2.039e-024  3.563e-025   -23.691   -24.448    -0.758
   FeHSeO3+2            1.873e-029  8.625e-030   -28.728   -29.064    -0.337
Se(6)           3.976e-013
   SeO4-2               3.975e-013  2.124e-013   -12.401   -12.673    -0.272
   MnSeO4               5.636e-017  5.636e-017   -16.249   -16.249     0.000
   NiSeO4               6.395e-018  6.395e-018   -17.194   -17.194     0.000
   ZnSeO4               6.815e-019  6.815e-019   -18.167   -18.167     0.000
   CoSeO4               4.796e-020  4.796e-020   -19.319   -19.319     0.000
   CdSeO4               6.280e-021  6.280e-021   -20.202   -20.202     0.000
   HSeO4-               4.246e-021  3.498e-021   -20.372   -20.456    -0.084
   Zn(SeO4)2-2          3.186e-031  1.468e-031   -30.497   -30.833    -0.337
Si              3.375e-006
   H4SiO4               2.222e-006  2.236e-006    -5.653    -5.651     0.003
   H3SiO4-              1.153e-006  9.835e-007    -5.938    -6.007    -0.069
   H2SiO4-2             3.440e-010  1.889e-010    -9.463    -9.724    -0.260
   UO2H3SiO4+           2.138e-012  1.761e-012   -11.670   -11.754    -0.084
   SiF6-2               6.979e-040  3.793e-040   -39.156   -39.421    -0.265
Sn(2)           5.630e-033
   HSnO2-               3.736e-033  3.078e-033   -32.428   -32.512    -0.084
   Sn(OH)3-             1.023e-033  8.429e-034   -32.990   -33.074    -0.084
   Sn(OH)2              8.703e-034  8.703e-034   -33.060   -33.060     0.000
   SnOH+                1.729e-039  1.424e-039   -38.762   -38.846    -0.084
   Sn+2                 0.000e+000  0.000e+000   -44.596   -44.933    -0.337
   SnF+                 0.000e+000  0.000e+000   -44.697   -44.781    -0.084
   SnCl+                0.000e+000  0.000e+000   -45.024   -45.108    -0.084
   SnCl2                0.000e+000  0.000e+000   -46.134   -46.134     0.000
   SnF2                 0.000e+000  0.000e+000   -46.313   -46.313     0.000
   SnF3-                0.000e+000  0.000e+000   -47.745   -47.830    -0.084
   SnCl3-               0.000e+000  0.000e+000   -49.039   -49.123    -0.084
   SnNO3+               0.000e+000  0.000e+000   -57.785   -57.870    -0.084
   Sn2(OH)2+2           0.000e+000  0.000e+000   -75.356   -75.693    -0.337
   Sn3(OH)4+2           0.000e+000  0.000e+000  -103.417  -103.753    -0.337
Sn(4)           8.648e-011
   Sn(OH)6-2            8.586e-011  4.587e-011   -10.066   -10.338    -0.272
   SnO3-2               6.152e-013  2.834e-013   -12.211   -12.548    -0.337
   Sn+4                 0.000e+000  0.000e+000   -44.671   -46.018    -1.347
   SnF6-2               0.000e+000  0.000e+000   -59.334   -59.671    -0.337
Sr              2.134e-006
   Sr+2                 2.078e-006  1.110e-006    -5.682    -5.955    -0.272
   SrSO4                5.551e-008  5.551e-008    -7.256    -7.256     0.000
   SrH2BO3+             3.809e-010  3.211e-010    -9.419    -9.493    -0.074
   SrOH+                2.616e-010  2.246e-010    -9.582    -9.649    -0.066
   SrF+                 2.194e-010  1.807e-010    -9.659    -9.743    -0.084
   SrNH3+2              1.054e-011  4.856e-012   -10.977   -11.314    -0.337
   SrHPO4               1.111e-012  1.111e-012   -11.954   -11.954     0.000
   SrH2PO4+             1.498e-016  1.234e-016   -15.824   -15.909    -0.084
   SrNO3+               8.801e-020  7.250e-020   -19.055   -19.140    -0.084
Tl(1)           6.588e-010
   Tl+                  6.290e-010  5.182e-010    -9.201    -9.285    -0.084
   TlCl                 2.563e-011  2.563e-011   -10.591   -10.591     0.000
   TlSO4-               3.696e-012  3.044e-012   -11.432   -11.516    -0.084
   TlCl2-               2.801e-013  2.307e-013   -12.553   -12.637    -0.084
   TlOH                 9.787e-014  9.787e-014   -13.009   -13.009     0.000
   TlF                  3.007e-014  3.007e-014   -13.522   -13.522     0.000
   TlNO2                2.364e-017  2.364e-017   -16.626   -16.626     0.000
   TlNO3                1.818e-023  1.818e-023   -22.740   -22.740     0.000
   TlHS                 0.000e+000  0.000e+000   -78.059   -78.059     0.000
   Tl2HS+               0.000e+000  0.000e+000   -83.761   -83.845    -0.084
   Tl2(OH)2(HS)2-2      0.000e+000  0.000e+000  -152.832  -153.169    -0.337
   Tl2OH(HS)3-2         0.000e+000  0.000e+000  -221.490  -221.827    -0.337
Tl(3)           4.016e-023
   Tl(OH)3              3.986e-023  4.011e-023   -22.399   -22.397     0.003
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Tl(OH)4-		2.976e-025	2.451e-025	-24.526	-24.611	-0.084
Tl(OH)2+		1.263e-030	1.040e-030	-29.899	-29.983	-0.084
TlOHCl+		3.424e-033	2.821e-033	-32.465	-32.550	-0.084
TlCl4-		3.684e-037	3.035e-037	-36.434	-36.518	-0.084
TlCl3		3.146e-037	3.146e-037	-36.502	-36.502	0.000
TlCl2+		2.386e-038	1.966e-038	-37.622	-37.706	-0.084
TlOH+2		4.653e-039	2.143e-039	-38.332	-38.669	-0.337
TlCl+2		0.000e+000	0.000e+000	-41.314	-41.651	-0.337
Tl+3		0.000e+000	0.000e+000	-46.798	-47.555	-0.758
TlNO3+2		0.000e+000	0.000e+000	-57.287	-57.624	-0.337
U(3)	0.000e+000					
U+3		0.000e+000	0.000e+000	-56.415	-57.173	-0.758
U(4)	9.943e-013					
U(OH)5-		9.943e-013	8.191e-013	-12.002	-12.087	-0.084
U(OH)4		1.128e-017	1.128e-017	-16.948	-16.948	0.000
U(OH)3+		1.645e-023	1.356e-023	-22.784	-22.868	-0.084
U(OH)2+2		4.474e-030	2.061e-030	-29.349	-29.686	-0.337
UOH+3		1.826e-037	3.190e-038	-36.739	-37.496	-0.758
UF3+		1.963e-038	1.617e-038	-37.707	-37.791	-0.084
UF2+2		4.806e-039	2.213e-039	-38.318	-38.655	-0.337
U(HPO4)4-4		0.000e+000	0.000e+000	-40.043	-41.389	-1.347
UF4		0.000e+000	0.000e+000	-40.088	-40.088	0.000
UF+3		0.000e+000	0.000e+000	-40.661	-41.419	-0.758
U(HPO4)3-2		0.000e+000	0.000e+000	-41.099	-41.436	-0.337
U(HPO4)2		0.000e+000	0.000e+000	-41.294	-41.294	0.000
UHPO4+2		0.000e+000	0.000e+000	-42.475	-42.812	-0.337
UF5-		0.000e+000	0.000e+000	-42.742	-42.826	-0.084
USO4+2		0.000e+000	0.000e+000	-43.047	-43.383	-0.337
U(SO4)2		0.000e+000	0.000e+000	-43.084	-43.084	0.000
UF6-2		0.000e+000	0.000e+000	-44.346	-44.682	-0.337
U+4		0.000e+000	0.000e+000	-45.035	-46.382	-1.347
UCl+3		0.000e+000	0.000e+000	-45.740	-46.498	-0.758
U6(OH)15+9		0.000e+000	0.000e+000	-146.384	-153.202	-6.818
U(5)	1.580e-013					
UO2+		1.580e-013	1.301e-013	-12.801	-12.886	-0.084
U(6)	2.417e-009					
(UO2)3(OH)5+		7.710e-010	6.352e-010	-9.113	-9.197	-0.084
UO2OH+		9.872e-011	8.132e-011	-10.006	-10.090	-0.084
UO2H3SiO4+		2.138e-012	1.761e-012	-11.670	-11.754	-0.084
UO2PO4-		1.858e-012	1.531e-012	-11.731	-11.815	-0.084
UO2(HPO4)2-2		8.012e-013	3.690e-013	-12.096	-12.433	-0.337
UO2F+		1.629e-013	1.342e-013	-12.788	-12.872	-0.084
UO2+2		3.948e-014	2.109e-014	-13.404	-13.676	-0.272
(UO2)2(OH)2+2		2.383e-014	1.098e-014	-13.623	-13.960	-0.337
UO2F2		1.784e-014	1.784e-014	-13.749	-13.749	0.000
UO2SO4		8.000e-015	8.000e-015	-14.097	-14.097	0.000
UO2HPO4		1.278e-015	1.278e-015	-14.893	-14.893	0.000
UO2Cl+		6.347e-016	5.229e-016	-15.197	-15.282	-0.084
UO2F3-		2.508e-016	2.066e-016	-15.601	-15.685	-0.084
UO2(SO4)2-2		5.739e-017	2.643e-017	-16.241	-16.578	-0.337
UO2F4-2		1.642e-019	7.564e-020	-18.785	-19.121	-0.337
UO2H2PO4+		7.681e-022	6.327e-022	-21.115	-21.199	-0.084
UO2NO3+		8.380e-028	6.904e-028	-27.077	-27.161	-0.084
UO2(H2PO4)2		2.053e-030	2.053e-030	-29.688	-29.688	0.000
UO2(H2PO4)3-		3.852e-039	3.173e-039	-38.414	-38.498	-0.084
V(2)	0.000e+000					
VOH+		0.000e+000	0.000e+000	-41.826	-41.910	-0.084
V+2		0.000e+000	0.000e+000	-44.570	-44.906	-0.337
V(3)	5.802e-014					
V(OH)3		5.802e-014	5.802e-014	-13.236	-13.236	0.000
V(OH)2+		1.496e-026	1.232e-026	-25.825	-25.909	-0.084
VOH+2		8.343e-032	3.842e-032	-31.079	-31.415	-0.337
V+3		1.432e-038	2.503e-039	-37.844	-38.602	-0.758

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   VSO4+                 3.595e-040  2.961e-040   -39.444   -39.529    -0.084
   V2(OH)3+3             0.000e+000  0.000e+000   -58.115   -58.873    -0.758
   V2(OH)2+4             0.000e+000  0.000e+000   -60.684   -62.031    -1.347
V(4)            3.419e-020
   V(OH)3+               3.418e-020  2.816e-020   -19.466   -19.550    -0.084
   VO+2                  1.001e-023  4.610e-024   -23.000   -23.336    -0.337
   VOF+                  1.547e-024  1.274e-024   -23.810   -23.895    -0.084
   VOSO4                 3.182e-025  3.182e-025   -24.497   -24.497     0.000
   VOCl+                 2.400e-025  1.977e-025   -24.620   -24.704    -0.084
   VOF2                  2.203e-026  2.203e-026   -25.657   -25.657     0.000
   VOF3-                 4.374e-029  3.603e-029   -28.359   -28.443    -0.084
   VOF4-2                1.456e-032  6.704e-033   -31.837   -32.174    -0.337
   H2V2O4+2              8.635e-035  3.977e-035   -34.064   -34.400    -0.337
V(5)            4.353e-007
   HVO4-2                4.056e-007  1.868e-007    -6.392    -6.729    -0.337
   H2VO4-                2.967e-008  2.444e-008    -7.528    -7.612    -0.084
   VO4-3                 1.631e-011  2.850e-012   -10.788   -11.545    -0.758
   HV2O7-3               8.858e-012  1.548e-012   -11.053   -11.810    -0.758
   V2O7-4                2.818e-012  1.268e-013   -11.550   -12.897    -1.347
   H3VO4                 8.031e-014  8.031e-014   -13.095   -13.095     0.000
   H3V2O7-               1.539e-014  1.268e-014   -13.813   -13.897    -0.084
   V3O9-3                8.760e-017  1.531e-017   -16.057   -16.815    -0.758
   VO2+                  6.165e-020  5.270e-020   -19.210   -19.278    -0.068
   VO2F                  4.261e-021  4.261e-021   -20.370   -20.370     0.000
   V4O12-4               3.468e-021  1.560e-022   -20.460   -21.807    -1.347
   VO2SO4-               3.829e-022  3.154e-022   -21.417   -21.501    -0.084
   VO2F2-                8.657e-023  7.132e-023   -22.063   -22.147    -0.084
   VO2F3-2               8.903e-026  4.101e-026   -25.050   -25.387    -0.337
   VO2F4-3               5.322e-030  9.301e-031   -29.274   -30.031    -0.758
   VO2NO3                4.374e-034  4.374e-034   -33.359   -33.359     0.000
   V10O28-6              0.000e+000  0.000e+000   -62.114   -65.144    -3.030
   HV10O28-5             0.000e+000  0.000e+000   -64.336   -66.441    -2.104
   H2V10O28-4            0.000e+000  0.000e+000   -69.370   -70.717    -1.347
Zn              5.154e-007
   Zn(OH)2               3.081e-007  3.081e-007    -6.511    -6.511     0.000
   ZnOH+                 7.704e-008  6.346e-008    -7.113    -7.197    -0.084
   Zn(OH)3-              5.740e-008  4.729e-008    -7.241    -7.325    -0.084
   Zn+2                  3.878e-008  2.072e-008    -7.411    -7.684    -0.272
   ZnOHCl                3.190e-008  3.190e-008    -7.496    -7.496     0.000
   ZnSO4                 1.136e-009  1.136e-009    -8.945    -8.945     0.000
   ZnCl+                 9.329e-010  7.956e-010    -9.030    -9.099    -0.069
   Zn(OH)4-2             1.252e-010  5.766e-011    -9.902   -10.239    -0.337
   ZnF+                  2.313e-011  1.906e-011   -10.636   -10.720    -0.084
   ZnCl2                 1.927e-011  1.927e-011   -10.715   -10.715     0.000
   Zn(SO4)2-2            5.384e-012  2.480e-012   -11.269   -11.606    -0.337
   ZnCl3-                2.744e-013  2.340e-013   -12.562   -12.631    -0.069
   ZnCl4-2               3.292e-015  1.789e-015   -14.483   -14.747    -0.265
   ZnSeO4                6.815e-019  6.815e-019   -18.167   -18.167     0.000
   ZnNO3+                1.036e-021  8.539e-022   -20.984   -21.069    -0.084
   Zn(SeO4)2-2           3.186e-031  1.468e-031   -30.497   -30.833    -0.337
   Zn(NO3)2              2.795e-036  2.795e-036   -35.554   -35.554     0.000
   ZnS(HS)-              0.000e+000  0.000e+000  -133.802  -133.886    -0.084
   Zn(HS)2               0.000e+000  0.000e+000  -137.359  -137.359     0.000
   Zn(HS)3-              0.000e+000  0.000e+000  -205.243  -205.327    -0.084
   ZnS(HS)2-2            0.000e+000  0.000e+000  -205.487  -205.824    -0.337
   Zn(HS)4-2             0.000e+000  0.000e+000  -277.698  -278.035    -0.337

-----------------------------Saturation indices-------------------------------

      Phase               SI log IAP  log KT

      (Co(NH3)5Cl)(NO3)2 -55.50  -49.21    6.29  (Co(NH3)5Cl)(NO3)2
      (Co(NH3)5Cl)Cl2 -29.78  -25.27    4.51  (Co(NH3)5Cl)Cl2
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(Co(NH3)5OH2)Cl3	-37.01	-25.27	11.74	(Co(NH3)5OH2)Cl3
(Co(NH3)6)(NO3)3	-75.13	-57.20	17.93	(Co(NH3)6)(NO3)3
(Co(NH3)6)Cl3	-41.32	-21.29	20.03	(Co(NH3)6)Cl3
(NH4)2CrO4	-26.42	-26.02	0.40	(NH4)2CrO4
(NH4)2SeO4	-24.12	-23.67	0.45	(NH4)2SeO4
(UO2)3(PO4)2	-14.41	-63.81	-49.40	(UO2)3(PO4)2
(VO)3(PO4)2	-67.69	-92.79	-25.10	(VO)3(PO4)2
Acanthite	-51.08	-87.30	-36.22	Ag2S
Ag2CrO4	-28.96	-40.55	-11.59	Ag2CrO4
Ag2HVO4	-17.84	-16.36	1.48	Ag2HVO4
Ag2MoO4	-20.29	-31.84	-11.55	Ag2MoO4
Ag2O	-19.14	-6.57	12.57	Ag2O
Ag2Se	-0.16	-48.86	-48.70	Ag2Se
Ag2SeO3	-17.70	-24.85	-7.15	Ag2SeO3
Ag2SeO4	-29.30	-38.21	-8.91	Ag2SeO4
Ag2SO4	-24.31	-29.13	-4.82	Ag2SO4
Ag3AsO3	-32.05	-29.89	2.16	Ag3AsO3
Ag3AsO4	-23.05	-25.83	-2.79	Ag3AsO4
Ag3H2VO5	-24.83	-19.65	5.18	Ag3H2VO5
Ag3PO4	-32.10	-49.69	-17.59	Ag3PO4
AgF:4H2O	-18.15	-17.10	1.05	AgF:4H2O
Agmetal	-1.25	-14.76	-13.51	Ag
AgVO3	-13.85	-13.08	0.77	AgVO3
Al(OH)3(am)	-3.48	7.32	10.80	Al(OH)3
Al2(MoO4)3	-63.56	-61.19	2.37	Al2(MoO4)3
Al2O3	-5.01	14.64	19.65	Al2O3
Al4(OH)10SO4	-15.99	6.71	22.70	Al4(OH)10SO4
AlAsO4:2H2O	-13.47	-8.67	4.80	AlAsO4:2H2O
AlOHSO4	-12.02	-15.25	-3.23	AlOHSO4
AlSb	-145.78	-80.16	65.62	AlSb
Alunite	-15.26	-16.66	-1.40	KAl3(SO4)2(OH)6
Anglesite	-6.87	-14.66	-7.79	PbSO4
Anhydrite	-1.65	-6.01	-4.36	CaSO4
Anilite	-48.60	-80.48	-31.88	Cu0.25Cu1.5S
Antlerite	-8.33	0.46	8.79	Cu3(OH)4SO4
Arsenolite	-77.41	-80.17	-2.76	As4O6
As2O5	-38.68	-31.97	6.71	As2O5
Atacamite	-3.34	4.05	7.39	Cu2(OH)3Cl
Autunite	-8.61	-52.54	-43.93	Ca(UO2)2(PO4)2
Avicennite	-31.79	-44.79	-13.00	Tl2O3
Ba(OH)2:8H2O	-14.60	9.79	24.39	Ba(OH)2:8H2O
Ba2V2O7:2H2O	-15.87	0.00	15.87	Ba2V2O7:2H2O
Ba3(AsO4)2	6.33	-2.58	-8.91	Ba3(AsO4)2
Ba3(VO4)2:4H2O	-23.14	9.80	32.94	Ba3(VO4)2:4H2O
BaCrO4	-14.52	-24.19	-9.67	BaCrO4
BaF2	-12.02	-17.84	-5.82	BaF2
BaHPO4	-10.27	-30.04	-19.77	BaHPO4
BaMoO4	-8.52	-15.48	-6.96	BaMoO4
Barite	-2.79	-12.77	-9.98	BaSO4
BaS	-87.12	-70.94	16.18	BaS
BaSeO3	-10.32	-8.49	1.83	BaSeO3
BaSeO4	-14.38	-21.84	-7.46	BaSeO4
Bassetite	-18.29	-62.77	-44.48	Fe(UO2)2(PO4)2
Bianchite	-9.52	-11.29	-1.76	ZnSO4:6H2O
Birnessite	-7.52	10.57	18.09	MnO2
Bixbyite	-1.18	-1.82	-0.64	Mn2O3
BlaubleiI	-49.88	-74.05	-24.16	Cu0.9Cu0.2S
BlaubleiII	-49.74	-77.02	-27.28	Cu0.6Cu0.8S
Boehmite	-1.26	7.32	8.58	AlOOH
Breithauptite	-45.70	-64.22	-18.52	NiSb
Brochantite	-7.09	8.13	15.22	Cu4(OH)6SO4
Brucite	-1.39	15.45	16.84	Mg(OH)2
Bunsenite	-0.67	11.78	12.45	NiO

Ca(VO3)2	-8.69	-3.03	5.66	Ca(VO3)2
Ca2V2O7	-3.97	13.53	17.50	Ca2V2O7
Ca2V2O7:2H2O	-8.02	13.53	21.55	Ca2V2O7:2H2O
Ca3(AsO4)2:4H2O	-4.59	17.71	22.30	Ca3(AsO4)2:4H2O
Ca3(PO4)2(beta)	-1.08	-30.00	-28.92	Ca3(PO4)2
Ca3(VO4)2	-8.87	30.09	38.96	Ca3(VO4)2
Ca3(VO4)2:4H2O	-9.77	30.09	39.86	Ca3(VO4)2:4H2O
Ca3Sb2	-268.25	-125.28	142.97	Ca3Sb2
Ca4H(PO4)3:3H2O	-6.20	-53.28	-47.08	Ca4H(PO4)3:3H2O
CaCrO4	-15.16	-17.43	-2.27	CaCrO4
CaHPO4	-4.00	-23.28	-19.27	CaHPO4
CaHPO4:2H2O	-4.28	-23.28	-19.00	CaHPO4:2H2O
Calomel	-15.01	-32.92	-17.91	Hg2Cl2
CaMoO4	-0.77	-8.72	-7.95	CaMoO4
Carnotite	1.78	2.01	0.23	KUO2VO4
CaSeO3:2H2O	-4.54	-1.73	2.81	CaSeO3:2H2O
CaSeO4:2H2O	-12.06	-15.08	-3.02	CaSeO4:2H2O
Cd(BO2)2	-11.34	-1.50	9.84	Cd(BO2)2
Cd(OH)2	-4.48	9.17	13.64	Cd(OH)2
Cd(OH)2(am)	-4.56	9.17	13.73	Cd(OH)2
Cd3(OH)2(SO4)2	-24.34	-17.63	6.71	Cd3(OH)2(SO4)2
Cd3(OH)4SO4	-17.63	4.93	22.56	Cd3(OH)4SO4
Cd3(PO4)2	-19.58	-52.18	-32.60	Cd3(PO4)2
Cd4(OH)6SO4	-14.30	14.10	28.40	Cd4(OH)6SO4
CdCl2	-12.77	-13.43	-0.66	CdCl2
CdCl2:1H2O	-11.74	-13.43	-1.69	CdCl2:1H2O
CdCl2:2.5H2O	-11.52	-13.43	-1.91	CdCl2:2.5H2O
CdF2	-17.26	-18.47	-1.21	CdF2
Cdmetal(alpha)	-27.30	-13.79	13.51	Cd
Cdmetal(gamma)	-27.41	-13.79	13.62	Cd
CdMoO4	-1.96	-16.11	-14.15	CdMoO4
CdOHCl	-5.67	-2.13	3.54	CdOHCl
CdSb	-66.48	-66.83	-0.35	CdSb
CdSe	-12.93	-33.13	-20.20	CdSe
CdSeO4:2H2O	-20.62	-22.47	-1.85	CdSeO4:2H2O
CdSO4	-13.23	-13.40	-0.17	CdSO4
CdSO4:1H2O	-11.67	-13.40	-1.73	CdSO4:1H2O
CdSO4:2.67H2O	-11.53	-13.40	-1.87	CdSO4:2.67H2O
Celestite	-2.94	-9.56	-6.62	SrSO4
Cerargyrite	-4.83	-14.58	-9.75	AgCl
Chalcanthite	-12.25	-14.89	-2.64	CuSO4:5H2O
Chalcedony	-2.10	-5.65	-3.55	SiO2
Chalcocite	-48.04	-82.96	-34.92	Cu2S
Chalcopyrite	-112.20	-147.47	-35.27	CuFeS2
Chrysotile	2.85	35.05	32.20	Mg3Si2O5(OH)4
Cinnabar	-50.32	-96.01	-45.69	HgS
Claudetite	-77.10	-80.17	-3.06	As4O6
Clausthalite	-7.29	-34.39	-27.10	PbSe
Co(BO2)2	-28.12	-1.05	27.07	Co(BO2)2
Co(OH)2	-3.47	9.62	13.09	Co(OH)2
Co(OH)3	-8.99	-11.30	-2.31	Co(OH)3
Co3(AsO4)2	-16.14	-3.11	13.03	Co3(AsO4)2
Co3(PO4)2	-16.13	-50.82	-34.69	Co3(PO4)2
Co3O4	-2.49	-12.98	-10.50	Co3O4
CoCl2	-21.24	-12.98	8.27	CoCl2
CoCl2:6H2O	-15.52	-12.98	2.54	CoCl2:6H2O
CoF2	-16.42	-18.02	-1.60	CoF2
CoF3	-51.30	-52.76	-1.46	CoF3
CoFe2O4	22.68	19.16	-3.53	CoFe2O4
CoHPO4	-11.16	-30.22	-19.06	CoHPO4
CoMoO4	-7.90	-15.66	-7.76	CoMoO4
CoO	-3.97	9.62	13.59	CoO
CoS(alpha)	-63.67	-71.11	-7.44	CoS

CoS(beta)	-60.04	-71.11	-11.07	CoS
CoSe	-16.47	-32.67	-16.20	CoSe
CoSeO3	-9.99	-8.67	1.32	CoSeO3
CoSeO4:6H2O	-20.49	-22.02	-1.53	CoSeO4:6H2O
CoSO4	-15.75	-12.95	2.80	CoSO4
CoSO4:6H2O	-10.48	-12.95	-2.47	CoSO4:6H2O
Cotunnite	-9.92	-14.70	-4.78	PbCl2
Covellite	-50.76	-73.06	-22.30	CuS
Cr(OH)2	-20.39	-9.57	10.82	Cr(OH)2
Cr(OH)3	-2.38	-1.04	1.34	Cr(OH)3
Cr(OH)3(am)	-0.29	-1.04	-0.75	Cr(OH)3
Cr2O3	0.27	-2.09	-2.36	Cr2O3
CrCl2	-46.26	-32.17	14.09	CrCl2
CrCl3	-50.05	-34.94	15.11	CrCl3
CrF3	-31.17	-42.50	-11.34	CrF3
Cristobalite	-2.30	-5.65	-3.35	SiO2
Crmetal	-63.01	-32.53	30.48	Cr
CrO3	-30.77	-33.99	-3.21	CrO3
Cryolite	-21.73	-55.57	-33.84	Na3AlF6
Cu(OH)2	-1.00	7.68	8.67	Cu(OH)2
Cu(SbO3)2	-28.84	16.37	45.21	Cu(SbO3)2
Cu2(OH)3NO3	-17.17	-7.92	9.25	Cu2(OH)3NO3
Cu2Sb:3H2O	-46.03	-80.92	-34.88	Cu2Sb:3H2O
Cu2Se(alpha)	1.28	-44.52	-45.80	Cu2Se
Cu2SO4	-22.84	-24.79	-1.95	Cu2SO4
Cu3(AsO4)2:2H2O	-15.04	-8.94	6.10	Cu3(AsO4)2:2H2O
Cu3(PO4)2	-19.80	-56.65	-36.85	Cu3(PO4)2
Cu3(PO4)2:3H2O	-21.53	-56.65	-35.12	Cu3(PO4)2:3H2O
Cu3Sb	-48.22	-90.82	-42.59	Cu3Sb
Cu3Se2	-15.65	-79.14	-63.49	Cu3Se2
CuCrO4	-20.87	-26.31	-5.44	CuCrO4
CuF	-10.03	-14.93	-4.91	CuF
CuF2	-21.08	-19.96	1.12	CuF2
CuF2:2H2O	-15.41	-19.96	-4.55	CuF2:2H2O
Cumetal	-3.83	-12.59	-8.76	Cu
CuMoO4	-4.52	-17.60	-13.08	CuMoO4
CuOCuSO4	-17.52	-7.22	10.30	CuOCuSO4
Cupricferrite	11.22	17.21	5.99	CuFe2O4
Cuprite	-0.82	-2.23	-1.41	Cu2O
Cuprousferrite	12.57	3.65	-8.92	CuFeO2
CuSe	-1.52	-34.62	-33.10	CuSe
CuSe2	-20.59	-53.96	-33.37	CuSe2
CuSeO3:2H2O	-11.12	-10.61	0.51	CuSeO3:2H2O
CuSeO4:5H2O	-21.53	-23.97	-2.44	CuSeO4:5H2O
CuSO4	-17.83	-14.89	2.94	CuSO4
Diaspore	0.45	7.32	6.87	AlOOH
Djurleite	-48.38	-82.30	-33.92	Cu0.066Cu1.868S
Epsomite	-4.99	-7.12	-2.13	MgSO4:7H2O
Fe(OH)2	-7.24	6.32	13.56	Fe(OH)2
Fe(OH)2.7Cl.3	4.42	1.38	-3.04	Fe(OH)2.7Cl.3
Fe(VO3)2	-9.55	-13.27	-3.72	Fe(VO3)2
Fe2(OH)4SeO3	-10.31	-8.75	1.55	Fe2(OH)4SeO3
Fe2(SeO3)3:2H2O	-24.70	-45.33	-20.63	Fe2(SeO3)3:2H2O
Fe2(SO4)3	-54.43	-58.17	-3.73	Fe2(SO4)3
Fe3(OH)8	-4.37	15.86	20.22	Fe3(OH)8
FeAsO4:2H2O	-11.62	-11.22	0.40	FeAsO4:2H2O
FeCr2O4	-2.96	4.24	7.20	FeCr2O4
FeMoO4	-8.86	-18.95	-10.09	FeMoO4
Ferrihydrite	1.58	4.77	3.19	Fe(OH)3
Ferroselite	-36.72	-55.31	-18.60	FeSe2
FeS(ppt)	-71.46	-74.41	-2.95	FeS
FeSe	-24.97	-35.97	-11.00	FeSe
Fluorite	-0.58	-11.08	-10.50	CaF2

Galena	-58.86	-72.83	-13.97	PbS
Gibbsite	-0.97	7.32	8.29	Al(OH)3
Goethite	4.28	4.77	0.49	FeOOH
Goslarite	-9.27	-11.29	-2.01	ZnSO4:7H2O
Greenalite	-13.15	7.66	20.81	Fe3Si2O5(OH)4
Greenockite	-57.20	-71.56	-14.36	CdS
Greigite	-262.03	-307.07	-45.03	Fe3S4
Gummite	-2.38	5.29	7.67	UO3
Gypsum	-1.40	-6.01	-4.61	CaSO4:2H2O
H-Autunite	-21.17	-69.10	-47.93	H2(UO2)2(PO4)2
H-Jarosite	-18.73	-30.83	-12.10	(H3O)Fe3(SO4)2(OH)6
H2MoO4	-12.40	-25.28	-12.88	H2MoO4
H2S(g)	-72.72	-80.73	-8.01	H2S
H2Se(g)	-37.34	-42.30	-4.96	H2Se
H2Sn(OH)6	-5.78	-29.31	-23.53	H2Sn(OH)6
Halite	-6.22	-4.62	1.60	NaCl
Halloysite	-6.24	3.34	9.57	Al2Si2O5(OH)4
Hausmannite	0.81	61.84	61.03	Mn3O4
Hematite	10.95	9.54	-1.42	Fe2O3
Hercynite	-1.93	20.96	22.89	FeAl2O4
Hg(g)	-8.77	-16.64	-7.87	Hg
Hg(OH)2	-11.78	-15.28	-3.50	Hg(OH)2
Hg2(g)	-18.33	-33.28	-14.96	Hg2
Hg2(OH)2	-15.59	-10.33	5.26	Hg2(OH)2
Hg2CrO4	-35.61	-44.31	-8.70	Hg2CrO4
Hg2F2	-27.60	-37.97	-10.36	Hg2F2
Hg2HPO4	-25.39	-50.17	-24.77	Hg2HPO4
Hg2S	-79.38	-91.06	-11.68	Hg2S
Hg2SeO3	-23.96	-28.61	-4.66	Hg2SeO3
Hg2SO4	-26.76	-32.89	-6.13	Hg2SO4
HgCl(g)	-35.96	-16.46	19.50	HgCl
HgCl2	-16.61	-37.88	-21.26	HgCl2
HgF(g)	-51.66	-18.98	32.68	HgF
HgF2(g)	-55.48	-42.92	12.57	HgF2
Hgmetal(l)	-3.19	-16.64	-13.45	Hg
HgSe	-1.88	-57.57	-55.69	HgSe
HgSeO3	-21.14	-33.57	-12.43	HgSeO3
HgSO4	-28.43	-37.85	-9.42	HgSO4
Hinsdalite	-30.05	-32.55	-2.50	PbAl3PO4SO4(OH)6
Hydroxylapatite	7.61	-36.72	-44.33	Ca5(PO4)3OH
Hydroxylpyromorphite	-17.21	-80.00	-62.79	Pb5(PO4)3OH
K-Alum	-26.13	-31.30	-5.17	KAl(SO4)2:12H2O
K-Autunite	-7.82	-56.07	-48.24	K2(UO2)2(PO4)2
K-Jarosite	-9.52	-24.32	-14.80	KFe3(SO4)2(OH)6
K2Cr2O7	-37.70	-54.94	-17.24	K2Cr2O7
K2CrO4	-20.44	-20.95	-0.51	K2CrO4
K2MoO4	-15.51	-12.25	3.26	K2MoO4
K2SeO4	-17.88	-18.61	-0.73	K2SeO4
Kaolinite	-4.10	3.34	7.43	Al2Si2O5(OH)4
Langite	-9.36	8.13	17.49	Cu4(OH)6SO4:H2O
Larnakite	-6.33	-6.76	-0.43	PbO:PbSO4
Laurionite	-4.02	-3.40	0.62	PbOHCl
Lepidocrocite	3.40	4.77	1.37	FeOOH
Lime	-16.14	16.56	32.70	CaO
Litharge	-4.79	7.90	12.69	PbO
Mackinawite	-70.81	-74.41	-3.60	FeS
Maghemite	3.15	9.54	6.39	Fe2O3
Magnesioferrite	8.13	24.99	16.86	Fe2MgO4
Magnetite	12.45	15.86	3.40	Fe3O4
Manganite	-0.90	24.44	25.34	MnOOH
Massicot	-4.99	7.90	12.89	PbO
Matlockite	-8.24	-17.22	-8.97	PbClF
Melanothallite	-21.18	-14.92	6.26	CuCl2

Melanterite	-14.04	-16.25	-2.21	FeSO4:7H2O
Metacinnabar	-50.92	-96.01	-45.09	HgS
Mg(OH)2(active)	-3.34	15.45	18.79	Mg(OH)2
Mg(VO3)2	-15.42	-4.14	11.28	Mg(VO3)2
Mg2Sb3	-248.82	-174.14	74.68	Mg2Sb3
Mg2V2O7	-15.05	11.31	26.36	Mg2V2O7
Mg3(PO4)2	-10.04	-33.32	-23.28	Mg3(PO4)2
MgCr2O4	-2.84	13.37	16.20	MgCr2O4
MgCrO4	-23.91	-18.53	5.38	MgCrO4
MgF2	-4.06	-12.19	-8.13	MgF2
MgHPO4:3H2O	-6.21	-24.39	-18.18	MgHPO4:3H2O
MgMoO4	-7.98	-9.83	-1.85	MgMoO4
MgSeO3:6H2O	-5.89	-2.84	3.06	MgSeO3:6H2O
MgSeO4:6H2O	-14.99	-16.19	-1.20	MgSeO4:6H2O
Minium	-26.86	46.66	73.52	Pb3O4
Mirabilite	-8.10	-9.22	-1.11	Na2SO4:10H2O
Mn(VO3)2	-11.53	-6.63	4.90	Mn(VO3)2
Mn2(SO4)3	-63.81	-69.53	-5.71	Mn2(SO4)3
Mn2Sb	-134.11	-73.03	61.08	Mn2Sb
Mn3(AsO4)2:8H2O	-5.59	6.91	12.50	Mn3(AsO4)2:8H2O
Mn3(PO4)2	-16.97	-40.80	-23.83	Mn3(PO4)2
MnCl2:4H2O	-12.35	-9.64	2.72	MnCl2:4H2O
MnHPO4	-1.48	-26.88	-25.40	MnHPO4
MnS(grn)	-67.94	-67.77	0.17	MnS
MnS(pnk)	-71.11	-67.77	3.34	MnS
MnSb	-85.48	-88.39	-2.91	MnSb
MnSe	-32.83	-29.33	3.50	MnSe
MnSeO3	-6.46	-5.33	1.13	MnSeO3
MnSeO3:2H2O	-6.31	-5.33	0.98	MnSeO3:2H2O
MnSeO4:5H2O	-16.63	-18.68	-2.05	MnSeO4:5H2O
MnSO4	-12.19	-9.61	2.58	MnSO4
Monteponite	-5.94	9.17	15.10	CdO
Montroydite	-11.64	-15.28	-3.64	HgO
MoO3	-17.28	-25.28	-8.00	MoO3
Morenosite	-8.65	-10.79	-2.14	NiSO4:7H2O
MoS2	-139.43	-209.69	-70.26	MoS2
Na-Autunite	-8.33	-55.74	-47.41	Na2(UO2)2(PO4)2
Na-Jarosite	-12.96	-24.16	-11.20	NaFe3(SO4)2(OH)6
Na2Cr2O7	-44.72	-54.62	-9.90	Na2Cr2O7
Na2CrO4	-23.56	-20.63	2.93	Na2CrO4
Na2Mo2O7	-20.60	-37.20	-16.60	Na2Mo2O7
Na2MoO4	-13.41	-11.92	1.49	Na2MoO4
Na2MoO4:2H2O	-13.15	-11.92	1.22	Na2MoO4:2H2O
Na2SeO3:5H2O	-15.23	-4.93	10.30	Na2SeO3:5H2O
Na2SeO4	-19.56	-18.28	1.28	Na2SeO4
Na3Sb	-161.90	-67.45	94.45	Na3Sb
Na3VO4	-26.44	10.24	36.68	Na3VO4
Na4V2O7	-30.28	7.12	37.40	Na4V2O7
Nantokite	-5.68	-12.41	-6.73	CuCl
NaSb	-81.01	-57.84	23.17	NaSb
NaVO3	-6.98	-3.12	3.86	NaVO3
Ni(OH)2	-1.02	11.77	12.79	Ni(OH)2
Ni3(AsO4)2:8H2O	-12.35	3.35	15.70	Ni3(AsO4)2:8H2O
Ni3(PO4)2	-13.05	-44.35	-31.30	Ni3(PO4)2
Ni4(OH)6SO4	-7.47	24.53	32.00	Ni4(OH)6SO4
NiMoO4	-2.36	-13.50	-11.14	NiMoO4
Ningyoite	-17.66	-71.57	-53.91	CaU(PO4)2:2H2O
NiS(alpha)	-63.36	-68.96	-5.60	NiS
NiS(beta)	-57.86	-68.96	-11.10	NiS
NiS(gamma)	-56.16	-68.96	-12.80	NiS
NiSe	-12.82	-30.52	-17.70	NiSe
NiSeO3:2H2O	-9.33	-6.51	2.81	NiSeO3:2H2O
NiSeO4:6H2O	-18.35	-19.87	-1.52	NiSeO4:6H2O

Nsutite	-6.94	10.57	17.50	MnO2
O2(g)	-37.18	45.91	83.09	O2
Orpiment	-221.21	-282.28	-61.07	As2S3
Pb(BO2)2	-9.29	-2.77	6.52	Pb(BO2)2
Pb(OH)2	-0.25	7.90	8.15	Pb(OH)2
Pb2(OH)3Cl	-4.29	4.51	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-10.38	15.81	26.19	Pb2O(OH)2
Pb2O3	-22.28	38.76	61.04	Pb2O3
Pb2V2O7	-1.88	-3.78	-1.90	Pb2V2O7
Pb3(AsO4)2	-14.06	-8.26	5.80	Pb3(AsO4)2
Pb3(PO4)2	-12.44	-55.97	-43.53	Pb3(PO4)2
Pb3(VO4)2	-2.02	4.12	6.14	Pb3(VO4)2
Pb3O2SO4	-9.55	1.14	10.69	Pb3O2SO4
Pb4(OH)6SO4	-12.06	9.04	21.10	Pb4(OH)6SO4
Pb4O3SO4	-12.83	9.04	21.88	Pb4O3SO4
PbCrO4	-13.48	-26.08	-12.60	PbCrO4
PbF2	-12.30	-19.74	-7.44	PbF2
PbHPO4	-8.13	-31.94	-23.81	PbHPO4
Pbmetal	-19.30	-15.05	4.25	Pb
PbMoO4	-1.75	-17.37	-15.62	PbMoO4
PbO:0.3H2O	-5.08	7.90	12.98	PbO:0.33H2O
PbSeO4	-16.90	-23.74	-6.84	PbSeO4
Periclase	-6.13	15.45	21.58	MgO
Plattnerite	-18.74	30.86	49.60	PbO2
Plumbgummite	-17.03	-49.82	-32.79	PbAl3(PO4)2(OH)5:H2O
Portlandite	-6.24	16.56	22.80	Ca(OH)2
Przhevalskite	-16.83	-61.19	-44.37	Pb(UO2)2(PO4)2
Pyrite	-113.68	-132.18	-18.51	FeS2
Pyrochroite	-2.23	12.96	15.19	Mn(OH)2
Pyrolusite	-5.46	35.92	41.38	MnO2
Pyromorphite	-6.87	-91.30	-84.43	Pb5(PO4)3Cl
Quartz	-1.65	-5.65	-4.00	SiO2
Realgar	-92.50	-112.25	-19.75	AsS
Retgersite	-8.75	-10.79	-2.04	NiSO4:6H2O
Saleeite	-10.00	-53.65	-43.65	Mg(UO2)2(PO4)2
Sb(OH)3	-11.50	-18.61	-7.11	Sb(OH)3
Sb2O4	-17.67	-14.26	3.40	Sb2O4
Sb2O5	-30.26	-39.93	-9.67	Sb2O5
Sb2Se3	-96.35	-164.10	-67.76	Sb2Se3
Sb4O6(cubic)	-56.18	-74.44	-18.26	Sb4O6
Sb4O6(orth)	-56.54	-74.44	-17.90	Sb4O6
SbCl3	-53.08	-52.51	0.57	SbCl3
SbF3	-49.84	-60.07	-10.23	SbF3
Sbmetal	-41.35	-53.04	-11.69	Sb
SbO2	-3.62	-31.44	-27.82	SbO2
Schoepite	-0.70	5.29	5.99	UO2(OH)2:H2O
Semetal(am)	-12.23	-19.34	-7.11	Se
Semetal(hex	-11.63	-19.34	-7.71	Se
Senarmontite	-24.85	-37.22	-12.37	Sb2O3
SeO2	-18.41	-18.29	0.12	SeO2
SeO3	-52.68	-31.64	21.04	SeO3
Sepiolite	-1.81	13.95	15.76	Mg2Si3O7.5OH:3H2O
Sepiolite(A)	-4.83	13.95	18.78	Mg2Si3O7.5OH:3H2O
SiO2(am-gel)	-2.94	-5.65	-2.71	SiO2
SiO2(am-ppt)	-2.91	-5.65	-2.74	SiO2
Sn(OH)2	-27.63	-33.06	-5.43	Sn(OH)2
Sn(OH)4	-7.02	-29.30	-22.28	Sn(OH)4
Sn(SO4)2	-59.23	-74.44	-15.21	Sn(SO4)2
SnCl2	-46.38	-55.66	-9.28	SnCl2
Snmetal(wht)	-53.69	-56.02	-2.33	Sn
SnO	-28.15	-33.06	-4.91	SnO
SnO2	-0.33	-29.30	-28.97	SnO2
SnS	-94.68	-113.79	-19.11	SnS

SnS2	-133.31	-190.77	-57.45	SnS2
SnSe	-44.86	-75.36	-30.49	SnSe
SnSe2	-48.78	-113.89	-65.12	SnSe2
SnSO4	1.35	-55.63	-56.97	SnSO4
Sphalerite	-58.00	-69.45	-11.45	ZnS
Spinel	-6.76	30.09	36.85	MgAl2O4
Sr-Autunite	-11.63	-56.08	-44.46	Sr(UO2)2(PO4)2
SrCrO4	-16.32	-20.97	-4.65	SrCrO4
SrF2	-6.05	-14.63	-8.58	SrF2
SrHPO4	-7.53	-26.83	-19.30	SrHPO4
SrSeO3	-7.58	-5.28	2.30	SrSeO3
SrSeO4	-14.23	-18.63	-4.40	SrSeO4
Stibnite	-228.95	-279.41	-50.46	Sb2S3
Strengite	-8.67	-35.07	-26.40	FePO4:2H2O
Sulfur	-55.63	-57.78	-2.14	S
Tenorite	0.03	7.68	7.64	CuO
Thenardite	-9.53	-9.21	0.32	Na2SO4
Tl(OH)3	-16.96	-22.40	-5.44	Tl(OH)3
Tl2CrO4	-21.58	-33.59	-12.01	Tl2CrO4
Tl2MoO4	-16.89	-24.88	-7.99	Tl2MoO4
Tl2O	-26.70	0.40	27.09	Tl2O
Tl2S	-73.15	-80.34	-7.19	Tl2S
Tl2Se	-23.80	-41.90	-18.10	Tl2Se
Tl2SeO4	-27.14	-31.24	-4.10	Tl2SeO4
Tl2SO4	-18.39	-22.17	-3.79	Tl2SO4
TlCl	-7.36	-11.10	-3.74	TlCl
Tlmetal	-16.96	-11.28	5.68	Tl
TlNO3	-21.46	-23.07	-1.61	TlNO3
TlOH	-12.72	0.20	12.92	TlOH
Torbernite	-16.14	-61.42	-45.28	Cu(UO2)2(PO4)2
Tsumebite	-6.57	-16.36	-9.79	Pb2CuPO4(OH)3:3H2O
Tyuyamunite	3.47	7.55	4.08	Ca(UO2)2(VO4)2
U(HPO4)2:4H2O	-36.54	-88.13	-51.58	U(HPO4)2:4H2O
U3O8	-0.52	20.56	21.08	U3O8
U3Sb4	-527.64	-375.26	152.38	U3Sb4
U4O9	-7.82	-10.84	-3.02	U4O9
UF4	-34.19	-63.73	-29.54	UF4
UF4:2.5H2O	-31.01	-63.73	-32.72	UF4:2.5H2O
UO2(am)	-9.38	-8.45	0.93	UO2
UO2(NO3)2	-53.39	-41.25	12.15	UO2(NO3)2
UO2(NO3)2:2H2O	-46.10	-41.25	4.85	UO2(NO3)2:2H2O
UO2(NO3)2:3H2O	-44.64	-41.25	3.39	UO2(NO3)2:3H2O
UO2(NO3)2:6H2O	-43.29	-41.25	2.05	UO2(NO3)2:6H2O
UO2(OH)2(beta)	-0.32	5.29	5.61	UO2(OH)2
UO2HPO4	-10.32	-34.55	-24.23	UO2HPO4
UO2SeO4:4H2O	-24.10	-26.35	-2.25	UO2SeO4:4H2O
UO3	-2.41	5.29	7.70	UO3
Uramphite	-9.38	-61.13	-51.75	(NH4)2(UO2)2(PO4)2
Uraninite	-3.78	-8.45	-4.67	UO2
Uranocircite	-14.67	-59.30	-44.63	Ba(UO2)2(PO4)2
USb2	-199.24	-169.66	29.58	USb2
V(OH)3	-17.74	-10.15	7.59	V(OH)3
V2O5	-18.23	-19.59	-1.36	V2O5
V3O5	-37.90	-36.07	1.84	V3O5
V4O7	-47.62	-40.44	7.19	V4O7
V6O13	-43.82	-104.68	-60.86	V6O13
Valentinite	-28.74	-37.22	-8.48	Sb2O3
VCl2	-63.10	-44.23	18.87	VCl2
VCl3	-67.48	-44.05	23.43	VCl3
VF4	-74.58	-59.65	14.93	VF4
Vivianite	-24.71	-60.71	-36.00	Fe3(PO4)2:8H2O
Vmetal	-88.61	-44.59	44.03	V
VO	-36.39	-21.63	14.76	VO

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      VO(OH)2          -9.52   -4.37    5.15  VO(OH)2
      VO2Cl           -23.94  -21.09    2.84  VO2Cl
      VOCl            -32.60  -21.45   11.15  VOCl
      VOCl2           -39.73  -26.97   12.76  VOCl2
      VOSO4           -30.55  -26.94    3.61  VOSO4
      Wurtzite        -60.50  -69.45   -8.95  ZnS
      Zincite          -0.05   11.28   11.33  ZnO
      Zincosite       -15.21  -11.28    3.93  ZnSO4
      Zn(BO2)2         -7.68    0.61    8.29  Zn(BO2)2
      Zn(NO3)2:6H2O   -38.57  -35.25    3.32  Zn(NO3)2:6H2O
      Zn(OH)2          -0.92   11.28   12.20  Zn(OH)2
      Zn(OH)2(am)      -1.19   11.28   12.47  Zn(OH)2
      Zn(OH)2(beta)    -0.47   11.28   11.75  Zn(OH)2
      Zn(OH)2(epsilon)  -0.25   11.28   11.53  Zn(OH)2
      Zn(OH)2(gamma)   -0.45   11.28   11.73  Zn(OH)2
      Zn2(OH)2SO4      -7.50   -0.00    7.50  Zn2(OH)2SO4
      Zn2(OH)3Cl       -3.92   11.27   15.19  Zn2(OH)3Cl
      Zn3(AsO4)2:2.5H2O -11.77    1.88   13.65  Zn3(AsO4)2:2.5H2O
      Zn3(PO4)2:4H2O  -10.41  -45.83  -35.42  Zn3(PO4)2:4H2O
      Zn3O(SO4)2      -30.20  -11.29   18.91  Zn3O(SO4)2
      Zn4(OH)6SO4      -5.84   22.56   28.40  Zn4(OH)6SO4
      Zn5(OH)8Cl2      -4.68   33.82   38.50  Zn5(OH)8Cl2
      ZnCl2           -18.37  -11.32    7.05  ZnCl2
      ZnF2            -15.82  -16.36   -0.53  ZnF2
      Znmetal         -37.46  -11.67   25.79  Zn
      ZnMoO4           -3.87  -13.99  -10.13  ZnMoO4
      ZnO(active)       0.09   11.28   11.19  ZnO
      ZnS(am)         -60.40  -69.45   -9.05  ZnS
      ZnSb            -75.73  -64.72   11.01  ZnSb
      ZnSe            -16.61  -31.01  -14.40  ZnSe
      ZnSeO4:6H2O     -18.84  -20.36   -1.52  ZnSeO4:6H2O
      ZnSO4:1H2O      -10.65  -11.28   -0.64  ZnSO4:1H2O

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End of simulation.
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Reading input data for simulation 6.
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      USE SOLUTION 4
      EQUILIBRIUM_PHASES  5
            Ag2Se    0    0
            Ba3(AsO4)2    0    0
            Barite   0    0
            CaMoO4   0    0
            CdSe     0    0
            Celestite     0    0
            Clausthalite  0    0
            CoFe2O4  0    0
            CoSe     0    0
            Cr(OH)3(am)   0    0
            Cr2O3    0    0
            Cu2Se(alpha)  0    0
            Cumetal  0    0
            Cuprite  0    0
            Cuprousferrite     0    0
            CuSe     0    0
            CuSe2    0    0
            Diaspore 0    0
            FCO3Apatite   0    0
            Halloysite    0    0
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            Hausmannite   0    0
            Hercynite     0    0
            HgSe     0    0
            Hydroxylapatite    0    0
            Kaolinite     0    0
            Magnetite     0    0
            MnHPO4   0    0
            PbMoO4   0    0
            Pyromorphite  0    0
            Sb(OH)3  0    0
            SbO2     0    0
            SiO2(am-ppt)  0    0
            SnO2     0    0
            Tl2Se    0    0
            ZnSe     0    0
      Dolomite(disordered)     0    0
      Dolomite(ordered)   0    0
      Azurite   0    0
      CuMoO4    0    0
      Cupricferrite  0    0
            Rhodochrosite 0    0
      Malachite 0    0
      Pyrolusite     0    0
      SnSO4     0    0
      Tenorite  0    0
      Calcite   0    0
      Fe(OH)2.7Cl.3  0    0
      Fluorite  0    0
      Nsutite   0    0
      Goethite  0    0
      Gypsum    0    0
      Hematite  0    0
      SAVE SOLUTION 5
      END
-----------------------------------------
Beginning of batch-reaction calculations.
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Reaction step 1.

WARNING: Element C is contained in Azurite (which has 0.0 mass),
but is not in solution or other phases.
WARNING: Element C is contained in Calcite (which has 0.0 mass),
but is not in solution or other phases.
WARNING: Element C is contained in Dolomite(disordered) (which has 0.0 mass),
but is not in solution or other phases.
WARNING: Element C is contained in Dolomite(ordered) (which has 0.0 mass),
but is not in solution or other phases.
WARNING: Element C is contained in FCO3Apatite (which has 0.0 mass),
but is not in solution or other phases.
WARNING: Element C is contained in Malachite (which has 0.0 mass),
but is not in solution or other phases.
WARNING: Element C is contained in Rhodochrosite (which has 0.0 mass),
but is not in solution or other phases.
Using solution 4.   Solution after simulation 5.
Using pure phase assemblage 5.

-------------------------------Phase assemblage--------------------------------

                                                        Moles in assemblage
Phase                    SI log IAP  log KT      Initial       Final       Delta

Ag2Se                  0.00  -48.70  -48.70   0.000e+000  6.659e-012  6.659e-012
```

Azurite	Element not present.			0.000e+000	0	0.000e+000
Ba3(AsO4)2	0.00	-8.91	-8.91	0.000e+000	4.176e-010	4.176e-010
Barite	-4.91	-14.89	-9.98	0.000e+000	0	0.000e+000
Calcite	Element not present.			0.000e+000	0	0.000e+000
CaMoO4	-0.77	-8.72	-7.95	0.000e+000	0	0.000e+000
CdSe	-10.52	-30.72	-20.20	0.000e+000	0	0.000e+000
Celestite	-2.94	-9.56	-6.62	0.000e+000	0	0.000e+000
Clausthalite	-4.89	-31.99	-27.10	0.000e+000	0	0.000e+000
CoFe2O4	0.00	-3.53	-3.53	0.000e+000	2.036e-009	2.036e-009
CoSe	-25.81	-42.01	-16.20	0.000e+000	0	0.000e+000
Cr(OH)3(am)	-0.43	-1.18	-0.75	0.000e+000	0	0.000e+000
Cr2O3	-0.00	-2.36	-2.36	0.000e+000	1.927e-010	1.927e-010
Cu2Se(alpha)	-10.51	-56.31	-45.80	0.000e+000	0	0.000e+000
Cumetal	-10.53	-19.28	-8.76	0.000e+000	0	0.000e+000
CuMoO4	-12.04	-25.11	-13.08	0.000e+000	0	0.000e+000
Cupricferrite	-7.23	-1.24	5.99	0.000e+000	0	0.000e+000
Cuprite	-15.01	-16.42	-1.41	0.000e+000	0	0.000e+000
Cuprousferrite	0.00	-8.92	-8.92	0.000e+000	6.206e-009	6.206e-009
CuSe	-6.62	-39.72	-33.10	0.000e+000	0	0.000e+000
CuSe2	-24.10	-57.46	-33.37	0.000e+000	0	0.000e+000
Diaspore	0.00	6.87	6.87	0.000e+000	9.654e-007	9.654e-007
Dolomite(disordered)	Element not present.			0.000e+000	0	0.000e+000
Dolomite(ordered)	Element not present.			0.000e+000	0	0.000e+000
FCO3Apatite	Element not present.			0.000e+000	0	0.000e+000
Fe(OH)2.7Cl.3	-1.06	-4.10	-3.04	0.000e+000	0	0.000e+000
Fluorite	-0.58	-11.08	-10.50	0.000e+000	0	0.000e+000
Goethite	-1.20	-0.71	0.49	0.000e+000	0	0.000e+000
Gypsum	-1.40	-6.01	-4.61	0.000e+000	0	0.000e+000
Halloysite	-7.13	2.44	9.57	0.000e+000	0	0.000e+000
Hausmannite	0.00	61.03	61.03	0.000e+000	2.586e-008	2.586e-008
Hematite	0.00	-1.42	-1.42	0.000e+000	2.990e-008	2.990e-008
Hercynite	-7.90	14.99	22.89	0.000e+000	0	0.000e+000
HgSe	-0.28	-55.98	-55.69	0.000e+000	0	0.000e+000
Hydroxylapatite	0.00	-44.33	-44.33	0.000e+000	2.193e-008	2.193e-008
Kaolinite	-4.99	2.44	7.43	0.000e+000	0	0.000e+000
Magnetite	-3.57	-0.17	3.40	0.000e+000	0	0.000e+000
Malachite	Element not present.			0.000e+000	0	0.000e+000
MnHPO4	-4.04	-29.44	-25.40	0.000e+000	0	0.000e+000
Nsutite	-7.74	9.76	17.50	0.000e+000	0	0.000e+000
PbMoO4	-1.76	-17.38	-15.62	0.000e+000	0	0.000e+000
Pyrolusite	-6.27	35.11	41.38	0.000e+000	0	0.000e+000
Pyromorphite	-14.55	-98.98	-84.43	0.000e+000	0	0.000e+000
Rhodochrosite	Element not present.			0.000e+000	0	0.000e+000
Sb(OH)3	-10.70	-17.81	-7.11	0.000e+000	0	0.000e+000
SbO2	-3.22	-31.05	-27.82	0.000e+000	0	0.000e+000
SiO2(am-ppt)	-2.91	-5.65	-2.74	0.000e+000	0	0.000e+000
SnO2	-2.47	-31.44	-28.97	0.000e+000	0	0.000e+000
SnSO4	-0.00	-56.97	-56.97	0.000e+000	8.583e-011	8.583e-011
Tenorite	-7.47	0.18	7.64	0.000e+000	0	0.000e+000
Tl2Se	-21.39	-39.49	-18.10	0.000e+000	0	0.000e+000
ZnSe	-14.21	-28.61	-14.40	0.000e+000	0	0.000e+000

----------Solution composition----------

Elements	Molality	Moles
Ag	1.110e-012	1.110e-012
Al	5.532e-007	5.532e-007
As	1.349e-006	1.349e-006
B	1.656e-005	1.656e-005
Ba	9.720e-012	9.720e-012
Ca	7.569e-003	7.569e-003
Cd	9.488e-010	9.488e-010

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      Cl                1.788e-002  1.788e-002
      Co                3.715e-021  3.715e-021
      Cr                1.100e-009  1.100e-009
      Cu                3.082e-016  3.082e-016
      F                 5.811e-005  5.811e-005
      Fe                2.368e-013  2.368e-013
      Hg                8.420e-011  8.420e-011
      K                 1.261e-003  1.261e-003
      Mg                5.918e-004  5.918e-004
      Mn                2.220e-006  2.220e-006
      Mo                9.170e-007  9.170e-007
      N                 9.348e-006  9.348e-006
      Na                1.831e-003  1.831e-003
      Ni                2.200e-007  2.200e-007
      P                 1.894e-010  1.894e-010
      Pb                1.497e-009  1.497e-009
      S                 7.128e-004  7.128e-004
      Sb                3.434e-008  3.434e-008
      Se                4.320e-008  4.320e-008
      Si                3.375e-006  3.375e-006
      Sn                6.518e-013  6.518e-013
      Sr                2.134e-006  2.134e-006
      Tl                6.588e-010  6.588e-010
      U                 2.418e-009  2.418e-009
      V                 4.353e-007  4.353e-007
      Zn                5.154e-007  5.154e-007

----------------------------Description of solution----------------------------

                                     pH  =   9.491      Charge balance
                                     pe  =   1.585      Adjusted to redox
equilibrium
                        Activity of water  =   0.999
                           Ionic strength  =  2.731e-002
                      Mass of water (kg)   =  1.000e+000
                  Total alkalinity (eq/kg) =  6.784e-005
                     Total carbon (mol/kg) =  0.000e+000
                      Total CO2 (mol/kg)   =  0.000e+000
                    Temperature (deg C)    =  25.000
                  Electrical balance (eq)  =  2.111e-018
 Percent error, 100*(Cat-|An|)/(Cat+|An|)  =   0.00
                             Iterations   =  52
                                Total H   = 1.110138e+002
                                Total O   = 5.550981e+001

----------------------------Distribution of species----------------------------

                                                   Log       Log         Log
   Species                  Molality    Activity  Molality  Activity     Gamma

   OH-                    3.665e-005  3.114e-005    -4.436    -4.507    -0.071
   H+                     3.780e-010  3.232e-010    -9.423    -9.491    -0.068
   H2O                    5.551e+001  9.995e-001     1.744    -0.000     0.000
Ag                1.110e-012
   AgCl2-                 6.457e-013  5.320e-013   -12.190   -12.274    -0.084
   AgCl                   3.996e-013  3.996e-013   -12.398   -12.398     0.000
   Ag2Se                  1.626e-014  1.626e-014   -13.789   -13.789     0.000
   AgCl3-2                1.573e-014  7.247e-015   -13.803   -14.140    -0.337
   Ag+                    1.497e-014  1.280e-014   -13.825   -13.893    -0.068
   AgCl4-3                1.294e-015  2.262e-016   -14.888   -15.646    -0.758
   AgNH3+                 1.760e-016  1.450e-016   -15.754   -15.839    -0.084
   AgSO4-                 7.771e-017  6.402e-017   -16.110   -16.194    -0.084
   AgOH                   3.987e-017  3.987e-017   -16.399   -16.399     0.000
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   Ag(NH3)2+            7.939e-018  6.540e-018   -17.100   -17.184    -0.084
   AgH2BO3              1.662e-018  1.662e-018   -17.779   -17.779     0.000
   AgF                  1.482e-018  1.482e-018   -17.829   -17.829     0.000
   AgSeO3-              1.901e-019  1.566e-019   -18.721   -18.805    -0.084
   Ag(OH)2-             1.473e-019  1.213e-019   -18.832   -18.916    -0.084
   AgNO2                7.133e-023  7.133e-023   -22.147   -22.147     0.000
   Ag(SeO3)2-3          1.527e-025  2.668e-026   -24.816   -25.574    -0.758
   AgNO3                1.034e-031  1.034e-031   -30.985   -30.985     0.000
   Ag(NO2)2-            3.576e-033  2.946e-033   -32.447   -32.531    -0.084
   Ag2MoO4              3.039e-035  3.039e-035   -34.517   -34.517     0.000
   AgOH(Se)2-4          0.000e+000  0.000e+000   -65.394   -66.740    -1.347
   AgHS                 0.000e+000  0.000e+000   -68.115   -68.115     0.000
   Ag(S4)2-3            0.000e+000  0.000e+000  -129.649  -129.994    -0.345
   Ag(HS)S4-2           0.000e+000  0.000e+000  -129.859  -130.045    -0.186
   AgS4S5-3             0.000e+000  0.000e+000  -129.976  -130.305    -0.329
   Ag(HS)2-             0.000e+000  0.000e+000  -131.968  -132.052    -0.084
Al              5.532e-007
   Al(OH)4-             5.531e-007  4.733e-007    -6.257    -6.325    -0.068
   Al(OH)3              1.207e-010  1.207e-010    -9.918    -9.918     0.000
   Al(OH)2+             2.257e-013  1.943e-013   -12.646   -12.712    -0.065
   AlOH+2               1.430e-017  7.854e-018   -16.845   -17.105    -0.260
   AlF2+                2.479e-018  2.134e-018   -17.606   -17.671    -0.065
   AlF3                 1.238e-018  1.238e-018   -17.907   -17.907     0.000
   AlF+2                2.117e-019  1.163e-019   -18.674   -18.935    -0.260
   AlF4-                3.343e-020  2.861e-020   -19.476   -19.544    -0.068
   Al+3                 1.033e-021  2.522e-022   -20.986   -21.598    -0.613
   AlSO4+               5.733e-022  4.906e-022   -21.242   -21.309    -0.068
   Al(SO4)2-            1.540e-024  1.318e-024   -23.813   -23.880    -0.068
   AlMo6O21-3           0.000e+000  0.000e+000   -60.650   -61.408    -0.758
As(3)           1.640e-019
   H2AsO3-              1.076e-019  8.862e-020   -18.968   -19.052    -0.084
   H3AsO3               5.585e-020  5.585e-020   -19.253   -19.253     0.000
   HAsO3-2              5.430e-022  2.501e-022   -21.265   -21.602    -0.337
   AsO3-3               1.707e-025  2.983e-026   -24.768   -25.525    -0.758
   H4AsO3+              1.085e-029  8.942e-030   -28.964   -29.049    -0.084
As(5)           1.349e-006
   HAsO4-2              1.313e-006  6.046e-007    -5.882    -6.219    -0.337
   AsO4-3               3.385e-008  5.916e-009    -7.470    -8.228    -0.758
   H2AsO4-              2.163e-009  1.782e-009    -8.665    -8.749    -0.084
   H3AsO4               9.945e-017  1.001e-016   -16.002   -16.000     0.003
B               1.656e-005
   H2BO3-               9.714e-006  8.190e-006    -5.013    -5.087    -0.074
   H3BO3                4.529e-006  4.558e-006    -5.344    -5.341     0.003
   CaH2BO3+             2.191e-006  1.847e-006    -5.659    -5.733    -0.074
   MgH2BO3+             1.029e-007  8.672e-008    -6.988    -7.062    -0.074
   NaH2BO3              2.029e-008  2.029e-008    -7.693    -7.693     0.000
   SrH2BO3+             3.826e-010  3.226e-010    -9.417    -9.491    -0.074
   BF(OH)3-             9.943e-011  8.383e-011   -10.002   -10.077    -0.074
   H5(BO3)2-            3.768e-011  3.177e-011   -10.424   -10.498    -0.074
   H8(BO3)3-            1.717e-014  1.448e-014   -13.765   -13.839    -0.074
   BaH2BO3+             1.559e-015  1.314e-015   -14.807   -14.881    -0.074
   BF2(OH)2-            1.584e-016  1.336e-016   -15.800   -15.874    -0.074
   AgH2BO3              1.662e-018  1.662e-018   -17.779   -17.779     0.000
   BF3OH-               9.187e-025  7.746e-025   -24.037   -24.111    -0.074
   BF4-                 6.738e-032  5.681e-032   -31.171   -31.246    -0.074
Ba              9.720e-012
   Ba+2                 9.718e-012  5.192e-012   -11.012   -11.285    -0.272
   BaH2BO3+             1.559e-015  1.314e-015   -14.807   -14.881    -0.074
   BaOH+                8.220e-016  7.058e-016   -15.085   -15.151    -0.066
   BaNH3+2              3.946e-017  1.818e-017   -16.404   -16.741    -0.337
   BaNO3+               3.212e-028  2.646e-028   -27.493   -27.577    -0.084
Ca              7.569e-003
   Ca+2                 7.337e-003  3.920e-003    -2.134    -2.407    -0.272
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CaSO4	2.250e-004	2.250e-004	-3.648	-3.648	0.000
CaOH+	2.819e-006	2.436e-006	-5.550	-5.613	-0.064
CaF+	2.297e-006	1.972e-006	-5.639	-5.705	-0.066
CaH2BO3+	2.191e-006	1.847e-006	-5.659	-5.733	-0.074
CaNH3+2	5.944e-008	2.738e-008	-7.226	-7.563	-0.337
CaPO4-	1.543e-010	1.329e-010	-9.812	-9.877	-0.065
CaHPO4	1.614e-011	1.614e-011	-10.792	-10.792	0.000
Ca(NH3)2+2	1.313e-013	6.048e-014	-12.882	-13.218	-0.337
CaH2PO4+	4.681e-015	4.029e-015	-14.330	-14.395	-0.065
CaNO3+	1.530e-019	1.261e-019	-18.815	-18.899	-0.084
Cd	9.488e-010				
Cd+2	2.954e-010	1.578e-010	-9.530	-9.802	-0.272
CdOHCl	2.943e-010	2.943e-010	-9.531	-9.531	0.000
CdCl+	2.797e-010	2.304e-010	-9.553	-9.638	-0.084
CdOH+	4.739e-011	3.904e-011	-10.324	-10.408	-0.084
CdCl2	1.468e-011	1.468e-011	-10.833	-10.833	0.000
CdSO4	9.272e-012	9.272e-012	-11.033	-11.033	0.000
Cd(OH)2	7.671e-012	7.671e-012	-11.115	-11.115	0.000
CdCl3-	1.719e-013	1.416e-013	-12.765	-12.849	-0.084
CdF+	1.400e-013	1.153e-013	-12.854	-12.938	-0.084
Cd(SO4)2-2	6.806e-014	3.135e-014	-13.167	-13.504	-0.337
Cd(OH)3-	1.772e-014	1.459e-014	-13.752	-13.836	-0.084
CdF2	1.061e-017	1.061e-017	-16.974	-16.974	0.000
Cd2OH+3	1.767e-019	3.088e-020	-18.753	-19.510	-0.758
Cd(OH)4-2	1.615e-019	7.440e-020	-18.792	-19.128	-0.337
Cd(SeO3)2-2	1.023e-019	4.711e-020	-18.990	-19.327	-0.337
CdSeO4	9.794e-022	9.794e-022	-21.009	-21.009	0.000
CdNO3+	6.161e-027	5.075e-027	-26.210	-26.295	-0.084
Cd(NO3)2	0.000e+000	0.000e+000	-43.587	-43.587	0.000
CdHS+	0.000e+000	0.000e+000	-69.747	-69.831	-0.084
Cd(HS)2	0.000e+000	0.000e+000	-130.664	-130.664	0.000
Cd(HS)3-	0.000e+000	0.000e+000	-196.716	-196.801	-0.084
Cd(HS)4-2	0.000e+000	0.000e+000	-262.305	-262.641	-0.337
Cl	1.788e-002				
Cl-	1.788e-002	1.529e-002	-1.748	-1.816	-0.068
ZnOHCl	3.151e-008	3.151e-008	-7.502	-7.502	0.000
MnCl+	2.134e-008	1.832e-008	-7.671	-7.737	-0.066
NiCl+	3.020e-009	2.488e-009	-8.520	-8.604	-0.084
ZnCl+	9.062e-010	7.728e-010	-9.043	-9.112	-0.069
MnCl2	3.956e-010	3.956e-010	-9.403	-9.403	0.000
CdOHCl	2.943e-010	2.943e-010	-9.531	-9.531	0.000
CdCl+	2.797e-010	2.304e-010	-9.553	-9.638	-0.084
TlCl	2.563e-011	2.563e-011	-10.591	-10.591	0.000
ZnCl2	1.872e-011	1.872e-011	-10.728	-10.728	0.000
CdCl2	1.468e-011	1.468e-011	-10.833	-10.833	0.000
PbCl+	5.550e-012	4.572e-012	-11.256	-11.340	-0.084
MnCl3-	1.940e-012	1.665e-012	-11.712	-11.778	-0.066
AgCl2-	6.457e-013	5.320e-013	-12.190	-12.274	-0.084
AgCl	3.996e-013	3.996e-013	-12.398	-12.398	0.000
PbCl2	3.122e-013	3.122e-013	-12.506	-12.506	0.000
TlCl2-	2.801e-013	2.307e-013	-12.553	-12.637	-0.084
ZnCl3-	2.666e-013	2.273e-013	-12.574	-12.643	-0.069
NiCl2	1.915e-013	1.915e-013	-12.718	-12.718	0.000
CdCl3-	1.719e-013	1.416e-013	-12.765	-12.849	-0.084
AgCl3-2	1.573e-014	7.247e-015	-13.803	-14.140	-0.337
ZnCl4-2	3.198e-015	1.738e-015	-14.495	-14.760	-0.265
PbCl3-	2.306e-015	1.900e-015	-14.637	-14.721	-0.084
AgCl4-3	1.294e-015	2.262e-016	-14.888	-15.646	-0.758
UO2Cl+	6.172e-016	5.084e-016	-15.210	-15.294	-0.084
CuCl2-	1.443e-016	1.230e-016	-15.841	-15.910	-0.069
CuCl	3.852e-017	3.852e-017	-16.414	-16.414	0.000
PbCl4-2	2.882e-017	1.327e-017	-16.540	-16.877	-0.337
HgClOH	1.135e-017	1.135e-017	-16.945	-16.945	0.000

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   CuCl3-2                7.399e-019  4.021e-019   -18.131   -18.396    -0.265
   HgCl2                  3.156e-019  3.156e-019   -18.501   -18.501     0.000
   HgCl3-                 5.856e-020  4.824e-020   -19.232   -19.317    -0.084
   HgCl4-2                6.374e-021  2.936e-021   -20.196   -20.532    -0.337
   CuCl+                  4.468e-021  3.810e-021   -20.350   -20.419    -0.069
   CrOHCl2                1.484e-021  1.484e-021   -20.829   -20.829     0.000
   CrCl+2                 3.561e-022  1.640e-022   -21.448   -21.785    -0.337
   CoCl+                  5.205e-023  4.288e-023   -22.284   -22.368    -0.084
   CuCl2                  2.020e-023  2.020e-023   -22.695   -22.695     0.000
   HgCl+                  5.000e-024  4.119e-024   -23.301   -23.385    -0.084
   VOCl+                  5.676e-025  4.676e-025   -24.246   -24.330    -0.084
   CrCl2+                 2.888e-025  2.379e-025   -24.539   -24.624    -0.084
   CuCl3-                 3.378e-027  2.881e-027   -26.471   -26.540    -0.069
   FeCl+2                 5.608e-030  3.047e-030   -29.251   -29.516    -0.265
   CrO3Cl-                1.775e-030  1.463e-030   -29.751   -29.835    -0.084
   CuCl4-2                4.062e-031  2.207e-031   -30.391   -30.656    -0.265
   FeCl2+                 2.423e-031  2.081e-031   -30.616   -30.682    -0.066
   TlOHCl+                5.281e-034  4.351e-034   -33.277   -33.361    -0.084
   FeCl3                  3.181e-034  3.181e-034   -33.497   -33.497     0.000
   TlCl4-                 5.589e-038  4.604e-038   -37.253   -37.337    -0.084
   TlCl3                  4.773e-038  4.773e-038   -37.321   -37.321     0.000
   TlCl2+                 3.620e-039  2.982e-039   -38.441   -38.525    -0.084
   Cr(NH3)6Cl+2           1.015e-039  4.676e-040   -38.993   -39.330    -0.337
   TlCl+2                 0.000e+000  0.000e+000   -42.133   -42.470    -0.337
   UCl+3                  0.000e+000  0.000e+000   -44.962   -45.720    -0.758
   SnCl+                  0.000e+000  0.000e+000   -46.371   -46.455    -0.084
   SnCl2                  0.000e+000  0.000e+000   -47.481   -47.481     0.000
   SnCl3-                 0.000e+000  0.000e+000   -50.386   -50.470    -0.084
   CoCl+2                 0.000e+000  0.000e+000   -51.076   -51.413    -0.337
   Co(NH3)5Cl+2           0.000e+000  0.000e+000   -51.402   -51.739    -0.337
   Co(NH3)6Cl+2           0.000e+000  0.000e+000   -63.374   -63.710    -0.337
Co(2)            3.715e-021
   Co+2                   1.761e-021  8.109e-022   -20.754   -21.091    -0.337
   Co(OH)2                1.246e-021  1.246e-021   -20.904   -20.904     0.000
   CoOH+                  6.117e-022  5.039e-022   -21.213   -21.298    -0.084
   CoCl+                  5.205e-023  4.288e-023   -22.284   -22.368    -0.084
   CoSO4                  4.055e-023  4.055e-023   -22.392   -22.392     0.000
   CoF+                   1.435e-024  1.182e-024   -23.843   -23.927    -0.084
   Co(NH3)+2              1.174e-024  5.409e-025   -23.930   -24.267    -0.337
   Co(OH)3-               9.402e-025  7.745e-025   -24.027   -24.111    -0.084
   CoOOH-                 2.360e-025  1.944e-025   -24.627   -24.711    -0.084
   Co(NH3)2+2             2.780e-028  1.280e-028   -27.556   -27.893    -0.337
   Co(OH)4-2              8.300e-030  3.823e-030   -29.081   -29.418    -0.337
   CoHPO4                 7.968e-030  7.968e-030   -29.099   -29.099     0.000
   CoNO2+                 1.850e-031  1.524e-031   -30.733   -30.817    -0.084
   Co(NH3)3+2             1.942e-032  8.943e-033   -31.712   -32.049    -0.337
   CoSeO4                 1.355e-032  1.355e-032   -31.868   -31.868     0.000
   Co(NH3)4+2             5.654e-037  2.604e-037   -36.248   -36.584    -0.337
   CoNO3+                 1.587e-038  1.307e-038   -37.800   -37.884    -0.084
   Co(NH3)5+2             0.000e+000  0.000e+000   -41.284   -41.620    -0.337
   Co2OH+3                0.000e+000  0.000e+000   -42.931   -43.689    -0.758
   Co(NO3)2               0.000e+000  0.000e+000   -54.568   -54.568     0.000
   Co4(OH)4+4             0.000e+000  0.000e+000   -75.544   -76.891    -1.347
Co(3)            0.000e+000
   CoOH+2                 0.000e+000  0.000e+000   -43.370   -43.706    -0.337
   CoCl+2                 0.000e+000  0.000e+000   -51.076   -51.413    -0.337
   Co+3                   0.000e+000  0.000e+000   -51.293   -51.906    -0.613
   Co(NH3)5Cl+2           0.000e+000  0.000e+000   -51.402   -51.739    -0.337
   Co(NH3)6SO4+           0.000e+000  0.000e+000   -60.486   -60.570    -0.084
   Co(NH3)6OH+2           0.000e+000  0.000e+000   -61.865   -62.201    -0.337
   Co(NH3)6Cl+2           0.000e+000  0.000e+000   -63.374   -63.710    -0.337
Cr(2)            1.118e-028
   Cr+2                   1.118e-028  5.148e-029   -27.952   -28.288    -0.337
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Cr(3)	1.100e-009					
CrO2-		4.469e-010	3.682e-010	-9.350	-9.434	-0.084
Cr(OH)4-		3.769e-010	3.105e-010	-9.424	-9.508	-0.084
Cr(OH)3		2.504e-010	2.504e-010	-9.601	-9.601	0.000
Cr(OH)2+		2.598e-011	2.141e-011	-10.585	-10.669	-0.084
Cr(OH)+2		1.227e-014	5.649e-015	-13.911	-14.248	-0.337
CrOHSO4		3.360e-016	3.360e-016	-15.474	-15.474	0.000
CrF+2		1.315e-019	6.058e-020	-18.881	-19.218	-0.337
Cr+3		4.745e-020	8.292e-021	-19.324	-20.081	-0.758
CrSO4+		5.890e-021	4.852e-021	-20.230	-20.314	-0.084
CrOHCl2		1.484e-021	1.484e-021	-20.829	-20.829	0.000
CrCl+2		3.561e-022	1.640e-022	-21.448	-21.785	-0.337
CrCl2+		2.888e-025	2.379e-025	-24.539	-24.624	-0.084
Cr2(OH)2SO4+2		3.725e-028	1.715e-028	-27.429	-27.766	-0.337
Cr2(OH)2(SO4)2		2.554e-030	2.554e-030	-29.593	-29.593	0.000
Cr(NH3)5OH+2		6.947e-031	3.199e-031	-30.158	-30.495	-0.337
CrH2PO4+2		4.812e-031	2.216e-031	-30.318	-30.654	-0.337
Cr(NH3)6+3		1.384e-038	2.419e-039	-37.859	-38.616	-0.758
CrNO3+2		8.003e-039	3.686e-039	-38.097	-38.433	-0.337
Cr(NH3)6Cl+2		1.015e-039	4.676e-040	-38.993	-39.330	-0.337
Cr(6)	8.491e-017					
CrO4-2		8.421e-017	4.499e-017	-16.075	-16.347	-0.272
NaCrO4-		4.242e-019	3.494e-019	-18.372	-18.457	-0.084
KCrO4-		2.184e-019	1.799e-019	-18.661	-18.745	-0.084
HCrO4-		5.711e-020	4.705e-020	-19.243	-19.327	-0.084
H2CrO4		1.233e-029	1.233e-029	-28.909	-28.909	0.000
CrO3SO4-2		2.521e-030	1.161e-030	-29.598	-29.935	-0.337
CrO3Cl-		1.775e-030	1.463e-030	-29.751	-29.835	-0.084
CrO3HPO4-2		1.858e-032	8.558e-033	-31.731	-32.068	-0.337
Cr2O7-2		1.667e-037	7.680e-038	-36.778	-37.115	-0.337
CrO3H2PO4-		1.617e-039	1.332e-039	-38.791	-38.875	-0.084
Cu(1)	1.860e-016					
CuCl2-		1.443e-016	1.230e-016	-15.841	-15.910	-0.069
CuCl		3.852e-017	3.852e-017	-16.414	-16.414	0.000
Cu+		2.430e-018	2.002e-018	-17.614	-17.699	-0.084
CuCl3-2		7.399e-019	4.021e-019	-18.131	-18.396	-0.265
Cu(S4)2-3		0.000e+000	0.000e+000	-131.064	-131.401	-0.337
CuS4S5-3		0.000e+000	0.000e+000	-131.810	-132.131	-0.321
Cu(2)	1.222e-016					
Cu(OH)2		9.624e-017	9.624e-017	-16.017	-16.017	0.000
CuOH+		1.816e-017	1.549e-017	-16.741	-16.810	-0.069
Cu(OH)3-		7.462e-018	6.147e-018	-17.127	-17.211	-0.084
Cu+2		2.944e-019	1.573e-019	-18.531	-18.803	-0.272
CuNH3+2		1.939e-020	8.929e-021	-19.712	-20.049	-0.337
CuSO4		9.030e-021	9.030e-021	-20.044	-20.044	0.000
CuCl+		4.468e-021	3.810e-021	-20.350	-20.419	-0.069
Cu(OH)4-2		3.271e-021	1.507e-021	-20.485	-20.822	-0.337
CuF+		5.553e-022	4.574e-022	-21.255	-21.340	-0.084
CuCl2		2.020e-023	2.020e-023	-22.695	-22.695	0.000
CuCl3-		3.378e-027	2.881e-027	-26.471	-26.540	-0.069
CuNO2+		5.331e-028	4.392e-028	-27.273	-27.357	-0.084
Cu2(OH)2+2		1.308e-029	6.026e-030	-28.883	-29.220	-0.337
CuCl4-2		4.062e-031	2.207e-031	-30.391	-30.656	-0.265
CuNO3+		6.140e-036	5.058e-036	-35.212	-35.296	-0.084
Cu(NO2)2		1.198e-037	1.198e-037	-36.921	-36.921	0.000
Cu(NO3)2		0.000e+000	0.000e+000	-53.189	-53.189	0.000
Cu(HS)3-		0.000e+000	0.000e+000	-196.931	-197.015	-0.084
F	5.811e-005					
F-		5.392e-005	4.610e-005	-4.268	-4.336	-0.068
CaF+		2.297e-006	1.972e-006	-5.639	-5.705	-0.066
MgF+		1.846e-006	1.579e-006	-5.734	-5.802	-0.068
NaF		4.546e-008	4.546e-008	-7.342	-7.342	0.000
MnF+		2.035e-009	1.747e-009	-8.691	-8.758	-0.066

SrF+	2.194e-010	1.807e-010	-9.659	-9.743	-0.084
BF(OH)3-	9.943e-011	8.383e-011	-10.002	-10.077	-0.074
NiF+	8.940e-011	7.365e-011	-10.049	-10.133	-0.084
ZnF+	2.247e-011	1.851e-011	-10.648	-10.733	-0.084
HF	2.203e-011	2.203e-011	-10.657	-10.657	0.000
UO2F+	1.584e-013	1.305e-013	-12.800	-12.884	-0.084
CdF+	1.400e-013	1.153e-013	-12.854	-12.938	-0.084
PbF+	3.324e-014	2.738e-014	-13.478	-13.563	-0.084
TlF	3.007e-014	3.007e-014	-13.522	-13.522	0.000
UO2F2	1.735e-014	1.735e-014	-13.761	-13.761	0.000
HF2-	4.545e-015	3.862e-015	-14.342	-14.413	-0.071
UO2F3-	2.439e-016	2.009e-016	-15.613	-15.697	-0.084
BF2(OH)2-	1.584e-016	1.336e-016	-15.800	-15.874	-0.074
PbF2	2.484e-017	2.484e-017	-16.605	-16.605	0.000
CdF2	1.061e-017	1.061e-017	-16.974	-16.974	0.000
AlF2+	2.479e-018	2.134e-018	-17.606	-17.671	-0.065
AgF	1.482e-018	1.482e-018	-17.829	-17.829	0.000
AlF3	1.238e-018	1.238e-018	-17.907	-17.907	0.000
AlF+2	2.117e-019	1.163e-019	-18.674	-18.935	-0.260
UO2F4-2	1.597e-019	7.356e-020	-18.797	-19.133	-0.337
CrF+2	1.315e-019	6.058e-020	-18.881	-19.218	-0.337
AlF4-	3.343e-020	2.861e-020	-19.476	-19.544	-0.068
VO2F	4.058e-021	4.058e-021	-20.392	-20.392	0.000
PbF3-	2.636e-021	2.172e-021	-20.579	-20.663	-0.084
H2F2	1.301e-021	1.301e-021	-20.886	-20.886	0.000
CuF+	5.553e-022	4.574e-022	-21.255	-21.340	-0.084
VO2F2-	8.245e-023	6.792e-023	-22.084	-22.168	-0.084
VOF+	3.659e-024	3.015e-024	-23.437	-23.521	-0.084
CoF+	1.435e-024	1.182e-024	-23.843	-23.927	-0.084
BF3OH-	9.187e-025	7.746e-025	-24.037	-24.111	-0.074
PbF4-2	1.040e-025	4.792e-026	-24.983	-25.319	-0.337
VO2F3-2	8.480e-026	3.906e-026	-25.072	-25.408	-0.337
VOF2	5.211e-026	5.211e-026	-25.283	-25.283	0.000
Sb(OH)2F	3.582e-026	3.582e-026	-25.446	-25.446	0.000
SbOF	3.524e-026	3.524e-026	-25.453	-25.453	0.000
FeF+2	6.140e-028	3.337e-028	-27.212	-27.477	-0.265
FeF2+	4.794e-028	4.116e-028	-27.319	-27.386	-0.066
VOF3-	1.035e-028	8.523e-029	-27.985	-28.069	-0.084
FeF3	2.677e-029	2.677e-029	-28.572	-28.572	0.000
VO2F4-3	5.069e-030	8.859e-031	-29.295	-30.053	-0.758
BF4-	6.738e-032	5.681e-032	-31.171	-31.246	-0.074
VOF4-2	3.443e-032	1.586e-032	-31.463	-31.800	-0.337
HgF+	2.801e-032	2.308e-032	-31.553	-31.637	-0.084
UF3+	1.177e-037	9.699e-038	-36.929	-37.013	-0.084
UF2+2	2.882e-038	1.327e-038	-37.540	-37.877	-0.337
SiF6-2	6.493e-040	3.529e-040	-39.188	-39.452	-0.265
UF4	4.902e-040	4.902e-040	-39.310	-39.310	0.000
UF+3	1.309e-040	0.000e+000	-39.883	-40.641	-0.758
UF5-	0.000e+000	0.000e+000	-41.964	-42.048	-0.084
UF6-2	0.000e+000	0.000e+000	-43.568	-43.904	-0.337
SnF+	0.000e+000	0.000e+000	-46.044	-46.128	-0.084
SnF2	0.000e+000	0.000e+000	-47.660	-47.660	0.000
SnF3-	0.000e+000	0.000e+000	-49.093	-49.177	-0.084
SnF6-2	0.000e+000	0.000e+000	-61.500	-61.837	-0.337
Fe(2)	7.496e-018				
Fe+2	4.010e-018	1.847e-018	-17.397	-17.734	-0.337
FeOH+	2.667e-018	2.290e-018	-17.574	-17.640	-0.066
Fe(OH)3-	6.496e-019	5.578e-019	-18.187	-18.254	-0.066
FeSO4	1.136e-019	1.136e-019	-18.945	-18.945	0.000
Fe(OH)2	5.664e-020	5.664e-020	-19.247	-19.247	0.000
FeHPO4	6.622e-026	6.622e-026	-25.179	-25.179	0.000
FeH2PO4+	4.938e-029	4.250e-029	-28.306	-28.372	-0.065
Fe(HS)2	0.000e+000	0.000e+000	-144.857	-144.857	0.000

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   Fe(HS)3-              0.000e+000  0.000e+000  -210.773  -210.857    -0.084
Fe(3)            2.368e-013
   Fe(OH)4-              1.812e-013  1.560e-013   -12.742   -12.807    -0.065
   Fe(OH)3               5.379e-014  5.379e-014   -13.269   -13.269     0.000
   Fe(OH)2+              1.868e-015  1.608e-015   -14.729   -14.794    -0.065
   FeOH+2                2.442e-022  1.327e-022   -21.612   -21.877    -0.265
   FeF+2                 6.140e-028  3.337e-028   -27.212   -27.477    -0.265
   FeF2+                 4.794e-028  4.116e-028   -27.319   -27.386    -0.066
   Fe+3                  2.705e-029  6.601e-030   -28.568   -29.180    -0.613
   FeF3                  2.677e-029  2.677e-029   -28.572   -28.572     0.000
   FeSO4+                2.162e-029  1.856e-029   -28.665   -28.731    -0.066
   FeCl+2                5.608e-030  3.047e-030   -29.251   -29.516    -0.265
   FeHPO4+               5.705e-031  4.911e-031   -30.244   -30.309    -0.065
   FeCl2+                2.423e-031  2.081e-031   -30.616   -30.682    -0.066
   Fe(SO4)2-             1.207e-031  9.947e-032   -30.918   -31.002    -0.084
   FeCl3                 3.181e-034  3.181e-034   -33.497   -33.497     0.000
   FeHSeO3+2             5.851e-035  2.695e-035   -34.233   -34.569    -0.337
   FeH2PO4+2             1.048e-038  5.756e-039   -37.979   -38.240    -0.260
   Fe2(OH)2+4            0.000e+000  0.000e+000   -40.887   -42.234    -1.347
   FeNO3+2               0.000e+000  0.000e+000   -44.836   -45.173    -0.337
   Fe3(OH)4+5            0.000e+000  0.000e+000   -53.763   -55.868    -2.104
H(0)             9.925e-026
   H2                    4.963e-026  4.994e-026   -25.304   -25.302     0.003
Hg(0)            8.420e-011
   Hg                    8.420e-011  8.420e-011   -10.075   -10.075     0.000
Hg(1)            3.352e-030
   Hg2+2                 1.676e-030  7.720e-031   -29.776   -30.112    -0.337
Hg(2)            9.386e-017
   Hg(OH)2               8.213e-017  8.265e-017   -16.086   -16.083     0.003
   HgClOH                1.135e-017  1.135e-017   -16.945   -16.945     0.000
   HgCl2                 3.156e-019  3.156e-019   -18.501   -18.501     0.000
   HgCl3-                5.856e-020  4.824e-020   -19.232   -19.317    -0.084
   HgCl4-2               6.374e-021  2.936e-021   -20.196   -20.532    -0.337
   Hg(NH3)2+2            5.696e-022  2.623e-022   -21.244   -21.581    -0.337
   Hg(OH)3-              3.933e-022  3.240e-022   -21.405   -21.489    -0.084
   HgOH+                 2.033e-023  1.674e-023   -22.692   -22.776    -0.084
   HgCl+                 5.000e-024  4.119e-024   -23.301   -23.385    -0.084
   HgNH3+2               1.027e-025  4.728e-026   -24.989   -25.325    -0.337
   Hg(NH3)3+2            1.258e-026  5.794e-027   -25.900   -26.237    -0.337
   Hg+2                  2.932e-029  1.351e-029   -28.533   -28.869    -0.337
   HgSO4                 8.862e-031  8.862e-031   -30.052   -30.052     0.000
   Hg(NH3)4+2            5.544e-031  2.554e-031   -30.256   -30.593    -0.337
   HgF+                  2.801e-032  2.308e-032   -31.553   -31.637    -0.084
   HgNO3+                0.000e+000  0.000e+000   -46.211   -46.295    -0.084
   Hg(NO3)2              0.000e+000  0.000e+000   -63.669   -63.669     0.000
   HgS2-2                0.000e+000  0.000e+000  -122.405  -122.742    -0.337
   HgHS2-                0.000e+000  0.000e+000  -123.441  -123.525    -0.084
   Hg(HS)2               0.000e+000  0.000e+000  -126.621  -126.621     0.000
K                1.261e-003
   K+                    1.259e-003  1.076e-003    -2.900    -2.968    -0.068
   KSO4-                 2.219e-006  1.910e-006    -5.654    -5.719    -0.065
   KHPO4-                8.544e-014  7.355e-014   -13.068   -13.133    -0.065
   KCrO4-                2.184e-019  1.799e-019   -18.661   -18.745    -0.084
Mg               5.918e-004
   Mg+2                  5.716e-004  3.054e-004    -3.243    -3.515    -0.272
   MgSO4                 1.393e-005  1.393e-005    -4.856    -4.856     0.000
   MgOH+                 4.369e-006  3.786e-006    -5.360    -5.422    -0.062
   MgF+                  1.846e-006  1.579e-006    -5.734    -5.802    -0.068
   MgH2BO3+              1.029e-007  8.672e-008    -6.988    -7.062    -0.074
   MgHPO4                1.735e-012  1.735e-012   -11.761   -11.761     0.000
   MgPO4-                1.879e-013  1.618e-013   -12.726   -12.791    -0.065
   MgH2PO4+              7.852e-016  6.759e-016   -15.105   -15.170    -0.065
Mn(2)            2.220e-006
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Mn+2	2.067e-006	9.520e-007	-5.685	-6.021	-0.337
MnOH+	8.674e-008	7.447e-008	-7.062	-7.128	-0.066
MnSO4	4.243e-008	4.243e-008	-7.372	-7.372	0.000
MnCl+	2.134e-008	1.832e-008	-7.671	-7.737	-0.066
MnF+	2.035e-009	1.747e-009	-8.691	-8.758	-0.066
MnCl2	3.956e-010	3.956e-010	-9.403	-9.403	0.000
MnCl3-	1.940e-012	1.665e-012	-11.712	-11.778	-0.066
Mn(OH)3-	5.199e-013	4.464e-013	-12.284	-12.350	-0.066
Mn(OH)4-2	8.258e-017	4.488e-017	-16.083	-16.348	-0.265
MnSeO4	8.540e-018	8.540e-018	-17.069	-17.069	0.000
MnNO3+	1.863e-023	1.534e-023	-22.730	-22.814	-0.084
MnSe	4.776e-033	4.776e-033	-32.321	-32.321	0.000
Mn(NO3)2	3.920e-040	3.920e-040	-39.407	-39.407	0.000
Mn(3)	6.705e-030				
Mn+3	6.705e-030	1.636e-030	-29.174	-29.786	-0.613
Mn(6)	0.000e+000				
MnO4-2	0.000e+000	0.000e+000	-41.914	-42.179	-0.265
Mn(7)	0.000e+000				
MnO4-	0.000e+000	0.000e+000	-49.893	-49.966	-0.072
Mo	9.170e-007				
MoO4-2	9.170e-007	4.899e-007	-6.038	-6.310	-0.272
HMoO4-	3.824e-012	3.150e-012	-11.417	-11.502	-0.084
H2MoO4	7.457e-018	7.457e-018	-17.127	-17.127	0.000
Ag2MoO4	3.039e-035	3.039e-035	-34.517	-34.517	0.000
AlMo6O21-3	0.000e+000	0.000e+000	-60.650	-61.408	-0.758
Mo7O24-6	0.000e+000	0.000e+000	-64.073	-67.103	-3.030
HMo7O24-5	0.000e+000	0.000e+000	-68.102	-70.207	-2.104
H2Mo7O24-4	0.000e+000	0.000e+000	-73.568	-74.915	-1.347
H3Mo7O24-3	0.000e+000	0.000e+000	-80.402	-81.160	-0.758
N(-3)	9.348e-006				
NH3	5.548e-006	5.548e-006	-5.256	-5.256	0.000
NH4+	3.730e-006	3.145e-006	-5.428	-5.502	-0.074
CaNH3+2	5.944e-008	2.738e-008	-7.226	-7.563	-0.337
NH4SO4-	9.836e-009	8.445e-009	-8.007	-8.073	-0.066
NiNH3+2	4.115e-010	1.895e-010	-9.386	-9.722	-0.337
SrNH3+2	1.062e-011	4.892e-012	-10.974	-11.310	-0.337
Ni(NH3)2+2	3.300e-013	1.520e-013	-12.481	-12.818	-0.337
Ca(NH3)2+2	1.313e-013	6.048e-014	-12.882	-13.218	-0.337
AgNH3+	1.760e-016	1.450e-016	-15.754	-15.839	-0.084
BaNH3+2	3.946e-017	1.818e-017	-16.404	-16.741	-0.337
Ag(NH3)2+	7.939e-018	6.540e-018	-17.100	-17.184	-0.084
CuNH3+2	1.939e-020	8.929e-021	-19.712	-20.049	-0.337
Hg(NH3)2+2	5.696e-022	2.623e-022	-21.244	-21.581	-0.337
Co(NH3)+2	1.174e-024	5.409e-025	-23.930	-24.267	-0.337
HgNH3+2	1.027e-025	4.728e-026	-24.989	-25.325	-0.337
Hg(NH3)3+2	1.258e-026	5.794e-027	-25.900	-26.237	-0.337
Co(NH3)2+2	2.780e-028	1.280e-028	-27.556	-27.893	-0.337
Cr(NH3)5OH+2	6.947e-031	3.199e-031	-30.158	-30.495	-0.337
Hg(NH3)4+2	5.544e-031	2.554e-031	-30.256	-30.593	-0.337
Co(NH3)3+2	1.942e-032	8.943e-033	-31.712	-32.049	-0.337
Co(NH3)4+2	5.654e-037	2.604e-037	-36.248	-36.584	-0.337
Cr(NH3)6+3	1.384e-038	2.419e-039	-37.859	-38.616	-0.758
Cr(NH3)6Cl+2	1.015e-039	4.676e-040	-38.993	-39.330	-0.337
Co(NH3)5+2	0.000e+000	0.000e+000	-41.284	-41.620	-0.337
Co(NH3)5Cl+2	0.000e+000	0.000e+000	-51.402	-51.739	-0.337
Co(NH3)6SO4+	0.000e+000	0.000e+000	-60.486	-60.570	-0.084
Co(NH3)6OH+2	0.000e+000	0.000e+000	-61.865	-62.201	-0.337
Co(NH3)6Cl+2	0.000e+000	0.000e+000	-63.374	-63.710	-0.337
N(3)	3.150e-011				
NO2-	3.150e-011	2.667e-011	-10.502	-10.574	-0.072
TlNO2	9.343e-020	9.343e-020	-19.030	-19.030	0.000
AgNO2	7.133e-023	7.133e-023	-22.147	-22.147	0.000
CuNO2+	5.331e-028	4.392e-028	-27.273	-27.357	-0.084

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   CoNO2+                 1.850e-031  1.524e-031   -30.733   -30.817    -0.084
   Ag(NO2)2-              3.576e-033  2.946e-033   -32.447   -32.531    -0.084
   Cu(NO2)2               1.198e-037  1.198e-037   -36.921   -36.921     0.000
N(5)            1.205e-017
   NO3-                   1.190e-017  1.017e-017   -16.925   -16.993    -0.068
   CaNO3+                 1.530e-019  1.261e-019   -18.815   -18.899    -0.084
   SrNO3+                 5.456e-023  4.494e-023   -22.263   -22.347    -0.084
   MnNO3+                 1.863e-023  1.534e-023   -22.730   -22.814    -0.084
   NiNO3+                 1.972e-024  1.625e-024   -23.705   -23.789    -0.084
   ZnNO3+                 6.241e-025  5.142e-025   -24.205   -24.289    -0.084
   TlNO3                  1.127e-026  1.127e-026   -25.948   -25.948     0.000
   CdNO3+                 6.161e-027  5.075e-027   -26.210   -26.295    -0.084
   PbNO3+                 1.539e-027  1.268e-027   -26.813   -26.897    -0.084
   BaNO3+                 3.212e-028  2.646e-028   -27.493   -27.577    -0.084
   UO2NO3+                5.051e-031  4.161e-031   -30.297   -30.381    -0.084
   AgNO3                  1.034e-031  1.034e-031   -30.985   -30.985     0.000
   CuNO3+                 6.140e-036  5.058e-036   -35.212   -35.296    -0.084
   VO2NO3                 2.582e-037  2.582e-037   -36.588   -36.588     0.000
   CoNO3+                 1.587e-038  1.307e-038   -37.800   -37.884    -0.084
   CrNO3+2                8.003e-039  3.686e-039   -38.097   -38.433    -0.337
   Mn(NO3)2               3.920e-040  3.920e-040   -39.407   -39.407     0.000
   Zn(NO3)2               0.000e+000  0.000e+000   -41.982   -41.982     0.000
   Cd(NO3)2               0.000e+000  0.000e+000   -43.587   -43.587     0.000
   Pb(NO3)2               0.000e+000  0.000e+000   -43.660   -43.660     0.000
   FeNO3+2                0.000e+000  0.000e+000   -44.836   -45.173    -0.337
   HgNO3+                 0.000e+000  0.000e+000   -46.211   -46.295    -0.084
   Cu(NO3)2               0.000e+000  0.000e+000   -53.189   -53.189     0.000
   Co(NO3)2               0.000e+000  0.000e+000   -54.568   -54.568     0.000
   TlNO3+2                0.000e+000  0.000e+000   -61.314   -61.650    -0.337
   SnNO3+                 0.000e+000  0.000e+000   -62.340   -62.424    -0.084
   Hg(NO3)2               0.000e+000  0.000e+000   -63.669   -63.669     0.000
Na              1.831e-003
   Na+                    1.828e-003  1.563e-003    -2.738    -2.806    -0.068
   NaSO4-                 2.444e-006  2.104e-006    -5.612    -5.677    -0.065
   NaF                    4.546e-008  4.546e-008    -7.342    -7.342     0.000
   NaH2BO3                2.029e-008  2.029e-008    -7.693    -7.693     0.000
   NaHPO4-                1.921e-013  1.654e-013   -12.716   -12.781    -0.065
   NaCrO4-                4.242e-019  3.494e-019   -18.372   -18.457    -0.084
Ni              2.200e-007
   Ni+2                   1.191e-007  6.361e-008    -6.924    -7.197    -0.272
   Ni(OH)2                6.169e-008  6.169e-008    -7.210    -7.210     0.000
   NiOH+                  3.027e-008  2.494e-008    -7.519    -7.603    -0.084
   NiSO4                  3.181e-009  3.181e-009    -8.497    -8.497     0.000
   NiCl+                  3.020e-009  2.488e-009    -8.520    -8.604    -0.084
   Ni(OH)3-               2.332e-009  1.921e-009    -8.632    -8.716    -0.084
   NiNH3+2                4.115e-010  1.895e-010    -9.386    -9.722    -0.337
   NiF+                   8.940e-011  7.365e-011   -10.049   -10.133    -0.084
   Ni(NH3)2+2             3.300e-013  1.520e-013   -12.481   -12.818    -0.337
   NiCl2                  1.915e-013  1.915e-013   -12.718   -12.718     0.000
   Ni(SO4)2-2             5.731e-014  2.640e-014   -13.242   -13.578    -0.337
   NiSeO4                 9.915e-019  9.915e-019   -18.004   -18.004     0.000
   NiNO3+                 1.972e-024  1.625e-024   -23.705   -23.789    -0.084
O(0)            0.000e+000
   O2                     0.000e+000  0.000e+000   -41.695   -41.692     0.003
P               1.894e-010
   CaPO4-                 1.543e-010  1.329e-010    -9.812    -9.877    -0.065
   HPO4-2                 1.657e-011  9.007e-012   -10.781   -11.045    -0.265
   CaHPO4                 1.614e-011  1.614e-011   -10.792   -10.792     0.000
   MgHPO4                 1.735e-012  1.735e-012   -11.761   -11.761     0.000
   NaHPO4-                1.921e-013  1.654e-013   -12.716   -12.781    -0.065
   MgPO4-                 1.879e-013  1.618e-013   -12.726   -12.791    -0.065
   KHPO4-                 8.544e-014  7.355e-014   -13.068   -13.133    -0.065
   H2PO4-                 5.334e-014  4.592e-014   -13.273   -13.338    -0.065
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   PO4-3                  4.816e-014  1.175e-014   -13.317   -13.930    -0.613
   UO2PO4-                5.203e-015  4.286e-015   -14.284   -14.368    -0.084
   CaH2PO4+               4.681e-015  4.029e-015   -14.330   -14.395    -0.065
   SrHPO4                 3.146e-015  3.146e-015   -14.502   -14.502     0.000
   MgH2PO4+               7.852e-016  6.759e-016   -15.105   -15.170    -0.065
   UO2(HPO4)2-2           6.248e-018  2.878e-018   -17.204   -17.541    -0.337
   UO2HPO4                3.520e-018  3.520e-018   -17.454   -17.454     0.000
   SrH2PO4+               4.173e-019  3.438e-019   -18.380   -18.464    -0.084
   H3PO4                  2.087e-021  2.087e-021   -20.681   -20.681     0.000
   UO2H2PO4+              2.080e-024  1.714e-024   -23.682   -23.766    -0.084
   FeHPO4                 6.622e-026  6.622e-026   -25.179   -25.179     0.000
   FeH2PO4+               4.938e-029  4.250e-029   -28.306   -28.372    -0.065
   CoHPO4                 7.968e-030  7.968e-030   -29.099   -29.099     0.000
   FeHPO4+                5.705e-031  4.911e-031   -30.244   -30.309    -0.065
   CrH2PO4+2              4.812e-031  2.216e-031   -30.318   -30.654    -0.337
   CrO3HPO4-2             1.858e-032  8.558e-033   -31.731   -32.068    -0.337
   UO2(H2PO4)2            1.549e-035  1.549e-035   -34.810   -34.810     0.000
   FeH2PO4+2              1.048e-038  5.756e-039   -37.979   -38.240    -0.260
   CrO3H2PO4-             1.617e-039  1.332e-039   -38.791   -38.875    -0.084
   UHPO4+2                0.000e+000  0.000e+000   -44.245   -44.582    -0.337
   U(HPO4)2               0.000e+000  0.000e+000   -45.612   -45.612     0.000
   UO2(H2PO4)3-           0.000e+000  0.000e+000   -46.092   -46.176    -0.084
   U(HPO4)3-2             0.000e+000  0.000e+000   -47.965   -48.302    -0.337
   U(HPO4)4-4             0.000e+000  0.000e+000   -49.456   -50.803    -1.347
Pb              1.497e-009
   PbOH+                  8.004e-010  6.594e-010    -9.097    -9.181    -0.084
   Pb(OH)2                6.494e-010  6.494e-010    -9.187    -9.187     0.000
   Pb(OH)3-               2.455e-011  2.022e-011   -10.610   -10.694    -0.084
   Pb+2                   1.578e-011  8.430e-012   -10.802   -11.074    -0.272
   PbCl+                  5.550e-012  4.572e-012   -11.256   -11.340    -0.084
   PbSO4                  1.035e-012  1.035e-012   -11.985   -11.985     0.000
   Pb(OH)4-2              3.349e-013  1.542e-013   -12.475   -12.812    -0.337
   PbCl2                  3.122e-013  3.122e-013   -12.506   -12.506     0.000
   PbF+                   3.324e-014  2.738e-014   -13.478   -13.563    -0.084
   Pb(SO4)2-2             3.393e-015  1.563e-015   -14.469   -14.806    -0.337
   PbCl3-                 2.306e-015  1.900e-015   -14.637   -14.721    -0.084
   PbCl4-2                2.882e-017  1.327e-017   -16.540   -16.877    -0.337
   PbF2                   2.484e-017  2.484e-017   -16.605   -16.605     0.000
   Pb2OH+3                5.041e-019  8.810e-020   -18.297   -19.055    -0.758
   Pb3(OH)4+2             1.540e-019  7.093e-020   -18.812   -19.149    -0.337
   PbF3-                  2.636e-021  2.172e-021   -20.579   -20.663    -0.084
   Pb4(OH)4+4             1.055e-025  4.749e-027   -24.977   -26.323    -1.347
   PbF4-2                 1.040e-025  4.792e-026   -24.983   -25.319    -0.337
   PbNO3+                 1.539e-027  1.268e-027   -26.813   -26.897    -0.084
   Pb(NO3)2               0.000e+000  0.000e+000   -43.660   -43.660     0.000
   Pb(HS)2                0.000e+000  0.000e+000  -131.878  -131.878     0.000
   Pb(HS)3-               0.000e+000  0.000e+000  -198.531  -198.615    -0.084
S(-2)           0.000e+000
   S5-2                   0.000e+000  0.000e+000   -67.575   -67.911    -0.337
   HS-                    0.000e+000  0.000e+000   -67.953   -68.037    -0.084
   S6-2                   0.000e+000  0.000e+000   -68.091   -68.427    -0.337
   AgHS                   0.000e+000  0.000e+000   -68.115   -68.115     0.000
   S4-2                   0.000e+000  0.000e+000   -68.170   -68.507    -0.337
   S3-2                   0.000e+000  0.000e+000   -68.976   -69.313    -0.337
   CdHS+                  0.000e+000  0.000e+000   -69.747   -69.831    -0.084
   S2-2                   0.000e+000  0.000e+000   -69.992   -70.329    -0.337
   H2S                    0.000e+000  0.000e+000   -70.507   -70.507     0.000
   TlHS                   0.000e+000  0.000e+000   -74.848   -74.848     0.000
   S-2                    0.000e+000  0.000e+000   -75.582   -75.846    -0.265
   Tl2HS+                 0.000e+000  0.000e+000   -80.550   -80.634    -0.084
   HgS2-2                 0.000e+000  0.000e+000  -122.405  -122.742    -0.337
   HgHS2-                 0.000e+000  0.000e+000  -123.441  -123.525    -0.084
   Hg(HS)2                0.000e+000  0.000e+000  -126.621  -126.621     0.000
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ZnS(HS)-	0.000e+000	0.000e+000	-127.385	-127.469	-0.084
Ag(S4)2-3	0.000e+000	0.000e+000	-129.649	-129.994	-0.345
Ag(HS)S4-2	0.000e+000	0.000e+000	-129.859	-130.045	-0.186
AgS4S5-3	0.000e+000	0.000e+000	-129.976	-130.305	-0.329
Cd(HS)2	0.000e+000	0.000e+000	-130.664	-130.664	0.000
Zn(HS)2	0.000e+000	0.000e+000	-130.950	-130.950	0.000
Cu(S4)2-3	0.000e+000	0.000e+000	-131.064	-131.401	-0.337
CuS4S5-3	0.000e+000	0.000e+000	-131.810	-132.131	-0.321
Pb(HS)2	0.000e+000	0.000e+000	-131.878	-131.878	0.000
Ag(HS)2-	0.000e+000	0.000e+000	-131.968	-132.052	-0.084
Fe(HS)2	0.000e+000	0.000e+000	-144.857	-144.857	0.000
Tl2(OH)2(HS)2-2	0.000e+000	0.000e+000	-146.396	-146.732	-0.337
Zn(HS)3-	0.000e+000	0.000e+000	-195.623	-195.707	-0.084
ZnS(HS)2-2	0.000e+000	0.000e+000	-195.860	-196.196	-0.337
Cd(HS)3-	0.000e+000	0.000e+000	-196.716	-196.801	-0.084
Cu(HS)3-	0.000e+000	0.000e+000	-196.931	-197.015	-0.084
Pb(HS)3-	0.000e+000	0.000e+000	-198.531	-198.615	-0.084
Fe(HS)3-	0.000e+000	0.000e+000	-210.773	-210.857	-0.084
Tl2OH(HS)3-2	0.000e+000	0.000e+000	-211.850	-212.187	-0.337
Cd(HS)4-2	0.000e+000	0.000e+000	-262.305	-262.641	-0.337
Zn(HS)4-2	0.000e+000	0.000e+000	-264.867	-265.204	-0.337
Sb2S4-2	0.000e+000	0.000e+000	-277.028	-277.365	-0.337
S(6) 7.128e-004					
SO4-2	4.691e-004	2.506e-004	-3.329	-3.601	-0.272
CaSO4	2.250e-004	2.250e-004	-3.648	-3.648	0.000
MgSO4	1.393e-005	1.393e-005	-4.856	-4.856	0.000
NaSO4-	2.444e-006	2.104e-006	-5.612	-5.677	-0.065
KSO4-	2.219e-006	1.910e-006	-5.654	-5.719	-0.065
SrSO4	5.551e-008	5.551e-008	-7.256	-7.256	0.000
MnSO4	4.243e-008	4.243e-008	-7.372	-7.372	0.000
NH4SO4-	9.836e-009	8.445e-009	-8.007	-8.073	-0.066
NiSO4	3.181e-009	3.181e-009	-8.497	-8.497	0.000
ZnSO4	1.104e-009	1.104e-009	-8.957	-8.957	0.000
CdSO4	9.272e-012	9.272e-012	-11.033	-11.033	0.000
HSO4-	9.249e-012	7.915e-012	-11.034	-11.102	-0.068
Zn(SO4)2-2	5.230e-012	2.409e-012	-11.281	-11.618	-0.337
TlSO4-	3.696e-012	3.045e-012	-11.432	-11.516	-0.084
PbSO4	1.035e-012	1.035e-012	-11.985	-11.985	0.000
Cd(SO4)2-2	6.806e-014	3.135e-014	-13.167	-13.504	-0.337
Ni(SO4)2-2	5.731e-014	2.640e-014	-13.242	-13.578	-0.337
UO2SO4	7.779e-015	7.779e-015	-14.109	-14.109	0.000
Pb(SO4)2-2	3.393e-015	1.563e-015	-14.469	-14.806	-0.337
CrOHSO4	3.360e-016	3.360e-016	-15.474	-15.474	0.000
AgSO4-	7.771e-017	6.402e-017	-16.110	-16.194	-0.084
UO2(SO4)2-2	5.580e-017	2.570e-017	-16.253	-16.590	-0.337
FeSO4	1.136e-019	1.136e-019	-18.945	-18.945	0.000
CuSO4	9.030e-021	9.030e-021	-20.044	-20.044	0.000
CrSO4+	5.890e-021	4.852e-021	-20.230	-20.314	-0.084
AlSO4+	5.733e-022	4.906e-022	-21.242	-21.309	-0.068
VO2SO4-	3.646e-022	3.004e-022	-21.438	-21.522	-0.084
CoSO4	4.055e-023	4.055e-023	-22.392	-22.392	0.000
Al(SO4)2-	1.540e-024	1.318e-024	-23.813	-23.880	-0.068
VOSO4	7.526e-025	7.526e-025	-24.123	-24.123	0.000
Cr2(OH)2SO4+2	3.725e-028	1.715e-028	-27.429	-27.766	-0.337
FeSO4+	2.162e-029	1.856e-029	-28.665	-28.731	-0.066
Cr2(OH)2(SO4)2	2.554e-030	2.554e-030	-29.593	-29.593	0.000
CrO3SO4-2	2.521e-030	1.161e-030	-29.598	-29.935	-0.337
HgSO4	8.862e-031	8.862e-031	-30.052	-30.052	0.000
Fe(SO4)2-	1.207e-031	9.947e-032	-30.918	-31.002	-0.084
VSO4+	2.112e-039	1.740e-039	-38.675	-38.760	-0.084
USO4+2	0.000e+000	0.000e+000	-42.269	-42.605	-0.337
U(SO4)2	0.000e+000	0.000e+000	-42.306	-42.306	0.000
Co(NH3)6SO4+	0.000e+000	0.000e+000	-60.486	-60.570	-0.084

Sb(3)	3.056e-018					
Sb(OH)3		1.539e-018	1.539e-018	-17.813	-17.813	0.000
HSbO2		1.503e-018	1.503e-018	-17.823	-17.823	0.000
SbO2-		9.141e-021	7.530e-021	-20.039	-20.123	-0.084
Sb(OH)4-		5.233e-021	4.311e-021	-20.281	-20.365	-0.084
Sb(OH)2F		3.582e-026	3.582e-026	-25.446	-25.446	0.000
SbOF		3.524e-026	3.524e-026	-25.453	-25.453	0.000
Sb(OH)2+		1.466e-026	1.208e-026	-25.834	-25.918	-0.084
SbO+		5.058e-027	4.167e-027	-26.296	-26.380	-0.084
Sb2S4-2		0.000e+000	0.000e+000	-277.028	-277.365	-0.337
Sb(5)	3.434e-008					
SbO3-		3.430e-008	2.826e-008	-7.465	-7.549	-0.084
Sb(OH)6-		3.861e-011	3.301e-011	-10.413	-10.481	-0.068
SbO2+		1.028e-027	8.469e-028	-26.988	-27.072	-0.084
Se(-2)	1.626e-014					
Ag2Se		1.626e-014	1.626e-014	-13.789	-13.789	0.000
HSe-		4.776e-031	3.934e-031	-30.321	-30.405	-0.084
MnSe		4.776e-033	4.776e-033	-32.321	-32.321	0.000
Se-2		2.643e-036	1.217e-036	-35.578	-35.915	-0.337
H2Se		9.870e-037	9.870e-037	-36.006	-36.006	0.000
AgOH(Se)2-4		0.000e+000	0.000e+000	-65.394	-66.740	-1.347
Se(4)	4.320e-008					
SeO3-2		4.132e-008	1.903e-008	-7.384	-7.721	-0.337
HSeO3-		1.875e-009	1.545e-009	-8.727	-8.811	-0.084
H2SeO3		2.130e-016	2.130e-016	-15.672	-15.672	0.000
AgSeO3-		1.901e-019	1.566e-019	-18.721	-18.805	-0.084
Cd(SeO3)2-2		1.023e-019	4.711e-020	-18.990	-19.327	-0.337
Ag(SeO3)2-3		1.527e-025	2.668e-026	-24.816	-25.574	-0.758
FeHSeO3+2		5.851e-035	2.695e-035	-34.233	-34.569	-0.337
Se(6)	6.239e-014					
SeO4-2		6.238e-014	3.333e-014	-13.205	-13.477	-0.272
MnSeO4		8.540e-018	8.540e-018	-17.069	-17.069	0.000
NiSeO4		9.915e-019	9.915e-019	-18.004	-18.004	0.000
ZnSeO4		1.039e-019	1.039e-019	-18.983	-18.983	0.000
CdSeO4		9.794e-022	9.794e-022	-21.009	-21.009	0.000
HSeO4-		6.553e-022	5.398e-022	-21.184	-21.268	-0.084
CoSeO4		1.355e-032	1.355e-032	-31.868	-31.868	0.000
Zn(SeO4)2-2		7.623e-033	3.511e-033	-32.118	-32.455	-0.337
Si	3.375e-006					
H4SiO4		2.209e-006	2.223e-006	-5.656	-5.653	0.003
H3SiO4-		1.166e-006	9.943e-007	-5.933	-6.002	-0.069
H2SiO4-2		3.536e-010	1.941e-010	-9.452	-9.712	-0.260
UO2H3SiO4+		2.101e-012	1.731e-012	-11.677	-11.762	-0.084
SiF6-2		6.493e-040	3.529e-040	-39.188	-39.452	-0.265
Sn(2)	2.654e-034					
HSnO2-		1.766e-034	1.455e-034	-33.753	-33.837	-0.084
Sn(OH)3-		4.836e-035	3.984e-035	-34.316	-34.400	-0.084
Sn(OH)2		4.045e-035	4.045e-035	-34.393	-34.393	0.000
SnOH+		0.000e+000	0.000e+000	-40.102	-40.186	-0.084
Sn+2		0.000e+000	0.000e+000	-45.943	-46.280	-0.337
SnF+		0.000e+000	0.000e+000	-46.044	-46.128	-0.084
SnCl+		0.000e+000	0.000e+000	-46.371	-46.455	-0.084
SnCl2		0.000e+000	0.000e+000	-47.481	-47.481	0.000
SnF2		0.000e+000	0.000e+000	-47.660	-47.660	0.000
SnF3-		0.000e+000	0.000e+000	-49.093	-49.177	-0.084
SnCl3-		0.000e+000	0.000e+000	-50.386	-50.470	-0.084
SnNO3+		0.000e+000	0.000e+000	-62.340	-62.424	-0.084
Sn2(OH)2+2		0.000e+000	0.000e+000	-78.036	-78.373	-0.337
Sn3(OH)4+2		0.000e+000	0.000e+000	-107.429	-107.766	-0.337
Sn(4)	6.518e-013					
Sn(OH)6-2		6.472e-013	3.458e-013	-12.189	-12.461	-0.272
SnO3-2		4.637e-015	2.136e-015	-14.334	-14.670	-0.337
Sn+4		0.000e+000	0.000e+000	-46.837	-48.184	-1.347

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   SnF6-2                 0.000e+000  0.000e+000   -61.500   -61.837    -0.337
Sr                2.134e-006
   Sr+2                   2.078e-006  1.110e-006    -5.682    -5.955    -0.272
   SrSO4                  5.551e-008  5.551e-008    -7.256    -7.256     0.000
   SrH2BO3+               3.826e-010  3.226e-010    -9.417    -9.491    -0.074
   SrOH+                  2.660e-010  2.284e-010    -9.575    -9.641    -0.066
   SrF+                   2.194e-010  1.807e-010    -9.659    -9.743    -0.084
   SrNH3+2                1.062e-011  4.892e-012   -10.974   -11.310    -0.337
   SrHPO4                 3.146e-015  3.146e-015   -14.502   -14.502     0.000
   SrH2PO4+               4.173e-019  3.438e-019   -18.380   -18.464    -0.084
   SrNO3+                 5.456e-023  4.494e-023   -22.263   -22.347    -0.084
Tl(1)             6.588e-010
   Tl+                    6.290e-010  5.182e-010    -9.201    -9.285    -0.084
   TlCl                   2.563e-011  2.563e-011   -10.591   -10.591     0.000
   TlSO4-                 3.696e-012  3.045e-012   -11.432   -11.516    -0.084
   TlCl2-                 2.801e-013  2.307e-013   -12.553   -12.637    -0.084
   TlOH                   9.951e-014  9.951e-014   -13.002   -13.002     0.000
   TlF                    3.007e-014  3.007e-014   -13.522   -13.522     0.000
   TlNO2                  9.343e-020  9.343e-020   -19.030   -19.030     0.000
   TlNO3                  1.127e-026  1.127e-026   -25.948   -25.948     0.000
   TlHS                   0.000e+000  0.000e+000   -74.848   -74.848     0.000
   Tl2HS+                 0.000e+000  0.000e+000   -80.550   -80.634    -0.084
   Tl2(OH)2(HS)2-2        0.000e+000  0.000e+000  -146.396  -146.732    -0.337
   Tl2OH(HS)3-2           0.000e+000  0.000e+000  -211.850  -212.187    -0.337
Tl(3)             6.405e-024
   Tl(OH)3                6.357e-024  6.397e-024   -23.197   -23.194     0.003
   Tl(OH)4-               4.825e-026  3.975e-026   -25.317   -25.401    -0.084
   Tl(OH)2+               1.981e-031  1.632e-031   -30.703   -30.787    -0.084
   TlOHCl+                5.281e-034  4.351e-034   -33.277   -33.361    -0.084
   TlCl4-                 5.589e-038  4.604e-038   -37.253   -37.337    -0.084
   TlCl3                  4.773e-038  4.773e-038   -37.321   -37.321     0.000
   TlCl2+                 3.620e-039  2.982e-039   -38.441   -38.525    -0.084
   TlOH+2                 7.177e-040  3.306e-040   -39.144   -39.481    -0.337
   TlCl+2                 0.000e+000  0.000e+000   -42.133   -42.470    -0.337
   Tl+3                   0.000e+000  0.000e+000   -47.617   -48.374    -0.758
   TlNO3+2                0.000e+000  0.000e+000   -61.314   -61.650    -0.337
U(3)              0.000e+000
   U+3                    0.000e+000  0.000e+000   -55.228   -55.986    -0.758
U(4)              6.480e-012
   U(OH)5-                6.480e-012  5.338e-012   -11.188   -11.273    -0.084
   U(OH)4                 7.229e-017  7.229e-017   -16.141   -16.141     0.000
   U(OH)3+                1.037e-022  8.545e-023   -21.984   -22.068    -0.084
   U(OH)2+2               2.774e-029  1.278e-029   -28.557   -28.894    -0.337
   UOH+3                  1.113e-036  1.945e-037   -35.953   -36.711    -0.758
   UF3+                   1.177e-037  9.699e-038   -36.929   -37.013    -0.084
   UF2+2                  2.882e-038  1.327e-038   -37.540   -37.877    -0.337
   UF4                    4.902e-040  4.902e-040   -39.310   -39.310     0.000
   UF+3                   1.309e-040  0.000e+000   -39.883   -40.641    -0.758
   UF5-                   0.000e+000  0.000e+000   -41.964   -42.048    -0.084
   USO4+2                 0.000e+000  0.000e+000   -42.269   -42.605    -0.337
   U(SO4)2                0.000e+000  0.000e+000   -42.306   -42.306     0.000
   UF6-2                  0.000e+000  0.000e+000   -43.568   -43.904    -0.337
   UHPO4+2                0.000e+000  0.000e+000   -44.245   -44.582    -0.337
   U+4                    0.000e+000  0.000e+000   -44.258   -45.604    -1.347
   UCl+3                  0.000e+000  0.000e+000   -44.962   -45.720    -0.758
   U(HPO4)2               0.000e+000  0.000e+000   -45.612   -45.612     0.000
   U(HPO4)3-2             0.000e+000  0.000e+000   -47.965   -48.302    -0.337
   U(HPO4)4-4             0.000e+000  0.000e+000   -49.456   -50.803    -1.347
   U6(OH)15+9             0.000e+000  0.000e+000  -141.608  -148.426    -6.818
U(5)              3.944e-013
   UO2+                   3.944e-013  3.249e-013   -12.404   -12.488    -0.084
U(6)              2.411e-009
   (UO2)3(OH)5+           7.704e-010  6.346e-010    -9.113    -9.197    -0.084
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	UO2OH+	9.760e-011	8.040e-011	-10.011	-10.095	-0.084
	UO2H3SiO4+	2.101e-012	1.731e-012	-11.677	-11.762	-0.084
	UO2F+	1.584e-013	1.305e-013	-12.800	-12.884	-0.084
	UO2+2	3.839e-014	2.051e-014	-13.416	-13.688	-0.272
	(UO2)2(OH)2+2	2.329e-014	1.073e-014	-13.633	-13.969	-0.337
	UO2F2	1.735e-014	1.735e-014	-13.761	-13.761	0.000
	UO2SO4	7.779e-015	7.779e-015	-14.109	-14.109	0.000
	UO2PO4-	5.203e-015	4.286e-015	-14.284	-14.368	-0.084
	UO2Cl+	6.172e-016	5.084e-016	-15.210	-15.294	-0.084
	UO2F3-	2.439e-016	2.009e-016	-15.613	-15.697	-0.084
	UO2(SO4)2-2	5.580e-017	2.570e-017	-16.253	-16.590	-0.337
	UO2(HPO4)2-2	6.248e-018	2.878e-018	-17.204	-17.541	-0.337
	UO2HPO4	3.520e-018	3.520e-018	-17.454	-17.454	0.000
	UO2F4-2	1.597e-019	7.356e-020	-18.797	-19.133	-0.337
	UO2H2PO4+	2.080e-024	1.714e-024	-23.682	-23.766	-0.084
	UO2NO3+	5.051e-031	4.161e-031	-30.297	-30.381	-0.084
	UO2(H2PO4)2	1.549e-035	1.549e-035	-34.810	-34.810	0.000
	UO2(H2PO4)3-	0.000e+000	0.000e+000	-46.092	-46.176	-0.084
V(2)	0.000e+000					
	VOH+	0.000e+000	0.000e+000	-40.640	-40.724	-0.084
	V+2	0.000e+000	0.000e+000	-43.391	-43.728	-0.337
V(3)	3.582e-013					
	V(OH)3	3.582e-013	3.582e-013	-12.446	-12.446	0.000
	V(OH)2+	9.084e-026	7.484e-026	-25.042	-25.126	-0.084
	VOH+2	4.983e-031	2.295e-031	-30.303	-30.639	-0.337
	V+3	8.414e-038	1.470e-038	-37.075	-37.833	-0.758
	VSO4+	2.112e-039	1.740e-039	-38.675	-38.760	-0.084
	V2(OH)3+3	0.000e+000	0.000e+000	-56.556	-57.313	-0.758
	V2(OH)2+4	0.000e+000	0.000e+000	-59.132	-60.478	-1.347
V(4)	8.222e-020					
	V(OH)3+	8.220e-020	6.771e-020	-19.085	-19.169	-0.084
	VO+2	2.367e-023	1.090e-023	-22.626	-22.962	-0.337
	VOF+	3.659e-024	3.015e-024	-23.437	-23.521	-0.084
	VOSO4	7.526e-025	7.526e-025	-24.123	-24.123	0.000
	VOCl+	5.676e-025	4.676e-025	-24.246	-24.330	-0.084
	VOF2	5.211e-026	5.211e-026	-25.283	-25.283	0.000
	VOF3-	1.035e-028	8.523e-029	-27.985	-28.069	-0.084
	VOF4-2	3.443e-032	1.586e-032	-31.463	-31.800	-0.337
	H2V2O4+2	4.994e-034	2.300e-034	-33.302	-33.638	-0.337
V(5)	4.353e-007					
	HVO4-2	4.061e-007	1.870e-007	-6.391	-6.728	-0.337
	H2VO4-	2.921e-008	2.406e-008	-7.534	-7.619	-0.084
	VO4-3	1.660e-011	2.901e-012	-10.780	-11.538	-0.758
	HV2O7-3	8.731e-012	1.526e-012	-11.059	-11.816	-0.758
	V2O7-4	2.824e-012	1.271e-013	-11.549	-12.896	-1.347
	H3VO4	7.777e-014	7.777e-014	-13.109	-13.109	0.000
	H3V2O7-	1.467e-014	1.209e-014	-13.833	-13.918	-0.084
	V3O9-3	8.362e-017	1.461e-017	-16.078	-16.835	-0.758
	VO2+	5.871e-020	5.020e-020	-19.231	-19.299	-0.068
	VO2F	4.058e-021	4.058e-021	-20.392	-20.392	0.000
	V4O12-4	3.259e-021	1.467e-022	-20.487	-21.834	-1.347
	VO2SO4-	3.646e-022	3.004e-022	-21.438	-21.522	-0.084
	VO2F2-	8.245e-023	6.792e-023	-22.084	-22.168	-0.084
	VO2F3-2	8.480e-026	3.906e-026	-25.072	-25.408	-0.337
	VO2F4-3	5.069e-030	8.859e-031	-29.295	-30.053	-0.758
	VO2NO3	2.582e-037	2.582e-037	-36.588	-36.588	0.000
	V10O28-6	0.000e+000	0.000e+000	-62.210	-65.240	-3.030
	HV10O28-5	0.000e+000	0.000e+000	-64.440	-66.544	-2.104
	H2V10O28-4	0.000e+000	0.000e+000	-69.480	-70.827	-1.347
Zn	5.154e-007					
	Zn(OH)2	3.094e-007	3.094e-007	-6.510	-6.510	0.000
	ZnOH+	7.609e-008	6.268e-008	-7.119	-7.203	-0.084
	Zn(OH)3-	5.861e-008	4.829e-008	-7.232	-7.316	-0.084

Zn+2	3.767e-008	2.013e-008	-7.424	-7.696	-0.272
ZnOHCl	3.151e-008	3.151e-008	-7.502	-7.502	0.000
ZnSO4	1.104e-009	1.104e-009	-8.957	-8.957	0.000
ZnCl+	9.062e-010	7.728e-010	-9.043	-9.112	-0.069
Zn(OH)4-2	1.300e-010	5.986e-011	-9.886	-10.223	-0.337
ZnF+	2.247e-011	1.851e-011	-10.648	-10.733	-0.084
ZnCl2	1.872e-011	1.872e-011	-10.728	-10.728	0.000
Zn(SO4)2-2	5.230e-012	2.409e-012	-11.281	-11.618	-0.337
ZnCl3-	2.666e-013	2.273e-013	-12.574	-12.643	-0.069
ZnCl4-2	3.198e-015	1.738e-015	-14.495	-14.760	-0.265
ZnSeO4	1.039e-019	1.039e-019	-18.983	-18.983	0.000
ZnNO3+	6.241e-025	5.142e-025	-24.205	-24.289	-0.084
Zn(SeO4)2-2	7.623e-033	3.511e-033	-32.118	-32.455	-0.337
Zn(NO3)2	0.000e+000	0.000e+000	-41.982	-41.982	0.000
ZnS(HS)-	0.000e+000	0.000e+000	-127.385	-127.469	-0.084
Zn(HS)2	0.000e+000	0.000e+000	-130.950	-130.950	0.000
Zn(HS)3-	0.000e+000	0.000e+000	-195.623	-195.707	-0.084
ZnS(HS)2-2	0.000e+000	0.000e+000	-195.860	-196.196	-0.337
Zn(HS)4-2	0.000e+000	0.000e+000	-264.867	-265.204	-0.337

----------Saturation indices----------

Phase	SI	log IAP	log KT	
(Co(NH3)5Cl)(NO3)2	-74.05	-67.77	6.29	(Co(NH3)5Cl)(NO3)2
(Co(NH3)5Cl)Cl2	-41.92	-37.41	4.51	(Co(NH3)5Cl)Cl2
(Co(NH3)5OH2)Cl3	-49.15	-37.41	11.74	(Co(NH3)5OH2)Cl3
(Co(NH3)6)(NO3)3	-96.89	-78.95	17.93	(Co(NH3)6)(NO3)3
(Co(NH3)6)Cl3	-53.46	-33.42	20.03	(Co(NH3)6)Cl3
(NH4)2CrO4	-27.76	-27.35	0.40	(NH4)2CrO4
(NH4)2SeO4	-24.93	-24.48	0.45	(NH4)2SeO4
(UO2)3(PO4)2	-19.52	-68.92	-49.40	(UO2)3(PO4)2
(VO)3(PO4)2	-71.65	-96.75	-25.10	(VO)3(PO4)2
Acanthite	-50.11	-86.33	-36.22	Ag2S
Ag2CrO4	-32.54	-44.13	-11.59	Ag2CrO4
Ag2HVO4	-20.09	-18.61	1.48	Ag2HVO4
Ag2MoO4	-22.55	-34.10	-11.55	Ag2MoO4
Ag2O	-21.38	-8.80	12.57	Ag2O
Ag2Se	0.00	-48.70	-48.70	Ag2Se
Ag2SeO3	-19.96	-27.11	-7.15	Ag2SeO3
Ag2SeO4	-32.35	-41.26	-8.91	Ag2SeO4
Ag2SO4	-26.57	-31.39	-4.82	Ag2SO4
Ag3AsO3	-34.62	-32.46	2.16	Ag3AsO3
Ag3AsO4	-26.42	-29.21	-2.79	Ag3AsO4
Ag3H2VO5	-28.20	-23.02	5.18	Ag3H2VO5
Ag3PO4	-38.02	-55.61	-17.59	Ag3PO4
AgF:4H2O	-19.28	-18.23	1.05	AgF:4H2O
Agmetal	-1.97	-15.48	-13.51	Ag
AgVO3	-14.98	-14.21	0.77	AgVO3
Al(OH)3(am)	-3.93	6.87	10.80	Al(OH)3
Al2(MoO4)3	-64.49	-62.13	2.37	Al2(MoO4)3
Al2O3	-5.91	13.75	19.65	Al2O3
Al4(OH)10SO4	-17.79	4.91	22.70	Al4(OH)10SO4
AlAsO4:2H2O	-13.93	-9.13	4.80	AlAsO4:2H2O
AlOHSO4	-12.48	-15.71	-3.23	AlOHSO4
AlSb	-143.02	-77.39	65.62	AlSb
Alunite	-16.62	-18.02	-1.40	KAl3(SO4)2(OH)6
Anglesite	-6.89	-14.68	-7.79	PbSO4
Anhydrite	-1.65	-6.01	-4.36	CaSO4
Anilite	-57.92	-89.80	-31.88	Cu0.25Cu1.5S
Antlerite	-30.84	-22.05	8.79	Cu3(OH)4SO4
Arsenolite	-74.25	-77.01	-2.76	As4O6
As2O5	-38.70	-32.00	6.71	As2O5

Atacamite	-18.34	-10.95	7.39	Cu2(OH)3Cl
Autunite	-13.72	-57.64	-43.93	Ca(UO2)2(PO4)2
Avicennite	-33.39	-46.39	-13.00	Tl2O3
Ba(OH)2:8H2O	-16.70	7.69	24.39	Ba(OH)2:8H2O
Ba2V2O7:2H2O	-20.10	-4.23	15.87	Ba2V2O7:2H2O
Ba3(AsO4)2	0.00	-8.91	-8.91	Ba3(AsO4)2
Ba3(VO4)2:4H2O	-29.47	3.47	32.94	Ba3(VO4)2:4H2O
BaCrO4	-17.96	-27.63	-9.67	BaCrO4
BaF2	-14.14	-19.96	-5.82	BaF2
BaHPO4	-14.93	-34.71	-19.77	BaHPO4
BaMoO4	-10.63	-17.59	-6.96	BaMoO4
Barite	-4.91	-14.89	-9.98	BaSO4
BaS	-86.01	-69.83	16.18	BaS
BaSeO3	-12.44	-10.61	1.83	BaSeO3
BaSeO4	-17.30	-24.76	-7.46	BaSeO4
Bassetite	-28.48	-72.97	-44.48	Fe(UO2)2(PO4)2
Bianchite	-9.53	-11.30	-1.76	ZnSO4:6H2O
Birnessite	-8.33	9.76	18.09	MnO2
Bixbyite	-1.99	-2.63	-0.64	Mn2O3
BlaubleiI	-54.85	-79.01	-24.16	Cu0.9Cu0.2S
BlaubleiII	-56.71	-83.99	-27.28	Cu0.6Cu0.8S
Boehmite	-1.70	6.87	8.58	AlOOH
Breithauptite	-42.88	-61.41	-18.52	NiSb
Brochantite	-37.09	-21.87	15.22	Cu4(OH)6SO4
Brucite	-1.38	15.47	16.84	Mg(OH)2
Bunsenite	-0.66	11.78	12.45	NiO
Ca(VO3)2	-8.70	-3.04	5.66	Ca(VO3)2
Ca2V2O7	-3.97	13.53	17.50	Ca2V2O7
Ca2V2O7:2H2O	-8.02	13.53	21.55	Ca2V2O7:2H2O
Ca3(AsO4)2:4H2O	-4.58	17.72	22.30	Ca3(AsO4)2:4H2O
Ca3(PO4)2(beta)	-6.16	-35.08	-28.92	Ca3(PO4)2
Ca3(VO4)2	-8.86	30.10	38.96	Ca3(VO4)2
Ca3(VO4)2:4H2O	-9.76	30.10	39.86	Ca3(VO4)2:4H2O
Ca3Sb2	-261.78	-118.81	142.97	Ca3Sb2
Ca4H(PO4)3:3H2O	-13.83	-60.91	-47.08	Ca4H(PO4)3:3H2O
CaCrO4	-16.49	-18.75	-2.27	CaCrO4
CaHPO4	-6.55	-25.83	-19.27	CaHPO4
CaHPO4:2H2O	-6.83	-25.83	-19.00	CaHPO4:2H2O
Calomel	-15.83	-33.74	-17.91	Hg2Cl2
CaMoO4	-0.77	-8.72	-7.95	CaMoO4
Carnotite	1.78	2.01	0.23	KUO2VO4
CaSeO3:2H2O	-4.54	-1.73	2.81	CaSeO3:2H2O
CaSeO4:2H2O	-12.86	-15.88	-3.02	CaSeO4:2H2O
Cd(BO2)2	-11.34	-1.50	9.84	Cd(BO2)2
Cd(OH)2	-4.47	9.18	13.64	Cd(OH)2
Cd(OH)2(am)	-4.55	9.18	13.73	Cd(OH)2
Cd3(OH)2(SO4)2	-24.34	-17.63	6.71	Cd3(OH)2(SO4)2
Cd3(OH)4SO4	-17.61	4.95	22.56	Cd3(OH)4SO4
Cd3(PO4)2	-24.67	-57.27	-32.60	Cd3(PO4)2
Cd4(OH)6SO4	-14.27	14.13	28.40	Cd4(OH)6SO4
CdCl2	-12.77	-13.43	-0.66	CdCl2
CdCl2:1H2O	-11.74	-13.43	-1.69	CdCl2:1H2O
CdCl2:2.5H2O	-11.52	-13.43	-1.91	CdCl2:2.5H2O
CdF2	-17.26	-18.47	-1.21	CdF2
Cdmetal(alpha)	-26.49	-12.97	13.51	Cd
Cdmetal(gamma)	-26.59	-12.97	13.62	Cd
CdMoO4	-1.96	-16.11	-14.15	CdMoO4
CdOHCl	-5.66	-2.13	3.54	CdOHCl
CdSb	-63.66	-64.01	-0.35	CdSb
CdSe	-10.52	-30.72	-20.20	CdSe
CdSeO4:2H2O	-21.43	-23.28	-1.85	CdSeO4:2H2O
CdSO4	-13.23	-13.40	-0.17	CdSO4
CdSO4:1H2O	-11.68	-13.40	-1.73	CdSO4:1H2O

CdSO4:2.67H2O	-11.53	-13.40	-1.87	CdSO4:2.67H2O
Celestite	-2.94	-9.56	-6.62	SrSO4
Cerargyrite	-5.96	-15.71	-9.75	AgCl
Chalcanthite	-19.77	-22.41	-2.64	CuSO4:5H2O
Chalcedony	-2.10	-5.65	-3.55	SiO2
Chalcocite	-59.02	-93.94	-34.92	Cu2S
Chalcopyrite	-118.36	-153.63	-35.27	CuFeS2
Chrysotile	2.89	35.09	32.20	Mg3Si2O5(OH)4
Cinnabar	-47.92	-93.61	-45.69	HgS
Claudetite	-73.95	-77.01	-3.06	As4O6
Clausthalite	-4.89	-31.99	-27.10	PbSe
Co(BO2)2	-39.86	-12.79	27.07	Co(BO2)2
Co(OH)2	-15.20	-2.11	13.09	Co(OH)2
Co(OH)3	-21.13	-23.43	-2.31	Co(OH)3
Co3(AsO4)2	-51.36	-38.33	13.03	Co3(AsO4)2
Co3(PO4)2	-56.45	-91.13	-34.69	Co3(PO4)2
Co3O4	-38.48	-48.98	-10.50	Co3O4
CoCl2	-32.99	-24.72	8.27	CoCl2
CoCl2:6H2O	-27.26	-24.72	2.54	CoCl2:6H2O
CoF2	-28.17	-29.76	-1.60	CoF2
CoF3	-63.46	-64.91	-1.46	CoF3
CoFe2O4	0.00	-3.53	-3.53	CoFe2O4
CoHPO4	-25.45	-44.51	-19.06	CoHPO4
CoMoO4	-19.64	-27.40	-7.76	CoMoO4
CoO	-15.70	-2.11	13.59	CoO
CoS(alpha)	-72.20	-79.64	-7.44	CoS
CoS(beta)	-68.57	-79.64	-11.07	CoS
CoSe	-25.81	-42.01	-16.20	CoSe
CoSeO3	-21.73	-20.41	1.32	CoSeO3
CoSeO4:6H2O	-33.04	-34.57	-1.53	CoSeO4:6H2O
CoSO4	-27.49	-24.69	2.80	CoSO4
CoSO4:6H2O	-22.22	-24.69	-2.47	CoSO4:6H2O
Cotunnite	-9.93	-14.71	-4.78	PbCl2
Covellite	-55.05	-77.35	-22.30	CuS
Cr(OH)2	-20.13	-9.31	10.82	Cr(OH)2
Cr(OH)3	-2.51	-1.18	1.34	Cr(OH)3
Cr(OH)3(am)	-0.43	-1.18	-0.75	Cr(OH)3
Cr2O3	-0.00	-2.36	-2.36	Cr2O3
CrCl2	-46.01	-31.92	14.09	CrCl2
CrCl3	-50.21	-35.10	15.11	CrCl3
CrF3	-31.32	-42.66	-11.34	CrF3
Cristobalite	-2.30	-5.65	-3.35	SiO2
Crmetal	-61.94	-31.46	30.48	Cr
CrO3	-32.12	-35.33	-3.21	CrO3
Cryolite	-22.19	-56.03	-33.84	Na3AlF6
Cu(OH)2	-8.50	0.18	8.67	Cu(OH)2
Cu(SbO3)2	-36.36	8.86	45.21	Cu(SbO3)2
Cu2(OH)3NO3	-35.38	-26.13	9.25	Cu2(OH)3NO3
Cu2Sb:3H2O	-57.42	-92.30	-34.88	Cu2Sb:3H2O
Cu2Se(alpha)	-10.51	-56.31	-45.80	Cu2Se
Cu2SO4	-37.05	-39.00	-1.95	Cu2SO4
Cu3(AsO4)2:2H2O	-37.57	-31.47	6.10	Cu3(AsO4)2:2H2O
Cu3(PO4)2	-47.42	-84.27	-36.85	Cu3(PO4)2
Cu3(PO4)2:3H2O	-49.15	-84.27	-35.12	Cu3(PO4)2:3H2O
Cu3Sb	-66.30	-108.89	-42.59	Cu3Sb
Cu3Se2	-32.54	-96.03	-63.49	Cu3Se2
CuCrO4	-29.71	-35.15	-5.44	CuCrO4
CuF	-17.13	-22.03	-4.91	CuF
CuF2	-28.59	-27.48	1.12	CuF2
CuF2:2H2O	-22.93	-27.48	-4.55	CuF2:2H2O
Cumetal	-10.53	-19.28	-8.76	Cu
CuMoO4	-12.04	-25.11	-13.08	CuMoO4
CuOCuSO4	-32.53	-22.23	10.30	CuOCuSO4

Cupricferrite	-7.23	-1.24	5.99	CuFe2O4
Cuprite	-15.01	-16.42	-1.41	Cu2O
Cuprousferrite	0.00	-8.92	-8.92	CuFeO2
CuSe	-6.62	-39.72	-33.10	CuSe
CuSe2	-24.10	-57.46	-33.37	CuSe2
CuSeO3:2H2O	-18.64	-18.12	0.51	CuSeO3:2H2O
CuSeO4:5H2O	-29.84	-32.28	-2.44	CuSeO4:5H2O
CuSO4	-25.34	-22.40	2.94	CuSO4
Diaspore	0.00	6.87	6.87	AlOOH
Djurleite	-58.93	-92.85	-33.92	Cu0.066Cu1.868S
Epsomite	-4.99	-7.12	-2.13	MgSO4:7H2O
Fe(OH)2	-12.32	1.25	13.56	Fe(OH)2
Fe(OH)2.7Cl.3	-1.06	-4.10	-3.04	Fe(OH)2.7Cl.3
Fe(VO3)2	-14.65	-18.37	-3.72	Fe(VO3)2
Fe2(OH)4SeO3	-21.27	-19.72	1.55	Fe2(OH)4SeO3
Fe2(SeO3)3:2H2O	-35.70	-56.32	-20.63	Fe2(SeO3)3:2H2O
Fe2(SO4)3	-65.43	-69.16	-3.73	Fe2(SO4)3
Fe3(OH)8	-20.39	-0.17	20.22	Fe3(OH)8
FeAsO4:2H2O	-17.11	-16.71	0.40	FeAsO4:2H2O
FeCr2O4	-8.31	-1.11	7.20	FeCr2O4
FeMoO4	-13.95	-24.04	-10.09	FeMoO4
Ferrihydrite	-3.90	-0.71	3.19	Fe(OH)3
Ferroselite	-37.80	-56.39	-18.60	FeSe2
FeS(ppt)	-73.33	-76.28	-2.95	FeS
FeSe	-27.65	-38.65	-11.00	FeSe
Fluorite	-0.58	-11.08	-10.50	CaF2
Galena	-55.65	-69.62	-13.97	PbS
Gibbsite	-1.42	6.87	8.29	Al(OH)3
Goethite	-1.20	-0.71	0.49	FeOOH
Goslarite	-9.29	-11.30	-2.01	ZnSO4:7H2O
Greenalite	-28.37	-7.56	20.81	Fe3Si2O5(OH)4
Greenockite	-53.99	-68.35	-14.36	CdS
Greigite	-265.24	-310.28	-45.03	Fe3S4
Gummite	-2.38	5.29	7.67	UO3
Gypsum	-1.40	-6.01	-4.61	CaSO4:2H2O
H-Autunite	-26.29	-74.22	-47.93	H2(UO2)2(PO4)2
H-Jarosite	-35.19	-47.29	-12.10	(H3O)Fe3(SO4)2(OH)6
H2MoO4	-12.41	-25.29	-12.88	H2MoO4
H2S(g)	-69.52	-77.53	-8.01	H2S
H2Se(g)	-34.94	-39.90	-4.96	H2Se
H2Sn(OH)6	-7.91	-31.44	-23.53	H2Sn(OH)6
Halite	-6.22	-4.62	1.60	NaCl
Halloysite	-7.13	2.44	9.57	Al2Si2O5(OH)4
Hausmannite	0.00	61.03	61.03	Mn3O4
Hematite	0.00	-1.42	-1.42	Fe2O3
Hercynite	-7.90	14.99	22.89	FeAl2O4
Hg(g)	-8.77	-16.64	-7.87	Hg
Hg(OH)2	-12.59	-16.08	-3.50	Hg(OH)2
Hg2(g)	-18.33	-33.28	-14.96	Hg2
Hg2(OH)2	-16.39	-11.13	5.26	Hg2(OH)2
Hg2CrO4	-37.76	-46.46	-8.70	Hg2CrO4
Hg2F2	-28.42	-38.79	-10.36	Hg2F2
Hg2HPO4	-28.76	-53.53	-24.77	Hg2HPO4
Hg2S	-76.98	-88.66	-11.68	Hg2S
Hg2SeO3	-24.78	-29.43	-4.66	Hg2SeO3
Hg2SO4	-27.58	-33.71	-6.13	Hg2SO4
HgCl(g)	-36.37	-16.87	19.50	HgCl
HgCl2	-17.43	-38.69	-21.26	HgCl2
HgF(g)	-52.07	-19.39	32.68	HgF
HgF2(g)	-56.30	-43.74	12.57	HgF2
Hgmetal(l)	-3.19	-16.64	-13.45	Hg
HgSe	-0.28	-55.98	-55.69	HgSe
HgSeO3	-21.95	-34.38	-12.43	HgSeO3

HgSO4	-29.25	-38.66	-9.42	HgSO4
Hinsdalite	-33.96	-36.46	-2.50	PbAl3PO4SO4(OH)6
Hydroxylapatite	0.00	-44.33	-44.33	Ca5(PO4)3OH
Hydroxylpyromorphite	-24.88	-87.67	-62.79	Pb5(PO4)3OH
K-Alum	-26.60	-31.77	-5.17	KAl(SO4)2:12H2O
K-Autunite	-12.93	-61.17	-48.24	K2(UO2)2(PO4)2
K-Jarosite	-25.97	-40.77	-14.80	KFe3(SO4)2(OH)6
K2Cr2O7	-40.37	-57.61	-17.24	K2Cr2O7
K2CrO4	-21.77	-22.28	-0.51	K2CrO4
K2MoO4	-15.51	-12.25	3.26	K2MoO4
K2SeO4	-18.68	-19.41	-0.73	K2SeO4
Kaolinite	-4.99	2.44	7.43	Al2Si2O5(OH)4
Langite	-39.36	-21.87	17.49	Cu4(OH)6SO4:H2O
Larnakite	-6.33	-6.77	-0.43	PbO:PbSO4
Laurionite	-4.02	-3.40	0.62	PbOHCl
Lepidocrocite	-2.08	-0.71	1.37	FeOOH
Lime	-16.13	16.57	32.70	CaO
Litharge	-4.79	7.91	12.69	PbO
Mackinawite	-72.68	-76.28	-3.60	FeS
Maghemite	-7.80	-1.42	6.39	Fe2O3
Magnesioferrite	-2.81	14.05	16.86	Fe2MgO4
Magnetite	-3.57	-0.17	3.40	Fe3O4
Manganite	-1.30	24.04	25.34	MnOOH
Massicot	-4.99	7.91	12.89	PbO
Matlockite	-8.25	-17.23	-8.97	PbClF
Melanothallite	-28.69	-22.43	6.26	CuCl2
Melanterite	-19.13	-21.34	-2.21	FeSO4:7H2O
Metacinnabar	-48.52	-93.61	-45.09	HgS
Mg(OH)2(active)	-3.33	15.47	18.79	Mg(OH)2
Mg(VO3)2	-15.43	-4.15	11.28	Mg(VO3)2
Mg2Sb3	-241.17	-166.49	74.68	Mg2Sb3
Mg2V2O7	-15.05	11.31	26.36	Mg2V2O7
Mg3(PO4)2	-15.13	-38.41	-23.28	Mg3(PO4)2
MgCr2O4	-3.09	13.11	16.20	MgCr2O4
MgCrO4	-25.24	-19.86	5.38	MgCrO4
MgF2	-4.06	-12.19	-8.13	MgF2
MgHPO4:3H2O	-8.76	-26.94	-18.18	MgHPO4:3H2O
MgMoO4	-7.98	-9.83	-1.85	MgMoO4
MgSeO3:6H2O	-5.89	-2.84	3.06	MgSeO3:6H2O
MgSeO4:6H2O	-15.79	-16.99	-1.20	MgSeO4:6H2O
Minium	-27.65	45.87	73.52	Pb3O4
Mirabilite	-8.10	-9.22	-1.11	Na2SO4:10H2O
Mn(VO3)2	-11.56	-6.66	4.90	Mn(VO3)2
Mn2(SO4)3	-64.66	-70.38	-5.71	Mn2(SO4)3
Mn2Sb	-130.50	-69.42	61.08	Mn2Sb
Mn3(AsO4)2:8H2O	-5.62	6.88	12.50	Mn3(AsO4)2:8H2O
Mn3(PO4)2	-22.10	-45.92	-23.83	Mn3(PO4)2
MnCl2:4H2O	-12.37	-9.65	2.72	MnCl2:4H2O
MnHPO4	-4.04	-29.44	-25.40	MnHPO4
MnS(grn)	-64.74	-64.57	0.17	MnS
MnS(pnk)	-67.91	-64.57	3.34	MnS
MnSb	-82.67	-85.58	-2.91	MnSb
MnSe	-30.44	-26.94	3.50	MnSe
MnSeO3	-6.47	-5.34	1.13	MnSeO3
MnSeO3:2H2O	-6.32	-5.34	0.98	MnSeO3:2H2O
MnSeO4:5H2O	-17.45	-19.50	-2.05	MnSeO4:5H2O
MnSO4	-12.21	-9.62	2.58	MnSO4
Monteponite	-5.92	9.18	15.10	CdO
Montroydite	-12.44	-16.08	-3.64	HgO
MoO3	-17.29	-25.29	-8.00	MoO3
Morenosite	-8.65	-10.80	-2.14	NiSO4:7H2O
MoS2	-132.24	-202.50	-70.26	MoS2
Na-Autunite	-13.44	-60.85	-47.41	Na2(UO2)2(PO4)2

Na-Jarosite	-29.41	-40.61	-11.20	NaFe3(SO4)2(OH)6
Na2Cr2O7	-47.39	-57.29	-9.90	Na2Cr2O7
Na2CrO4	-24.89	-21.96	2.93	Na2CrO4
Na2Mo2O7	-20.62	-37.21	-16.60	Na2Mo2O7
Na2MoO4	-13.41	-11.92	1.49	Na2MoO4
Na2MoO4:2H2O	-13.15	-11.92	1.22	Na2MoO4:2H2O
Na2SeO3:5H2O	-15.23	-4.93	10.30	Na2SeO3:5H2O
Na2SeO4	-20.37	-19.09	1.28	Na2SeO4
Na3Sb	-158.67	-64.21	94.45	Na3Sb
Na3VO4	-26.44	10.24	36.68	Na3VO4
Na4V2O7	-30.28	7.12	37.40	Na4V2O7
Nantokite	-12.78	-19.51	-6.73	CuCl
NaSb	-78.60	-55.43	23.17	NaSb
NaVO3	-6.98	-3.12	3.86	NaVO3
Ni(OH)2	-1.01	11.78	12.79	Ni(OH)2
Ni3(AsO4)2:8H2O	-12.35	3.35	15.70	Ni3(AsO4)2:8H2O
Ni3(PO4)2	-18.15	-49.45	-31.30	Ni3(PO4)2
Ni4(OH)6SO4	-7.44	24.56	32.00	Ni4(OH)6SO4
NiMoO4	-2.36	-13.51	-11.14	NiMoO4
Ningyoite	-21.97	-75.87	-53.91	CaU(PO4)2:2H2O
NiS(alpha)	-60.14	-65.74	-5.60	NiS
NiS(beta)	-54.64	-65.74	-11.10	NiS
NiS(gamma)	-52.94	-65.74	-12.80	NiS
NiSe	-10.41	-28.11	-17.70	NiSe
NiSeO3:2H2O	-9.33	-6.52	2.81	NiSeO3:2H2O
NiSeO4:6H2O	-19.16	-20.68	-1.52	NiSeO4:6H2O
Nsutite	-7.74	9.76	17.50	MnO2
O2(g)	-38.79	44.30	83.09	O2
Orpiment	-210.02	-271.09	-61.07	As2S3
Pb(BO2)2	-9.29	-2.78	6.52	Pb(BO2)2
Pb(OH)2	-0.24	7.91	8.15	Pb(OH)2
Pb2(OH)3Cl	-4.29	4.51	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-10.37	15.81	26.19	Pb2O(OH)2
Pb2O3	-23.08	37.96	61.04	Pb2O3
Pb2V2O7	-1.90	-3.80	-1.90	Pb2V2O7
Pb3(AsO4)2	-14.08	-8.28	5.80	Pb3(AsO4)2
Pb3(PO4)2	-17.55	-61.08	-43.53	Pb3(PO4)2
Pb3(VO4)2	-2.04	4.10	6.14	Pb3(VO4)2
Pb3O2SO4	-9.55	1.14	10.69	Pb3O2SO4
Pb4(OH)6SO4	-12.06	9.04	21.10	Pb4(OH)6SO4
Pb4O3SO4	-12.83	9.04	21.88	Pb4O3SO4
PbCrO4	-14.82	-27.42	-12.60	PbCrO4
PbF2	-12.31	-19.75	-7.44	PbF2
PbHPO4	-10.69	-34.49	-23.81	PbHPO4
Pbmetal	-18.49	-14.24	4.25	Pb
PbMoO4	-1.76	-17.38	-15.62	PbMoO4
PbO:0.3H2O	-5.07	7.91	12.98	PbO:0.33H2O
PbSeO4	-17.71	-24.55	-6.84	PbSeO4
Periclase	-6.12	15.47	21.58	MgO
Plattnerite	-19.54	30.06	49.60	PbO2
Plumbgummite	-23.49	-56.28	-32.79	PbAl3(PO4)2(OH)5:H2O
Portlandite	-6.23	16.57	22.80	Ca(OH)2
Przhevalskite	-21.95	-66.31	-44.37	Pb(UO2)2(PO4)2
Pyrite	-113.15	-131.66	-18.51	FeS2
Pyrochroite	-2.23	12.96	15.19	Mn(OH)2
Pyrolusite	-6.27	35.11	41.38	MnO2
Pyromorphite	-14.55	-98.98	-84.43	Pb5(PO4)3Cl
Quartz	-1.65	-5.65	-4.00	SiO2
Realgar	-88.11	-107.86	-19.75	AsS
Retgersite	-8.76	-10.80	-2.04	NiSO4:6H2O
Saleeite	-15.11	-58.75	-43.65	Mg(UO2)2(PO4)2
Sb(OH)3	-10.70	-17.81	-7.11	Sb(OH)3
Sb2O4	-16.88	-13.47	3.40	Sb2O4

Sb2O5	-30.28	-39.94	-9.67	Sb2O5
Sb2Se3	-87.55	-155.31	-67.76	Sb2Se3
Sb4O6(cubic)	-52.99	-71.25	-18.26	Sb4O6
Sb4O6(orth)	-53.35	-71.25	-17.90	Sb4O6
SbCl3	-52.30	-51.73	0.57	SbCl3
SbF3	-49.07	-59.29	-10.23	SbF3
Sbmetal	-39.35	-51.04	-11.69	Sb
SbO2	-3.22	-31.05	-27.82	SbO2
Schoepite	-0.70	5.29	5.99	UO2(OH)2:H2O
Semetal(am)	-10.63	-17.74	-7.11	Se
Semetal(hex	-10.04	-17.74	-7.71	Se
Senarmontite	-23.26	-35.63	-12.37	Sb2O3
SeO2	-18.43	-18.30	0.12	SeO2
SeO3	-53.50	-32.46	21.04	SeO3
Sepiolite	-1.79	13.97	15.76	Mg2Si3O7.5OH:3H2O
Sepiolite(A)	-4.81	13.97	18.78	Mg2Si3O7.5OH:3H2O
SiO2(am-gel)	-2.94	-5.65	-2.71	SiO2
SiO2(am-ppt)	-2.91	-5.65	-2.74	SiO2
Sn(OH)2	-28.96	-34.39	-5.43	Sn(OH)2
Sn(OH)4	-9.16	-31.44	-22.28	Sn(OH)4
Sn(SO4)2	-61.39	-76.61	-15.21	Sn(SO4)2
SnCl2	-47.73	-57.01	-9.28	SnCl2
Snmetal(wht)	-54.22	-56.54	-2.33	Sn
SnO	-29.48	-34.39	-4.91	SnO
SnO2	-2.47	-31.44	-28.97	SnO2
SnS	-92.81	-111.92	-19.11	SnS
SnS2	-129.04	-186.50	-57.45	SnS2
SnSe	-43.79	-74.29	-30.49	SnSe
SnSe2	-46.11	-111.23	-65.12	SnSe2
SnSO4	-0.00	-56.97	-56.97	SnSO4
Sphalerite	-54.79	-66.24	-11.45	ZnS
Spinel	-7.64	29.21	36.85	MgAl2O4
Sr-Autunite	-16.73	-61.19	-44.46	Sr(UO2)2(PO4)2
SrCrO4	-17.65	-22.30	-4.65	SrCrO4
SrF2	-6.05	-14.63	-8.58	SrF2
SrHPO4	-10.08	-29.38	-19.30	SrHPO4
SrSeO3	-7.58	-5.28	2.30	SrSeO3
SrSeO4	-15.03	-19.43	-4.40	SrSeO4
Stibnite	-217.75	-268.21	-50.46	Sb2S3
Strengite	-16.71	-43.11	-26.40	FePO4:2H2O
Sulfur	-53.23	-55.38	-2.14	S
Tenorite	-7.47	0.18	7.64	CuO
Thenardite	-9.53	-9.21	0.32	Na2SO4
Tl(OH)3	-17.75	-23.19	-5.44	Tl(OH)3
Tl2CrO4	-22.91	-34.92	-12.01	Tl2CrO4
Tl2MoO4	-16.89	-24.88	-7.99	Tl2MoO4
Tl2O	-26.68	0.41	27.09	Tl2O
Tl2S	-69.93	-77.12	-7.19	Tl2S
Tl2Se	-21.39	-39.49	-18.10	Tl2Se
Tl2SeO4	-27.95	-32.05	-4.10	Tl2SeO4
Tl2SO4	-18.39	-22.17	-3.79	Tl2SO4
TlCl	-7.36	-11.10	-3.74	TlCl
Tlmetal	-16.55	-10.87	5.68	Tl
TlNO3	-24.67	-26.28	-1.61	TlNO3
TlOH	-12.71	0.20	12.92	TlOH
Torbernite	-28.76	-74.04	-45.28	Cu(UO2)2(PO4)2
Tsumebite	-16.62	-26.41	-9.79	Pb2CuPO4(OH)3:3H2O
Tyuyamunite	3.46	7.54	4.08	Ca(UO2)2(VO4)2
U(HPO4)2:4H2O	-40.86	-92.45	-51.58	U(HPO4)2:4H2O
U3O8	0.29	21.38	21.08	U3O8
U3Sb4	-512.38	-359.99	152.38	U3Sb4
U4O9	-5.40	-8.42	-3.02	U4O9
UF4	-33.41	-62.95	-29.54	UF4

UF4:2.5H2O	-30.23	-62.95	-32.72	UF4:2.5H2O
UO2(am)	-8.58	-7.64	0.93	UO2
UO2(NO3)2	-59.82	-47.67	12.15	UO2(NO3)2
UO2(NO3)2:2H2O	-52.52	-47.67	4.85	UO2(NO3)2:2H2O
UO2(NO3)2:3H2O	-51.06	-47.67	3.39	UO2(NO3)2:3H2O
UO2(NO3)2:6H2O	-49.72	-47.67	2.05	UO2(NO3)2:6H2O
UO2(OH)2(beta)	-0.32	5.29	5.61	UO2(OH)2
UO2HPO4	-12.88	-37.11	-24.23	UO2HPO4
UO2SeO4:4H2O	-24.92	-27.17	-2.25	UO2SeO4:4H2O
UO3	-2.41	5.29	7.70	UO3
Uramphite	-14.49	-66.24	-51.75	(NH4)2(UO2)2(PO4)2
Uraninite	-2.97	-7.64	-4.67	UO2
Uranocircite	-21.89	-66.52	-44.63	Ba(UO2)2(PO4)2
USb2	-192.82	-163.24	29.58	USb2
V(OH)3	-16.95	-9.36	7.59	V(OH)3
V2O5	-18.26	-19.62	-1.36	V2O5
V3O5	-35.93	-34.10	1.84	V3O5
V4O7	-45.26	-38.08	7.19	V4O7
V6O13	-42.30	-103.16	-60.86	V6O13
Valentinite	-27.14	-35.63	-8.48	Sb2O3
VCl2	-61.92	-43.05	18.87	VCl2
VCl3	-66.71	-43.28	23.43	VCl3
VF4	-74.22	-59.29	14.93	VF4
Vivianite	-45.06	-81.06	-36.00	Fe3(PO4)2:8H2O
Vmetal	-86.61	-42.59	44.03	V
VO	-35.19	-20.44	14.76	VO
VO(OH)2	-9.13	-3.98	5.15	VO(OH)2
VO2Cl	-23.96	-21.12	2.84	VO2Cl
VOCl	-31.82	-20.67	11.15	VOCl
VOCl2	-39.35	-26.59	12.76	VOCl2
VOSO4	-30.17	-26.56	3.61	VOSO4
Wurtzite	-57.29	-66.24	-8.95	ZnS
Zincite	-0.05	11.28	11.33	ZnO
Zincosite	-15.23	-11.30	3.93	ZnSO4
Zn(BO2)2	-7.69	0.60	8.29	Zn(BO2)2
Zn(NO3)2:6H2O	-45.00	-41.68	3.32	Zn(NO3)2:6H2O
Zn(OH)2	-0.92	11.28	12.20	Zn(OH)2
Zn(OH)2(am)	-1.19	11.28	12.47	Zn(OH)2
Zn(OH)2(beta)	-0.47	11.28	11.75	Zn(OH)2
Zn(OH)2(epsilon)	-0.25	11.28	11.53	Zn(OH)2
Zn(OH)2(gamma)	-0.45	11.28	11.73	Zn(OH)2
Zn2(OH)2SO4	-7.51	-0.01	7.50	Zn2(OH)2SO4
Zn2(OH)3Cl	-3.93	11.26	15.19	Zn2(OH)3Cl
Zn3(AsO4)2:2.5H2O	-11.80	1.85	13.65	Zn3(AsO4)2:2.5H2O
Zn3(PO4)2:4H2O	-15.53	-50.95	-35.42	Zn3(PO4)2:4H2O
Zn3O(SO4)2	-30.22	-11.31	18.91	Zn3O(SO4)2
Zn4(OH)6SO4	-5.84	22.56	28.40	Zn4(OH)6SO4
Zn5(OH)8Cl2	-4.69	33.81	38.50	Zn5(OH)8Cl2
ZnCl2	-18.38	-11.33	7.05	ZnCl2
ZnF2	-15.83	-16.37	-0.53	ZnF2
Znmetal	-36.66	-10.87	25.79	Zn
ZnMoO4	-3.88	-14.01	-10.13	ZnMoO4
ZnO(active)	0.10	11.28	11.19	ZnO
ZnS(am)	-57.19	-66.24	-9.05	ZnS
ZnSb	-72.92	-61.91	11.01	ZnSb
ZnSe	-14.21	-28.61	-14.40	ZnSe
ZnSeO4:6H2O	-19.65	-21.17	-1.52	ZnSeO4:6H2O
ZnSO4:1H2O	-10.66	-11.30	-0.64	ZnSO4:1H2O

End of simulation.

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Reading input data for simulation 7.
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       MIX  6    Blend  leachate & runoff
       5    0.172160486806402
       3    0.827839513193598
       SAVE SOLUTION 6
       END
----------------------------------------
Beginning of batch-reaction calculations.
----------------------------------------

Reaction step 1.

Using mix 6.  Blend  leachate & runoff

Mixture 6.   Blend  leachate & runoff

        1.722e-001 Solution 5     Solution after simulation 6.
        8.278e-001 Solution 3

-----------------------------Solution composition------------------------------

       Elements           Molality       Moles

       Ag               1.919e-013  1.919e-013
       Al               9.524e-008  9.524e-008
       As               2.322e-007  2.322e-007
       B                2.851e-006  2.851e-006
       Ba               1.674e-012  1.674e-012
       Ca               1.303e-003  1.303e-003
       Cd               1.633e-010  1.633e-010
       Cl               3.078e-003  3.078e-003
       Co               1.405e-015  1.405e-015
       Cr               1.894e-010  1.894e-010
       Cu               1.356e-015  1.356e-015
       F                1.000e-005  1.000e-005
       Fe               4.226e-014  4.226e-014
       Hg               1.450e-011  1.450e-011
       K                2.171e-004  2.171e-004
       Mg               1.019e-004  1.019e-004
       Mn               3.822e-007  3.822e-007
       Mo               1.579e-007  1.579e-007
       N                1.609e-006  1.609e-006
       Na               3.152e-004  3.152e-004
       Ni               3.788e-008  3.788e-008
       P                3.260e-011  3.260e-011
       Pb               2.578e-010  2.578e-010
       S                1.227e-004  1.227e-004
       Sb               5.912e-009  5.912e-009
       Se               7.437e-009  7.437e-009
       Si               5.811e-007  5.811e-007
       Sn               1.129e-013  1.129e-013
       Sr               3.674e-007  3.674e-007
       Tl               1.134e-010  1.134e-010
       U                4.163e-010  4.163e-010
       V                7.495e-008  7.495e-008
       Zn               8.874e-008  8.874e-008

----------------------------Description of solution----------------------------

                                       pH  =   8.915      Charge balance
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                                        pe  =   2.487      Adjusted to redox
equilibrium
                         Activity of water  =   1.000
                            Ionic strength  =  4.800e-003
                        Mass of water (kg)  =  1.000e+000
                  Total alkalinity (eq/kg)  =  1.168e-005
                     Total carbon (mol/kg)  =  0.000e+000
                        Total CO2 (mol/kg)  =  0.000e+000
                      Temperature (deg C)  =  25.000
                   Electrical balance (eq)  = -1.459e-018
 Percent error, 100*(Cat-|An|)/(Cat+|An|)  =  -0.00
                               Iterations  =  16
                                  Total H  = 1.110137e+002
                                  Total O  = 5.550735e+001

----------------------------Distribution of species----------------------------

                                                     Log        Log         Log
   Species                  Molality    Activity  Molality  Activity     Gamma

   OH-                    8.919e-006  8.272e-006    -5.050    -5.082    -0.033
   H+                     1.311e-009  1.217e-009    -8.882    -8.915    -0.032
   H2O                    5.551e+001  9.999e-001     1.744    -0.000     0.000
Ag               1.919e-013
   AgCl                   1.316e-013  1.316e-013   -12.881   -12.881     0.000
   AgCl2-                 3.553e-014  3.276e-014   -13.449   -13.485    -0.035
   Ag+                    2.429e-014  2.255e-014   -13.614   -13.647    -0.032
   Ag2Se                  1.277e-016  1.277e-016   -15.894   -15.894     0.000
   AgCl3-2                1.155e-016  8.343e-017   -15.938   -16.079    -0.141
   AgSO4-                 3.787e-017  3.492e-017   -16.422   -16.457    -0.035
   AgNH3+                 2.429e-017  2.240e-017   -16.615   -16.650    -0.035
   AgOH                   1.866e-017  1.866e-017   -16.729   -16.729     0.000
   AgCl4-3                1.011e-018  4.868e-019   -17.995   -18.313    -0.318
   AgF                    5.164e-019  5.164e-019   -18.287   -18.287     0.000
   AgH2BO3                3.149e-019  3.149e-019   -18.502   -18.502     0.000
   Ag(NH3)2+              9.603e-020  8.854e-020   -19.018   -19.053    -0.035
   AgSeO3-                6.815e-020  6.283e-020   -19.167   -19.202    -0.035
   Ag(OH)2-               1.636e-020  1.508e-020   -19.786   -19.822    -0.035
   AgNO2                  2.630e-022  2.630e-022   -21.580   -21.580     0.000
   Ag(SeO3)2-3            5.067e-027  2.439e-027   -26.295   -26.613    -0.318
   AgNO3                  1.709e-030  1.709e-030   -29.767   -29.767     0.000
   Ag(NO2)2-              2.466e-032  2.274e-032   -31.608   -31.643    -0.035
   Ag2MoO4                2.258e-035  2.258e-035   -34.646   -34.646     0.000
   AgHS                   0.000e+000  0.000e+000   -70.408   -70.408     0.000
   AgOH(Se)2-4            0.000e+000  0.000e+000   -71.699   -72.264    -0.565
   Ag(HS)S4-2             0.000e+000  0.000e+000  -135.347  -135.453    -0.105
   Ag(S4)2-3              0.000e+000  0.000e+000  -135.766  -135.978    -0.212
   AgS4S5-3               0.000e+000  0.000e+000  -136.083  -136.289    -0.205
   Ag(HS)2-               0.000e+000  0.000e+000  -136.848  -136.884    -0.035
Al               9.524e-008
   Al(OH)4-               9.515e-008  8.839e-008    -7.022    -7.054    -0.032
   Al(OH)3                8.488e-011  8.488e-011   -10.071   -10.071     0.000
   Al(OH)2+               5.529e-013  5.143e-013   -12.257   -12.289    -0.031
   AlOH+2                 1.045e-016  7.827e-017   -15.981   -16.106    -0.126
   AlF2+                  3.364e-018  3.129e-018   -17.473   -17.505    -0.031
   AlF+2                  1.152e-018  8.624e-019   -17.939   -18.064    -0.126
   AlF3                   3.591e-019  3.591e-019   -18.445   -18.445     0.000
   Al+3                   1.847e-020  9.462e-021   -19.734   -20.024    -0.290
   AlSO4+                 6.134e-021  5.698e-021   -20.212   -20.244    -0.032
   AlF4-                  1.766e-021  1.640e-021   -20.753   -20.785    -0.032
   Al(SO4)2-              5.099e-024  4.737e-024   -23.292   -23.324    -0.032
   AlMo6O21-3             0.000e+000  0.000e+000   -59.786   -60.104    -0.318
As(3)            7.061e-020
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   H3AsO3                4.845e-020  4.845e-020   -19.315   -19.315     0.000
   H2AsO3-               2.214e-020  2.041e-020   -19.655   -19.690    -0.035
   HAsO3-2               2.117e-023  1.530e-023   -22.674   -22.815    -0.141
   AsO3-3                1.006e-027  4.844e-028   -26.997   -27.315    -0.318
   H4AsO3+               3.169e-029  2.921e-029   -28.499   -28.534    -0.035
As(5)            2.322e-007
   HAsO4-2               2.293e-007  1.657e-007    -6.640    -6.781    -0.141
   H2AsO4-               1.995e-009  1.839e-009    -8.700    -8.735    -0.035
   AsO4-3                8.943e-010  4.304e-010    -9.049    -9.366    -0.318
   H3AsO4                3.886e-016  3.890e-016   -15.411   -15.410     0.000
B                2.851e-006
   H3BO3                 1.844e-006  1.846e-006    -5.734    -5.734     0.000
   H2BO3-                9.513e-007  8.809e-007    -6.022    -6.055    -0.033
   CaH2BO3+              5.229e-008  4.842e-008    -7.282    -7.315    -0.033
   MgH2BO3+              2.462e-009  2.280e-009    -8.609    -8.642    -0.033
   NaH2BO3               4.083e-010  4.083e-010    -9.389    -9.389     0.000
   SrH2BO3+              9.108e-012  8.434e-012   -11.041   -11.074    -0.033
   BF(OH)3-              7.251e-012  6.715e-012   -11.140   -11.173    -0.033
   H5(BO3)2-             1.495e-012  1.384e-012   -11.825   -11.859    -0.033
   H8(BO3)3-             2.760e-016  2.556e-016   -15.559   -15.593    -0.033
   BaH2BO3+              3.656e-017  3.385e-017   -16.437   -16.470    -0.033
   BF2(OH)2-             8.601e-018  7.965e-018   -17.065   -17.099    -0.033
   AgH2BO3               3.149e-019  3.149e-019   -18.502   -18.502     0.000
   BF3OH-                3.713e-026  3.438e-026   -25.430   -25.464    -0.033
   BF4-                  2.027e-033  1.877e-033   -32.693   -32.727    -0.033
Ba               1.674e-012
   Ba+2                  1.674e-012  1.244e-012   -11.776   -11.905    -0.129
   BaOH+                 4.830e-017  4.490e-017   -16.316   -16.348    -0.032
   BaH2BO3+              3.656e-017  3.385e-017   -16.437   -16.470    -0.033
   BaNH3+2               5.282e-019  3.816e-019   -18.277   -18.418    -0.141
   BaNO3+                6.448e-028  5.945e-028   -27.191   -27.226    -0.035
Ca               1.303e-003
   Ca+2                  1.286e-003  9.552e-004    -2.891    -3.020    -0.129
   CaSO4                 1.698e-005  1.698e-005    -4.770    -4.770     0.000
   CaOH+                 1.693e-007  1.577e-007    -6.771    -6.802    -0.031
   CaF+                  1.022e-007  9.503e-008    -6.990    -7.022    -0.032
   CaH2BO3+              5.229e-008  4.842e-008    -7.282    -7.315    -0.033
   CaNH3+2               8.095e-010  5.849e-010    -9.092    -9.233    -0.141
   CaPO4-                1.162e-011  1.081e-011   -10.935   -10.966    -0.031
   CaHPO4                4.947e-012  4.947e-012   -11.306   -11.306     0.000
   CaH2PO4+              5.001e-015  4.652e-015   -14.301   -14.332    -0.031
   Ca(NH3)2+2            1.567e-016  1.132e-016   -15.805   -15.946    -0.141
   CaNO3+                3.125e-019  2.881e-019   -18.505   -18.540    -0.035
Cd               1.633e-010
   Cd+2                  1.201e-010  8.921e-011    -9.921   -10.050    -0.129
   CdCl+                 2.641e-011  2.435e-011   -10.578   -10.614    -0.035
   CdOHCl                8.261e-012  8.261e-012   -11.083   -11.083     0.000
   CdOH+                 6.358e-012  5.862e-012   -11.197   -11.232    -0.035
   CdSO4                 1.623e-012  1.623e-012   -11.790   -11.790     0.000
   Cd(OH)2               3.059e-013  3.059e-013   -12.514   -12.514     0.000
   CdCl2                 2.900e-013  2.900e-013   -12.538   -12.538     0.000
   CdF+                  1.398e-014  1.289e-014   -13.855   -13.890    -0.035
   Cd(SO4)2-2            2.350e-015  1.698e-015   -14.629   -14.770    -0.141
   CdCl3-                5.673e-016  5.230e-016   -15.246   -15.282    -0.035
   Cd(OH)3-              1.677e-016  1.546e-016   -15.775   -15.811    -0.035
   CdF2                  2.344e-019  2.344e-019   -18.630   -18.630     0.000
   Cd2OH+3               5.445e-021  2.621e-021   -20.264   -20.582    -0.318
   Cd(SeO3)2-2           1.912e-021  1.381e-021   -20.719   -20.860    -0.141
   CdSeO4                5.650e-022  5.650e-022   -21.248   -21.248     0.000
   Cd(OH)4-2             2.897e-022  2.093e-022   -21.538   -21.679    -0.141
   CdNO3+                2.919e-026  2.691e-026   -25.535   -25.570    -0.035
   Cd(NO3)2              0.000e+000  0.000e+000   -41.891   -41.891     0.000
   CdHS+                 0.000e+000  0.000e+000   -72.582   -72.617    -0.035
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Cd(HS)2	0.000e+000	0.000e+000	-135.989	-135.989	0.000
Cd(HS)3-	0.000e+000	0.000e+000	-204.629	-204.665	-0.035
Cd(HS)4-2	0.000e+000	0.000e+000	-272.903	-273.044	-0.141
Cl	3.078e-003				
Cl-	3.078e-003	2.858e-003	-2.512	-2.544	-0.032
ZnOHCl	1.983e-009	1.983e-009	-8.703	-8.703	0.000
MnCl+	1.038e-009	9.653e-010	-8.984	-9.015	-0.032
ZnCl+	1.972e-010	1.831e-010	-9.705	-9.737	-0.032
NiCl+	1.936e-010	1.785e-010	-9.713	-9.748	-0.035
CdCl+	2.641e-011	2.435e-011	-10.578	-10.614	-0.035
CdOHCl	8.261e-012	8.261e-012	-11.083	-11.083	0.000
MnCl2	3.897e-012	3.897e-012	-11.409	-11.409	0.000
PbCl+	9.605e-013	8.856e-013	-12.017	-12.053	-0.035
TlCl	9.570e-013	9.570e-013	-12.019	-12.019	0.000
ZnCl2	8.292e-013	8.292e-013	-12.081	-12.081	0.000
CdCl2	2.900e-013	2.900e-013	-12.538	-12.538	0.000
AgCl	1.316e-013	1.316e-013	-12.881	-12.881	0.000
AgCl2-	3.553e-014	3.276e-014	-13.449	-13.485	-0.035
PbCl2	1.130e-014	1.130e-014	-13.947	-13.947	0.000
MnCl3-	3.299e-015	3.067e-015	-14.482	-14.513	-0.032
NiCl2	2.568e-015	2.568e-015	-14.590	-14.590	0.000
ZnCl3-	2.028e-015	1.882e-015	-14.693	-14.725	-0.032
TlCl2-	1.747e-015	1.610e-015	-14.758	-14.793	-0.035
CdCl3-	5.673e-016	5.230e-016	-15.246	-15.282	-0.035
UO2Cl+	4.958e-016	4.571e-016	-15.305	-15.340	-0.035
AgCl3-2	1.155e-016	8.343e-017	-15.938	-16.079	-0.141
CuCl	9.196e-017	9.196e-017	-16.036	-16.036	0.000
CuCl2-	5.915e-017	5.491e-017	-16.228	-16.260	-0.032
PbCl3-	1.395e-017	1.286e-017	-16.855	-16.891	-0.035
CoCl+	8.870e-018	8.178e-018	-17.052	-17.087	-0.035
HgClOH	6.168e-018	6.168e-018	-17.210	-17.210	0.000
ZnCl4-2	3.601e-018	2.690e-018	-17.444	-17.570	-0.127
AgCl4-3	1.011e-018	4.868e-019	-17.995	-18.313	-0.318
HgCl2	1.207e-019	1.207e-019	-18.918	-18.918	0.000
CuCl+	7.810e-020	7.250e-020	-19.107	-19.140	-0.032
CuCl3-2	4.492e-020	3.355e-020	-19.348	-19.474	-0.127
PbCl4-2	2.325e-020	1.680e-020	-19.634	-19.775	-0.141
HgCl3-	3.740e-021	3.448e-021	-20.427	-20.462	-0.035
CrCl+2	8.042e-022	5.811e-022	-21.095	-21.236	-0.141
CrOHCl2	2.611e-022	2.611e-022	-21.583	-21.583	0.000
CuCl2	7.184e-023	7.184e-023	-22.144	-22.144	0.000
HgCl4-2	5.429e-023	3.923e-023	-22.265	-22.406	-0.141
HgCl+	9.137e-024	8.424e-024	-23.039	-23.074	-0.035
VOCl+	1.889e-024	1.742e-024	-23.724	-23.759	-0.035
CrCl2+	1.709e-025	1.576e-025	-24.767	-24.803	-0.035
CuCl3-	2.064e-027	1.916e-027	-26.685	-26.718	-0.032
FeCl+2	1.640e-029	1.225e-029	-28.785	-28.912	-0.127
CrO3Cl-	9.984e-031	9.204e-031	-30.001	-30.036	-0.035
FeCl2+	1.682e-031	1.564e-031	-30.774	-30.806	-0.032
CuCl4-2	3.674e-032	2.744e-032	-31.435	-31.562	-0.127
TlOHCl+	2.973e-034	2.741e-034	-33.527	-33.562	-0.035
FeCl3	4.469e-035	4.469e-035	-34.350	-34.350	0.000
TlCl3	3.957e-039	3.957e-039	-38.403	-38.403	0.000
TlCl2+	1.434e-039	1.322e-039	-38.843	-38.879	-0.035
TlCl4-	7.740e-040	7.136e-040	-39.111	-39.147	-0.035
TlCl+2	0.000e+000	0.000e+000	-41.953	-42.095	-0.141
UCl+3	0.000e+000	0.000e+000	-44.948	-45.266	-0.318
Cr(NH3)6Cl+2	0.000e+000	0.000e+000	-44.983	-45.124	-0.141
CoCl+2	0.000e+000	0.000e+000	-45.090	-45.231	-0.141
SnCl+	0.000e+000	0.000e+000	-46.115	-46.150	-0.035
SnCl2	0.000e+000	0.000e+000	-47.904	-47.904	0.000
Co(NH3)5Cl+2	0.000e+000	0.000e+000	-50.702	-50.843	-0.141
SnCl3-	0.000e+000	0.000e+000	-51.586	-51.622	-0.035

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   Co(NH3)6Cl+2          0.000e+000  0.000e+000   -63.731   -63.872    -0.141
Co(2)           1.405e-015
   Co+2                  1.145e-015  8.272e-016   -14.941   -15.082    -0.141
   CoOH+                 1.481e-016  1.365e-016   -15.829   -15.865    -0.035
   Co(OH)2               8.971e-017  8.971e-017   -16.047   -16.047     0.000
   CoSO4                 1.281e-017  1.281e-017   -16.893   -16.893     0.000
   CoCl+                 8.870e-018  8.178e-018   -17.052   -17.087    -0.035
   CoF+                  2.586e-019  2.384e-019   -18.587   -18.623    -0.035
   Co(NH3)+2             6.694e-020  4.837e-020   -19.174   -19.315    -0.141
   Co(OH)3-              1.606e-020  1.481e-020   -19.794   -19.830    -0.035
   CoOOH-                4.030e-021  3.715e-021   -20.395   -20.430    -0.035
   CoHPO4                1.022e-023  1.022e-023   -22.990   -22.990     0.000
   Co(NH3)2+2            1.389e-024  1.004e-024   -23.857   -23.998    -0.141
   CoNO2+                3.529e-025  3.254e-025   -24.452   -24.488    -0.035
   Co(OH)4-2             2.687e-026  1.941e-026   -25.571   -25.712    -0.141
   CoSeO4                1.410e-026  1.410e-026   -25.851   -25.851     0.000
   Co(NH3)3+2            8.504e-030  6.144e-030   -29.070   -29.212    -0.141
   CoNO3+                1.356e-031  1.251e-031   -30.868   -30.903    -0.035
   Co2OH+3               1.176e-032  5.660e-033   -31.930   -32.247    -0.318
   Co(NH3)4+2            2.170e-035  1.568e-035   -34.663   -34.805    -0.141
   Co(NH3)5+2            0.000e+000  0.000e+000   -40.756   -40.898    -0.141
   Co(NO3)2              0.000e+000  0.000e+000   -46.615   -46.615     0.000
   Co4(OH)4+4            0.000e+000  0.000e+000   -54.595   -55.159    -0.565
Co(3)           5.876e-038
   CoOH+2                5.876e-038  4.246e-038   -37.231   -37.372    -0.141
   Co+3                  0.000e+000  0.000e+000   -44.705   -44.996    -0.290
   CoCl+2                0.000e+000  0.000e+000   -45.090   -45.231    -0.141
   Co(NH3)5Cl+2          0.000e+000  0.000e+000   -50.702   -50.843    -0.141
   Co(NH3)6SO4+          0.000e+000  0.000e+000   -60.478   -60.513    -0.035
   Co(NH3)6OH+2          0.000e+000  0.000e+000   -62.069   -62.210    -0.141
   Co(NH3)6Cl+2          0.000e+000  0.000e+000   -63.731   -63.872    -0.141
Cr(2)           1.694e-028
   Cr+2                  1.694e-028  1.224e-028   -27.771   -27.912    -0.141
Cr(3)           1.894e-010
   Cr(OH)3               8.893e-011  8.893e-011   -10.051   -10.051     0.000
   CrO2-                 3.764e-011  3.470e-011   -10.424   -10.460    -0.035
   Cr(OH)4-              3.176e-011  2.929e-011   -10.498   -10.533    -0.035
   Cr(OH)2+              3.104e-011  2.862e-011   -10.508   -10.543    -0.035
   Cr(OH)+2              3.935e-014  2.843e-014   -13.405   -13.546    -0.141
   CrOHSO4               5.235e-016  5.235e-016   -15.281   -15.281     0.000
   Cr+3                  3.264e-019  1.571e-019   -18.486   -18.804    -0.318
   CrF+2                 3.141e-019  2.270e-019   -18.503   -18.644    -0.141
   CrSO4+                3.087e-020  2.846e-020   -19.510   -19.546    -0.035
   CrCl+2                8.042e-022  5.811e-022   -21.095   -21.236    -0.141
   CrOHCl2               2.611e-022  2.611e-022   -21.583   -21.583     0.000
   CrCl2+                1.709e-025  1.576e-025   -24.767   -24.803    -0.035
   Cr2(OH)2SO4+2         1.862e-027  1.345e-027   -26.730   -26.871    -0.141
   CrH2PO4+2             2.754e-029  1.990e-029   -28.560   -28.701    -0.141
   Cr2(OH)2(SO4)2        6.200e-030  6.200e-030   -29.208   -29.208     0.000
   Cr(NH3)5OH+2          1.153e-035  8.334e-036   -34.938   -35.079    -0.141
   CrNO3+2               9.066e-037  6.551e-037   -36.043   -36.184    -0.141
   Cr(NH3)6+3            0.000e+000  0.000e+000   -43.365   -43.682    -0.318
   Cr(NH3)6Cl+2          0.000e+000  0.000e+000   -44.983   -45.124    -0.141
Cr(6)           1.445e-017
   CrO4-2                1.438e-017  1.068e-017   -16.842   -16.971    -0.129
   HCrO4-                4.563e-020  4.207e-020   -19.341   -19.376    -0.035
   NaCrO4-               1.684e-020  1.552e-020   -19.774   -19.809    -0.035
   KCrO4-                8.673e-021  7.996e-021   -20.062   -20.097    -0.035
   H2CrO4                4.151e-029  4.151e-029   -28.382   -28.382     0.000
   CrO3SO4-2             1.675e-030  1.210e-030   -29.776   -29.917    -0.141
   CrO3Cl-               9.984e-031  9.204e-031   -30.001   -30.036    -0.035
   CrO3HPO4-2            5.016e-032  3.624e-032   -31.300   -31.441    -0.141
   Cr2O7-2               8.495e-038  6.138e-038   -37.071   -37.212    -0.141
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   CrO3H2PO4-            2.305e-038  2.125e-038   -37.637   -37.673    -0.035
Cu(1)           1.789e-016
   CuCl                  9.196e-017  9.196e-017   -16.036   -16.036     0.000
   CuCl2-                5.915e-017  5.491e-017   -16.228   -16.260    -0.032
   Cu+                   2.772e-017  2.556e-017   -16.557   -16.592    -0.035
   CuCl3-2               4.492e-020  3.355e-020   -19.348   -19.474    -0.127
   Cu(S4)2-3             0.000e+000  0.000e+000  -136.316  -136.525    -0.208
   CuS4S5-3              0.000e+000  0.000e+000  -137.052  -137.255    -0.202
Cu(2)           1.177e-015
   Cu(OH)2               6.911e-016  6.911e-016   -15.160   -15.160     0.000
   CuOH+                 4.511e-016  4.187e-016   -15.346   -15.378    -0.032
   Cu+2                  2.155e-017  1.601e-017   -16.667   -16.796    -0.129
   Cu(OH)3-              1.272e-017  1.173e-017   -16.896   -16.931    -0.035
   CuSO4                 2.845e-019  2.845e-019   -18.546   -18.546     0.000
   CuNH3+2               1.103e-019  7.966e-020   -18.958   -19.099    -0.141
   CuCl+                 7.810e-020  7.250e-020   -19.107   -19.140    -0.032
   CuF+                  9.985e-021  9.206e-021   -20.001   -20.036    -0.035
   Cu(OH)4-2             1.057e-021  7.634e-022   -20.976   -21.117    -0.141
   CuCl2                 7.184e-023  7.184e-023   -22.144   -22.144     0.000
   CuNO2+                1.015e-025  9.356e-026   -24.994   -25.029    -0.035
   Cu2(OH)2+2            6.095e-027  4.404e-027   -26.215   -26.356    -0.141
   CuCl3-                2.064e-027  1.916e-027   -26.685   -26.718    -0.032
   CuCl4-2               3.674e-032  2.744e-032   -31.435   -31.562    -0.127
   CuNO3+                5.237e-033  4.828e-033   -32.281   -32.316    -0.035
   Cu(NO2)2              5.344e-035  5.344e-035   -34.272   -34.272     0.000
   Cu(NO3)2              0.000e+000  0.000e+000   -49.237   -49.237     0.000
   Cu(HS)3-              0.000e+000  0.000e+000  -202.589  -202.624    -0.035
F               1.000e-005
   F-                    9.818e-006  9.115e-006    -5.008    -5.040    -0.032
   CaF+                  1.022e-007  9.503e-008    -6.990    -7.022    -0.032
   MgF+                  8.218e-008  7.634e-008    -7.085    -7.117    -0.032
   NaF                   1.682e-009  1.682e-009    -8.774    -8.774     0.000
   MnF+                  1.047e-010  9.736e-011    -9.980   -10.012    -0.032
   HF                    1.641e-011  1.641e-011   -10.785   -10.785     0.000
   SrF+                  9.422e-012  8.686e-012   -11.026   -11.061    -0.035
   BF(OH)3-              7.251e-012  6.715e-012   -11.140   -11.173    -0.033
   NiF+                  6.061e-012  5.588e-012   -11.217   -11.253    -0.035
   ZnF+                  5.031e-012  4.638e-012   -11.298   -11.334    -0.035
   UO2F+                 1.346e-013  1.241e-013   -12.871   -12.906    -0.035
   CdF+                  1.398e-014  1.289e-014   -13.855   -13.890    -0.035
   PbF+                  6.085e-015  5.610e-015   -14.216   -14.251    -0.035
   UO2F2                 3.262e-015  3.262e-015   -14.487   -14.487     0.000
   TlF                   1.187e-015  1.187e-015   -14.925   -14.925     0.000
   HF2-                  6.131e-016  5.687e-016   -15.212   -15.245    -0.033
   BF2(OH)2-             8.601e-018  7.965e-018   -17.065   -17.099    -0.033
   UO2F3-                8.100e-018  7.468e-018   -17.091   -17.127    -0.035
   AlF2+                 3.364e-018  3.129e-018   -17.473   -17.505    -0.031
   AlF+2                 1.152e-018  8.624e-019   -17.939   -18.064    -0.126
   PbF2                  1.006e-018  1.006e-018   -17.997   -17.997     0.000
   AgF                   5.164e-019  5.164e-019   -18.287   -18.287     0.000
   AlF3                  3.591e-019  3.591e-019   -18.445   -18.445     0.000
   CrF+2                 3.141e-019  2.270e-019   -18.503   -18.644    -0.141
   CoF+                  2.586e-019  2.384e-019   -18.587   -18.623    -0.035
   CdF2                  2.344e-019  2.344e-019   -18.630   -18.630     0.000
   CuF+                  9.985e-021  9.206e-021   -20.001   -20.036    -0.035
   VO2F                  8.989e-021  8.989e-021   -20.046   -20.046     0.000
   AlF4-                 1.766e-021  1.640e-021   -20.753   -20.785    -0.032
   UO2F4-2               7.484e-022  5.407e-022   -21.126   -21.267    -0.141
   H2F2                  7.214e-022  7.214e-022   -21.142   -21.142     0.000
   VO2F2-                3.226e-023  2.975e-023   -22.491   -22.527    -0.035
   PbF3-                 1.887e-023  1.740e-023   -22.724   -22.760    -0.035
   VOF+                  1.288e-023  1.188e-023   -22.890   -22.925    -0.035
   VOF2                  4.059e-026  4.059e-026   -25.392   -25.392     0.000
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BF3OH-		3.713e-026	3.438e-026	-25.430	-25.464	-0.033
VO2F3-2		4.681e-027	3.382e-027	-26.330	-26.471	-0.141
Sb(OH)2F		4.320e-027	4.320e-027	-26.365	-26.365	0.000
SbOF		4.248e-027	4.248e-027	-26.372	-26.372	0.000
FeF+2		1.900e-027	1.419e-027	-26.721	-26.848	-0.127
FeF2+		3.723e-028	3.461e-028	-27.429	-27.461	-0.032
PbF4-2		1.050e-028	7.589e-029	-27.979	-28.120	-0.141
VOF3-		1.424e-029	1.313e-029	-28.847	-28.882	-0.035
FeF3		4.451e-030	4.451e-030	-29.352	-29.352	0.000
HgF+		5.414e-032	4.992e-032	-31.266	-31.302	-0.035
VO2F4-3		3.151e-032	1.517e-032	-31.501	-31.819	-0.318
BF4-		2.027e-033	1.877e-033	-32.693	-32.727	-0.033
VOF4-2		6.685e-034	4.830e-034	-33.175	-33.316	-0.141
UF3+		1.237e-038	1.141e-038	-37.907	-37.943	-0.035
UF2+2		1.093e-038	7.898e-039	-37.961	-38.102	-0.141
UF+3		1.430e-040	0.000e+000	-39.845	-40.162	-0.318
UF4		0.000e+000	0.000e+000	-40.943	-40.943	0.000
SiF6-2		0.000e+000	0.000e+000	-41.881	-42.008	-0.127
UF5-		0.000e+000	0.000e+000	-44.350	-44.385	-0.035
SnF+		0.000e+000	0.000e+000	-45.763	-45.798	-0.035
UF6-2		0.000e+000	0.000e+000	-46.804	-46.945	-0.141
SnF2		0.000e+000	0.000e+000	-48.035	-48.035	0.000
SnF3-		0.000e+000	0.000e+000	-50.220	-50.255	-0.035
SnF6-2		0.000e+000	0.000e+000	-63.083	-63.224	-0.141
Fe(2)	8.797e-018					
Fe+2		6.896e-018	4.982e-018	-17.161	-17.303	-0.141
FeOH+		1.765e-018	1.641e-018	-17.753	-17.785	-0.032
FeSO4		9.489e-020	9.489e-020	-19.023	-19.023	0.000
Fe(OH)3-		3.034e-020	2.820e-020	-19.518	-19.550	-0.032
Fe(OH)2		1.078e-020	1.078e-020	-19.967	-19.967	0.000
FeHPO4		2.247e-025	2.247e-025	-24.648	-24.648	0.000
FeH2PO4+		5.840e-028	5.432e-028	-27.234	-27.265	-0.031
Fe(HS)2		0.000e+000	0.000e+000	-149.504	-149.504	0.000
Fe(HS)3-		0.000e+000	0.000e+000	-218.007	-218.043	-0.035
Fe(3)	4.225e-014					
Fe(OH)3		2.168e-014	2.168e-014	-13.664	-13.664	0.000
Fe(OH)4-		1.795e-014	1.670e-014	-13.746	-13.777	-0.031
Fe(OH)2+		2.623e-015	2.440e-015	-14.581	-14.613	-0.031
FeOH+2		1.015e-021	7.582e-022	-20.993	-21.120	-0.127
FeF+2		1.900e-027	1.419e-027	-26.721	-26.848	-0.127
FeF2+		3.723e-028	3.461e-028	-27.429	-27.461	-0.032
Fe+3		2.771e-028	1.420e-028	-27.557	-27.848	-0.290
FeSO4+		1.329e-028	1.236e-028	-27.876	-27.908	-0.032
FeCl+2		1.640e-029	1.225e-029	-28.785	-28.912	-0.127
FeHPO4+		1.428e-029	1.329e-029	-28.845	-28.877	-0.031
FeF3		4.451e-030	4.451e-030	-29.352	-29.352	0.000
Fe(SO4)2-		2.223e-031	2.050e-031	-30.653	-30.688	-0.035
FeCl2+		1.682e-031	1.564e-031	-30.774	-30.806	-0.032
FeHSeO3+2		6.880e-034	4.971e-034	-33.162	-33.304	-0.141
FeCl3		4.469e-035	4.469e-035	-34.350	-34.350	0.000
FeH2PO4+2		7.833e-037	5.864e-037	-36.106	-36.232	-0.126
Fe2(OH)2+4		0.000e+000	0.000e+000	-40.156	-40.720	-0.565
FeNO3+2		0.000e+000	0.000e+000	-42.727	-42.868	-0.141
Fe3(OH)4+5		0.000e+000	0.000e+000	-53.291	-54.173	-0.882
H(0)	2.227e-026					
H2		1.114e-026	1.115e-026	-25.953	-25.953	0.000
Hg(0)	1.450e-011					
Hg		1.450e-011	1.450e-011	-10.839	-10.839	0.000
Hg(1)	4.025e-030					
Hg2+2		2.012e-030	1.454e-030	-29.696	-29.837	-0.141
Hg(2)	7.001e-017					
Hg(OH)2		6.371e-017	6.378e-017	-16.196	-16.195	0.000
HgClOH		6.168e-018	6.168e-018	-17.210	-17.210	0.000

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   HgCl2                  1.207e-019  1.207e-019   -18.918   -18.918     0.000
   HgCl3-                 3.740e-021  3.448e-021   -20.427   -20.462    -0.035
   Hg(OH)3-               7.205e-023  6.642e-023   -22.142   -22.178    -0.035
   HgCl4-2                5.429e-023  3.923e-023   -22.265   -22.406    -0.141
   HgOH+                  5.277e-023  4.865e-023   -22.278   -22.313    -0.035
   Hg(NH3)2+2             3.052e-023  2.205e-023   -22.515   -22.657    -0.141
   HgCl+                  9.137e-024  8.424e-024   -23.039   -23.074    -0.035
   HgNH3+2                6.275e-026  4.534e-026   -25.202   -25.344    -0.141
   Hg+2                   2.045e-028  1.477e-028   -27.689   -27.831    -0.141
   Hg(NH3)3+2             5.909e-029  4.269e-029   -28.229   -28.370    -0.141
   HgSO4                  3.001e-030  3.001e-030   -29.523   -29.523     0.000
   HgF+                   5.414e-032  4.992e-032   -31.266   -31.302    -0.035
   Hg(NH3)4+2             2.283e-034  1.649e-034   -33.642   -33.783    -0.141
   HgNO3+                 0.000e+000  0.000e+000   -44.248   -44.284    -0.035
   Hg(NO3)2               0.000e+000  0.000e+000   -60.686   -60.686     0.000
   HgS2-2                 0.000e+000  0.000e+000  -127.791  -127.933    -0.141
   HgHS2-                 0.000e+000  0.000e+000  -128.104  -128.139    -0.035
   Hg(HS)2                0.000e+000  0.000e+000  -130.660  -130.660     0.000
K                2.171e-004
   K+                     2.170e-004  2.015e-004    -3.663    -3.696    -0.032
   KSO4-                  1.190e-007  1.107e-007    -6.925    -6.956    -0.031
   KHPO4-                 1.862e-014  1.732e-014   -13.730   -13.762    -0.031
   KCrO4-                 8.673e-021  7.996e-021   -20.062   -20.097    -0.035
Mg               1.019e-004
   Mg+2                   1.005e-004  7.465e-005    -3.998    -4.127    -0.129
   MgSO4                  1.054e-006  1.054e-006    -5.977    -5.977     0.000
   MgOH+                  2.639e-007  2.458e-007    -6.579    -6.609    -0.031
   MgF+                   8.218e-008  7.634e-008    -7.085    -7.117    -0.032
   MgH2BO3+               2.462e-009  2.280e-009    -8.609    -8.642    -0.033
   MgHPO4                 5.336e-013  5.336e-013   -12.273   -12.273     0.000
   MgPO4-                 1.420e-014  1.321e-014   -13.848   -13.879    -0.031
   MgH2PO4+               8.416e-016  7.828e-016   -15.075   -15.106    -0.031
Mn(2)            3.822e-007
   Mn+2                   3.713e-007  2.683e-007    -6.430    -6.571    -0.141
   MnOH+                  5.997e-009  5.575e-009    -8.222    -8.254    -0.032
   MnSO4                  3.702e-009  3.702e-009    -8.432    -8.432     0.000
   MnCl+                  1.038e-009  9.653e-010    -8.984    -9.015    -0.032
   MnF+                   1.047e-010  9.736e-011    -9.980   -10.012    -0.032
   MnCl2                  3.897e-012  3.897e-012   -11.409   -11.409     0.000
   MnCl3-                 3.299e-015  3.067e-015   -14.482   -14.513    -0.032
   Mn(OH)3-               2.536e-015  2.358e-015   -14.596   -14.628    -0.032
   MnSeO4                 2.456e-018  2.456e-018   -17.610   -17.610     0.000
   Mn(OH)4-2              8.429e-020  6.296e-020   -19.074   -19.201    -0.127
   MnNO3+                 4.399e-023  4.056e-023   -22.357   -22.392    -0.035
   MnSe                   3.408e-036  3.408e-036   -35.468   -35.468     0.000
   Mn(NO3)2               9.718e-039  9.718e-039   -38.012   -38.012     0.000
Mn(3)            7.174e-030
   Mn+3                   7.174e-030  3.676e-030   -29.144   -29.435    -0.290
Mn(6)            0.000e+000
   MnO4-2                 0.000e+000  0.000e+000   -43.603   -43.729    -0.127
Mn(7)            0.000e+000
   MnO4-                  0.000e+000  0.000e+000   -50.582   -50.615    -0.033
Mo               1.579e-007
   MoO4-2                 1.579e-007  1.173e-007    -6.802    -6.931    -0.129
   HMoO4-                 3.081e-012  2.840e-012   -11.511   -11.547    -0.035
   H2MoO4                 2.532e-017  2.532e-017   -16.596   -16.596     0.000
   Ag2MoO4                2.258e-035  2.258e-035   -34.646   -34.646     0.000
   AlMo6O21-3             0.000e+000  0.000e+000   -59.786   -60.104    -0.318
   Mo7O24-6               0.000e+000  0.000e+000   -65.572   -66.843    -1.270
   HMo7O24-5              0.000e+000  0.000e+000   -68.488   -69.370    -0.882
   H2Mo7O24-4             0.000e+000  0.000e+000   -72.938   -73.503    -0.565
   H3Mo7O24-3             0.000e+000  0.000e+000   -78.854   -79.171    -0.318
N(-3)            1.609e-006
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NH4+	1.121e-006	1.038e-006	-5.950	-5.984	-0.033
NH3	4.864e-007	4.864e-007	-6.313	-6.313	0.000
NH4SO4-	9.284e-010	8.631e-010	-9.032	-9.064	-0.032
CaNH3+2	8.095e-010	5.849e-010	-9.092	-9.233	-0.141
NiNH3+2	8.823e-012	6.375e-012	-11.054	-11.196	-0.141
SrNH3+2	1.443e-013	1.042e-013	-12.841	-12.982	-0.141
Ni(NH3)2+2	6.203e-016	4.482e-016	-15.207	-15.349	-0.141
Ca(NH3)2+2	1.567e-016	1.132e-016	-15.805	-15.946	-0.141
AgNH3+	2.429e-017	2.240e-017	-16.615	-16.650	-0.035
BaNH3+2	5.282e-019	3.816e-019	-18.277	-18.418	-0.141
CuNH3+2	1.103e-019	7.966e-020	-18.958	-19.099	-0.141
Ag(NH3)2+	9.603e-020	8.854e-020	-19.018	-19.053	-0.035
Co(NH3)+2	6.694e-020	4.837e-020	-19.174	-19.315	-0.141
Hg(NH3)2+2	3.052e-023	2.205e-023	-22.515	-22.657	-0.141
Co(NH3)2+2	1.389e-024	1.004e-024	-23.857	-23.998	-0.141
HgNH3+2	6.275e-026	4.534e-026	-25.202	-25.344	-0.141
Hg(NH3)3+2	5.909e-029	4.269e-029	-28.229	-28.370	-0.141
Co(NH3)3+2	8.504e-030	6.144e-030	-29.070	-29.212	-0.141
Hg(NH3)4+2	2.283e-034	1.649e-034	-33.642	-33.783	-0.141
Co(NH3)4+2	2.170e-035	1.568e-035	-34.663	-34.805	-0.141
Cr(NH3)5OH+2	1.153e-035	8.334e-036	-34.938	-35.079	-0.141
Co(NH3)5+2	0.000e+000	0.000e+000	-40.756	-40.898	-0.141
Cr(NH3)6+3	0.000e+000	0.000e+000	-43.365	-43.682	-0.318
Cr(NH3)6Cl+2	0.000e+000	0.000e+000	-44.983	-45.124	-0.141
Co(NH3)5Cl+2	0.000e+000	0.000e+000	-50.702	-50.843	-0.141
Co(NH3)6SO4+	0.000e+000	0.000e+000	-60.478	-60.513	-0.035
Co(NH3)6OH+2	0.000e+000	0.000e+000	-62.069	-62.210	-0.141
Co(NH3)6Cl+2	0.000e+000	0.000e+000	-63.731	-63.872	-0.141
N(3)	6.023e-011				
NO2-	6.023e-011	5.582e-011	-10.220	-10.253	-0.033
TlNO2	3.905e-020	3.905e-020	-19.408	-19.408	0.000
AgNO2	2.630e-022	2.630e-022	-21.580	-21.580	0.000
CoNO2+	3.529e-025	3.254e-025	-24.452	-24.488	-0.035
CuNO2+	1.015e-025	9.356e-026	-24.994	-25.029	-0.035
Ag(NO2)2-	2.466e-032	2.274e-032	-31.608	-31.643	-0.035
Cu(NO2)2	5.344e-035	5.344e-035	-34.272	-34.272	0.000
N(5)	1.031e-016				
NO3-	1.027e-016	9.538e-017	-15.988	-16.021	-0.032
CaNO3+	3.125e-019	2.881e-019	-18.505	-18.540	-0.035
SrNO3+	1.111e-022	1.025e-022	-21.954	-21.989	-0.035
MnNO3+	4.399e-023	4.056e-023	-22.357	-22.392	-0.035
ZnNO3+	6.628e-024	6.111e-024	-23.179	-23.214	-0.035
NiNO3+	6.343e-024	5.848e-024	-23.198	-23.233	-0.035
CdNO3+	2.919e-026	2.691e-026	-25.535	-25.570	-0.035
TlNO3	2.110e-026	2.110e-026	-25.676	-25.676	0.000
PbNO3+	1.336e-026	1.232e-026	-25.874	-25.909	-0.035
BaNO3+	6.448e-028	5.945e-028	-27.191	-27.226	-0.035
UO2NO3+	2.036e-029	1.877e-029	-28.691	-28.727	-0.035
AgNO3	1.709e-030	1.709e-030	-29.767	-29.767	0.000
CoNO3+	1.356e-031	1.251e-031	-30.868	-30.903	-0.035
CuNO3+	5.237e-033	4.828e-033	-32.281	-32.316	-0.035
VO2NO3	2.713e-035	2.713e-035	-34.567	-34.567	0.000
CrNO3+2	9.066e-037	6.551e-037	-36.043	-36.184	-0.141
Mn(NO3)2	9.718e-039	9.718e-039	-38.012	-38.012	0.000
Zn(NO3)2	1.163e-040	1.163e-040	-39.934	-39.934	0.000
Pb(NO3)2	0.000e+000	0.000e+000	-41.700	-41.700	0.000
Cd(NO3)2	0.000e+000	0.000e+000	-41.891	-41.891	0.000
FeNO3+2	0.000e+000	0.000e+000	-42.727	-42.868	-0.141
HgNO3+	0.000e+000	0.000e+000	-44.248	-44.284	-0.035
Co(NO3)2	0.000e+000	0.000e+000	-46.615	-46.615	0.000
Cu(NO3)2	0.000e+000	0.000e+000	-49.237	-49.237	0.000
TlNO3+2	0.000e+000	0.000e+000	-59.434	-59.575	-0.141
SnNO3+	0.000e+000	0.000e+000	-60.383	-60.419	-0.035

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   Hg(NO3)2              0.000e+000  0.000e+000   -60.686   -60.686     0.000
Na              3.152e-004
   Na+                   3.150e-004  2.925e-004    -3.502    -3.534    -0.032
   NaSO4-                1.310e-007  1.219e-007    -6.883    -6.914    -0.031
   NaF                   1.682e-009  1.682e-009    -8.774    -8.774     0.000
   NaH2BO3               4.083e-010  4.083e-010    -9.389    -9.389     0.000
   NaHPO4-               4.185e-014  3.893e-014   -13.378   -13.410    -0.031
   NaCrO4-               1.684e-020  1.552e-020   -19.774   -19.809    -0.035
Ni              3.788e-008
   Ni+2                  3.285e-008  2.441e-008    -7.483    -7.612    -0.129
   NiOH+                 2.757e-009  2.542e-009    -8.560    -8.595    -0.035
   Ni(OH)2               1.670e-009  1.670e-009    -8.777    -8.777     0.000
   NiSO4                 3.778e-010  3.778e-010    -9.423    -9.423     0.000
   NiCl+                 1.936e-010  1.785e-010    -9.713    -9.748    -0.035
   Ni(OH)3-              1.498e-011  1.382e-011   -10.824   -10.860    -0.035
   NiNH3+2               8.823e-012  6.375e-012   -11.054   -11.196    -0.141
   NiF+                  6.061e-012  5.588e-012   -11.217   -11.253    -0.035
   NiCl2                 2.568e-015  2.568e-015   -14.590   -14.590     0.000
   Ni(SO4)2-2            1.343e-015  9.707e-016   -14.872   -15.013    -0.141
   Ni(NH3)2+2            6.203e-016  4.482e-016   -15.207   -15.349    -0.141
   NiSeO4                3.883e-019  3.883e-019   -18.411   -18.411     0.000
   NiNO3+                6.343e-024  5.848e-024   -23.198   -23.233    -0.035
O(0)            0.000e+000
   O2                    0.000e+000  0.000e+000   -40.390   -40.390     0.000
P               3.260e-011
   HPO4-2                1.517e-011  1.133e-011   -10.819   -10.946    -0.127
   CaPO4-                1.162e-011  1.081e-011   -10.935   -10.966    -0.031
   CaHPO4                4.947e-012  4.947e-012   -11.306   -11.306     0.000
   MgHPO4                5.336e-013  5.336e-013   -12.273   -12.273     0.000
   H2PO4-                2.339e-013  2.175e-013   -12.631   -12.662    -0.031
   NaHPO4-               4.185e-014  3.893e-014   -13.378   -13.410    -0.031
   KHPO4-                1.862e-014  1.732e-014   -13.730   -13.762    -0.031
   MgPO4-                1.420e-014  1.321e-014   -13.848   -13.879    -0.031
   PO4-3                 7.660e-015  3.925e-015   -14.116   -14.406    -0.290
   UO2PO4-               7.466e-015  6.884e-015   -14.127   -14.162    -0.035
   CaH2PO4+              5.001e-015  4.652e-015   -14.301   -14.332    -0.031
   SrHPO4                9.618e-016  9.618e-016   -15.017   -15.017     0.000
   MgH2PO4+              8.416e-016  7.828e-016   -15.075   -15.106    -0.031
   UO2(HPO4)2-2          3.031e-017  2.190e-017   -16.518   -16.660    -0.141
   UO2HPO4               2.129e-017  2.129e-017   -16.672   -16.672     0.000
   SrH2PO4+              4.294e-019  3.959e-019   -18.367   -18.402    -0.035
   H3PO4                 3.723e-020  3.723e-020   -19.429   -19.429     0.000
   UO2H2PO4+             4.235e-023  3.904e-023   -22.373   -22.408    -0.035
   CoHPO4                1.022e-023  1.022e-023   -22.990   -22.990     0.000
   FeHPO4                2.247e-025  2.247e-025   -24.648   -24.648     0.000
   FeH2PO4+              5.840e-028  5.432e-028   -27.234   -27.265    -0.031
   CrH2PO4+2             2.754e-029  1.990e-029   -28.560   -28.701    -0.141
   FeHPO4+               1.428e-029  1.329e-029   -28.845   -28.877    -0.031
   CrO3HPO4-2            5.016e-032  3.624e-032   -31.300   -31.441    -0.141
   UO2(H2PO4)2           1.671e-033  1.671e-033   -32.777   -32.777     0.000
   FeH2PO4+2             7.833e-037  5.864e-037   -36.106   -36.232    -0.126
   CrO3H2PO4-            2.305e-038  2.125e-038   -37.637   -37.673    -0.035
   UHPO4+2               0.000e+000  0.000e+000   -43.159   -43.300    -0.141
   UO2(H2PO4)3-          0.000e+000  0.000e+000   -43.432   -43.467    -0.035
   U(HPO4)2              0.000e+000  0.000e+000   -44.231   -44.231     0.000
   U(HPO4)3-2            0.000e+000  0.000e+000   -46.679   -46.820    -0.141
   U(HPO4)4-4            0.000e+000  0.000e+000   -48.658   -49.222    -0.565
Pb              2.578e-010
   PbOH+                 1.968e-010  1.815e-010    -9.706    -9.741    -0.035
   Pb(OH)2               4.747e-011  4.747e-011   -10.324   -10.324     0.000
   Pb+2                  1.176e-011  8.734e-012   -10.930   -11.059    -0.129
   PbCl+                 9.605e-013  8.856e-013   -12.017   -12.053    -0.035
   Pb(OH)3-              4.259e-013  3.927e-013   -12.371   -12.406    -0.035
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   PbSO4                  3.319e-013  3.319e-013   -12.479   -12.479     0.000
   PbCl2                  1.130e-014  1.130e-014   -13.947   -13.947     0.000
   PbF+                   6.085e-015  5.610e-015   -14.216   -14.251    -0.035
   Pb(OH)4-2              1.101e-015  7.955e-016   -14.958   -15.099    -0.141
   Pb(SO4)2-2             2.147e-016  1.551e-016   -15.668   -15.809    -0.141
   PbCl3-                 1.395e-017  1.286e-017   -16.855   -16.891    -0.035
   PbF2                   1.006e-018  1.006e-018   -17.997   -17.997     0.000
   Pb2OH+3                5.219e-020  2.512e-020   -19.282   -19.600    -0.318
   PbCl4-2                2.325e-020  1.680e-020   -19.634   -19.775    -0.141
   Pb3(OH)4+2             5.435e-022  3.927e-022   -21.265   -21.406    -0.141
   PbF3-                  1.887e-023  1.740e-023   -22.724   -22.760    -0.035
   PbNO3+                 1.336e-026  1.232e-026   -25.874   -25.909    -0.035
   PbF4-2                 1.050e-028  7.589e-029   -27.979   -28.120    -0.141
   Pb4(OH)4+4             9.996e-029  2.724e-029   -28.000   -28.565    -0.565
   Pb(NO3)2               0.000e+000  0.000e+000   -41.700   -41.700     0.000
   Pb(HS)2                0.000e+000  0.000e+000  -136.940  -136.940     0.000
   Pb(HS)3-               0.000e+000  0.000e+000  -206.181  -206.216    -0.035
S(-2)           0.000e+000
   AgHS                   0.000e+000  0.000e+000   -70.408   -70.408     0.000
   HS-                    0.000e+000  0.000e+000   -70.540   -70.576    -0.035
   S5-2                   0.000e+000  0.000e+000   -70.885   -71.026    -0.141
   S6-2                   0.000e+000  0.000e+000   -71.401   -71.542    -0.141
   S4-2                   0.000e+000  0.000e+000   -71.481   -71.622    -0.141
   S3-2                   0.000e+000  0.000e+000   -72.287   -72.428    -0.141
   H2S                    0.000e+000  0.000e+000   -72.470   -72.470     0.000
   CdHS+                  0.000e+000  0.000e+000   -72.582   -72.617    -0.035
   S2-2                   0.000e+000  0.000e+000   -73.303   -73.444    -0.141
   TlHS                   0.000e+000  0.000e+000   -78.087   -78.087     0.000
   S-2                    0.000e+000  0.000e+000   -78.834   -78.961    -0.127
   Tl2HS+                 0.000e+000  0.000e+000   -84.537   -84.572    -0.035
   HgS2-2                 0.000e+000  0.000e+000  -127.791  -127.933    -0.141
   HgHS2-                 0.000e+000  0.000e+000  -128.104  -128.139    -0.035
   Hg(HS)2                0.000e+000  0.000e+000  -130.660  -130.660     0.000
   ZnS(HS)-               0.000e+000  0.000e+000  -132.985  -133.020    -0.035
   Ag(HS)S4-2             0.000e+000  0.000e+000  -135.347  -135.453    -0.105
   Ag(S4)2-3              0.000e+000  0.000e+000  -135.766  -135.978    -0.212
   Zn(HS)2                0.000e+000  0.000e+000  -135.925  -135.925     0.000
   Cd(HS)2                0.000e+000  0.000e+000  -135.989  -135.989     0.000
   AgS4S5-3               0.000e+000  0.000e+000  -136.083  -136.289    -0.205
   Cu(S4)2-3              0.000e+000  0.000e+000  -136.316  -136.525    -0.208
   Ag(HS)2-               0.000e+000  0.000e+000  -136.848  -136.884    -0.035
   Pb(HS)2                0.000e+000  0.000e+000  -136.940  -136.940     0.000
   CuS4S5-3               0.000e+000  0.000e+000  -137.052  -137.255    -0.202
   Fe(HS)2                0.000e+000  0.000e+000  -149.504  -149.504     0.000
   Tl2(OH)2(HS)2-2        0.000e+000  0.000e+000  -154.219  -154.361    -0.141
   Cu(HS)3-               0.000e+000  0.000e+000  -202.589  -202.624    -0.035
   Zn(HS)3-               0.000e+000  0.000e+000  -203.185  -203.221    -0.035
   ZnS(HS)2-2             0.000e+000  0.000e+000  -204.145  -204.286    -0.141
   Cd(HS)3-               0.000e+000  0.000e+000  -204.629  -204.665    -0.035
   Pb(HS)3-               0.000e+000  0.000e+000  -206.181  -206.216    -0.035
   Fe(HS)3-               0.000e+000  0.000e+000  -218.007  -218.043    -0.035
   Tl2OH(HS)3-2           0.000e+000  0.000e+000  -221.637  -221.778    -0.141
   Cd(HS)4-2              0.000e+000  0.000e+000  -272.903  -273.044    -0.141
   Zn(HS)4-2              0.000e+000  0.000e+000  -275.115  -275.256    -0.141
   Sb2S4-2                0.000e+000  0.000e+000  -287.809  -287.950    -0.141
S(6)            1.227e-004
   SO4-2                  1.044e-004  7.758e-005    -3.981    -4.110    -0.129
   CaSO4                  1.698e-005  1.698e-005    -4.770    -4.770     0.000
   MgSO4                  1.054e-006  1.054e-006    -5.977    -5.977     0.000
   NaSO4-                 1.310e-007  1.219e-007    -6.883    -6.914    -0.031
   KSO4-                  1.190e-007  1.107e-007    -6.925    -6.956    -0.031
   SrSO4                  4.177e-009  4.177e-009    -8.379    -8.379     0.000
   MnSO4                  3.702e-009  3.702e-009    -8.432    -8.432     0.000
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NH4SO4-	9.284e-010	8.631e-010	-9.032	-9.064	-0.032
ZnSO4	4.329e-010	4.329e-010	-9.364	-9.364	0.000
NiSO4	3.778e-010	3.778e-010	-9.423	-9.423	0.000
HSO4-	9.934e-012	9.228e-012	-11.003	-11.035	-0.032
CdSO4	1.623e-012	1.623e-012	-11.790	-11.790	0.000
Zn(SO4)2-2	4.049e-013	2.925e-013	-12.393	-12.534	-0.141
PbSO4	3.319e-013	3.319e-013	-12.479	-12.479	0.000
TlSO4-	2.041e-013	1.882e-013	-12.690	-12.725	-0.035
UO2SO4	1.158e-014	1.158e-014	-13.936	-13.936	0.000
Cd(SO4)2-2	2.350e-015	1.698e-015	-14.629	-14.770	-0.141
Ni(SO4)2-2	1.343e-015	9.707e-016	-14.872	-15.013	-0.141
CrOHSO4	5.235e-016	5.235e-016	-15.281	-15.281	0.000
Pb(SO4)2-2	2.147e-016	1.551e-016	-15.668	-15.809	-0.141
AgSO4-	3.787e-017	3.492e-017	-16.422	-16.457	-0.035
UO2(SO4)2-2	1.639e-017	1.184e-017	-16.785	-16.926	-0.141
CoSO4	1.281e-017	1.281e-017	-16.893	-16.893	0.000
CuSO4	2.845e-019	2.845e-019	-18.546	-18.546	0.000
FeSO4	9.489e-020	9.489e-020	-19.023	-19.023	0.000
CrSO4+	3.087e-020	2.846e-020	-19.510	-19.546	-0.035
AlSO4+	6.134e-021	5.698e-021	-20.212	-20.244	-0.032
VO2SO4-	1.130e-021	1.042e-021	-20.947	-20.982	-0.035
Al(SO4)2-	5.099e-024	4.737e-024	-23.292	-23.324	-0.032
VOSO4	4.642e-024	4.642e-024	-23.333	-23.333	0.000
Cr2(OH)2SO4+2	1.862e-027	1.345e-027	-26.730	-26.871	-0.141
FeSO4+	1.329e-028	1.236e-028	-27.876	-27.908	-0.032
Cr2(OH)2(SO4)2	6.200e-030	6.200e-030	-29.208	-29.208	0.000
HgSO4	3.001e-030	3.001e-030	-29.523	-29.523	0.000
CrO3SO4-2	1.675e-030	1.210e-030	-29.776	-29.917	-0.141
Fe(SO4)2-	2.223e-031	2.050e-031	-30.653	-30.688	-0.035
VSO4+	2.070e-038	1.909e-038	-37.684	-37.719	-0.035
USO4+2	0.000e+000	0.000e+000	-41.791	-41.932	-0.141
U(SO4)2	0.000e+000	0.000e+000	-42.142	-42.142	0.000
Co(NH3)6SO4+	0.000e+000	0.000e+000	-60.478	-60.513	-0.035
Sb(3)	4.931e-019				
Sb(OH)3	2.493e-019	2.493e-019	-18.603	-18.603	0.000
HSbO2	2.433e-019	2.433e-019	-18.614	-18.614	0.000
SbO2-	3.512e-022	3.238e-022	-21.454	-21.490	-0.035
Sb(OH)4-	2.012e-022	1.855e-022	-21.696	-21.732	-0.035
Sb(OH)2+	7.992e-027	7.368e-027	-26.097	-26.133	-0.035
Sb(OH)2F	4.320e-027	4.320e-027	-26.365	-26.365	0.000
SbOF	4.248e-027	4.248e-027	-26.372	-26.372	0.000
SbO+	2.755e-027	2.540e-027	-26.560	-26.595	-0.035
Sb2S4-2	0.000e+000	0.000e+000	-287.809	-287.950	-0.141
Sb(5)	5.912e-009				
SbO3-	5.905e-009	5.444e-009	-8.229	-8.264	-0.035
Sb(OH)6-	6.858e-012	6.367e-012	-11.164	-11.196	-0.032
SbO2+	2.509e-027	2.314e-027	-26.600	-26.636	-0.035
Se(-2)	1.277e-016				
Ag2Se	1.277e-016	1.277e-016	-15.894	-15.894	0.000
HSe-	4.069e-033	3.751e-033	-32.391	-32.426	-0.035
MnSe	3.408e-036	3.408e-036	-35.468	-35.468	0.000
H2Se	3.544e-038	3.544e-038	-37.450	-37.450	0.000
Se-2	4.265e-039	3.082e-039	-38.370	-38.511	-0.141
AgOH(Se)2-4	0.000e+000	0.000e+000	-71.699	-72.264	-0.565
Se(4)	7.437e-009				
SeO3-2	5.999e-009	4.335e-009	-8.222	-8.363	-0.141
HSeO3-	1.437e-009	1.325e-009	-8.842	-8.878	-0.035
H2SeO3	6.881e-016	6.881e-016	-15.162	-15.162	0.000
AgSeO3-	6.815e-020	6.283e-020	-19.167	-19.202	-0.035
Cd(SeO3)2-2	1.912e-021	1.381e-021	-20.719	-20.860	-0.141
Ag(SeO3)2-3	5.067e-027	2.439e-027	-26.295	-26.613	-0.318
FeHSeO3+2	6.880e-034	4.971e-034	-33.162	-33.304	-0.141
Se(6)	4.579e-014				

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   SeO4-2                 4.578e-014  3.401e-014   -13.339   -13.468    -0.129
   MnSeO4                 2.456e-018  2.456e-018   -17.610   -17.610     0.000
   NiSeO4                 3.883e-019  3.883e-019   -18.411   -18.411     0.000
   ZnSeO4                 1.344e-019  1.344e-019   -18.872   -18.872     0.000
   HSeO4-                 2.251e-021  2.075e-021   -20.648   -20.683    -0.035
   CdSeO4                 5.650e-022  5.650e-022   -21.248   -21.248     0.000
   CoSeO4                 1.410e-026  1.410e-026   -25.851   -25.851     0.000
   Zn(SeO4)2-2            6.413e-033  4.634e-033   -32.193   -32.334    -0.141
Si              5.811e-007
   H4SiO4                 5.151e-007  5.157e-007    -6.288    -6.288     0.000
   H3SiO4-                6.598e-008  6.124e-008    -7.181    -7.213    -0.032
   H2SiO4-2               4.240e-012  3.175e-012   -11.373   -11.498    -0.126
   UO2H3SiO4+             5.562e-013  5.128e-013   -12.255   -12.290    -0.035
   SiF6-2                 0.000e+000  0.000e+000   -41.881   -42.008    -0.127
Sn(2)           7.152e-035
   HSnO2-                 3.194e-035  2.944e-035   -34.496   -34.531    -0.035
   Sn(OH)2                3.084e-035  3.084e-035   -34.511   -34.511     0.000
   Sn(OH)3-               8.749e-036  8.066e-036   -35.058   -35.093    -0.035
   SnOH+                  2.026e-040  1.868e-040   -39.693   -39.729    -0.035
   Sn+2                   0.000e+000  0.000e+000   -45.105   -45.246    -0.141
   SnF+                   0.000e+000  0.000e+000   -45.763   -45.798    -0.035
   SnCl+                  0.000e+000  0.000e+000   -46.115   -46.150    -0.035
   SnCl2                  0.000e+000  0.000e+000   -47.904   -47.904     0.000
   SnF2                   0.000e+000  0.000e+000   -48.035   -48.035     0.000
   SnF3-                  0.000e+000  0.000e+000   -50.220   -50.255    -0.035
   SnCl3-                 0.000e+000  0.000e+000   -51.586   -51.622    -0.035
   SnNO3+                 0.000e+000  0.000e+000   -60.383   -60.419    -0.035
   Sn2(OH)2+2             0.000e+000  0.000e+000   -77.316   -77.457    -0.141
   Sn3(OH)4+2             0.000e+000  0.000e+000  -106.827  -106.968    -0.141
Sn(4)           1.129e-013
   Sn(OH)6-2              1.122e-013  8.336e-014   -12.950   -13.079    -0.129
   SnO3-2                 7.117e-016  5.142e-016   -15.148   -15.289    -0.141
   Sn+4                   0.000e+000  0.000e+000   -44.783   -45.347    -0.565
   SnF6-2                 0.000e+000  0.000e+000   -63.083   -63.224    -0.141
Sr              3.674e-007
   Sr+2                   3.632e-007  2.698e-007    -6.440    -6.569    -0.129
   SrSO4                  4.177e-009  4.177e-009    -8.379    -8.379     0.000
   SrOH+                  1.586e-011  1.475e-011   -10.800   -10.831    -0.032
   SrF+                   9.422e-012  8.686e-012   -11.026   -11.061    -0.035
   SrH2BO3+               9.108e-012  8.434e-012   -11.041   -11.074    -0.033
   SrNH3+2                1.443e-013  1.042e-013   -12.841   -12.982    -0.141
   SrHPO4                 9.618e-016  9.618e-016   -15.017   -15.017     0.000
   SrH2PO4+               4.294e-019  3.959e-019   -18.367   -18.402    -0.035
   SrNO3+                 1.111e-022  1.025e-022   -21.954   -21.989    -0.035
Tl(1)           1.134e-010
   Tl+                    1.122e-010  1.035e-010    -9.950    -9.985    -0.035
   TlCl                   9.570e-013  9.570e-013   -12.019   -12.019     0.000
   TlSO4-                 2.041e-013  1.882e-013   -12.690   -12.725    -0.035
   TlOH                   5.278e-015  5.278e-015   -14.278   -14.278     0.000
   TlCl2-                 1.747e-015  1.610e-015   -14.758   -14.793    -0.035
   TlF                    1.187e-015  1.187e-015   -14.925   -14.925     0.000
   TlNO2                  3.905e-020  3.905e-020   -19.408   -19.408     0.000
   TlNO3                  2.110e-026  2.110e-026   -25.676   -25.676     0.000
   TlHS                   0.000e+000  0.000e+000   -78.087   -78.087     0.000
   Tl2HS+                 0.000e+000  0.000e+000   -84.537   -84.572    -0.035
   Tl2(OH)2(HS)2-2        0.000e+000  0.000e+000  -154.219  -154.361    -0.141
   Tl2OH(HS)3-2           0.000e+000  0.000e+000  -221.637  -221.778    -0.141
Tl(3)           1.522e-024
   Tl(OH)3                1.519e-024  1.521e-024   -23.818   -23.818     0.000
   Tl(OH)4-               2.723e-027  2.511e-027   -26.565   -26.600    -0.035
   Tl(OH)2+               1.584e-031  1.461e-031   -30.800   -30.835    -0.035
   TlOHCl+                2.973e-034  2.741e-034   -33.527   -33.562    -0.035
   TlCl3                  3.957e-039  3.957e-039   -38.403   -38.403     0.000
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   TlOH+2                 1.542e-039  1.114e-039   -38.812   -38.953    -0.141
   TlCl2+                 1.434e-039  1.322e-039   -38.843   -38.879    -0.035
   TlCl4-                 7.740e-040  7.136e-040   -39.111   -39.147    -0.035
   TlCl+2                 0.000e+000  0.000e+000   -41.953   -42.095    -0.141
   Tl+3                   0.000e+000  0.000e+000   -46.953   -47.271    -0.318
   TlNO3+2                0.000e+000  0.000e+000   -59.434   -59.575    -0.141
U(3)            0.000e+000
   U+3                    0.000e+000  0.000e+000   -55.387   -55.705    -0.318
U(4)            1.165e-013
   U(OH)5-                1.165e-013  1.074e-013   -12.934   -12.969    -0.035
   U(OH)4                 5.476e-018  5.476e-018   -17.262   -17.262     0.000
   U(OH)3+                2.643e-023  2.437e-023   -22.578   -22.613    -0.035
   U(OH)2+2               1.898e-029  1.372e-029   -28.722   -28.863    -0.141
   UOH+3                  1.634e-036  7.863e-037   -35.787   -36.104    -0.318
   UF3+                   1.237e-038  1.141e-038   -37.907   -37.943    -0.035
   UF2+2                  1.093e-038  7.898e-039   -37.961   -38.102    -0.141
   UF+3                   1.430e-040  0.000e+000   -39.845   -40.162    -0.318
   UF4                    0.000e+000  0.000e+000   -40.943   -40.943     0.000
   USO4+2                 0.000e+000  0.000e+000   -41.791   -41.932    -0.141
   U(SO4)2                0.000e+000  0.000e+000   -42.142   -42.142     0.000
   UHPO4+2                0.000e+000  0.000e+000   -43.159   -43.300    -0.141
   U+4                    0.000e+000  0.000e+000   -43.857   -44.422    -0.565
   U(HPO4)2               0.000e+000  0.000e+000   -44.231   -44.231     0.000
   UF5-                   0.000e+000  0.000e+000   -44.350   -44.385    -0.035
   UCl+3                  0.000e+000  0.000e+000   -44.948   -45.266    -0.318
   U(HPO4)3-2             0.000e+000  0.000e+000   -46.679   -46.820    -0.141
   UF6-2                  0.000e+000  0.000e+000   -46.804   -46.945    -0.141
   U(HPO4)4-4             0.000e+000  0.000e+000   -48.658   -49.222    -0.565
   U6(OH)15+9             0.000e+000  0.000e+000  -147.110  -149.968    -2.858
U(5)            2.126e-013
   UO2+                   2.126e-013  1.960e-013   -12.672   -12.708    -0.035
U(6)            4.159e-010
   UO2OH+                 1.114e-010  1.027e-010    -9.953    -9.988    -0.035
   (UO2)3(OH)5+           1.012e-010  9.332e-011    -9.995   -10.030    -0.035
   UO2H3SiO4+             5.562e-013  5.128e-013   -12.255   -12.290    -0.035
   UO2F+                  1.346e-013  1.241e-013   -12.871   -12.906    -0.035
   UO2+2                  1.328e-013  9.862e-014   -12.877   -13.006    -0.129
   (UO2)2(OH)2+2          2.423e-014  1.751e-014   -13.616   -13.757    -0.141
   UO2SO4                 1.158e-014  1.158e-014   -13.936   -13.936     0.000
   UO2PO4-                7.466e-015  6.884e-015   -14.127   -14.162    -0.035
   UO2F2                  3.262e-015  3.262e-015   -14.487   -14.487     0.000
   UO2Cl+                 4.958e-016  4.571e-016   -15.305   -15.340    -0.035
   UO2(HPO4)2-2           3.031e-017  2.190e-017   -16.518   -16.660    -0.141
   UO2HPO4                2.129e-017  2.129e-017   -16.672   -16.672     0.000
   UO2(SO4)2-2            1.639e-017  1.184e-017   -16.785   -16.926    -0.141
   UO2F3-                 8.100e-018  7.468e-018   -17.091   -17.127    -0.035
   UO2F4-2                7.484e-022  5.407e-022   -21.126   -21.267    -0.141
   UO2H2PO4+              4.235e-023  3.904e-023   -22.373   -22.408    -0.035
   UO2NO3+                2.036e-029  1.877e-029   -28.691   -28.727    -0.035
   UO2(H2PO4)2            1.671e-033  1.671e-033   -32.777   -32.777     0.000
   UO2(H2PO4)3-           0.000e+000  0.000e+000   -43.432   -43.467    -0.035
V(2)            0.000e+000
   VOH+                   0.000e+000  0.000e+000   -40.617   -40.652    -0.035
   V+2                    0.000e+000  0.000e+000   -42.939   -43.080    -0.141
V(3)            2.380e-013
   V(OH)3                 2.380e-013  2.380e-013   -12.623   -12.623     0.000
   V(OH)2+                2.030e-025  1.872e-025   -24.693   -24.728    -0.035
   VOH+2                  2.990e-030  2.161e-030   -29.524   -29.665    -0.141
   V+3                    1.083e-036  5.212e-037   -35.965   -36.283    -0.318
   VSO4+                  2.070e-038  1.909e-038   -37.684   -37.719    -0.035
   V2(OH)3+3              0.000e+000  0.000e+000   -55.624   -55.941    -0.318
   V2(OH)2+4              0.000e+000  0.000e+000   -57.966   -58.531    -0.565
V(4)            3.892e-019
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   V(OH)3+                3.889e-019  3.585e-019   -18.410   -18.445    -0.035
   VO+2                   3.007e-022  2.172e-022   -21.522   -21.663    -0.141
   VOF+                   1.288e-023  1.188e-023   -22.890   -22.925    -0.035
   VOSO4                  4.642e-024  4.642e-024   -23.333   -23.333     0.000
   VOCl+                  1.889e-024  1.742e-024   -23.724   -23.759    -0.035
   VOF2                   4.059e-026  4.059e-026   -25.392   -25.392     0.000
   VOF3-                  1.424e-029  1.313e-029   -28.847   -28.882    -0.035
   H2V2O4+2               8.918e-033  6.444e-033   -32.050   -32.191    -0.141
   VOF4-2                 6.685e-034  4.830e-034   -33.175   -33.316    -0.141
V(5)            7.495e-008
   HVO4-2                 5.432e-008  3.925e-008    -7.265    -7.406    -0.141
   H2VO4-                 2.063e-008  1.902e-008    -7.686    -7.721    -0.035
   HV2O7-3                5.255e-013  2.529e-013   -12.279   -12.597    -0.318
   VO4-3                  3.358e-013  1.616e-013   -12.474   -12.792    -0.318
   H3VO4                  2.315e-013  2.315e-013   -12.635   -12.635     0.000
   H3V2O7-                3.083e-014  2.843e-014   -13.511   -13.546    -0.035
   V2O7-4                 2.052e-014  5.593e-015   -13.688   -14.252    -0.565
   V3O9-3                 1.497e-017  7.204e-018   -16.825   -17.142    -0.318
   VO2+                   6.056e-019  5.623e-019   -18.218   -18.250    -0.032
   VO2F                   8.989e-021  8.989e-021   -20.046   -20.046     0.000
   VO2SO4-                1.130e-021  1.042e-021   -20.947   -20.982    -0.035
   V4O12-4                2.096e-022  5.712e-023   -21.679   -22.243    -0.565
   VO2F2-                 3.226e-023  2.975e-023   -22.491   -22.527    -0.035
   VO2F3-2                4.681e-027  3.382e-027   -26.330   -26.471    -0.141
   VO2F4-3                3.151e-032  1.517e-032   -31.501   -31.819    -0.318
   VO2NO3                 2.713e-035  2.713e-035   -34.567   -34.567     0.000
   V10O28-6               0.000e+000  0.000e+000   -62.691   -63.961    -1.270
   HV10O28-5              0.000e+000  0.000e+000   -63.807   -64.689    -0.882
   H2V10O28-4             0.000e+000  0.000e+000   -67.831   -68.396    -0.565
Zn              8.874e-008
   Zn+2                   3.433e-008  2.550e-008    -7.464    -7.593    -0.129
   Zn(OH)2                2.766e-008  2.766e-008    -7.558    -7.558     0.000
   ZnOH+                  2.288e-008  2.110e-008    -7.640    -7.676    -0.035
   ZnOHCl                 1.983e-009  1.983e-009    -8.703    -8.703     0.000
   Zn(OH)3-               1.244e-009  1.147e-009    -8.905    -8.941    -0.035
   ZnSO4                  4.329e-010  4.329e-010    -9.364    -9.364     0.000
   ZnCl+                  1.972e-010  1.831e-010    -9.705    -9.737    -0.032
   ZnF+                   5.031e-012  4.638e-012   -11.298   -11.334    -0.035
   ZnCl2                  8.292e-013  8.292e-013   -12.081   -12.081     0.000
   Zn(OH)4-2              5.226e-013  3.776e-013   -12.282   -12.423    -0.141
   Zn(SO4)2-2             4.049e-013  2.925e-013   -12.393   -12.534    -0.141
   ZnCl3-                 2.028e-015  1.882e-015   -14.693   -14.725    -0.032
   ZnCl4-2                3.601e-018  2.690e-018   -17.444   -17.570    -0.127
   ZnSeO4                 1.344e-019  1.344e-019   -18.872   -18.872     0.000
   ZnNO3+                 6.628e-024  6.111e-024   -23.179   -23.214    -0.035
   Zn(SeO4)2-2            6.413e-033  4.634e-033   -32.193   -32.334    -0.141
   Zn(NO3)2               1.163e-040  1.163e-040   -39.934   -39.934     0.000
   ZnS(HS)-               0.000e+000  0.000e+000  -132.985  -133.020    -0.035
   Zn(HS)2                0.000e+000  0.000e+000  -135.925  -135.925     0.000
   Zn(HS)3-               0.000e+000  0.000e+000  -203.185  -203.221    -0.035
   ZnS(HS)2-2             0.000e+000  0.000e+000  -204.145  -204.286    -0.141
   Zn(HS)4-2              0.000e+000  0.000e+000  -275.115  -275.256    -0.141

------------------------------Saturation indices------------------------------

       Phase               SI log IAP  log KT

       (Co(NH3)5Cl)(NO3)2 -71.21  -64.93    6.29  (Co(NH3)5Cl)(NO3)2
       (Co(NH3)5Cl)Cl2 -42.48  -37.97    4.51  (Co(NH3)5Cl)Cl2
       (Co(NH3)5OH2)Cl3 -49.71  -37.97   11.74  (Co(NH3)5OH2)Cl3
       (Co(NH3)6)(NO3)3 -93.41  -75.47   17.93  (Co(NH3)6)(NO3)3
       (Co(NH3)6)Cl3   -55.07  -35.04   20.03  (Co(NH3)6)Cl3
       (NH4)2CrO4      -29.34  -28.94    0.40  (NH4)2CrO4
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(NH4)2SeO4	-25.89	-25.44	0.45	(NH4)2SeO4
(UO2)3(PO4)2	-18.43	-67.83	-49.40	(UO2)3(PO4)2
(VO)3(PO4)2	-68.70	-93.80	-25.10	(VO)3(PO4)2
Acanthite	-52.73	-88.95	-36.22	Ag2S
Ag2CrO4	-32.67	-44.26	-11.59	Ag2CrO4
Ag2HVO4	-20.28	-18.80	1.48	Ag2HVO4
Ag2MoO4	-22.67	-34.22	-11.55	Ag2MoO4
Ag2O	-22.04	-9.46	12.57	Ag2O
Ag2Se	-2.10	-50.80	-48.70	Ag2Se
Ag2SeO3	-20.11	-27.26	-7.15	Ag2SeO3
Ag2SeO4	-31.85	-40.76	-8.91	Ag2SeO4
Ag2SO4	-26.58	-31.40	-4.82	Ag2SO4
Ag3AsO3	-35.67	-33.51	2.16	Ag3AsO3
Ag3AsO4	-26.82	-29.61	-2.79	Ag3AsO4
Ag3H2VO5	-28.71	-23.53	5.18	Ag3H2VO5
Ag3PO4	-37.76	-55.35	-17.59	Ag3PO4
AgF:4H2O	-19.74	-18.69	1.05	AgF:4H2O
Agmetal	-2.63	-16.13	-13.51	Ag
AgVO3	-14.84	-14.07	0.77	AgVO3
Al(OH)3(am)	-4.08	6.72	10.80	Al(OH)3
Al2(MoO4)3	-63.21	-60.84	2.37	Al2(MoO4)3
Al2O3	-6.21	13.44	19.65	Al2O3
Al4(OH)10SO4	-17.76	4.94	22.70	Al4(OH)10SO4
AlAsO4:2H2O	-13.49	-8.69	4.80	AlAsO4:2H2O
AlOHSO4	-11.99	-15.22	-3.23	AlOHSO4
AlSb	-145.92	-80.29	65.62	AlSb
Alunite	-17.10	-18.50	-1.40	KAl3(SO4)2(OH)6
Anglesite	-7.38	-15.17	-7.79	PbSO4
Anhydrite	-2.77	-7.13	-4.36	CaSO4
Anilite	-58.87	-90.75	-31.88	Cu0.25Cu1.5S
Antlerite	-27.63	-18.84	8.79	Cu3(OH)4SO4
Arsenolite	-74.50	-77.26	-2.76	As4O6
As2O5	-37.53	-30.82	6.71	As2O5
Atacamite	-16.78	-9.39	7.39	Cu2(OH)3Cl
Autunite	-13.92	-57.84	-43.93	Ca(UO2)2(PO4)2
Avicennite	-34.64	-47.64	-13.00	Tl2O3
Ba(OH)2:8H2O	-18.47	5.92	24.39	Ba(OH)2:8H2O
Ba2V2O7:2H2O	-22.70	-6.82	15.87	Ba2V2O7:2H2O
Ba3(AsO4)2	-4.14	-13.05	-8.91	Ba3(AsO4)2
Ba3(VO4)2:4H2O	-33.84	-0.90	32.94	Ba3(VO4)2:4H2O
BaCrO4	-19.21	-28.88	-9.67	BaCrO4
BaF2	-16.17	-21.99	-5.82	BaF2
BaHPO4	-15.45	-35.23	-19.77	BaHPO4
BaMoO4	-11.88	-18.84	-6.96	BaMoO4
Barite	-6.04	-16.02	-9.98	BaSO4
BaS	-89.75	-73.57	16.18	BaS
BaSeO3	-13.70	-11.87	1.83	BaSeO3
BaSeO4	-17.91	-25.37	-7.46	BaSeO4
Bassetite	-27.64	-72.13	-44.48	Fe(UO2)2(PO4)2
Bianchite	-9.94	-11.70	-1.76	ZnSO4:6H2O
Birnessite	-9.38	8.71	18.09	MnO2
Bixbyite	-4.74	-5.38	-0.64	Mn2O3
BlaubleiI	-55.93	-80.10	-24.16	Cu0.9Cu0.2S
BlaubleiII	-57.73	-85.01	-27.28	Cu0.6Cu0.8S
Boehmite	-1.86	6.72	8.58	AlOOH
Breithauptite	-46.87	-65.39	-18.52	NiSb
Brochantite	-33.03	-17.81	15.22	Cu4(OH)6SO4
Brucite	-3.14	13.70	16.84	Mg(OH)2
Bunsenite	-2.23	10.22	12.45	NiO
Ca(VO3)2	-9.52	-3.86	5.66	Ca(VO3)2
Ca2V2O7	-6.55	10.95	17.50	Ca2V2O7
Ca2V2O7:2H2O	-10.60	10.95	21.55	Ca2V2O7:2H2O
Ca3(AsO4)2:4H2O	-8.69	13.61	22.30	Ca3(AsO4)2:4H2O

Ca3(PO4)2(beta)	-8.95	-37.87	-28.92	Ca3(PO4)2
Ca3(VO4)2	-13.20	25.76	38.96	Ca3(VO4)2
Ca3(VO4)2:4H2O	-14.10	25.76	39.86	Ca3(VO4)2:4H2O
Ca3Sb2	-272.57	-129.59	142.97	Ca3Sb2
Ca4H(PO4)3:3H2O	-17.13	-64.21	-47.08	Ca4H(PO4)3:3H2O
CaCrO4	-17.73	-19.99	-2.27	CaCrO4
CaHPO4	-7.07	-26.34	-19.27	CaHPO4
CaHPO4:2H2O	-7.35	-26.34	-19.00	CaHPO4:2H2O
Calomel	-17.02	-34.93	-17.91	Hg2Cl2
CaMoO4	-2.00	-9.95	-7.95	CaMoO4
Carnotite	0.48	0.71	0.23	KUO2VO4
CaSeO3:2H2O	-5.80	-2.98	2.81	CaSeO3:2H2O
CaSeO4:2H2O	-13.47	-16.49	-3.02	CaSeO4:2H2O
Cd(BO2)2	-13.53	-3.69	9.84	Cd(BO2)2
Cd(OH)2	-5.86	7.78	13.64	Cd(OH)2
Cd(OH)2(am)	-5.95	7.78	13.73	Cd(OH)2
Cd3(OH)2(SO4)2	-27.25	-20.54	6.71	Cd3(OH)2(SO4)2
Cd3(OH)4SO4	-21.16	1.40	22.56	Cd3(OH)4SO4
Cd3(PO4)2	-26.36	-58.96	-32.60	Cd3(PO4)2
Cd4(OH)6SO4	-19.22	9.18	28.40	Cd4(OH)6SO4
CdCl2	-14.48	-15.14	-0.66	CdCl2
CdCl2:1H2O	-13.44	-15.14	-1.69	CdCl2:1H2O
CdCl2:2.5H2O	-13.22	-15.14	-1.91	CdCl2:2.5H2O
CdF2	-18.92	-20.13	-1.21	CdF2
Cdmetal(alpha)	-28.54	-15.02	13.51	Cd
Cdmetal(gamma)	-28.64	-15.02	13.62	Cd
CdMoO4	-2.83	-16.98	-14.15	CdMoO4
CdOHCl	-7.22	-3.68	3.54	CdOHCl
CdSb	-67.48	-67.83	-0.35	CdSb
CdSe	-13.36	-33.56	-20.20	CdSe
CdSeO4:2H2O	-21.67	-23.52	-1.85	CdSeO4:2H2O
CdSO4	-13.99	-14.16	-0.17	CdSO4
CdSO4:1H2O	-12.43	-14.16	-1.73	CdSO4:1H2O
CdSO4:2.67H2O	-12.29	-14.16	-1.87	CdSO4:2.67H2O
Celestite	-4.06	-10.68	-6.62	SrSO4
Cerargyrite	-6.44	-16.19	-9.75	AgCl
Chalcanthite	-18.27	-20.91	-2.64	CuSO4:5H2O
Chalcedony	-2.74	-6.29	-3.55	SiO2
Chalcocite	-59.93	-94.85	-34.92	Cu2S
Chalcopyrite	-122.15	-157.42	-35.27	CuFeS2
Chrysotile	-3.67	28.53	32.20	Mg3Si2O5(OH)4
Cinnabar	-49.99	-95.69	-45.69	HgS
Claudetite	-74.19	-77.26	-3.06	As4O6
Clausthalite	-7.47	-34.57	-27.10	PbSe
Co(BO2)2	-35.79	-8.72	27.07	Co(BO2)2
Co(OH)2	-10.35	2.75	13.09	Co(OH)2
Co(OH)3	-15.94	-18.25	-2.31	Co(OH)3
Co3(AsO4)2	-35.61	-22.58	13.03	Co3(AsO4)2
Co3(PO4)2	-39.37	-74.06	-34.69	Co3(PO4)2
Co3O4	-23.26	-33.76	-10.50	Co3O4
CoCl2	-28.44	-20.17	8.27	CoCl2
CoCl2:6H2O	-22.71	-20.17	2.54	CoCl2:6H2O
CoF2	-23.57	-25.16	-1.60	CoF2
CoF3	-58.66	-60.12	-1.46	CoF3
CoFe2O4	4.07	0.54	-3.53	CoFe2O4
CoHPO4	-19.34	-38.40	-19.06	CoHPO4
CoMoO4	-14.25	-22.01	-7.76	CoMoO4
CoO	-10.84	2.75	13.59	CoO
CoS(alpha)	-69.30	-76.74	-7.44	CoS
CoS(beta)	-65.67	-76.74	-11.07	CoS
CoSe	-22.39	-38.59	-16.20	CoSe
CoSeO3	-16.37	-15.05	1.32	CoSeO3
CoSeO4:6H2O	-27.02	-28.55	-1.53	CoSeO4:6H2O

CoSO4	-22.00	-19.19	2.80	CoSO4
CoSO4:6H2O	-16.72	-19.19	-2.47	CoSO4:6H2O
Cotunnite	-11.37	-16.15	-4.78	PbCl2
Covellite	-56.16	-78.46	-22.30	CuS
Cr(OH)2	-20.90	-10.08	10.82	Cr(OH)2
Cr(OH)3	-2.96	-1.63	1.34	Cr(OH)3
Cr(OH)3(am)	-0.88	-1.63	-0.75	Cr(OH)3
Cr2O3	-0.90	-3.26	-2.36	Cr2O3
CrCl2	-47.09	-33.00	14.09	CrCl2
CrCl3	-51.12	-36.00	15.11	CrCl3
CrF3	-32.16	-43.49	-11.34	CrF3
Cristobalite	-2.94	-6.29	-3.35	SiO2
Crmetal	-63.37	-32.89	30.48	Cr
CrO3	-31.59	-34.80	-3.21	CrO3
Cryolite	-27.03	-60.87	-33.84	Na3AlF6
Cu(OH)2	-7.64	1.03	8.67	Cu(OH)2
Cu(SbO3)2	-35.78	9.43	45.21	Cu(SbO3)2
Cu2(OH)3NO3	-32.12	-22.87	9.25	Cu2(OH)3NO3
Cu2Sb:3H2O	-58.77	-93.66	-34.88	Cu2Sb:3H2O
Cu2Se(alpha)	-10.90	-56.70	-45.80	Cu2Se
Cu2SO4	-35.35	-37.30	-1.95	Cu2SO4
Cu3(AsO4)2:2H2O	-33.82	-27.72	6.10	Cu3(AsO4)2:2H2O
Cu3(PO4)2	-42.35	-79.20	-36.85	Cu3(PO4)2
Cu3(PO4)2:3H2O	-44.08	-79.20	-35.12	Cu3(PO4)2:3H2O
Cu3Sb	-67.45	-110.04	-42.59	Cu3Sb
Cu3Se2	-33.51	-97.00	-63.49	Cu3Se2
CuCrO4	-28.33	-33.77	-5.44	CuCrO4
CuF	-16.73	-21.63	-4.91	CuF
CuF2	-27.99	-26.88	1.12	CuF2
CuF2:2H2O	-22.33	-26.88	-4.55	CuF2:2H2O
Cumetal	-10.32	-19.08	-8.76	Cu
CuMoO4	-10.65	-23.73	-13.08	CuMoO4
CuOCuSO4	-30.18	-19.87	10.30	CuOCuSO4
Cupricferrite	-7.16	-1.17	5.99	CuFe2O4
Cuprite	-13.95	-15.36	-1.41	Cu2O
Cuprousferrite	0.14	-8.78	-8.92	CuFeO2
CuSe	-7.21	-40.31	-33.10	CuSe
CuSe2	-25.48	-58.84	-33.37	CuSe2
CuSeO3:2H2O	-17.27	-16.76	0.51	CuSeO3:2H2O
CuSeO4:5H2O	-27.82	-30.26	-2.44	CuSeO4:5H2O
CuSO4	-23.85	-20.91	2.94	CuSO4
Diaspore	-0.15	6.72	6.87	AlOOH
Djurleite	-59.84	-93.76	-33.92	Cu0.066Cu1.868S
Epsomite	-6.11	-8.24	-2.13	MgSO4:7H2O
Fe(OH)2	-13.04	0.53	13.56	Fe(OH)2
Fe(OH)2.7Cl.3	-1.50	-4.54	-3.04	Fe(OH)2.7Cl.3
Fe(VO3)2	-14.42	-18.14	-3.72	Fe(VO3)2
Fe2(OH)4SeO3	-21.55	-20.00	1.55	Fe2(OH)4SeO3
Fe2(SeO3)3:2H2O	-34.96	-55.58	-20.63	Fe2(SeO3)3:2H2O
Fe2(SO4)3	-64.29	-68.03	-3.73	Fe2(SO4)3
Fe3(OH)8	-21.90	-1.68	20.22	Fe3(OH)8
FeAsO4:2H2O	-16.91	-16.51	0.40	FeAsO4:2H2O
FeCr2O4	-9.93	-2.73	7.20	FeCr2O4
FeMoO4	-14.14	-24.23	-10.09	FeMoO4
Ferrihydrite	-4.30	-1.10	3.19	Fe(OH)3
Ferroselite	-40.76	-59.35	-18.60	FeSe2
FeS(ppt)	-76.01	-78.96	-2.95	FeS
FeSe	-29.81	-40.81	-11.00	FeSe
Fluorite	-2.60	-13.10	-10.50	CaF2
Galena	-58.75	-72.72	-13.97	PbS
Gibbsite	-1.57	6.72	8.29	Al(OH)3
Goethite	-1.59	-1.10	0.49	FeOOH
Goslarite	-9.69	-11.70	-2.01	ZnSO4:7H2O

Greenalite	-31.81	-11.00	20.81	Fe3Si2O5(OH)4
Greenockite	-57.35	-71.71	-14.36	CdS
Greigite	-274.61	-319.64	-45.03	Fe3S4
Gummite	-2.85	4.82	7.67	UO3
Gypsum	-2.52	-7.13	-4.61	CaSO4:2H2O
H-Autunite	-24.72	-72.65	-47.93	H2(UO2)2(PO4)2
H-Jarosite	-35.09	-47.19	-12.10	(H3O)Fe3(SO4)2(OH)6
H2MoO4	-11.88	-24.76	-12.88	H2MoO4
H2S(g)	-71.48	-79.49	-8.01	H2S
H2Se(g)	-36.38	-41.34	-4.96	H2Se
H2Sn(OH)6	-7.38	-30.91	-23.53	H2Sn(OH)6
Halite	-7.68	-6.08	1.60	NaCl
Halloysite	-8.71	0.86	9.57	Al2Si2O5(OH)4
Hausmannite	-4.45	56.58	61.03	Mn3O4
Hematite	-0.79	-2.21	-1.42	Fe2O3
Hercynite	-8.93	13.97	22.89	FeAl2O4
Hg(g)	-9.53	-17.41	-7.87	Hg
Hg(OH)2	-12.70	-16.20	-3.50	Hg(OH)2
Hg2(g)	-19.86	-34.81	-14.96	Hg2
Hg2(OH)2	-17.27	-12.01	5.26	Hg2(OH)2
Hg2CrO4	-38.11	-46.81	-8.70	Hg2CrO4
Hg2F2	-29.56	-39.92	-10.36	Hg2F2
Hg2HPO4	-28.38	-53.16	-24.77	Hg2HPO4
Hg2S	-79.82	-91.50	-11.68	Hg2S
Hg2SeO3	-25.14	-29.80	-4.66	Hg2SeO3
Hg2SO4	-27.82	-33.95	-6.13	Hg2SO4
HgCl(g)	-36.96	-17.46	19.50	HgCl
HgCl2	-17.85	-39.11	-21.26	HgCl2
HgF(g)	-52.63	-19.96	32.68	HgF
HgF2(g)	-56.67	-44.11	12.57	HgF2
Hgmetal(l)	-3.95	-17.41	-13.45	Hg
HgSe	-1.84	-57.54	-55.69	HgSe
HgSeO3	-21.56	-33.99	-12.43	HgSeO3
HgSO4	-28.72	-38.13	-9.42	HgSO4
Hinsdalite	-33.66	-36.16	-2.50	PbAl3PO4SO4(OH)6
Hydroxylapatite	-5.07	-49.40	-44.33	Ca5(PO4)3OH
Hydroxylpyromorphite	-26.81	-89.60	-62.79	Pb5(PO4)3OH
K-Alum	-26.77	-31.94	-5.17	KAl(SO4)2:12H2O
K-Autunite	-13.97	-62.22	-48.24	K2(UO2)2(PO4)2
K-Jarosite	-27.17	-41.97	-14.80	KFe3(SO4)2(OH)6
K2Cr2O7	-41.92	-59.16	-17.24	K2Cr2O7
K2CrO4	-23.85	-24.36	-0.51	K2CrO4
K2MoO4	-17.58	-14.32	3.26	K2MoO4
K2SeO4	-20.13	-20.86	-0.73	K2SeO4
Kaolinite	-6.57	0.86	7.43	Al2Si2O5(OH)4
Langite	-35.29	-17.81	17.49	Cu4(OH)6SO4:H2O
Larnakite	-7.96	-8.40	-0.43	PbO:PbSO4
Laurionite	-5.31	-4.69	0.62	PbOHCl
Lepidocrocite	-2.47	-1.10	1.37	FeOOH
Lime	-17.89	14.81	32.70	CaO
Litharge	-5.92	6.77	12.69	PbO
Mackinawite	-75.36	-78.96	-3.60	FeS
Maghemite	-8.59	-2.21	6.39	Fe2O3
Magnesioferrite	-5.37	11.49	16.86	Fe2MgO4
Magnetite	-5.08	-1.68	3.40	Fe3O4
Manganite	-2.68	22.66	25.34	MnOOH
Massicot	-6.12	6.77	12.89	PbO
Matlockite	-9.67	-18.64	-8.97	PbClF
Melanothallite	-28.14	-21.88	6.26	CuCl2
Melanterite	-19.20	-21.41	-2.21	FeSO4:7H2O
Metacinnabar	-50.59	-95.69	-45.09	HgS
Mg(OH)2(active)	-5.09	13.70	18.79	Mg(OH)2
Mg(VO3)2	-16.25	-4.97	11.28	Mg(VO3)2

Mg2Sb3	-251.31	-176.62	74.68	Mg2Sb3
Mg2V2O7	-17.63	8.73	26.36	Mg2V2O7
Mg3(PO4)2	-17.91	-41.19	-23.28	Mg3(PO4)2
MgCr2O4	-5.76	10.44	16.20	MgCr2O4
MgCrO4	-26.48	-21.10	5.38	MgCrO4
MgF2	-6.08	-14.21	-8.13	MgF2
MgHPO4:3H2O	-9.27	-27.45	-18.18	MgHPO4:3H2O
MgMoO4	-9.21	-11.06	-1.85	MgMoO4
MgSeO3:6H2O	-7.15	-4.09	3.06	MgSeO3:6H2O
MgSeO4:6H2O	-16.40	-17.60	-1.20	MgSeO4:6H2O
Minium	-30.41	43.11	73.52	Pb3O4
Mirabilite	-10.06	-11.18	-1.11	Na2SO4:10H2O
Mn(VO3)2	-12.31	-7.41	4.90	Mn(VO3)2
Mn2(SO4)3	-65.49	-71.20	-5.71	Mn2(SO4)3
Mn2Sb	-136.98	-75.90	61.08	Mn2Sb
Mn3(AsO4)2:8H2O	-9.55	2.95	12.50	Mn3(AsO4)2:8H2O
Mn3(PO4)2	-24.70	-48.53	-23.83	Mn3(PO4)2
MnCl2:4H2O	-14.37	-11.66	2.72	MnCl2:4H2O
MnHPO4	-4.49	-29.89	-25.40	MnHPO4
MnS(grn)	-68.40	-68.23	0.17	MnS
MnS(pnk)	-71.57	-68.23	3.34	MnS
MnSb	-86.79	-89.70	-2.91	MnSb
MnSe	-33.58	-30.08	3.50	MnSe
MnSeO3	-7.66	-6.53	1.13	MnSeO3
MnSeO3:2H2O	-7.52	-6.53	0.98	MnSeO3:2H2O
MnSeO4:5H2O	-17.99	-20.04	-2.05	MnSeO4:5H2O
MnSO4	-13.26	-10.68	2.58	MnSO4
Monteponite	-7.32	7.78	15.10	CdO
Montroydite	-12.56	-16.20	-3.64	HgO
MoO3	-16.76	-24.76	-8.00	MoO3
Morenosite	-9.58	-11.72	-2.14	NiSO4:7H2O
MoS2	-136.28	-206.54	-70.26	MoS2
Na-Autunite	-14.48	-61.89	-47.41	Na2(UO2)2(PO4)2
Na-Jarosite	-30.61	-41.81	-11.20	NaFe3(SO4)2(OH)6
Na2Cr2O7	-48.94	-58.84	-9.90	Na2Cr2O7
Na2CrO4	-26.97	-24.04	2.93	Na2CrO4
Na2Mo2O7	-22.16	-38.76	-16.60	Na2Mo2O7
Na2MoO4	-15.49	-14.00	1.49	Na2MoO4
Na2MoO4:2H2O	-15.22	-14.00	1.22	Na2MoO4:2H2O
Na2SeO3:5H2O	-17.33	-7.03	10.30	Na2SeO3:5H2O
Na2SeO4	-21.82	-20.54	1.28	Na2SeO4
Na3Sb	-165.32	-70.87	94.45	Na3Sb
Na3VO4	-29.87	6.81	36.68	Na3VO4
Na4V2O7	-34.55	2.85	37.40	Na4V2O7
Nantokite	-12.41	-19.14	-6.73	CuCl
NaSb	-81.99	-58.83	23.17	NaSb
NaVO3	-7.81	-3.95	3.86	NaVO3
Ni(OH)2	-2.58	10.22	12.79	Ni(OH)2
Ni3(AsO4)2:8H2O	-15.87	-0.17	15.70	Ni3(AsO4)2:8H2O
Ni3(PO4)2	-20.35	-51.65	-31.30	Ni3(PO4)2
Ni4(OH)6SO4	-13.07	18.93	32.00	Ni4(OH)6SO4
NiMoO4	-3.40	-14.54	-11.14	NiMoO4
Ningyoite	-22.35	-76.25	-53.91	CaU(PO4)2:2H2O
NiS(alpha)	-63.67	-69.27	-5.60	NiS
NiS(beta)	-58.17	-69.27	-11.10	NiS
NiS(gamma)	-56.47	-69.27	-12.80	NiS
NiSe	-13.42	-31.12	-17.70	NiSe
NiSeO3:2H2O	-10.39	-7.58	2.81	NiSeO3:2H2O
NiSeO4:6H2O	-19.56	-21.08	-1.52	NiSeO4:6H2O
Nsutite	-8.79	8.71	17.50	MnO2
O2(g)	-37.48	45.61	83.09	O2
Orpiment	-216.03	-277.10	-61.07	As2S3
Pb(BO2)2	-11.22	-4.70	6.52	Pb(BO2)2

Pb(OH)2	-1.38	6.77	8.15	Pb(OH)2
Pb2(OH)3Cl	-6.71	2.08	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-12.65	13.54	26.19	Pb2O(OH)2
Pb2O3	-24.70	36.34	61.04	Pb2O3
Pb2V2O7	-3.23	-5.13	-1.90	Pb2V2O7
Pb3(AsO4)2	-16.31	-10.51	5.80	Pb3(AsO4)2
Pb3(PO4)2	-18.46	-61.99	-43.53	Pb3(PO4)2
Pb3(VO4)2	-4.50	1.64	6.14	Pb3(VO4)2
Pb3O2SO4	-12.31	-1.63	10.69	Pb3O2SO4
Pb4(OH)6SO4	-15.96	5.14	21.10	Pb4(OH)6SO4
Pb4O3SO4	-16.73	5.14	21.88	Pb4O3SO4
PbCrO4	-15.43	-28.03	-12.60	PbCrO4
PbF2	-13.70	-21.14	-7.44	PbF2
PbHPO4	-10.57	-34.38	-23.81	PbHPO4
Pbmetal	-20.28	-16.03	4.25	Pb
PbMoO4	-2.37	-17.99	-15.62	PbMoO4
PbO:0.3H2O	-6.21	6.77	12.98	PbO:0.33H2O
PbSeO4	-17.69	-24.53	-6.84	PbSeO4
Periclase	-7.88	13.70	21.58	MgO
Plattnerite	-20.03	29.57	49.60	PbO2
Plumbgummite	-22.58	-55.37	-32.79	PbAl3(PO4)2(OH)5:H2O
Portlandite	-7.99	14.81	22.80	Ca(OH)2
Przhevalskite	-21.52	-65.88	-44.37	Pb(UO2)2(PO4)2
Pyrite	-117.14	-135.65	-18.51	FeS2
Pyrochroite	-3.94	11.26	15.19	Mn(OH)2
Pyrolusite	-7.32	34.06	41.38	MnO2
Pyromorphite	-16.63	-101.06	-84.43	Pb5(PO4)3Cl
Quartz	-2.29	-6.29	-4.00	SiO2
Realgar	-90.46	-110.21	-19.75	AsS
Retgersite	-9.68	-11.72	-2.04	NiSO4:6H2O
Saleeite	-15.31	-58.95	-43.65	Mg(UO2)2(PO4)2
Sb(OH)3	-11.49	-18.60	-7.11	Sb(OH)3
Sb2O4	-17.81	-14.40	3.40	Sb2O4
Sb2O5	-30.55	-40.22	-9.67	Sb2O5
Sb2Se3	-93.47	-161.23	-67.76	Sb2Se3
Sb4O6(cubic)	-56.15	-74.41	-18.26	Sb4O6
Sb4O6(orth)	-56.51	-74.41	-17.90	Sb4O6
SbCl3	-53.55	-52.98	0.57	SbCl3
SbF3	-50.24	-60.47	-10.23	SbF3
Sbmetal	-41.12	-52.81	-11.69	Sb
SbO2	-3.69	-31.51	-27.82	SbO2
Schoepite	-1.17	4.82	5.99	UO2(OH)2:H2O
Semetal(am)	-11.43	-18.54	-7.11	Se
Semetal(hex	-10.83	-18.54	-7.71	Se
Senarmontite	-24.84	-37.21	-12.37	Sb2O3
SeO2	-17.92	-17.79	0.12	SeO2
SeO3	-52.34	-31.30	21.04	SeO3
Sepiolite	-7.22	8.54	15.76	Mg2Si3O7.5OH:3H2O
Sepiolite(A)	-10.24	8.54	18.78	Mg2Si3O7.5OH:3H2O
SiO2(am-gel)	-3.58	-6.29	-2.71	SiO2
SiO2(am-ppt)	-3.55	-6.29	-2.74	SiO2
Sn(OH)2	-29.08	-34.51	-5.43	Sn(OH)2
Sn(OH)4	-8.63	-30.91	-22.28	Sn(OH)4
Sn(SO4)2	-59.57	-74.79	-15.21	Sn(SO4)2
SnCl2	-48.15	-57.43	-9.28	SnCl2
Snmetal(wht)	-54.99	-57.31	-2.33	Sn
SnO	-29.60	-34.51	-4.91	SnO
SnO2	-1.93	-30.91	-28.97	SnO2
SnS	-94.89	-114.00	-19.11	SnS
SnS2	-132.44	-189.89	-57.45	SnS2
SnSe	-45.36	-75.85	-30.49	SnSe
SnSe2	-48.47	-113.59	-65.12	SnSe2
SnSO4	0.52	-56.45	-56.97	SnSO4

Sphalerite	-57.80	-69.25	-11.45	ZnS
Spinel	-9.71	27.14	36.85	MgAl2O4
Sr-Autunite	-16.94	-61.39	-44.46	Sr(UO2)2(PO4)2
SrCrO4	-18.89	-23.54	-4.65	SrCrO4
SrF2	-8.07	-16.65	-8.58	SrF2
SrHPO4	-10.59	-29.89	-19.30	SrHPO4
SrSeO3	-8.83	-6.53	2.30	SrSeO3
SrSeO4	-15.64	-20.04	-4.40	SrSeO4
Stibnite	-225.22	-275.68	-50.46	Sb2S3
Strengite	-15.85	-42.25	-26.40	FePO4:2H2O
Sulfur	-54.54	-56.69	-2.14	S
Tenorite	-6.61	1.03	7.64	CuO
Thenardite	-11.50	-11.18	0.32	Na2SO4
Tl(OH)3	-18.38	-23.82	-5.44	Tl(OH)3
Tl2CrO4	-24.93	-36.94	-12.01	Tl2CrO4
Tl2MoO4	-18.91	-26.90	-7.99	Tl2MoO4
Tl2O	-29.23	-2.14	27.09	Tl2O
Tl2S	-74.44	-81.63	-7.19	Tl2S
Tl2Se	-25.38	-43.48	-18.10	Tl2Se
Tl2SeO4	-29.34	-33.44	-4.10	Tl2SeO4
Tl2SO4	-20.29	-24.08	-3.79	Tl2SO4
TlCl	-8.79	-12.53	-3.74	TlCl
Tlmetal	-18.15	-12.47	5.68	Tl
TlNO3	-24.39	-26.01	-1.61	TlNO3
TlOH	-13.99	-1.07	12.92	TlOH
Torbernite	-26.34	-71.62	-45.28	Cu(UO2)2(PO4)2
Tsumebite	-16.79	-26.58	-9.79	Pb2CuPO4(OH)3:3H2O
Tyuyamunite	1.70	5.78	4.08	Ca(UO2)2(VO4)2
U(HPO4)2:4H2O	-39.48	-91.06	-51.58	U(HPO4)2:4H2O
U3O8	-1.77	19.31	21.08	U3O8
U3Sb4	-526.72	-374.34	152.38	U3Sb4
U4O9	-9.23	-12.25	-3.02	U4O9
UF4	-35.05	-64.58	-29.54	UF4
UF4:2.5H2O	-31.87	-64.58	-32.72	UF4:2.5H2O
UO2(am)	-9.70	-8.76	0.93	UO2
UO2(NO3)2	-57.19	-45.05	12.15	UO2(NO3)2
UO2(NO3)2:2H2O	-49.90	-45.05	4.85	UO2(NO3)2:2H2O
UO2(NO3)2:3H2O	-48.44	-45.05	3.39	UO2(NO3)2:3H2O
UO2(NO3)2:6H2O	-47.09	-45.05	2.05	UO2(NO3)2:6H2O
UO2(OH)2(beta)	-0.79	4.82	5.61	UO2(OH)2
UO2HPO4	-12.10	-36.33	-24.23	UO2HPO4
UO2SeO4:4H2O	-24.22	-26.47	-2.25	UO2SeO4:4H2O
UO3	-2.88	4.82	7.70	UO3
Uramphite	-15.04	-66.79	-51.75	(NH4)2(UO2)2(PO4)2
Uraninite	-4.09	-8.76	-4.67	UO2
Uranocircite	-22.10	-66.73	-44.63	Ba(UO2)2(PO4)2
USb2	-198.78	-169.20	29.58	USb2
V(OH)3	-17.13	-9.54	7.59	V(OH)3
V2O5	-17.31	-18.67	-1.36	V2O5
V3O5	-36.14	-34.30	1.84	V3O5
V4O7	-45.32	-38.14	7.19	V4O7
V6O13	-40.76	-101.62	-60.86	V6O13
Valentinite	-28.73	-37.21	-8.48	Sb2O3
VCl2	-62.73	-43.86	18.87	VCl2
VCl3	-67.35	-43.91	23.43	VCl3
VF4	-74.58	-59.65	14.93	VF4
Vivianite	-44.72	-80.72	-36.00	Fe3(PO4)2:8H2O
Vmetal	-87.77	-43.74	44.03	V
VO	-35.70	-20.94	14.76	VO
VO(OH)2	-8.98	-3.83	5.15	VO(OH)2
VO2Cl	-23.64	-20.79	2.84	VO2Cl
VOCl	-32.15	-21.00	11.15	VOCl
VOCl2	-39.51	-26.75	12.76	VOCl2

```
       VOSO4            -29.38  -25.77    3.61  VOSO4
       Wurtzite         -60.30  -69.25   -8.95  ZnS
       Zincite           -1.10   10.24   11.33  ZnO
       Zincosite        -15.63  -11.70    3.93  ZnSO4
       Zn(BO2)2          -9.52   -1.23    8.29  Zn(BO2)2
       Zn(NO3)2:6H2O    -42.95  -39.63    3.32  Zn(NO3)2:6H2O
       Zn(OH)2           -1.96   10.24   12.20  Zn(OH)2
       Zn(OH)2(am)       -2.24   10.24   12.47  Zn(OH)2
       Zn(OH)2(beta)     -1.52   10.24   11.75  Zn(OH)2
       Zn(OH)2(epsilon)  -1.30   10.24   11.53  Zn(OH)2
       Zn(OH)2(gamma)    -1.50   10.24   11.73  Zn(OH)2
       Zn2(OH)2SO4       -8.97   -1.47    7.50  Zn2(OH)2SO4
       Zn2(OH)3Cl        -6.18    9.01   15.19  Zn2(OH)3Cl
       Zn3(AsO4)2:2.5H2O -13.76   -0.11   13.65  Zn3(AsO4)2:2.5H2O
       Zn3(PO4)2:4H2O   -16.17  -51.59  -35.42  Zn3(PO4)2:4H2O
       Zn3O(SO4)2       -32.08  -13.17   18.91  Zn3O(SO4)2
       Zn4(OH)6SO4       -9.40   19.00   28.40  Zn4(OH)6SO4
       Zn5(OH)8Cl2      -10.24   28.26   38.50  Zn5(OH)8Cl2
       ZnCl2            -19.73  -12.68    7.05  ZnCl2
       ZnF2             -17.14  -17.67   -0.53  ZnF2
       Znmetal          -38.36  -12.57   25.79  Zn
       ZnMoO4            -4.40  -14.52  -10.13  ZnMoO4
       ZnO(active)       -0.95   10.24   11.19  ZnO
       ZnS(am)          -60.20  -69.25   -9.05  ZnS
       ZnSb             -76.39  -65.37   11.01  ZnSb
       ZnSe             -16.70  -31.10  -14.40  ZnSe
       ZnSeO4:6H2O      -19.54  -21.06   -1.52  ZnSeO4:6H2O
       ZnSO4:1H2O       -11.07  -11.70   -0.64  ZnSO4:1H2O

------------------
End of simulation.
------------------

-------------------------------------
Reading input data for simulation 8.
-------------------------------------

       USE SOLUTION 6
       USE GAS_PHASE 1
       EQUILIBRIUM_PHASES  7
              Ba3(AsO4)2    0    0
              Barite   0    0
              CoFe2O4  0    0
              Diaspore 0    0
              FCO3Apatite   0    0
              SnO2     0    0
       Cupricferrite  0    0
       Pyrolusite     0    0
       Calcite   0    0
       SAVE SOLUTION 7
       END
-----------------------------------------
Beginning of batch-reaction calculations.
-----------------------------------------

Reaction step 1.

WARNING: Maximum iterations exceeded, 100

WARNING: Numerical method failed with this set of convergence parameters.

WARNING: Trying smaller step size, pe step size 10, 5 ...
```

```
WARNING: Maximum iterations exceeded, 200

WARNING: Numerical method failed with this set of convergence parameters.

WARNING: Trying reduced tolerance 1e-016 ...

Using solution 6.   Solution after simulation 7.
Using pure phase assemblage 7.
Using gas phase 1.

-----------------------------------Gas phase-----------------------------------


Total pressure:   1.0000   atmospheres
    Gas volume:  1.70e-001 liters

                                                          Moles in gas
                                                 ---------------------------------
Component                 log P           P     Initial       Final       Delta

CO2(g)                    -3.89  1.296e-004  1.292e-005  8.979e-007 -1.202e-005
O2(g)                     -0.00  9.999e-001  8.175e-003  6.930e-003 -1.244e-003

------------------------------Phase assemblage------------------------------

                                                     Moles in assemblage
Phase                   SI log IAP  log KT      Initial       Final       Delta

Ba3(AsO4)2           -9.83  -18.74   -8.91   0.000e+000           0  0.000e+000
Barite               -6.04  -16.02   -9.98   0.000e+000           0  0.000e+000
Calcite              -3.48  -11.96   -8.48   0.000e+000           0  0.000e+000
CoFe2O4              -2.93   -6.46   -3.53   0.000e+000           0  0.000e+000
Cupricferrite       -12.50   -6.51    5.99   0.000e+000           0  0.000e+000
Diaspore             -0.00    6.87    6.87   0.000e+000  9.426e-008  9.426e-008
FCO3Apatite         -21.14 -135.54 -114.40   0.000e+000           0  0.000e+000
Pyrolusite            0.00   41.38   41.38   0.000e+000  3.822e-007  3.822e-007
SnO2                  0.00  -28.97  -28.97   0.000e+000  1.127e-013  1.127e-013

----------------------------Solution composition----------------------------

      Elements          Molality       Moles

      Ag               1.919e-013  1.919e-013
      Al               9.810e-010  9.810e-010
      As               2.322e-007  2.322e-007
      B                2.851e-006  2.851e-006
      Ba               1.674e-012  1.674e-012
      C                1.202e-005  1.202e-005
      Ca               1.303e-003  1.303e-003
      Cd               1.633e-010  1.633e-010
      Cl               3.078e-003  3.078e-003
      Co               1.443e-015  1.443e-015
      Cr               1.894e-010  1.894e-010
      Cu               1.356e-015  1.356e-015
      F                1.000e-005  1.000e-005
      Fe               4.219e-014  4.219e-014
      Hg               1.450e-011  1.450e-011
      K                2.171e-004  2.171e-004
      Mg               1.019e-004  1.019e-004
      Mn               7.765e-014  7.765e-014
      Mo               1.579e-007  1.579e-007
      N                1.609e-006  1.609e-006
      Na               3.152e-004  3.152e-004
```

```
      Ni                3.788e-008  3.788e-008
      P                 3.260e-011  3.260e-011
      Pb                2.578e-010  2.578e-010
      S                 1.227e-004  1.227e-004
      Sb                5.912e-009  5.912e-009
      Se                7.437e-009  7.437e-009
      Si                5.811e-007  5.811e-007
      Sn                1.773e-016  1.773e-016
      Sr                3.674e-007  3.674e-007
      Tl                1.134e-010  1.134e-010
      U                 4.163e-010  4.163e-010
      V                 7.495e-008  7.495e-008
      Zn                8.874e-008  8.874e-008

----------------------------Description of solution----------------------------

                                       pH  =   6.546      Charge balance
                                       pe  =  14.226      Adjusted to redox
equilibrium
                        Activity of water  =   1.000
                           Ionic strength  =  4.799e-003
                       Mass of water (kg)  =  1.000e+000
                  Total alkalinity (eq/kg)  =  7.406e-006
                       Total CO2 (mol/kg)  =  1.202e-005
                     Temperature (deg C)   =  25.000
                   Electrical balance (eq) =  4.705e-019
 Percent error, 100*(Cat-|An|)/(Cat+|An|)  =   0.00
                                Iterations =  59
                                   Total H = 1.110137e+002
                                   Total O = 5.550986e+001

----------------------------Distribution of species----------------------------

                                                   Log       Log         Log
   Species                 Molality    Activity  Molality  Activity     Gamma

   H+                    3.063e-007  2.844e-007    -6.514    -6.546    -0.032
   OH-                   3.817e-008  3.540e-008    -7.418    -7.451    -0.033
   H2O                   5.551e+001  9.999e-001     1.744    -0.000     0.000
Ag                 1.919e-013
   AgCl                  1.318e-013  1.318e-013   -12.880   -12.880     0.000
   AgCl2-                3.558e-014  3.281e-014   -13.449   -13.484    -0.035
   Ag+                   2.433e-014  2.259e-014   -13.614   -13.646    -0.032
   AgCl3-2               1.156e-016  8.356e-017   -15.937   -16.078    -0.141
   AgSO4-                3.793e-017  3.497e-017   -16.421   -16.456    -0.035
   AgCl4-3               1.013e-018  4.876e-019   -17.994   -18.312    -0.318
   AgF                   5.170e-019  5.170e-019   -18.287   -18.287     0.000
   AgOH                  7.997e-020  7.997e-020   -19.097   -19.097     0.000
   AgNO3                 2.673e-020  2.673e-020   -19.573   -19.573     0.000
   AgH2BO3               2.082e-021  2.082e-021   -20.682   -20.682     0.000
   Ag(OH)2-              3.001e-025  2.766e-025   -24.523   -24.558    -0.035
   AgNO2                 7.453e-031  7.453e-031   -30.128   -30.128     0.000
   AgSeO3-               2.008e-033  1.852e-033   -32.697   -32.732    -0.035
   Ag2MoO4               2.255e-035  2.255e-035   -34.647   -34.647     0.000
   Ag(NO2)2-             0.000e+000  0.000e+000   -48.704   -48.739    -0.035
   Ag(SeO3)2-3           0.000e+000  0.000e+000   -53.357   -53.675    -0.318
   AgNH3+                0.000e+000  0.000e+000   -79.020   -79.055    -0.035
   Ag2Se                 0.000e+000  0.000e+000   -85.650   -85.650     0.000
   AgHS                  0.000e+000  0.000e+000  -143.007  -143.007     0.000
   Ag(NH3)2+             0.000e+000  0.000e+000  -143.828  -143.864    -0.035
   AgOH(Se)2-4           0.000e+000  0.000e+000  -213.581  -214.146    -0.564
   Ag(HS)2-              0.000e+000  0.000e+000  -282.046  -282.082    -0.035
   Ag(HS)S4-2            0.000e+000  0.000e+000  -282.914  -283.019    -0.105
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   Ag(S4)2-3            0.000e+000  0.000e+000  -285.701  -285.913    -0.212
   AgS4S5-3             0.000e+000  0.000e+000  -286.018  -286.224    -0.205
Al              9.810e-010
   Al(OH)4-             5.794e-010  5.382e-010    -9.237    -9.269    -0.032
   Al(OH)2+             1.838e-010  1.710e-010    -9.736    -9.767    -0.031
   Al(OH)3              1.208e-010  1.208e-010    -9.918    -9.918     0.000
   AlF2+                6.102e-011  5.677e-011   -10.214   -10.246    -0.031
   AlF+2                2.090e-011  1.565e-011   -10.680   -10.805    -0.126
   AlOH+2               8.121e-012  6.081e-012   -11.090   -11.216    -0.126
   AlF3                 6.511e-012  6.511e-012   -11.186   -11.186     0.000
   Al+3                 3.352e-013  1.718e-013   -12.475   -12.765    -0.290
   AlSO4+               1.114e-013  1.034e-013   -12.953   -12.985    -0.032
   AlF4-                3.201e-014  2.973e-014   -13.495   -13.527    -0.032
   Al(SO4)2-            9.258e-017  8.600e-017   -16.034   -16.066    -0.032
   AlMo6O21-3           4.703e-039  2.264e-039   -38.328   -38.645    -0.318
As(3)           1.603e-034
   H3AsO3               1.600e-034  1.600e-034   -33.796   -33.796     0.000
   H2AsO3-              3.129e-037  2.885e-037   -36.505   -36.540    -0.035
   H4AsO3+              0.000e+000  0.000e+000   -40.612   -40.647    -0.035
   HAsO3-2              0.000e+000  0.000e+000   -41.893   -42.034    -0.141
   AsO3-3               0.000e+000  0.000e+000   -48.584   -48.902    -0.318
As(5)           2.322e-007
   H2AsO4-              1.556e-007  1.435e-007    -6.808    -6.843    -0.035
   HAsO4-2              7.656e-008  5.532e-008    -7.116    -7.257    -0.141
   H3AsO4               7.084e-012  7.092e-012   -11.150   -11.149     0.000
   AsO4-3               1.278e-012  6.150e-013   -11.894   -12.211    -0.318
B               2.851e-006
   H3BO3                2.844e-006  2.847e-006    -5.546    -5.546     0.000
   H2BO3-               6.278e-009  5.814e-009    -8.202    -8.236    -0.033
   CaH2BO3+             3.451e-010  3.196e-010    -9.462    -9.495    -0.033
   MgH2BO3+             1.629e-011  1.509e-011   -10.788   -10.821    -0.033
   BF(OH)3-             1.118e-011  1.035e-011   -10.952   -10.985    -0.033
   NaH2BO3              2.695e-012  2.695e-012   -11.569   -11.569     0.000
   SrH2BO3+             6.011e-014  5.566e-014   -13.221   -13.254    -0.033
   H5(BO3)2-            1.521e-014  1.409e-014   -13.818   -13.851    -0.033
   BF2(OH)2-            3.097e-015  2.868e-015   -14.509   -14.542    -0.033
   H8(BO3)3-            4.332e-018  4.011e-018   -17.363   -17.397    -0.033
   BaH2BO3+             2.413e-019  2.234e-019   -18.617   -18.651    -0.033
   BF3OH-               3.122e-021  2.891e-021   -20.506   -20.539    -0.033
   AgH2BO3              2.082e-021  2.082e-021   -20.682   -20.682     0.000
   BF4-                 3.982e-026  3.687e-026   -25.400   -25.433    -0.033
Ba              1.674e-012
   Ba+2                 1.674e-012  1.244e-012   -11.776   -11.905    -0.129
   BaHCO3+              8.835e-017  8.225e-017   -16.054   -16.085    -0.031
   BaNO3+               1.007e-017  9.285e-018   -16.997   -17.032    -0.035
   BaCO3                7.281e-019  7.281e-019   -18.138   -18.138     0.000
   BaH2BO3+             2.413e-019  2.234e-019   -18.617   -18.651    -0.033
   BaOH+                2.067e-019  1.922e-019   -18.685   -18.716    -0.032
   BaNH3+2              0.000e+000  0.000e+000   -80.683   -80.824    -0.141
C(4)            1.202e-005
   HCO3-                7.445e-006  6.926e-006    -5.128    -5.160    -0.031
   H2CO3                4.430e-006  4.430e-006    -5.354    -5.354     0.000
   CaHCO3+              1.323e-007  1.232e-007    -6.878    -6.909    -0.031
   MgHCO3+              5.714e-009  5.304e-009    -8.243    -8.275    -0.032
   CaCO3                1.728e-009  1.728e-009    -8.762    -8.762     0.000
   CO3-2                1.537e-009  1.142e-009    -8.813    -8.942    -0.129
   NaHCO3               1.139e-009  1.139e-009    -8.943    -8.943     0.000
   UO2CO3               1.523e-010  1.523e-010    -9.817    -9.817     0.000
   MgCO3                7.106e-011  7.106e-011   -10.148   -10.148     0.000
   SrHCO3+              3.255e-011  3.031e-011   -10.487   -10.518    -0.031
   NiHCO3+              2.559e-011  2.359e-011   -10.592   -10.627    -0.035
   ZnHCO3+              1.532e-011  1.413e-011   -10.815   -10.850    -0.035
   NaCO3-               6.684e-012  6.217e-012   -11.175   -11.206    -0.031
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   UO2(CO3)2-2          4.802e-012  3.470e-012   -11.319   -11.460    -0.141
   ZnCO3                4.238e-012  4.238e-012   -11.373   -11.373     0.000
   NiCO3                1.177e-012  1.177e-012   -11.929   -11.929     0.000
   PbHCO3+              8.984e-013  8.283e-013   -12.047   -12.082    -0.035
   PbCO3                5.524e-013  5.524e-013   -12.258   -12.258     0.000
   SrCO3                1.989e-013  1.989e-013   -12.701   -12.701     0.000
   CdCO3                2.554e-015  2.554e-015   -14.593   -14.593     0.000
   CdHCO3+              1.678e-015  1.547e-015   -14.775   -14.810    -0.035
   UO2(CO3)3-4          7.283e-016  1.985e-016   -15.138   -15.702    -0.564
   BaHCO3+              8.835e-017  8.225e-017   -16.054   -16.085    -0.031
   HgCO3                1.925e-017  1.925e-017   -16.716   -16.716     0.000
   MnHCO3+              8.230e-018  7.651e-018   -17.085   -17.116    -0.032
   CuCO3                6.084e-018  6.084e-018   -17.216   -17.216     0.000
   Pb(CO3)2-2           2.517e-018  1.819e-018   -17.599   -17.740    -0.141
   BaCO3                7.281e-019  7.281e-019   -18.138   -18.138     0.000
   CoHCO3+              5.973e-019  5.507e-019   -18.224   -18.259    -0.035
   CuHCO3+              4.290e-019  3.955e-019   -18.368   -18.403    -0.035
   HgHCO3+              1.106e-019  1.019e-019   -18.956   -18.992    -0.035
   CoCO3                1.973e-020  1.973e-020   -19.705   -19.705     0.000
   Cd(CO3)2-2           2.991e-021  2.161e-021   -20.524   -20.665    -0.141
   Hg(CO3)2-2           9.615e-023  6.948e-023   -22.017   -22.158    -0.141
   Cu(CO3)2-2           2.587e-023  1.870e-023   -22.587   -22.728    -0.141
   FeHCO3+              7.207e-028  6.710e-028   -27.142   -27.173    -0.031
Ca              1.303e-003
   Ca+2                 1.286e-003  9.553e-004    -2.891    -3.020    -0.129
   CaSO4                1.698e-005  1.698e-005    -4.770    -4.770     0.000
   CaHCO3+              1.323e-007  1.232e-007    -6.878    -6.909    -0.031
   CaF+                 1.022e-007  9.500e-008    -6.991    -7.022    -0.032
   CaNO3+               4.881e-009  4.500e-009    -8.311    -8.347    -0.035
   CaCO3                1.728e-009  1.728e-009    -8.762    -8.762     0.000
   CaOH+                7.248e-010  6.748e-010    -9.140    -9.171    -0.031
   CaH2BO3+             3.451e-010  3.196e-010    -9.462    -9.495    -0.033
   CaHPO4               2.100e-012  2.100e-012   -11.678   -11.678     0.000
   CaH2PO4+             4.962e-013  4.615e-013   -12.304   -12.336    -0.031
   CaPO4-               2.112e-014  1.965e-014   -13.675   -13.707    -0.031
   CaNH3+2              0.000e+000  0.000e+000   -71.497   -71.639    -0.141
   Ca(NH3)2+2           0.000e+000  0.000e+000  -140.616  -140.757    -0.141
Cd              1.633e-010
   Cd+2                 1.321e-010  9.814e-011    -9.879   -10.008    -0.129
   CdCl+                2.905e-011  2.678e-011   -10.537   -10.572    -0.035
   CdSO4                1.785e-012  1.785e-012   -11.748   -11.748     0.000
   CdCl2                3.191e-013  3.191e-013   -12.496   -12.496     0.000
   CdOHCl               3.889e-014  3.889e-014   -13.410   -13.410     0.000
   CdOH+                2.993e-014  2.760e-014   -13.524   -13.559    -0.035
   CdF+                 1.537e-014  1.417e-014   -13.813   -13.849    -0.035
   Cd(SO4)2-2           2.585e-015  1.868e-015   -14.587   -14.729    -0.141
   CdCO3                2.554e-015  2.554e-015   -14.593   -14.593     0.000
   CdHCO3+              1.678e-015  1.547e-015   -14.775   -14.810    -0.035
   CdCl3-               6.241e-016  5.754e-016   -15.205   -15.240    -0.035
   CdNO3+               5.014e-016  4.623e-016   -15.300   -15.335    -0.035
   CdSeO4               1.010e-016  1.010e-016   -15.996   -15.996     0.000
   Cd(OH)2              6.164e-018  6.164e-018   -17.210   -17.210     0.000
   CdF2                 2.576e-019  2.576e-019   -18.589   -18.589     0.000
   Cd(CO3)2-2           2.991e-021  2.161e-021   -20.524   -20.665    -0.141
   Cd(NO3)2             3.451e-022  3.451e-022   -21.462   -21.462     0.000
   Cd2OH+3              2.820e-023  1.357e-023   -22.550   -22.867    -0.318
   Cd(OH)3-             1.446e-023  1.333e-023   -22.840   -22.875    -0.035
   Cd(OH)4-2            1.069e-031  7.724e-032   -30.971   -31.112    -0.141
   Cd(SeO3)2-2          0.000e+000  0.000e+000   -47.740   -47.881    -0.141
   CdHS+                0.000e+000  0.000e+000  -145.140  -145.175    -0.035
   Cd(HS)2              0.000e+000  0.000e+000  -281.146  -281.146     0.000
   Cd(HS)3-             0.000e+000  0.000e+000  -422.386  -422.421    -0.035
   Cd(HS)4-2            0.000e+000  0.000e+000  -563.259  -563.400    -0.141
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Cl	3.078e-003					
Cl-		3.078e-003	2.858e-003	-2.512	-2.544	-0.032
ZnCl+		4.989e-010	4.631e-010	-9.302	-9.334	-0.032
NiCl+		2.191e-010	2.020e-010	-9.659	-9.695	-0.035
CdCl+		2.905e-011	2.678e-011	-10.537	-10.572	-0.035
ZnOHCl		2.146e-011	2.146e-011	-10.668	-10.668	0.000
PbCl+		1.770e-011	1.632e-011	-10.752	-10.787	-0.035
HgCl2		1.151e-011	1.151e-011	-10.939	-10.939	0.000
HgClOH		2.517e-012	2.517e-012	-11.599	-11.599	0.000
ZnCl2		2.098e-012	2.098e-012	-11.678	-11.678	0.000
HgCl3-		3.566e-013	3.288e-013	-12.448	-12.483	-0.035
CdCl2		3.191e-013	3.191e-013	-12.496	-12.496	0.000
PbCl2		2.083e-013	2.083e-013	-12.681	-12.681	0.000
UO2Cl+		1.685e-013	1.554e-013	-12.773	-12.809	-0.035
AgCl		1.318e-013	1.318e-013	-12.880	-12.880	0.000
CdOHCl		3.889e-014	3.889e-014	-13.410	-13.410	0.000
AgCl2-		3.558e-014	3.281e-014	-13.449	-13.484	-0.035
HgCl4-2		5.177e-015	3.741e-015	-14.286	-14.427	-0.141
ZnCl3-		5.130e-015	4.762e-015	-14.290	-14.322	-0.032
TlCl		3.014e-015	3.014e-015	-14.521	-14.521	0.000
NiCl2		2.907e-015	2.907e-015	-14.537	-14.537	0.000
TlOHCl+		1.208e-015	1.114e-015	-14.918	-14.953	-0.035
HgCl+		8.712e-016	8.033e-016	-15.060	-15.095	-0.035
CdCl3-		6.241e-016	5.754e-016	-15.205	-15.240	-0.035
PbCl3-		2.571e-016	2.370e-016	-15.590	-15.625	-0.035
MnCl+		2.143e-016	1.992e-016	-15.669	-15.701	-0.032
AgCl3-2		1.156e-016	8.356e-017	-15.937	-16.078	-0.141
CoCl+		1.096e-017	1.011e-017	-16.960	-16.995	-0.035
ZnCl4-2		9.110e-018	6.804e-018	-17.041	-17.167	-0.127
TlCl2-		5.501e-018	5.072e-018	-17.260	-17.295	-0.035
CuCl+		4.417e-018	4.100e-018	-17.355	-17.387	-0.032
TlCl3		3.757e-018	3.757e-018	-17.425	-17.425	0.000
TlCl2+		1.362e-018	1.255e-018	-17.866	-17.901	-0.035
AgCl4-3		1.013e-018	4.876e-019	-17.994	-18.312	-0.318
MnCl2		8.041e-019	8.041e-019	-18.095	-18.095	0.000
TlCl4-		7.348e-019	6.774e-019	-18.134	-18.169	-0.035
PbCl4-2		4.285e-019	3.096e-019	-18.368	-18.509	-0.141
CrO3Cl-		4.119e-019	3.798e-019	-18.385	-18.420	-0.035
CuCl2		4.062e-021	4.062e-021	-20.391	-20.391	0.000
TlCl+2		1.057e-021	7.634e-022	-20.976	-21.117	-0.141
MnCl3-		6.808e-022	6.329e-022	-21.167	-21.199	-0.032
FeCl+2		1.391e-023	1.039e-023	-22.857	-22.983	-0.127
FeCl2+		1.427e-025	1.326e-025	-24.846	-24.877	-0.032
CuCl3-		1.167e-025	1.083e-025	-24.933	-24.965	-0.032
VOCl+		3.667e-026	3.381e-026	-25.436	-25.471	-0.035
CuCl		9.472e-027	9.472e-027	-26.024	-26.024	0.000
CuCl2-		6.093e-027	5.656e-027	-26.215	-26.248	-0.032
FeCl3		3.790e-029	3.790e-029	-28.421	-28.421	0.000
CuCl3-2		4.626e-030	3.455e-030	-29.335	-29.461	-0.127
CuCl4-2		2.078e-030	1.552e-030	-29.682	-29.809	-0.127
CrCl+2		3.264e-031	2.359e-031	-30.486	-30.627	-0.141
CoCl+2		5.514e-034	3.985e-034	-33.258	-33.400	-0.141
CrOHCl2		4.535e-034	4.535e-034	-33.343	-33.343	0.000
CrCl2+		6.937e-035	6.396e-035	-34.159	-34.194	-0.035
UCl+3		0.000e+000	0.000e+000	-56.422	-56.739	-0.318
SnCl+		0.000e+000	0.000e+000	-58.186	-58.222	-0.035
SnCl2		0.000e+000	0.000e+000	-59.976	-59.976	0.000
SnCl3-		0.000e+000	0.000e+000	-63.658	-63.693	-0.035
Co(NH3)5Cl+2		0.000e+000	0.000e+000	-350.899	-351.040	-0.141
Co(NH3)6Cl+2		0.000e+000	0.000e+000	-426.333	-426.474	-0.141
Cr(NH3)6Cl+2		0.000e+000	0.000e+000	-428.809	-428.950	-0.141
Co(2)	1.443e-015					
Co+2		1.415e-015	1.022e-015	-14.849	-14.990	-0.141

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   CoSO4                  1.582e-017  1.582e-017   -16.801   -16.801     0.000
   CoCl+                  1.096e-017  1.011e-017   -16.960   -16.995    -0.035
   CoOH+                  7.831e-019  7.220e-019   -18.106   -18.141    -0.035
   CoHCO3+                5.973e-019  5.507e-019   -18.224   -18.259    -0.035
   CoF+                   3.194e-019  2.945e-019   -18.496   -18.531    -0.035
   CoCO3                  1.973e-020  1.973e-020   -19.705   -19.705     0.000
   CoSeO4                 2.830e-021  2.830e-021   -20.548   -20.548     0.000
   CoNO3+                 2.618e-021  2.413e-021   -20.582   -20.617    -0.035
   Co(OH)2                2.030e-021  2.030e-021   -20.692   -20.692     0.000
   CoHPO4                 5.363e-024  5.363e-024   -23.271   -23.271     0.000
   Co(NO3)2               7.315e-027  7.315e-027   -26.136   -26.136     0.000
   Co(OH)3-               1.555e-027  1.434e-027   -26.808   -26.843    -0.035
   CoOOH-                 3.903e-028  3.598e-028   -27.409   -27.444    -0.035
   CoNO2+                 1.234e-033  1.137e-033   -32.909   -32.944    -0.035
   Co2OH+3                7.684e-035  3.699e-035   -34.114   -34.432    -0.318
   Co(OH)4-2              1.113e-035  8.046e-036   -34.953   -35.094    -0.141
   Co4(OH)4+4             0.000e+000  0.000e+000   -63.701   -64.266    -0.564
   Co(NH3)+2              0.000e+000  0.000e+000   -81.488   -81.629    -0.141
   Co(NH3)2+2             0.000e+000  0.000e+000  -148.577  -148.718    -0.141
   Co(NH3)3+2             0.000e+000  0.000e+000  -216.195  -216.337    -0.141
   Co(NH3)4+2             0.000e+000  0.000e+000  -284.194  -284.335    -0.141
   Co(NH3)5+2             0.000e+000  0.000e+000  -352.693  -352.834    -0.141
Co(3)           1.706e-028
   CoOH+2                 1.706e-028  1.233e-028   -27.768   -27.909    -0.141
   Co+3                   1.337e-033  6.852e-034   -32.874   -33.164    -0.290
   CoCl+2                 5.514e-034  3.985e-034   -33.258   -33.400    -0.141
   Co(NH3)5Cl+2           0.000e+000  0.000e+000  -350.899  -351.040    -0.141
   Co(NH3)6SO4+           0.000e+000  0.000e+000  -423.080  -423.115    -0.035
   Co(NH3)6Cl+2           0.000e+000  0.000e+000  -426.333  -426.474    -0.141
   Co(NH3)6OH+2           0.000e+000  0.000e+000  -427.040  -427.181    -0.141
Cr(2)           0.000e+000
   Cr+2                   0.000e+000  0.000e+000   -48.902   -49.043    -0.141
Cr(3)           3.031e-025
   Cr(OH)2+               2.307e-025  2.127e-025   -24.637   -24.672    -0.035
   Cr(OH)+2               6.835e-026  4.939e-026   -25.165   -25.306    -0.141
   Cr(OH)3                2.829e-027  2.829e-027   -26.548   -26.548     0.000
   CrOHSO4                9.093e-028  9.093e-028   -27.041   -27.041     0.000
   Cr+3                   1.325e-028  6.377e-029   -27.878   -28.195    -0.318
   CrF+2                  1.274e-028  9.208e-029   -27.895   -28.036    -0.141
   CrSO4+                 1.253e-029  1.155e-029   -28.902   -28.937    -0.035
   CrO2-                  5.124e-030  4.724e-030   -29.290   -29.326    -0.035
   Cr(OH)4-               4.324e-030  3.987e-030   -29.364   -29.399    -0.035
   CrCl+2                 3.264e-031  2.359e-031   -30.486   -30.627    -0.141
   CrOHCl2                4.535e-034  4.535e-034   -33.343   -33.343     0.000
   CrCl2+                 6.937e-035  6.396e-035   -34.159   -34.194    -0.035
   CrNO3+2                5.747e-036  4.152e-036   -35.241   -35.382    -0.141
   CrH2PO4+2              1.109e-036  8.010e-037   -35.955   -36.096    -0.141
   Cr2(OH)2SO4+2          0.000e+000  0.000e+000   -50.250   -50.392    -0.141
   Cr2(OH)2(SO4)2         0.000e+000  0.000e+000   -52.728   -52.728     0.000
   Cr(NH3)5OH+2           0.000e+000  0.000e+000  -358.727  -358.868    -0.141
   Cr(NH3)6+3             0.000e+000  0.000e+000  -427.190  -427.508    -0.318
   Cr(NH3)6Cl+2           0.000e+000  0.000e+000  -428.809  -428.950    -0.141
Cr(6)           1.894e-010
   CrO4-2                 1.086e-010  8.072e-011    -9.964   -10.093    -0.129
   HCrO4-                 8.057e-011  7.429e-011   -10.094   -10.129    -0.035
   NaCrO4-                1.272e-013  1.173e-013   -12.895   -12.931    -0.035
   KCrO4-                 6.554e-014  6.043e-014   -13.183   -13.219    -0.035
   H2CrO4                 1.713e-017  1.713e-017   -16.766   -16.766     0.000
   CrO3SO4-2              6.911e-019  4.993e-019   -18.160   -18.302    -0.141
   CrO3Cl-                4.119e-019  3.798e-019   -18.385   -18.420    -0.035
   Cr2O7-2                2.648e-019  1.914e-019   -18.577   -18.718    -0.141
   CrO3HPO4-2             8.785e-021  6.347e-021   -20.056   -20.197    -0.141
   CrO3H2PO4-             9.433e-025  8.697e-025   -24.025   -24.061    -0.035
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Cu(1)	1.842e-026					
CuCl		9.472e-027	9.472e-027	-26.024	-26.024	0.000
CuCl2-		6.093e-027	5.656e-027	-26.215	-26.248	-0.032
Cu+		2.856e-027	2.633e-027	-26.544	-26.580	-0.035
CuCl3-2		4.626e-030	3.455e-030	-29.335	-29.461	-0.127
Cu(S4)2-3		0.000e+000	0.000e+000	-296.239	-296.447	-0.208
CuS4S5-3		0.000e+000	0.000e+000	-296.975	-297.177	-0.202
Cu(2)	1.356e-015					
Cu+2		1.218e-015	9.051e-016	-14.914	-15.043	-0.129
CuOH+		1.092e-016	1.013e-016	-15.962	-15.994	-0.032
CuSO4		1.609e-017	1.609e-017	-16.794	-16.794	0.000
CuCO3		6.084e-018	6.084e-018	-17.216	-17.216	0.000
CuCl+		4.417e-018	4.100e-018	-17.355	-17.387	-0.032
Cu(OH)2		7.157e-019	7.157e-019	-18.145	-18.145	0.000
CuF+		5.644e-019	5.203e-019	-18.248	-18.284	-0.035
CuHCO3+		4.290e-019	3.955e-019	-18.368	-18.403	-0.035
CuNO3+		4.625e-021	4.264e-021	-20.335	-20.370	-0.035
CuCl2		4.062e-021	4.062e-021	-20.391	-20.391	0.000
Cu(OH)3-		5.637e-023	5.197e-023	-22.249	-22.284	-0.035
Cu(CO3)2-2		2.587e-023	1.870e-023	-22.587	-22.728	-0.141
CuCl3-		1.167e-025	1.083e-025	-24.933	-24.965	-0.032
Cu(NO3)2		7.996e-028	7.996e-028	-27.097	-27.097	0.000
Cu2(OH)2+2		3.569e-028	2.579e-028	-27.447	-27.589	-0.141
Cu(OH)4-2		2.004e-029	1.448e-029	-28.698	-28.839	-0.141
CuCl4-2		2.078e-030	1.552e-030	-29.682	-29.809	-0.127
CuNO2+		1.623e-032	1.497e-032	-31.790	-31.825	-0.035
Cu(NO2)2		0.000e+000	0.000e+000	-49.616	-49.616	0.000
CuNH3+2		0.000e+000	0.000e+000	-79.611	-79.752	-0.141
Cu(HS)3-		0.000e+000	0.000e+000	-418.634	-418.669	-0.035
F	1.000e-005					
F-		9.814e-006	9.111e-006	-5.008	-5.040	-0.032
CaF+		1.022e-007	9.500e-008	-6.991	-7.022	-0.032
MgF+		8.236e-008	7.651e-008	-7.084	-7.116	-0.032
HF		3.833e-009	3.833e-009	-8.416	-8.416	0.000
NaF		1.681e-009	1.681e-009	-8.774	-8.774	0.000
AlF2+		6.102e-011	5.677e-011	-10.214	-10.246	-0.031
UO2F+		4.573e-011	4.216e-011	-10.340	-10.375	-0.035
AlF+2		2.090e-011	1.565e-011	-10.680	-10.805	-0.126
ZnF+		1.272e-011	1.173e-011	-10.895	-10.931	-0.035
BF(OH)3-		1.118e-011	1.035e-011	-10.952	-10.985	-0.033
SrF+		9.418e-012	8.683e-012	-11.026	-11.061	-0.035
NiF+		6.858e-012	6.323e-012	-11.164	-11.199	-0.035
AlF3		6.511e-012	6.511e-012	-11.186	-11.186	0.000
UO2F2		1.108e-012	1.108e-012	-11.956	-11.956	0.000
HF2-		1.431e-013	1.328e-013	-12.844	-12.877	-0.033
PbF+		1.121e-013	1.033e-013	-12.950	-12.986	-0.035
AlF4-		3.201e-014	2.973e-014	-13.495	-13.527	-0.032
CdF+		1.537e-014	1.417e-014	-13.813	-13.849	-0.035
BF2(OH)2-		3.097e-015	2.868e-015	-14.509	-14.542	-0.033
UO2F3-		2.750e-015	2.535e-015	-14.561	-14.596	-0.035
VO2F		1.754e-015	1.754e-015	-14.756	-14.756	0.000
H2F2		3.936e-017	3.936e-017	-16.405	-16.405	0.000
MnF+		2.160e-017	2.008e-017	-16.665	-16.697	-0.032
PbF2		1.853e-017	1.853e-017	-16.732	-16.732	0.000
VO2F2-		6.293e-018	5.802e-018	-17.201	-17.236	-0.035
TlF		3.739e-018	3.739e-018	-17.427	-17.427	0.000
CuF+		5.644e-019	5.203e-019	-18.248	-18.284	-0.035
AgF		5.170e-019	5.170e-019	-18.287	-18.287	0.000
CoF+		3.194e-019	2.945e-019	-18.496	-18.531	-0.035
CdF2		2.576e-019	2.576e-019	-18.589	-18.589	0.000
UO2F4-2		2.539e-019	1.835e-019	-18.595	-18.736	-0.141
BF3OH-		3.122e-021	2.891e-021	-20.506	-20.539	-0.033
FeF+2		1.610e-021	1.203e-021	-20.793	-20.920	-0.127

VO2F3-2		9.125e-022	6.594e-022	-21.040	-21.181	-0.141
PbF3-		3.473e-022	3.202e-022	-21.459	-21.495	-0.035
FeF2+		3.154e-022	2.932e-022	-21.501	-21.533	-0.032
HgF+		5.160e-024	4.758e-024	-23.287	-23.323	-0.035
FeF3		3.770e-024	3.770e-024	-23.424	-23.424	0.000
VOF+		2.500e-025	2.305e-025	-24.602	-24.637	-0.035
BF4-		3.982e-026	3.687e-026	-25.400	-25.433	-0.033
VO2F4-3		6.141e-027	2.956e-027	-26.212	-26.529	-0.318
PbF4-2		1.933e-027	1.396e-027	-26.714	-26.855	-0.141
VOF2		7.874e-028	7.874e-028	-27.104	-27.104	0.000
CrF+2		1.274e-028	9.208e-029	-27.895	-28.036	-0.141
VOF3-		2.761e-031	2.545e-031	-30.559	-30.594	-0.035
SiF6-2		4.412e-033	3.295e-033	-32.355	-32.482	-0.127
VOF4-2		1.296e-035	9.361e-036	-34.888	-35.029	-0.141
Sb(OH)2F		0.000e+000	0.000e+000	-40.369	-40.369	0.000
SbOF		0.000e+000	0.000e+000	-40.377	-40.377	0.000
UF3+		0.000e+000	0.000e+000	-49.381	-49.417	-0.035
UF2+2		0.000e+000	0.000e+000	-49.435	-49.576	-0.141
UF+3		0.000e+000	0.000e+000	-51.318	-51.636	-0.318
SnF6-2		0.000e+000	0.000e+000	-51.676	-51.817	-0.141
UF4		0.000e+000	0.000e+000	-52.417	-52.417	0.000
UF5-		0.000e+000	0.000e+000	-55.824	-55.860	-0.035
SnF+		0.000e+000	0.000e+000	-57.835	-57.870	-0.035
UF6-2		0.000e+000	0.000e+000	-58.279	-58.420	-0.141
SnF2		0.000e+000	0.000e+000	-60.106	-60.106	0.000
SnF3-		0.000e+000	0.000e+000	-62.292	-62.327	-0.035
Fe(2)	1.081e-023					
Fe+2		1.065e-023	7.696e-024	-22.973	-23.114	-0.141
FeSO4		1.466e-025	1.466e-025	-24.834	-24.834	0.000
FeOH+		1.167e-026	1.085e-026	-25.933	-25.965	-0.032
FeHCO3+		7.207e-028	6.710e-028	-27.142	-27.173	-0.031
Fe(OH)2		3.050e-031	3.050e-031	-30.516	-30.516	0.000
FeHPO4		1.474e-031	1.474e-031	-30.832	-30.832	0.000
FeH2PO4+		8.948e-032	8.324e-032	-31.048	-31.080	-0.031
Fe(OH)3-		3.673e-033	3.414e-033	-32.435	-32.467	-0.032
Fe(HS)2		0.000e+000	0.000e+000	-300.514	-300.514	0.000
Fe(HS)3-		0.000e+000	0.000e+000	-441.616	-441.652	-0.035
Fe(3)	4.219e-014					
Fe(OH)2+		4.074e-014	3.790e-014	-13.390	-13.421	-0.031
Fe(OH)3		1.441e-015	1.441e-015	-14.841	-14.841	0.000
Fe(OH)4-		5.105e-018	4.749e-018	-17.292	-17.323	-0.031
FeOH+2		3.684e-018	2.752e-018	-17.434	-17.560	-0.127
FeF+2		1.610e-021	1.203e-021	-20.793	-20.920	-0.127
FeF2+		3.154e-022	2.932e-022	-21.501	-21.533	-0.032
Fe+3		2.349e-022	1.204e-022	-21.629	-21.919	-0.290
FeSO4+		1.127e-022	1.048e-022	-21.948	-21.980	-0.032
FeCl+2		1.391e-023	1.039e-023	-22.857	-22.983	-0.127
FeHPO4+		5.141e-024	4.783e-024	-23.289	-23.320	-0.031
FeF3		3.770e-024	3.770e-024	-23.424	-23.424	0.000
Fe(SO4)2-		1.885e-025	1.738e-025	-24.725	-24.760	-0.035
FeCl2+		1.427e-025	1.326e-025	-24.846	-24.877	-0.032
FeNO3+2		2.482e-027	1.793e-027	-26.605	-26.746	-0.141
FeH2PO4+2		6.589e-029	4.933e-029	-28.181	-28.307	-0.126
FeCl3		3.790e-029	3.790e-029	-28.421	-28.421	0.000
Fe2(OH)2+4		9.197e-034	2.507e-034	-33.036	-33.601	-0.564
FeHSeO3+2		4.011e-039	2.898e-039	-38.397	-38.538	-0.141
Fe3(OH)4+5		0.000e+000	0.000e+000	-44.980	-45.862	-0.882
H(0)	0.000e+000					
H2		0.000e+000	0.000e+000	-44.695	-44.695	0.000
Hg(0)	4.586e-027					
Hg		4.586e-027	4.586e-027	-26.339	-26.339	0.000
Hg(1)	1.214e-037					
Hg2+2		6.070e-038	4.386e-038	-37.217	-37.358	-0.141

Hg(2)	1.450e-011					
HgCl2		1.151e-011	1.151e-011	-10.939	-10.939	0.000
HgClOH		2.517e-012	2.517e-012	-11.599	-11.599	0.000
HgCl3-		3.566e-013	3.288e-013	-12.448	-12.483	-0.035
Hg(OH)2		1.113e-013	1.114e-013	-12.954	-12.953	0.000
HgCl4-2		5.177e-015	3.741e-015	-14.286	-14.427	-0.141
HgCl+		8.712e-016	8.033e-016	-15.060	-15.095	-0.035
HgOH+		2.153e-017	1.985e-017	-16.667	-16.702	-0.035
HgCO3		1.925e-017	1.925e-017	-16.716	-16.716	0.000
HgHCO3+		1.106e-019	1.019e-019	-18.956	-18.992	-0.035
Hg+2		1.950e-020	1.409e-020	-19.710	-19.851	-0.141
Hg(OH)3-		5.384e-022	4.964e-022	-21.269	-21.304	-0.035
HgSO4		2.862e-022	2.862e-022	-21.543	-21.543	0.000
Hg(CO3)2-2		9.615e-023	6.948e-023	-22.017	-22.158	-0.141
HgF+		5.160e-024	4.758e-024	-23.287	-23.323	-0.035
HgNO3+		8.404e-027	7.748e-027	-26.076	-26.111	-0.035
Hg(NO3)2		4.797e-033	4.797e-033	-32.319	-32.319	0.000
HgNH3+2		0.000e+000	0.000e+000	-79.629	-79.770	-0.141
Hg(NH3)2+2		0.000e+000	0.000e+000	-139.347	-139.489	-0.141
Hg(NH3)3+2		0.000e+000	0.000e+000	-207.466	-207.607	-0.141
HgHS2-		0.000e+000	0.000e+000	-267.692	-267.727	-0.035
Hg(HS)2		0.000e+000	0.000e+000	-267.879	-267.879	0.000
HgS2-2		0.000e+000	0.000e+000	-269.748	-269.889	-0.141
Hg(NH3)4+2		0.000e+000	0.000e+000	-275.285	-275.426	-0.141
K	2.171e-004					
K+		2.170e-004	2.015e-004	-3.663	-3.696	-0.032
KSO4-		1.190e-007	1.107e-007	-6.925	-6.956	-0.031
KCrO4-		6.554e-014	6.043e-014	-13.183	-13.219	-0.035
KHPO4-		7.903e-015	7.351e-015	-14.102	-14.134	-0.031
Mg	1.019e-004					
Mg+2		1.007e-004	7.484e-005	-3.997	-4.126	-0.129
MgSO4		1.057e-006	1.057e-006	-5.976	-5.976	0.000
MgF+		8.236e-008	7.651e-008	-7.084	-7.116	-0.032
MgHCO3+		5.714e-009	5.304e-009	-8.243	-8.275	-0.032
MgOH+		1.132e-009	1.055e-009	-8.946	-8.977	-0.031
MgCO3		7.106e-011	7.106e-011	-10.148	-10.148	0.000
MgH2BO3+		1.629e-011	1.509e-011	-10.788	-10.821	-0.033
MgHPO4		2.271e-013	2.271e-013	-12.644	-12.644	0.000
MgH2PO4+		8.370e-014	7.785e-014	-13.077	-13.109	-0.031
MgPO4-		2.586e-017	2.406e-017	-16.587	-16.619	-0.031
Mn(2)	7.764e-014					
Mn+2		7.663e-014	5.537e-014	-13.116	-13.257	-0.141
MnSO4		7.639e-016	7.639e-016	-15.117	-15.117	0.000
MnCl+		2.143e-016	1.992e-016	-15.669	-15.701	-0.032
MnF+		2.160e-017	2.008e-017	-16.665	-16.697	-0.032
MnHCO3+		8.230e-018	7.651e-018	-17.085	-17.116	-0.032
MnOH+		5.296e-018	4.924e-018	-17.276	-17.308	-0.032
MnCl2		8.041e-019	8.041e-019	-18.095	-18.095	0.000
MnNO3+		1.418e-019	1.307e-019	-18.848	-18.884	-0.035
MnSeO4		8.234e-020	8.234e-020	-19.084	-19.084	0.000
MnCl3-		6.808e-022	6.329e-022	-21.167	-21.199	-0.032
Mn(NO3)2		4.891e-025	4.891e-025	-24.311	-24.311	0.000
Mn(OH)3-		4.102e-029	3.813e-029	-28.387	-28.419	-0.032
Mn(OH)4-2		5.835e-036	4.358e-036	-35.234	-35.361	-0.127
MnSe		0.000e+000	0.000e+000	-111.910	-111.910	0.000
Mn(3)	8.127e-025					
Mn+3		8.127e-025	4.165e-025	-24.090	-24.380	-0.290
Mn(6)	5.266e-023					
MnO4-2		5.266e-023	3.933e-023	-22.279	-22.405	-0.127
Mn(7)	3.034e-018					
MnO4-		3.034e-018	2.812e-018	-17.518	-17.551	-0.033
Mo	1.579e-007					
MoO4-2		1.571e-007	1.168e-007	-6.804	-6.933	-0.129

HMoO4-	7.166e-010	6.607e-010	-9.145	-9.180	-0.035
H2MoO4	1.376e-012	1.376e-012	-11.861	-11.861	0.000
Ag2MoO4	2.255e-035	2.255e-035	-34.647	-34.647	0.000
AlMo6O21-3	4.703e-039	2.264e-039	-38.328	-38.645	-0.318
Mo7O24-6	0.000e+000	0.000e+000	-46.637	-47.907	-1.270
HMo7O24-5	0.000e+000	0.000e+000	-47.185	-48.067	-0.882
H2Mo7O24-4	0.000e+000	0.000e+000	-49.266	-49.830	-0.564
H3Mo7O24-3	0.000e+000	0.000e+000	-52.813	-53.131	-0.318
N(-3)	0.000e+000				
NH4+	0.000e+000	0.000e+000	-65.987	-66.021	-0.033
NH3	0.000e+000	0.000e+000	-68.719	-68.719	0.000
NH4SO4-	0.000e+000	0.000e+000	-69.069	-69.101	-0.032
CaNH3+2	0.000e+000	0.000e+000	-71.497	-71.639	-0.141
NiNH3+2	0.000e+000	0.000e+000	-73.406	-73.547	-0.141
SrNH3+2	0.000e+000	0.000e+000	-75.246	-75.388	-0.141
AgNH3+	0.000e+000	0.000e+000	-79.020	-79.055	-0.035
CuNH3+2	0.000e+000	0.000e+000	-79.611	-79.752	-0.141
HgNH3+2	0.000e+000	0.000e+000	-79.629	-79.770	-0.141
BaNH3+2	0.000e+000	0.000e+000	-80.683	-80.824	-0.141
Co(NH3)+2	0.000e+000	0.000e+000	-81.488	-81.629	-0.141
Hg(NH3)2+2	0.000e+000	0.000e+000	-139.347	-139.489	-0.141
Ni(NH3)2+2	0.000e+000	0.000e+000	-139.965	-140.106	-0.141
Ca(NH3)2+2	0.000e+000	0.000e+000	-140.616	-140.757	-0.141
Ag(NH3)2+	0.000e+000	0.000e+000	-143.828	-143.864	-0.035
Co(NH3)2+2	0.000e+000	0.000e+000	-148.577	-148.718	-0.141
Hg(NH3)3+2	0.000e+000	0.000e+000	-207.466	-207.607	-0.141
Co(NH3)3+2	0.000e+000	0.000e+000	-216.195	-216.337	-0.141
Hg(NH3)4+2	0.000e+000	0.000e+000	-275.285	-275.426	-0.141
Co(NH3)4+2	0.000e+000	0.000e+000	-284.194	-284.335	-0.141
Co(NH3)5Cl+2	0.000e+000	0.000e+000	-350.899	-351.040	-0.141
Co(NH3)5+2	0.000e+000	0.000e+000	-352.693	-352.834	-0.141
Cr(NH3)5OH+2	0.000e+000	0.000e+000	-358.727	-358.868	-0.141
Co(NH3)6SO4+	0.000e+000	0.000e+000	-423.080	-423.115	-0.035
Co(NH3)6Cl+2	0.000e+000	0.000e+000	-426.333	-426.474	-0.141
Co(NH3)6OH+2	0.000e+000	0.000e+000	-427.040	-427.181	-0.141
Cr(NH3)6+3	0.000e+000	0.000e+000	-427.190	-427.508	-0.318
Cr(NH3)6Cl+2	0.000e+000	0.000e+000	-428.809	-428.950	-0.141
N(3)	1.704e-019				
NO2-	1.704e-019	1.579e-019	-18.769	-18.802	-0.033
AgNO2	7.453e-031	7.453e-031	-30.128	-30.128	0.000
TlNO2	3.480e-031	3.480e-031	-30.458	-30.458	0.000
CuNO2+	1.623e-032	1.497e-032	-31.790	-31.825	-0.035
CoNO2+	1.234e-033	1.137e-033	-32.909	-32.944	-0.035
Ag(NO2)2-	0.000e+000	0.000e+000	-48.704	-48.739	-0.035
Cu(NO2)2	0.000e+000	0.000e+000	-49.616	-49.616	0.000
N(5)	1.609e-006				
NO3-	1.604e-006	1.490e-006	-5.795	-5.827	-0.032
CaNO3+	4.881e-009	4.500e-009	-8.311	-8.347	-0.035
SrNO3+	1.736e-012	1.600e-012	-11.761	-11.796	-0.035
ZnNO3+	2.618e-013	2.414e-013	-12.582	-12.617	-0.035
NiNO3+	1.121e-013	1.034e-013	-12.950	-12.986	-0.035
PbNO3+	3.847e-015	3.547e-015	-14.415	-14.450	-0.035
CdNO3+	5.014e-016	4.623e-016	-15.300	-15.335	-0.035
UO2NO3+	1.081e-016	9.963e-017	-15.966	-16.002	-0.035
BaNO3+	1.007e-017	9.285e-018	-16.997	-17.032	-0.035
TlNO3	1.038e-018	1.038e-018	-17.984	-17.984	0.000
MnNO3+	1.418e-019	1.307e-019	-18.848	-18.884	-0.035
VO2NO3	8.270e-020	8.270e-020	-19.083	-19.083	0.000
Zn(NO3)2	7.175e-020	7.175e-020	-19.144	-19.144	0.000
AgNO3	2.673e-020	2.673e-020	-19.573	-19.573	0.000
Pb(NO3)2	8.972e-021	8.972e-021	-20.047	-20.047	0.000
CuNO3+	4.625e-021	4.264e-021	-20.335	-20.370	-0.035
CoNO3+	2.618e-021	2.413e-021	-20.582	-20.617	-0.035

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   Cd(NO3)2              3.451e-022  3.451e-022   -21.462   -21.462     0.000
   Mn(NO3)2              4.891e-025  4.891e-025   -24.311   -24.311     0.000
   HgNO3+                8.404e-027  7.748e-027   -26.076   -26.111    -0.035
   Co(NO3)2              7.315e-027  7.315e-027   -26.136   -26.136     0.000
   FeNO3+2               2.482e-027  1.793e-027   -26.605   -26.746    -0.141
   Cu(NO3)2              7.996e-028  7.996e-028   -27.097   -27.097     0.000
   TlNO3+2               5.461e-029  3.946e-029   -28.263   -28.404    -0.141
   Hg(NO3)2              4.797e-033  4.797e-033   -32.319   -32.319     0.000
   CrNO3+2               5.747e-036  4.152e-036   -35.241   -35.382    -0.141
   SnNO3+                0.000e+000  0.000e+000   -62.261   -62.297    -0.035
Na               3.152e-004
   Na+                   3.150e-004  2.925e-004    -3.502    -3.534    -0.032
   NaSO4-                1.310e-007  1.219e-007    -6.883    -6.914    -0.031
   NaF                   1.681e-009  1.681e-009    -8.774    -8.774     0.000
   NaHCO3                1.139e-009  1.139e-009    -8.943    -8.943     0.000
   NaCO3-                6.684e-012  6.217e-012   -11.175   -11.206    -0.031
   NaH2BO3               2.695e-012  2.695e-012   -11.569   -11.569     0.000
   NaCrO4-               1.272e-013  1.173e-013   -12.895   -12.931    -0.035
   NaHPO4-               1.777e-014  1.653e-014   -13.750   -13.782    -0.031
Ni               3.788e-008
   Ni+2                  3.719e-008  2.763e-008    -7.430    -7.559    -0.129
   NiSO4                 4.277e-010  4.277e-010    -9.369    -9.369     0.000
   NiCl+                 2.191e-010  2.020e-010    -9.659    -9.695    -0.035
   NiHCO3+               2.559e-011  2.359e-011   -10.592   -10.627    -0.035
   NiOH+                 1.336e-011  1.231e-011   -10.874   -10.910    -0.035
   NiF+                  6.858e-012  6.323e-012   -11.164   -11.199    -0.035
   NiCO3                 1.177e-012  1.177e-012   -11.929   -11.929     0.000
   NiNO3+                1.121e-013  1.034e-013   -12.950   -12.986    -0.035
   NiSeO4                7.140e-014  7.140e-014   -13.146   -13.146     0.000
   Ni(OH)2               3.462e-014  3.462e-014   -13.461   -13.461     0.000
   NiCl2                 2.907e-015  2.907e-015   -14.537   -14.537     0.000
   Ni(SO4)2-2            1.521e-015  1.099e-015   -14.818   -14.959    -0.141
   Ni(OH)3-              1.329e-018  1.226e-018   -17.876   -17.912    -0.035
   NiNH3+2               0.000e+000  0.000e+000   -73.406   -73.547    -0.141
   Ni(NH3)2+2            0.000e+000  0.000e+000  -139.965  -140.106    -0.141
O(0)             2.482e-003
   O2                    1.241e-003  1.242e-003    -2.906    -2.906     0.000
P                3.260e-011
   H2PO4-                2.320e-011  2.158e-011   -10.635   -10.666    -0.031
   HPO4-2                6.439e-012  4.809e-012   -11.191   -11.318    -0.127
   CaHPO4                2.100e-012  2.100e-012   -11.678   -11.678     0.000
   CaH2PO4+              4.962e-013  4.615e-013   -12.304   -12.336    -0.031
   MgHPO4                2.271e-013  2.271e-013   -12.644   -12.644     0.000
   MgH2PO4+              8.370e-014  7.785e-014   -13.077   -13.109    -0.031
   CaPO4-                2.112e-014  1.965e-014   -13.675   -13.707    -0.031
   NaHPO4-               1.777e-014  1.653e-014   -13.750   -13.782    -0.031
   KHPO4-                7.903e-015  7.351e-015   -14.102   -14.134    -0.031
   UO2PO4-               4.610e-015  4.251e-015   -14.336   -14.372    -0.035
   UO2HPO4               3.072e-015  3.072e-015   -14.513   -14.513     0.000
   UO2(HPO4)2-2          1.856e-015  1.341e-015   -14.731   -14.873    -0.141
   H3PO4                 8.629e-016  8.629e-016   -15.064   -15.064     0.000
   SrHPO4                4.083e-016  4.083e-016   -15.389   -15.389     0.000
   SrH2PO4+              4.259e-017  3.927e-017   -16.371   -16.406    -0.035
   MgPO4-                2.586e-017  2.406e-017   -16.587   -16.619    -0.031
   PO4-3                 1.392e-017  7.131e-018   -16.856   -17.147    -0.290
   UO2H2PO4+             1.428e-018  1.316e-018   -17.845   -17.881    -0.035
   CrO3HPO4-2            8.785e-021  6.347e-021   -20.056   -20.197    -0.141
   CoHPO4                5.363e-024  5.363e-024   -23.271   -23.271     0.000
   FeHPO4+               5.141e-024  4.783e-024   -23.289   -23.320    -0.031
   CrO3H2PO4-            9.433e-025  8.697e-025   -24.025   -24.061    -0.035
   UO2(H2PO4)2           5.590e-027  5.590e-027   -26.253   -26.253     0.000
   FeH2PO4+2             6.589e-029  4.933e-029   -28.181   -28.307    -0.126
   FeHPO4                1.474e-031  1.474e-031   -30.832   -30.832     0.000
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   FeH2PO4+              8.948e-032  8.324e-032   -31.048   -31.080    -0.031
   UO2(H2PO4)3-          1.227e-035  1.131e-035   -34.911   -34.947    -0.035
   CrH2PO4+2             1.109e-036  8.010e-037   -35.955   -36.096    -0.141
   UHPO4+2               0.000e+000  0.000e+000   -55.004   -55.145    -0.141
   U(HPO4)2              0.000e+000  0.000e+000   -56.448   -56.448     0.000
   U(HPO4)3-2            0.000e+000  0.000e+000   -59.269   -59.410    -0.141
   U(HPO4)4-4            0.000e+000  0.000e+000   -61.620   -62.184    -0.564
Pb              2.578e-010
   Pb+2                  2.167e-010  1.610e-010    -9.664    -9.793    -0.129
   PbCl+                 1.770e-011  1.632e-011   -10.752   -10.787    -0.035
   PbOH+                 1.552e-011  1.431e-011   -10.809   -10.844    -0.035
   PbSO4                 6.117e-012  6.117e-012   -11.213   -11.213     0.000
   PbHCO3+               8.984e-013  8.283e-013   -12.047   -12.082    -0.035
   PbCO3                 5.524e-013  5.524e-013   -12.258   -12.258     0.000
   PbCl2                 2.083e-013  2.083e-013   -12.681   -12.681     0.000
   PbF+                  1.121e-013  1.033e-013   -12.950   -12.986    -0.035
   Pb(OH)2               1.602e-014  1.602e-014   -13.795   -13.795     0.000
   Pb(SO4)2-2            3.957e-015  2.859e-015   -14.403   -14.544    -0.141
   PbNO3+                3.847e-015  3.547e-015   -14.415   -14.450    -0.035
   PbCl3-                2.571e-016  2.370e-016   -15.590   -15.625    -0.035
   PbF2                  1.853e-017  1.853e-017   -16.732   -16.732     0.000
   Pb(CO3)2-2            2.517e-018  1.819e-018   -17.599   -17.740    -0.141
   Pb(OH)3-              6.152e-019  5.672e-019   -18.211   -18.246    -0.035
   PbCl4-2               4.285e-019  3.096e-019   -18.368   -18.509    -0.141
   Pb2OH+3               7.586e-020  3.651e-020   -19.120   -19.438    -0.318
   Pb(NO3)2              8.972e-021  8.972e-021   -20.047   -20.047     0.000
   PbF3-                 3.473e-022  3.202e-022   -21.459   -21.495    -0.035
   Pb(OH)4-2             6.806e-024  4.918e-024   -23.167   -23.308    -0.141
   PbF4-2                1.933e-027  1.396e-027   -26.714   -26.855    -0.141
   Pb3(OH)4+2            1.141e-027  8.245e-028   -26.943   -27.084    -0.141
   Pb4(OH)4+4            3.867e-033  1.054e-033   -32.413   -32.977    -0.564
   Pb(HS)2               0.000e+000  0.000e+000  -280.873  -280.873     0.000
   Pb(HS)3-              0.000e+000  0.000e+000  -422.713  -422.748    -0.035
S(-2)           0.000e+000
   H2S                   0.000e+000  0.000e+000  -142.701  -142.701     0.000
   AgHS                  0.000e+000  0.000e+000  -143.007  -143.007     0.000
   HS-                   0.000e+000  0.000e+000  -143.140  -143.175    -0.035
   CdHS+                 0.000e+000  0.000e+000  -145.140  -145.175    -0.035
   S5-2                  0.000e+000  0.000e+000  -145.853  -145.994    -0.141
   S6-2                  0.000e+000  0.000e+000  -146.369  -146.510    -0.141
   S4-2                  0.000e+000  0.000e+000  -146.449  -146.590    -0.141
   S3-2                  0.000e+000  0.000e+000  -147.254  -147.396    -0.141
   S2-2                  0.000e+000  0.000e+000  -148.271  -148.412    -0.141
   TlHS                  0.000e+000  0.000e+000  -153.188  -153.188     0.000
   S-2                   0.000e+000  0.000e+000  -153.802  -153.929    -0.127
   Tl2HS+                0.000e+000  0.000e+000  -162.139  -162.175    -0.035
   HgHS2-                0.000e+000  0.000e+000  -267.692  -267.727    -0.035
   Hg(HS)2               0.000e+000  0.000e+000  -267.879  -267.879     0.000
   HgS2-2                0.000e+000  0.000e+000  -269.748  -269.889    -0.141
   ZnS(HS)-              0.000e+000  0.000e+000  -280.149  -280.184    -0.035
   Zn(HS)2               0.000e+000  0.000e+000  -280.720  -280.720     0.000
   Pb(HS)2               0.000e+000  0.000e+000  -280.873  -280.873     0.000
   Cd(HS)2               0.000e+000  0.000e+000  -281.146  -281.146     0.000
   Ag(HS)2-              0.000e+000  0.000e+000  -282.046  -282.082    -0.035
   Ag(HS)S4-2            0.000e+000  0.000e+000  -282.914  -283.019    -0.105
   Ag(S4)2-3             0.000e+000  0.000e+000  -285.701  -285.913    -0.212
   AgS4S5-3              0.000e+000  0.000e+000  -286.018  -286.224    -0.205
   Cu(S4)2-3             0.000e+000  0.000e+000  -296.239  -296.447    -0.208
   CuS4S5-3              0.000e+000  0.000e+000  -296.975  -297.177    -0.202
   Fe(HS)2               0.000e+000  0.000e+000  -300.514  -300.514     0.000
   Tl2(OH)2(HS)2-2       0.000e+000  0.000e+000  -309.159  -309.300    -0.141
   Cu(HS)3-              0.000e+000  0.000e+000  -418.634  -418.669    -0.035
   Zn(HS)3-              0.000e+000  0.000e+000  -420.580  -420.615    -0.035
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   Cd(HS)3-              0.000e+000  0.000e+000  -422.386  -422.421    -0.035
   Pb(HS)3-              0.000e+000  0.000e+000  -422.713  -422.748    -0.035
   ZnS(HS)2-2            0.000e+000  0.000e+000  -423.908  -424.049    -0.141
   Fe(HS)3-              0.000e+000  0.000e+000  -441.616  -441.652    -0.035
   Tl2OH(HS)3-2          0.000e+000  0.000e+000  -446.807  -446.948    -0.141
   Cd(HS)4-2             0.000e+000  0.000e+000  -563.259  -563.400    -0.141
   Zn(HS)4-2             0.000e+000  0.000e+000  -565.109  -565.250    -0.141
   Sb2S4-2               0.000e+000  0.000e+000  -606.215  -606.357    -0.141
S(6)            1.227e-004
   SO4-2                 1.044e-004  7.758e-005    -3.981    -4.110    -0.129
   CaSO4                 1.698e-005  1.698e-005    -4.770    -4.770     0.000
   MgSO4                 1.057e-006  1.057e-006    -5.976    -5.976     0.000
   NaSO4-                1.310e-007  1.219e-007    -6.883    -6.914    -0.031
   KSO4-                 1.190e-007  1.107e-007    -6.925    -6.956    -0.031
   SrSO4                 4.177e-009  4.177e-009    -8.379    -8.379     0.000
   HSO4-                 2.321e-009  2.156e-009    -8.634    -8.666    -0.032
   ZnSO4                 1.095e-009  1.095e-009    -8.961    -8.961     0.000
   NiSO4                 4.277e-010  4.277e-010    -9.369    -9.369     0.000
   PbSO4                 6.117e-012  6.117e-012   -11.213   -11.213     0.000
   UO2SO4                3.936e-012  3.936e-012   -11.405   -11.405     0.000
   CdSO4                 1.785e-012  1.785e-012   -11.748   -11.748     0.000
   Zn(SO4)2-2            1.024e-012  7.400e-013   -11.990   -12.131    -0.141
   AlSO4+                1.114e-013  1.034e-013   -12.953   -12.985    -0.032
   UO2(SO4)2-2           5.572e-015  4.026e-015   -14.254   -14.395    -0.141
   Pb(SO4)2-2            3.957e-015  2.859e-015   -14.403   -14.544    -0.141
   Cd(SO4)2-2            2.585e-015  1.868e-015   -14.587   -14.729    -0.141
   Ni(SO4)2-2            1.521e-015  1.099e-015   -14.818   -14.959    -0.141
   MnSO4                 7.639e-016  7.639e-016   -15.117   -15.117     0.000
   TlSO4-                6.430e-016  5.928e-016   -15.192   -15.227    -0.035
   VO2SO4-               2.205e-016  2.033e-016   -15.657   -15.692    -0.035
   Al(SO4)2-             9.258e-017  8.600e-017   -16.034   -16.066    -0.032
   AgSO4-                3.793e-017  3.497e-017   -16.421   -16.456    -0.035
   CuSO4                 1.609e-017  1.609e-017   -16.794   -16.794     0.000
   CoSO4                 1.582e-017  1.582e-017   -16.801   -16.801     0.000
   CrO3SO4-2             6.911e-019  4.993e-019   -18.160   -18.302    -0.141
   HgSO4                 2.862e-022  2.862e-022   -21.543   -21.543     0.000
   FeSO4+                1.127e-022  1.048e-022   -21.948   -21.980    -0.032
   Fe(SO4)2-             1.885e-025  1.738e-025   -24.725   -24.760    -0.035
   FeSO4                 1.466e-025  1.466e-025   -24.834   -24.834     0.000
   VOSO4                 9.012e-026  9.012e-026   -25.045   -25.045     0.000
   CrOHSO4               9.093e-028  9.093e-028   -27.041   -27.041     0.000
   CrSO4+                1.253e-029  1.155e-029   -28.902   -28.937    -0.035
   VSO4+                 0.000e+000  0.000e+000   -46.398   -46.434    -0.035
   Cr2(OH)2SO4+2         0.000e+000  0.000e+000   -50.250   -50.392    -0.141
   Cr2(OH)2(SO4)2        0.000e+000  0.000e+000   -52.728   -52.728     0.000
   USO4+2                0.000e+000  0.000e+000   -53.265   -53.406    -0.141
   U(SO4)2               0.000e+000  0.000e+000   -53.616   -53.616     0.000
   NH4SO4-               0.000e+000  0.000e+000   -69.069   -69.101    -0.032
   Co(NH3)6SO4+          0.000e+000  0.000e+000  -423.080  -423.115    -0.035
Sb(3)           2.085e-035
   Sb(OH)3               1.055e-035  1.055e-035   -34.977   -34.977     0.000
   HSbO2                 1.030e-035  1.030e-035   -34.987   -34.987     0.000
   Sb(OH)2+              0.000e+000  0.000e+000   -40.102   -40.137    -0.035
   SbO2-                 0.000e+000  0.000e+000   -40.196   -40.232    -0.035
   Sb(OH)2F              0.000e+000  0.000e+000   -40.369   -40.369     0.000
   SbOF                  0.000e+000  0.000e+000   -40.377   -40.377     0.000
   Sb(OH)4-              0.000e+000  0.000e+000   -40.438   -40.474    -0.035
   SbO+                  0.000e+000  0.000e+000   -40.565   -40.600    -0.035
   Sb2S4-2               0.000e+000  0.000e+000  -606.215  -606.357    -0.141
Sb(5)           5.912e-009
   SbO3-                 5.905e-009  5.445e-009    -8.229    -8.264    -0.035
   Sb(OH)6-              6.858e-012  6.367e-012   -11.164   -11.196    -0.032
   SbO2+                 1.370e-022  1.263e-022   -21.863   -21.899    -0.035
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Se(-2)	0.000e+000					
Ag2Se		0.000e+000	0.000e+000	-85.650	-85.650	0.000
HSe-		0.000e+000	0.000e+000	-99.779	-99.814	-0.035
H2Se		0.000e+000	0.000e+000	-102.470	-102.470	0.000
Se-2		0.000e+000	0.000e+000	-108.127	-108.268	-0.141
MnSe		0.000e+000	0.000e+000	-111.910	-111.910	0.000
AgOH(Se)2-4		0.000e+000	0.000e+000	-213.581	-214.146	-0.564
Se(4)	1.006e-020					
HSeO3-		9.883e-021	9.112e-021	-20.005	-20.040	-0.035
SeO3-2		1.765e-022	1.275e-022	-21.753	-21.894	-0.141
H2SeO3		1.105e-024	1.105e-024	-23.956	-23.956	0.000
AgSeO3-		2.008e-033	1.852e-033	-32.697	-32.732	-0.035
FeHSeO3+2		4.011e-039	2.898e-039	-38.397	-38.538	-0.141
Cd(SeO3)2-2		0.000e+000	0.000e+000	-47.740	-47.881	-0.141
Ag(SeO3)2-3		0.000e+000	0.000e+000	-53.357	-53.675	-0.318
Se(6)	7.437e-009					
SeO4-2		7.436e-009	5.525e-009	-8.129	-8.258	-0.129
HSeO4-		8.542e-014	7.875e-014	-13.068	-13.104	-0.035
NiSeO4		7.140e-014	7.140e-014	-13.146	-13.146	0.000
ZnSeO4		5.520e-014	5.520e-014	-13.258	-13.258	0.000
CdSeO4		1.010e-016	1.010e-016	-15.996	-15.996	0.000
MnSeO4		8.234e-020	8.234e-020	-19.084	-19.084	0.000
CoSeO4		2.830e-021	2.830e-021	-20.548	-20.548	0.000
Zn(SeO4)2-2		4.280e-022	3.092e-022	-21.369	-21.510	-0.141
Si	5.811e-007					
H4SiO4		5.808e-007	5.814e-007	-6.236	-6.235	0.000
H3SiO4-		3.183e-010	2.955e-010	-9.497	-9.529	-0.032
UO2H3SiO4+		9.121e-013	8.409e-013	-12.040	-12.075	-0.035
H2SiO4-2		8.756e-017	6.556e-017	-16.058	-16.183	-0.126
SiF6-2		4.412e-033	3.295e-033	-32.355	-32.482	-0.127
Sn(2)	0.000e+000					
Sn(OH)2		0.000e+000	0.000e+000	-51.320	-51.320	0.000
HSnO2-		0.000e+000	0.000e+000	-53.673	-53.708	-0.035
SnOH+		0.000e+000	0.000e+000	-54.133	-54.169	-0.035
Sn(OH)3-		0.000e+000	0.000e+000	-54.235	-54.271	-0.035
Sn+2		0.000e+000	0.000e+000	-57.177	-57.318	-0.141
SnF+		0.000e+000	0.000e+000	-57.835	-57.870	-0.035
SnCl+		0.000e+000	0.000e+000	-58.186	-58.222	-0.035
SnCl2		0.000e+000	0.000e+000	-59.976	-59.976	0.000
SnF2		0.000e+000	0.000e+000	-60.106	-60.106	0.000
SnNO3+		0.000e+000	0.000e+000	-62.261	-62.297	-0.035
SnF3-		0.000e+000	0.000e+000	-62.292	-62.327	-0.035
SnCl3-		0.000e+000	0.000e+000	-63.658	-63.693	-0.035
Sn2(OH)2+2		0.000e+000	0.000e+000	-106.196	-106.337	-0.141
Sn3(OH)4+2		0.000e+000	0.000e+000	-152.516	-152.657	-0.141
Sn(4)	1.773e-016					
Sn(OH)6-2		1.762e-016	1.309e-016	-15.754	-15.883	-0.129
SnO3-2		1.118e-018	8.077e-019	-17.952	-18.093	-0.141
Sn+4		4.216e-034	1.149e-034	-33.375	-33.940	-0.564
SnF6-2		0.000e+000	0.000e+000	-51.676	-51.817	-0.141
Sr	3.674e-007					
Sr+2		3.632e-007	2.698e-007	-6.440	-6.569	-0.129
SrSO4		4.177e-009	4.177e-009	-8.379	-8.379	0.000
SrHCO3+		3.255e-011	3.031e-011	-10.487	-10.518	-0.031
SrF+		9.418e-012	8.683e-012	-11.026	-11.061	-0.035
SrNO3+		1.736e-012	1.600e-012	-11.761	-11.796	-0.035
SrCO3		1.989e-013	1.989e-013	-12.701	-12.701	0.000
SrOH+		6.789e-014	6.311e-014	-13.168	-13.200	-0.032
SrH2BO3+		6.011e-014	5.566e-014	-13.221	-13.254	-0.033
SrHPO4		4.083e-016	4.083e-016	-15.389	-15.389	0.000
SrH2PO4+		4.259e-017	3.927e-017	-16.371	-16.406	-0.035
SrNH3+2		0.000e+000	0.000e+000	-75.246	-75.388	-0.141
Tl(1)	3.572e-013					

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   Tl+                    3.535e-013  3.259e-013   -12.452   -12.487    -0.035
   TlCl                   3.014e-015  3.014e-015   -14.521   -14.521     0.000
   TlSO4-                 6.430e-016  5.928e-016   -15.192   -15.227    -0.035
   TlCl2-                 5.501e-018  5.072e-018   -17.260   -17.295    -0.035
   TlF                    3.739e-018  3.739e-018   -17.427   -17.427     0.000
   TlNO3                  1.038e-018  1.038e-018   -17.984   -17.984     0.000
   TlOH                   7.114e-020  7.114e-020   -19.148   -19.148     0.000
   TlNO2                  3.480e-031  3.480e-031   -30.458   -30.458     0.000
   TlHS                   0.000e+000  0.000e+000  -153.188  -153.188     0.000
   Tl2HS+                 0.000e+000  0.000e+000  -162.139  -162.175    -0.035
   Tl2(OH)2(HS)2-2        0.000e+000  0.000e+000  -309.159  -309.300    -0.141
   Tl2OH(HS)3-2           0.000e+000  0.000e+000  -446.807  -446.948    -0.141
Tl(3)            1.131e-010
   Tl(OH)3                1.131e-010  1.132e-010    -9.947    -9.946     0.000
   Tl(OH)2+               2.754e-015  2.540e-015   -14.560   -14.595    -0.035
   TlOHCl+                1.208e-015  1.114e-015   -14.918   -14.953    -0.035
   Tl(OH)4-               8.671e-016  7.994e-016   -15.062   -15.097    -0.035
   TlCl3                  3.757e-018  3.757e-018   -17.425   -17.425     0.000
   TlCl2+                 1.362e-018  1.255e-018   -17.866   -17.901    -0.035
   TlCl4-                 7.348e-019  6.774e-019   -18.134   -18.169    -0.035
   TlOH+2                 6.264e-021  4.526e-021   -20.203   -20.344    -0.141
   TlCl+2                 1.057e-021  7.634e-022   -20.976   -21.117    -0.141
   Tl+3                   1.057e-026  5.090e-027   -25.976   -26.293    -0.318
   TlNO3+2                5.461e-029  3.946e-029   -28.263   -28.404    -0.141
U(3)             0.000e+000
   U+3                    0.000e+000  0.000e+000   -78.600   -78.918    -0.318
U(4)             5.684e-037
   U(OH)5-                5.622e-037  5.183e-037   -36.250   -36.285    -0.035
   U(OH)4                 6.174e-039  6.174e-039   -38.209   -38.209     0.000
   U(OH)3+                0.000e+000  0.000e+000   -41.157   -41.192    -0.035
   U(OH)2+2               0.000e+000  0.000e+000   -44.932   -45.073    -0.141
   UF3+                   0.000e+000  0.000e+000   -49.381   -49.417    -0.035
   UF2+2                  0.000e+000  0.000e+000   -49.435   -49.576    -0.141
   UOH+3                  0.000e+000  0.000e+000   -49.629   -49.946    -0.318
   UF+3                   0.000e+000  0.000e+000   -51.318   -51.636    -0.318
   UF4                    0.000e+000  0.000e+000   -52.417   -52.417     0.000
   USO4+2                 0.000e+000  0.000e+000   -53.265   -53.406    -0.141
   U(SO4)2                0.000e+000  0.000e+000   -53.616   -53.616     0.000
   UHPO4+2                0.000e+000  0.000e+000   -55.004   -55.145    -0.141
   U+4                    0.000e+000  0.000e+000   -55.331   -55.895    -0.564
   UF5-                   0.000e+000  0.000e+000   -55.824   -55.860    -0.035
   UCl+3                  0.000e+000  0.000e+000   -56.422   -56.739    -0.318
   U(HPO4)2               0.000e+000  0.000e+000   -56.448   -56.448     0.000
   UF6-2                  0.000e+000  0.000e+000   -58.279   -58.420    -0.141
   U(HPO4)3-2             0.000e+000  0.000e+000   -59.269   -59.410    -0.141
   U(HPO4)4-4             0.000e+000  0.000e+000   -61.620   -62.184    -0.564
   U6(OH)15+9             0.000e+000  0.000e+000  -251.480  -254.337    -2.858
U(5)             1.316e-022
   UO2+                   1.316e-022  1.213e-022   -21.881   -21.916    -0.035
U(6)             4.163e-010
   UO2OH+                 1.620e-010  1.494e-010    -9.790    -9.826    -0.035
   UO2CO3                 1.523e-010  1.523e-010    -9.817    -9.817     0.000
   UO2F+                  4.573e-011  4.216e-011   -10.340   -10.375    -0.035
   UO2+2                  4.512e-011  3.352e-011   -10.346   -10.475    -0.129
   UO2(CO3)2-2            4.802e-012  3.470e-012   -11.319   -11.460    -0.141
   UO2SO4                 3.936e-012  3.936e-012   -11.405   -11.405     0.000
   UO2F2                  1.108e-012  1.108e-012   -11.956   -11.956     0.000
   UO2H3SiO4+             9.121e-013  8.409e-013   -12.040   -12.075    -0.035
   UO2Cl+                 1.685e-013  1.554e-013   -12.773   -12.809    -0.035
   (UO2)2(OH)2+2          5.126e-014  3.704e-014   -13.290   -13.431    -0.141
   (UO2)3(OH)5+           5.705e-015  5.260e-015   -14.244   -14.279    -0.035
   UO2(SO4)2-2            5.572e-015  4.026e-015   -14.254   -14.395    -0.141
   UO2PO4-                4.610e-015  4.251e-015   -14.336   -14.372    -0.035
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UO2HPO4		3.072e-015	3.072e-015	-14.513	-14.513	0.000
UO2F3-		2.750e-015	2.535e-015	-14.561	-14.596	-0.035
UO2(HPO4)2-2		1.856e-015	1.341e-015	-14.731	-14.873	-0.141
UO2(CO3)3-4		7.283e-016	1.985e-016	-15.138	-15.702	-0.564
UO2NO3+		1.081e-016	9.963e-017	-15.966	-16.002	-0.035
UO2H2PO4+		1.428e-018	1.316e-018	-17.845	-17.881	-0.035
UO2F4-2		2.539e-019	1.835e-019	-18.595	-18.736	-0.141
UO2(H2PO4)2		5.590e-027	5.590e-027	-26.253	-26.253	0.000
UO2(H2PO4)3-		1.227e-035	1.131e-035	-34.911	-34.947	-0.035
V(2)	0.000e+000					
V+2		0.000e+000	0.000e+000	-63.393	-63.534	-0.141
VOH+		0.000e+000	0.000e+000	-63.439	-63.475	-0.035
V(3)	3.601e-029					
V(OH)3		3.601e-029	3.601e-029	-28.444	-28.444	0.000
V(OH)2+		7.177e-039	6.617e-039	-38.144	-38.179	-0.035
VOH+2		0.000e+000	0.000e+000	-40.607	-40.748	-0.141
V+3		0.000e+000	0.000e+000	-44.680	-44.997	-0.318
VSO4+		0.000e+000	0.000e+000	-46.398	-46.434	-0.035
V2(OH)2+4		0.000e+000	0.000e+000	-80.132	-80.697	-0.564
V2(OH)3+3		0.000e+000	0.000e+000	-80.158	-80.476	-0.318
V(4)	3.852e-023					
V(OH)3+		3.231e-023	2.979e-023	-22.491	-22.526	-0.035
VO+2		5.837e-024	4.217e-024	-23.234	-23.375	-0.141
VOF+		2.500e-025	2.305e-025	-24.602	-24.637	-0.035
VOSO4		9.012e-026	9.012e-026	-25.045	-25.045	0.000
VOCl+		3.667e-026	3.381e-026	-25.436	-25.471	-0.035
VOF2		7.874e-028	7.874e-028	-27.104	-27.104	0.000
VOF3-		2.761e-031	2.545e-031	-30.559	-30.594	-0.035
VOF4-2		1.296e-035	9.361e-036	-34.888	-35.029	-0.141
H2V2O4+2		0.000e+000	0.000e+000	-40.211	-40.352	-0.141
V(5)	7.495e-008					
H2VO4-		7.374e-008	6.799e-008	-7.132	-7.168	-0.035
HVO4-2		8.310e-010	6.004e-010	-9.080	-9.222	-0.141
H3VO4		1.934e-010	1.934e-010	-9.714	-9.714	0.000
H3V2O7-		9.207e-011	8.489e-011	-10.036	-10.071	-0.035
VO2+		1.182e-013	1.098e-013	-12.927	-12.960	-0.032
HV2O7-3		2.874e-014	1.383e-014	-13.542	-13.859	-0.318
VO2F		1.754e-015	1.754e-015	-14.756	-14.756	0.000
V3O9-3		6.838e-016	3.292e-016	-15.165	-15.483	-0.318
VO2SO4-		2.205e-016	2.033e-016	-15.657	-15.692	-0.035
VO4-3		2.198e-017	1.058e-017	-16.658	-16.975	-0.318
VO2F2-		6.293e-018	5.802e-018	-17.201	-17.236	-0.035
V2O7-4		4.803e-018	1.309e-018	-17.319	-17.883	-0.564
VO2NO3		8.270e-020	8.270e-020	-19.083	-19.083	0.000
V4O12-4		3.423e-020	9.330e-021	-19.466	-20.030	-0.564
VO2F3-2		9.125e-022	6.594e-022	-21.040	-21.181	-0.141
VO2F4-3		6.141e-027	2.956e-027	-26.212	-26.529	-0.318
HV10O28-5		0.000e+000	0.000e+000	-46.431	-47.313	-0.882
V10O28-6		0.000e+000	0.000e+000	-47.684	-48.954	-1.270
H2V10O28-4		0.000e+000	0.000e+000	-48.087	-48.652	-0.564
Zn	8.874e-008					
Zn+2		8.684e-008	6.451e-008	-7.061	-7.190	-0.129
ZnSO4		1.095e-009	1.095e-009	-8.961	-8.961	0.000
ZnCl+		4.989e-010	4.631e-010	-9.302	-9.334	-0.032
ZnOH+		2.477e-010	2.284e-010	-9.606	-9.641	-0.035
ZnOHCl		2.146e-011	2.146e-011	-10.668	-10.668	0.000
ZnHCO3+		1.532e-011	1.413e-011	-10.815	-10.850	-0.035
ZnF+		1.272e-011	1.173e-011	-10.895	-10.931	-0.035
ZnCO3		4.238e-012	4.238e-012	-11.373	-11.373	0.000
ZnCl2		2.098e-012	2.098e-012	-11.678	-11.678	0.000
Zn(OH)2		1.281e-012	1.281e-012	-11.892	-11.892	0.000
Zn(SO4)2-2		1.024e-012	7.400e-013	-11.990	-12.131	-0.141
ZnNO3+		2.618e-013	2.414e-013	-12.582	-12.617	-0.035

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  ZnSeO4                5.520e-014  5.520e-014   -13.258   -13.258     0.000
  ZnCl3-                5.130e-015  4.762e-015   -14.290   -14.322    -0.032
  Zn(OH)3-              2.466e-016  2.273e-016   -15.608   -15.643    -0.035
  ZnCl4-2               9.110e-018  6.804e-018   -17.041   -17.167    -0.127
  Zn(NO3)2              7.175e-020  7.175e-020   -19.144   -19.144     0.000
  Zn(OH)4-2             4.434e-022  3.204e-022   -21.353   -21.494    -0.141
  Zn(SeO4)2-2           4.280e-022  3.092e-022   -21.369   -21.510    -0.141
  ZnS(HS)-              0.000e+000  0.000e+000  -280.149  -280.184    -0.035
  Zn(HS)2               0.000e+000  0.000e+000  -280.720  -280.720     0.000
  Zn(HS)3-              0.000e+000  0.000e+000  -420.580  -420.615    -0.035
  ZnS(HS)2-2            0.000e+000  0.000e+000  -423.908  -424.049    -0.141
  Zn(HS)4-2             0.000e+000  0.000e+000  -565.109  -565.250    -0.141

------------------------------Saturation indices------------------------------

      Phase               SI log IAP  log KT

      (Co(NH3)5Cl)(NO3)2-351.02 -344.74    6.29  (Co(NH3)5Cl)(NO3)2
      (Co(NH3)5Cl)Cl2-342.68 -338.17    4.51  (Co(NH3)5Cl)Cl2
      (Co(NH3)5OH2)Cl3-349.90 -338.17   11.74  (Co(NH3)5OH2)Cl3
      (Co(NH3)6)(NO3)3-425.43 -407.49   17.93  (Co(NH3)6)(NO3)3
      (Co(NH3)6)Cl3  -417.68 -397.64   20.03  (Co(NH3)6)Cl3
      (NH4)2CrO4     -142.54 -142.13    0.40  (NH4)2CrO4
      (NH4)2SeO4     -140.75 -140.30    0.45  (NH4)2SeO4
      (UO2)3(PO4)2    -16.32  -65.72  -49.40  (UO2)3(PO4)2
      (VO)3(PO4)2     -79.32 -104.42  -25.10  (VO)3(PO4)2
      Acanthite      -127.70 -163.92  -36.22  Ag2S
      Ag2CO3          -25.14  -36.23  -11.09  Ag2CO3
      Ag2CrO4         -25.80  -37.39  -11.59  Ag2CrO4
      Ag2HVO4         -22.09  -20.61    1.48  Ag2HVO4
      Ag2MoO4         -22.67  -34.22  -11.55  Ag2MoO4
      Ag2O            -26.77  -14.20   12.57  Ag2O
      Ag2Se           -71.86 -120.56  -48.70  Ag2Se
      Ag2SeO3         -33.64  -40.79   -7.15  Ag2SeO3
      Ag2SeO4         -26.64  -35.55   -8.91  Ag2SeO4
      Ag2SO4          -26.58  -31.40   -4.82  Ag2SO4
      Ag3AsO3         -57.25  -55.10    2.16  Ag3AsO3
      Ag3AsO4         -29.66  -32.45   -2.79  Ag3AsO4
      Ag3H2VO5        -32.89  -27.71    5.18  Ag3H2VO5
      Ag3PO4          -40.50  -58.09  -17.59  Ag3PO4
      AgF:4H2O        -19.74  -18.69    1.05  AgF:4H2O
      Agmetal         -14.37  -27.87  -13.51  Ag
      AgVO3           -14.28  -13.51    0.77  AgVO3
      Al(OH)3(am)      -3.93    6.87   10.80  Al(OH)3
      Al2(MoO4)3      -48.70  -46.33    2.37  Al2(MoO4)3
      Al2O3            -5.91   13.75   19.65  Al2O3
      Al4(OH)10SO4    -12.41   10.29   22.70  Al4(OH)10SO4
      AlAsO4:2H2O      -9.08   -4.28    4.80  AlAsO4:2H2O
      AlOHSO4          -7.10  -10.33   -3.23  AlOHSO4
      AlSb           -218.36 -152.74   65.62  AlSb
      Alunite          -9.54  -10.94   -1.40  KAl3(SO4)2(OH)6
      Anglesite        -6.11  -13.90   -7.79  PbSO4
      Anhydrite        -2.77   -7.13   -4.36  CaSO4
      Anilite        -148.38 -180.26  -31.88  Cu0.25Cu1.5S
      Antlerite       -31.84  -23.06    8.79  Cu3(OH)4SO4
      Aragonite        -3.66  -11.96   -8.30  CaCO3
      Arsenolite     -132.42 -135.18   -2.76  As4O6
      Artinite        -13.70   -4.10    9.60  MgCO3:Mg(OH)2:3H2O
      As2O5           -29.00  -22.30    6.71  As2O5
      Atacamite       -20.38  -12.99    7.39  Cu2(OH)3Cl
      Autunite        -14.34  -58.26  -43.93  Ca(UO2)2(PO4)2
      Avicennite       -6.89  -19.89  -13.00  Tl2O3
      Azurite         -33.02  -49.92  -16.91  Cu3(OH)2(CO3)2
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Ba(OH)2:8H2O	-23.21	1.19	24.39	Ba(OH)2:8H2O
Ba2V2O7:2H2O	-26.33	-10.45	15.87	Ba2V2O7:2H2O
Ba3(AsO4)2	-9.83	-18.74	-8.91	Ba3(AsO4)2
Ba3(VO4)2:4H2O	-42.21	-9.27	32.94	Ba3(VO4)2:4H2O
BaCrO4	-12.33	-22.00	-9.67	BaCrO4
BaF2	-16.17	-21.99	-5.82	BaF2
BaHPO4	-15.82	-35.60	-19.77	BaHPO4
BaMoO4	-11.88	-18.84	-6.96	BaMoO4
Barite	-6.04	-16.02	-9.98	BaSO4
BaS	-164.71	-148.53	16.18	BaS
BaSeO3	-27.23	-25.40	1.83	BaSeO3
BaSeO4	-12.70	-20.16	-7.46	BaSeO4
Bassetite	-33.87	-78.36	-44.48	Fe(UO2)2(PO4)2
Bianchite	-9.54	-11.30	-1.76	ZnSO4:6H2O
Birnessite	-2.06	16.03	18.09	MnO2
Bixbyite	-8.84	-9.48	-0.64	Mn2O3
BlaubleiI	-131.32	-155.48	-24.16	Cu0.9Cu0.2S
BlaubleiII	-139.64	-166.92	-27.28	Cu0.6Cu0.8S
Boehmite	-1.71	6.87	8.58	AlOOH
Breithauptite	-114.78	-133.30	-18.52	NiSb
Brochantite	-40.23	-25.01	15.22	Cu4(OH)6SO4
Brucite	-7.88	8.97	16.84	Mg(OH)2
Bunsenite	-6.91	5.53	12.45	NiO
Ca(VO3)2	-8.41	-2.75	5.66	Ca(VO3)2
Ca2V2O7	-10.18	7.32	17.50	Ca2V2O7
Ca2V2O7:2H2O	-14.23	7.32	21.55	Ca2V2O7:2H2O
Ca3(AsO4)2:4H2O	-14.38	7.92	22.30	Ca3(AsO4)2:4H2O
Ca3(PO4)2(beta)	-14.43	-43.35	-28.92	Ca3(PO4)2
Ca3(VO4)2	-21.57	17.39	38.96	Ca3(VO4)2
Ca3(VO4)2:4H2O	-22.47	17.39	39.86	Ca3(VO4)2:4H2O
Ca3Sb2	-431.98	-289.00	142.97	Ca3Sb2
Ca4H(PO4)3:3H2O	-22.99	-70.07	-47.08	Ca4H(PO4)3:3H2O
CaCrO4	-10.85	-13.11	-2.27	CaCrO4
CaHPO4	-7.44	-26.71	-19.27	CaHPO4
CaHPO4:2H2O	-7.72	-26.71	-19.00	CaHPO4:2H2O
Calcite	-3.48	-11.96	-8.48	CaCO3
Calomel	-24.54	-42.45	-17.91	Hg2Cl2
CaMoO4	-2.00	-9.95	-7.95	CaMoO4
Carnotite	-1.18	-0.95	0.23	KUO2VO4
CaSeO3:2H2O	-19.33	-16.51	2.81	CaSeO3:2H2O
CaSeO4:2H2O	-8.26	-11.28	-3.02	CaSeO4:2H2O
Cd(BO2)2	-17.85	-8.01	9.84	Cd(BO2)2
Cd(OH)2	-10.56	3.08	13.64	Cd(OH)2
Cd(OH)2(am)	-10.65	3.08	13.73	Cd(OH)2
Cd3(OH)2(SO4)2	-31.86	-25.15	6.71	Cd3(OH)2(SO4)2
Cd3(OH)4SO4	-30.51	-7.95	22.56	Cd3(OH)4SO4
Cd3(PO4)2	-31.72	-64.32	-32.60	Cd3(PO4)2
Cd4(OH)6SO4	-33.27	-4.87	28.40	Cd4(OH)6SO4
CdCl2	-14.44	-15.10	-0.66	CdCl2
CdCl2:1H2O	-13.40	-15.10	-1.69	CdCl2:1H2O
CdCl2:2.5H2O	-13.18	-15.10	-1.91	CdCl2:2.5H2O
CdF2	-18.88	-20.09	-1.21	CdF2
Cdmetal(alpha)	-51.98	-38.46	13.51	Cd
Cdmetal(gamma)	-52.08	-38.46	13.62	Cd
CdMoO4	-2.79	-16.94	-14.15	CdMoO4
CdOHCl	-9.54	-6.01	3.54	CdOHCl
CdSb	-135.40	-135.75	-0.35	CdSb
CdSe	-83.08	-103.28	-20.20	CdSe
CdSeO4:2H2O	-16.42	-18.27	-1.85	CdSeO4:2H2O
CdSO4	-13.95	-14.12	-0.17	CdSO4
CdSO4:1H2O	-12.39	-14.12	-1.73	CdSO4:1H2O
CdSO4:2.67H2O	-12.25	-14.12	-1.87	CdSO4:2.67H2O
Celestite	-4.06	-10.68	-6.62	SrSO4

Cerargyrite	-6.44	-16.19	-9.75	AgCl
Cerrusite	-5.61	-18.74	-13.13	PbCO3
CH4(g)	-147.17	-188.21	-41.05	CH4
Chalcanthite	-16.51	-19.15	-2.64	CuSO4:5H2O
Chalcedony	-2.69	-6.24	-3.55	SiO2
Chalcocite	-154.87	-189.79	-34.92	Cu2S
Chalcopyrite	-276.14	-311.41	-35.27	CuFeS2
Chrysotile	-17.77	14.43	32.20	Mg3Si2O5(OH)4
Cinnabar	-116.98	-162.67	-45.69	HgS
Claudetite	-132.12	-135.18	-3.06	As4O6
Clausthalite	-75.96	-103.06	-27.10	PbSe
Co(BO2)2	-40.06	-12.99	27.07	Co(BO2)2
Co(OH)2	-14.99	-1.90	13.09	Co(OH)2
Co(OH)3	-11.22	-13.53	-2.31	Co(OH)3
CO2(g)	-3.89	-22.03	-18.15	CO2
Co3(AsO4)2	-41.03	-27.99	13.03	Co3(AsO4)2
Co3(PO4)2	-44.58	-79.27	-34.69	Co3(PO4)2
Co3O4	-18.45	-28.95	-10.50	Co3O4
CoCl2	-28.35	-20.08	8.27	CoCl2
CoCl2:6H2O	-22.62	-20.08	2.54	CoCl2:6H2O
CoCO3	-13.95	-23.93	-9.98	CoCO3
CoF2	-23.47	-25.07	-1.60	CoF2
CoF3	-46.83	-48.29	-1.46	CoF3
CoFe2O4	-2.93	-6.46	-3.53	CoFe2O4
CoHPO4	-19.62	-38.68	-19.06	CoHPO4
CoMoO4	-14.16	-21.92	-7.76	CoMoO4
CoO	-15.48	-1.90	13.59	CoO
CoS(alpha)	-144.18	-151.62	-7.44	CoS
CoS(beta)	-140.55	-151.62	-11.07	CoS
CoSe	-92.06	-108.26	-16.20	CoSe
CoSeO3	-29.80	-28.48	1.32	CoSeO3
CoSeO4:6H2O	-21.72	-23.25	-1.53	CoSeO4:6H2O
CoSO4	-21.90	-19.10	2.80	CoSO4
CoSO4:6H2O	-16.63	-19.10	-2.47	CoSO4:6H2O
Cotunnite	-10.10	-14.88	-4.78	PbCl2
Covellite	-129.37	-151.67	-22.30	CuS
Cr(OH)2	-46.77	-35.95	10.82	Cr(OH)2
Cr(OH)3	-19.46	-18.13	1.34	Cr(OH)3
Cr(OH)3(am)	-17.38	-18.13	-0.75	Cr(OH)3
Cr2O3	-33.89	-36.25	-2.36	Cr2O3
CrCl2	-68.22	-54.13	14.09	CrCl2
CrCl3	-60.51	-45.40	15.11	CrCl3
CrF3	-41.55	-52.89	-11.34	CrF3
Cristobalite	-2.89	-6.24	-3.35	SiO2
Crmetal	-107.98	-77.50	30.48	Cr
CrO3	-19.97	-23.19	-3.21	CrO3
Cryolite	-19.77	-53.61	-33.84	Na3AlF6
Cu(OH)2	-10.63	-1.95	8.67	Cu(OH)2
Cu(SbO3)2	-34.03	11.18	45.21	Cu(SbO3)2
Cu2(OH)3NO3	-25.53	-16.28	9.25	Cu2(OH)3NO3
Cu2Sb:3H2O	-146.71	-181.60	-34.88	Cu2Sb:3H2O
Cu2Se(alpha)	-100.63	-146.43	-45.80	Cu2Se
Cu2SO4	-55.32	-57.27	-1.95	Cu2SO4
Cu3(AsO4)2:2H2O	-34.25	-28.15	6.10	Cu3(AsO4)2:2H2O
Cu3(PO4)2	-42.57	-79.42	-36.85	Cu3(PO4)2
Cu3(PO4)2:3H2O	-44.30	-79.42	-35.12	Cu3(PO4)2:3H2O
Cu3Sb	-177.12	-219.71	-42.59	Cu3Sb
Cu3Se2	-191.25	-254.74	-63.49	Cu3Se2
CuCO3	-12.49	-23.99	-11.50	CuCO3
CuCrO4	-19.70	-25.14	-5.44	CuCrO4
CuF	-26.71	-31.62	-4.91	CuF
CuF2	-26.24	-25.12	1.12	CuF2
CuF2:2H2O	-20.57	-25.12	-4.55	CuF2:2H2O

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      Cumetal          -32.05  -40.81   -8.76  Cu
      CuMoO4            -8.90  -21.98  -13.08  CuMoO4
      CuOCuSO4         -31.41  -21.10   10.30  CuOCuSO4
      Cupricferrite    -12.50   -6.51    5.99  CuFe2O4
      Cuprite          -38.66  -40.07   -1.41  Cu2O
      Cuprousferrite   -13.40  -22.31   -8.92  CuFeO2
      CuSe             -75.21 -108.31  -33.10  CuSe
      CuSe2           -139.76 -173.13  -33.37  CuSe2
      CuSeO3:2H2O      -29.05  -28.54    0.51  CuSeO3:2H2O
      CuSeO4:5H2O      -20.86  -23.30   -2.44  CuSeO4:5H2O
      CuSO4            -22.09  -19.15    2.94  CuSO4
      Diaspore          -0.00    6.87    6.87  AlOOH
      Djurleite       -153.35 -187.27  -33.92  Cu0.066Cu1.868S
      Dolomite(disordered)  -8.49  -25.03  -16.54  CaMg(CO3)2
      Dolomite(ordered)  -7.94  -25.03  -17.09  CaMg(CO3)2
      Epsomite          -6.11   -8.24   -2.13  MgSO4:7H2O
      FCO3Apatite      -21.14 -135.54 -114.40
Ca9.316Na0.36Mg0.144(PO4)4.8(CO3)1.2F2.48
      Fe(OH)2          -23.59  -10.02   13.56  Fe(OH)2
      Fe(OH)2.7Cl.3     -1.97   -5.01   -3.04  Fe(OH)2.7Cl.3
      Fe(VO3)2         -19.13  -22.85   -3.72  Fe(VO3)2
      Fe2(OH)4SeO3     -32.70  -31.15    1.55  Fe2(OH)4SeO3
      Fe2(SeO3)3:2H2O  -63.70  -84.32  -20.63  Fe2(SeO3)3:2H2O
      Fe2(SO4)3        -52.44  -56.17   -3.73  Fe2(SO4)3
      Fe3(OH)8         -34.81  -14.58   20.22  Fe3(OH)8
      FeAsO4:2H2O      -13.83  -13.43    0.40  FeAsO4:2H2O
      FeCr2O4          -53.47  -46.27    7.20  FeCr2O4
      FeMoO4           -19.96  -30.05  -10.09  FeMoO4
      Ferrihydrite      -5.47   -2.28    3.19  Fe(OH)3
      Ferroselite     -162.60 -181.20  -18.60  FeSe2
      FeS(ppt)        -156.79 -159.74   -2.95  FeS
      FeSe            -105.38 -116.38  -11.00  FeSe
      Fluorite          -2.60  -13.10  -10.50  CaF2
      Galena          -132.45 -146.42  -13.97  PbS
      Gibbsite          -1.42    6.87    8.29  Al(OH)3
      Goethite          -2.77   -2.28    0.49  FeOOH
      Goslarite         -9.29  -11.30   -2.01  ZnSO4:7H2O
      Greenalite       -63.35  -42.54   20.81  Fe3Si2O5(OH)4
      Greenockite     -132.28 -146.64  -14.36  CdS
      Greigite        -568.43 -613.47  -45.03  Fe3S4
      Gummite           -5.05    2.62    7.67  UO3
      Gypsum            -2.52   -7.13   -4.61  CaSO4:2H2O
      H-Autunite       -20.40  -68.34  -47.93  H2(UO2)2(PO4)2
      H-Jarosite       -29.15  -41.25  -12.10  (H3O)Fe3(SO4)2(OH)6
      H2MoO4            -7.15  -20.02  -12.88  H2MoO4
      H2S(g)          -141.71 -149.72   -8.01  H2S
      H2Se(g)         -101.40 -106.36   -4.96  H2Se
      H2Sn(OH)6         -5.45  -28.98  -23.53  H2Sn(OH)6
      Halite            -7.68   -6.08    1.60  NaCl
      Halloysite        -8.30    1.28    9.57  Al2Si2O5(OH)4
      Hausmannite      -19.98   41.05   61.03  Mn3O4
      Hematite          -3.14   -4.56   -1.42  Fe2O3
      Hercynite        -19.17    3.72   22.89  FeAl2O4
      Hg(CH3)2(g)     -315.67 -389.38  -73.71  Hg(CH3)2
      Hg(g)            -25.03  -32.91   -7.87  Hg
      Hg(OH)2           -9.46  -12.95   -3.50  Hg(OH)2
      Hg2(g)           -50.86  -65.81  -14.96  Hg2
      Hg2(OH)2         -29.53  -24.27    5.26  Hg2(OH)2
      Hg2CO3           -30.25  -46.30  -16.05  Hg2CO3
      Hg2CrO4          -38.75  -47.45   -8.70  Hg2CrO4
      Hg2F2            -37.08  -47.44  -10.36  Hg2F2
      Hg2HPO4          -36.28  -61.05  -24.77  Hg2HPO4
      Hg2S            -162.31 -173.99  -11.68  Hg2S
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Hg2SeO3	-46.20	-50.85	-4.66	Hg2SeO3
Hg2SO4	-35.34	-41.47	-6.13	Hg2SO4
Hg3O2CO3	-31.21	-60.89	-29.68	Hg3O2CO3
HgCl(g)	-40.72	-21.22	19.50	HgCl
HgCl2	-9.87	-31.13	-21.26	HgCl2
HgF(g)	-56.40	-23.72	32.68	HgF
HgF2(g)	-48.69	-36.13	12.57	HgF2
Hgmetal(l)	-19.45	-32.91	-13.45	Hg
HgSe	-63.62	-119.31	-55.69	HgSe
HgSeO3	-27.11	-39.54	-12.43	HgSeO3
HgSO4	-20.74	-30.16	-9.42	HgSO4
Hinsdalite	-27.57	-30.07	-2.50	PbAl3PO4SO4(OH)6
Huntite	-21.20	-51.17	-29.97	CaMg3(CO3)4
Hydrocerrusite	-15.40	-34.17	-18.77	Pb3(OH)2(CO3)2
Hydromagnesite	-34.54	-43.31	-8.77	Mg5(CO3)4(OH)2:4H2O
Hydroxylapatite	-15.66	-59.99	-44.33	Ca5(PO4)3OH
Hydroxylpyromorphite	-31.07	-93.86	-62.79	Pb5(PO4)3OH
K-Alum	-19.51	-24.68	-5.17	KAl(SO4)2:12H2O
K-Autunite	-14.39	-62.63	-48.24	K2(UO2)2(PO4)2
K-Jarosite	-23.60	-38.40	-14.80	KFe3(SO4)2(OH)6
K2Cr2O7	-23.43	-40.67	-17.24	K2Cr2O7
K2CrO4	-16.97	-17.48	-0.51	K2CrO4
K2MoO4	-17.59	-14.32	3.26	K2MoO4
K2SeO4	-14.92	-15.65	-0.73	K2SeO4
Kaolinite	-6.16	1.28	7.43	Al2Si2O5(OH)4
Langite	-42.50	-25.01	17.49	Cu4(OH)6SO4:H2O
Larnakite	-10.17	-10.60	-0.43	PbO:PbSO4
Laurionite	-6.41	-5.79	0.62	PbOHCl
Lepidocrocite	-3.65	-2.28	1.37	FeOOH
Lime	-22.63	10.07	32.70	CaO
Litharge	-9.40	3.30	12.69	PbO
Mackinawite	-156.14	-159.74	-3.60	FeS
Maghemite	-10.95	-4.56	6.39	Fe2O3
Magnesioferrite	-12.46	4.40	16.86	Fe2MgO4
Magnesite	-5.61	-13.07	-7.46	MgCO3
Magnetite	-17.99	-14.58	3.40	Fe3O4
Malachite	-20.63	-25.94	-5.31	Cu2(OH)2CO3
Manganite	-4.73	20.61	25.34	MnOOH
Massicot	-9.60	3.30	12.89	PbO
Matlockite	-8.40	-17.38	-8.97	PbClF
Melanothallite	-26.39	-20.13	6.26	CuCl2
Melanterite	-25.02	-27.22	-2.21	FeSO4:7H2O
Metacinnabar	-117.58	-162.67	-45.09	HgS
Mg(OH)2(active)	-9.83	8.97	18.79	Mg(OH)2
Mg(VO3)2	-15.14	-3.86	11.28	Mg(VO3)2
Mg2Sb3	-431.72	-357.04	74.68	Mg2Sb3
Mg2V2O7	-21.25	5.11	26.36	Mg2V2O7
Mg3(PO4)2	-23.39	-46.67	-23.28	Mg3(PO4)2
MgCr2O4	-43.49	-27.29	16.20	MgCr2O4
MgCrO4	-19.60	-14.22	5.38	MgCrO4
MgF2	-6.08	-14.21	-8.13	MgF2
MgHPO4:3H2O	-9.64	-27.82	-18.18	MgHPO4:3H2O
MgMoO4	-9.21	-11.06	-1.85	MgMoO4
MgSeO3:6H2O	-20.68	-17.62	3.06	MgSeO3:6H2O
MgSeO4:6H2O	-11.18	-12.38	-1.20	MgSeO4:6H2O
Minium	-22.08	51.44	73.52	Pb3O4
Mirabilite	-10.06	-11.18	-1.11	Na2SO4:10H2O
Mn(VO3)2	-17.89	-12.99	4.90	Mn(VO3)2
Mn2(SO4)3	-55.38	-61.09	-5.71	Mn2(SO4)3
Mn2Sb	-241.79	-180.71	61.08	Mn2Sb
Mn3(AsO4)2:8H2O	-35.29	-22.79	12.50	Mn3(AsO4)2:8H2O
Mn3(PO4)2	-50.24	-74.06	-23.83	Mn3(PO4)2
MnCl2:4H2O	-21.06	-18.34	2.72	MnCl2:4H2O

MnHPO4	-11.55	-36.95	-25.40	MnHPO4
MnS(grn)	-150.06	-149.89	0.17	MnS
MnS(pnk)	-153.23	-149.89	3.34	MnS
MnSb	-161.44	-164.35	-2.91	MnSb
MnSe	-110.03	-106.53	3.50	MnSe
MnSeO3	-27.88	-26.75	1.13	MnSeO3
MnSeO3:2H2O	-27.73	-26.75	0.98	MnSeO3:2H2O
MnSeO4:5H2O	-19.46	-21.51	-2.05	MnSeO4:5H2O
MnSO4	-19.95	-17.37	2.58	MnSO4
Monteponite	-12.02	3.08	15.10	CdO
Montroydite	-9.31	-12.95	-3.64	HgO
MoO3	-12.02	-20.02	-8.00	MoO3
Morenosite	-9.52	-11.67	-2.14	NiSO4:7H2O
MoS2	-290.75	-361.01	-70.26	MoS2
Na-Autunite	-14.90	-62.31	-47.41	Na2(UO2)2(PO4)2
Na-Jarosite	-27.04	-38.24	-11.20	NaFe3(SO4)2(OH)6
Na2Cr2O7	-30.45	-40.35	-9.90	Na2Cr2O7
Na2CrO4	-20.09	-17.16	2.93	Na2CrO4
Na2Mo2O7	-17.43	-34.03	-16.60	Na2Mo2O7
Na2MoO4	-15.49	-14.00	1.49	Na2MoO4
Na2MoO4:2H2O	-15.22	-14.00	1.22	Na2MoO4:2H2O
Na2SeO3:5H2O	-30.86	-20.56	10.30	Na2SeO3:5H2O
Na2SeO4	-16.61	-15.33	1.28	Na2SeO4
Na3Sb	-245.03	-150.57	94.45	Na3Sb
Na3VO4	-34.06	2.62	36.68	Na3VO4
Na4V2O7	-38.18	-0.78	37.40	Na4V2O7
Nantokite	-22.39	-29.12	-6.73	CuCl
NaSb	-138.22	-115.05	23.17	NaSb
Natron	-14.70	-16.01	-1.31	Na2CO3:10H2O
NaVO3	-7.26	-3.40	3.86	NaVO3
Nesquehonite	-8.40	-13.07	-4.67	MgCO3:3H2O
Ni(OH)2	-7.26	5.53	12.79	Ni(OH)2
Ni3(AsO4)2:8H2O	-21.40	-5.70	15.70	Ni3(AsO4)2:8H2O
Ni3(PO4)2	-25.67	-56.97	-31.30	Ni3(PO4)2
Ni4(OH)6SO4	-27.07	4.93	32.00	Ni4(OH)6SO4
NiCO3	-9.63	-16.50	-6.87	NiCO3
NiMoO4	-3.35	-14.49	-11.14	NiMoO4
Ningyoite	-39.30	-93.21	-53.91	CaU(PO4)2:2H2O
NiS(alpha)	-138.59	-144.19	-5.60	NiS
NiS(beta)	-133.09	-144.19	-11.10	NiS
NiS(gamma)	-131.39	-144.19	-12.80	NiS
NiSe	-83.13	-100.83	-17.70	NiSe
NiSeO3:2H2O	-23.87	-21.05	2.81	NiSeO3:2H2O
NiSeO4:6H2O	-14.30	-15.82	-1.52	NiSeO4:6H2O
Nsutite	-1.47	16.03	17.50	MnO2
O2(g)	-0.00	83.09	83.09	O2
Orpiment	-455.69	-516.75	-61.07	As2S3
Otavite	-6.95	-18.95	-12.00	CdCO3
Pb(BO2)2	-14.31	-7.79	6.52	Pb(BO2)2
Pb(OH)2	-4.85	3.30	8.15	Pb(OH)2
Pb10(OH)6O(CO3)6	-90.46	-99.22	-8.76	Pb10(OH)6O(CO3)6
Pb2(OH)3Cl	-11.29	-2.49	8.79	Pb2(OH)3Cl
Pb2O(OH)2	-19.59	6.60	26.19	Pb2O(OH)2
Pb2O3	-12.90	48.14	61.04	Pb2O3
Pb2OCO3	-14.88	-15.44	-0.56	Pb2OCO3
Pb2V2O7	-4.33	-6.23	-1.90	Pb2V2O7
Pb3(AsO4)2	-18.20	-12.40	5.80	Pb3(AsO4)2
Pb3(PO4)2	-20.14	-63.67	-43.53	Pb3(PO4)2
Pb3(VO4)2	-9.07	-2.93	6.14	Pb3(VO4)2
Pb3O2CO3	-23.16	-12.14	11.02	Pb3O2CO3
Pb3O2SO4	-17.99	-7.31	10.69	Pb3O2SO4
Pb4(OH)6SO4	-25.11	-4.01	21.10	Pb4(OH)6SO4
Pb4O3SO4	-25.88	-4.01	21.88	Pb4O3SO4

PbCrO4	-7.29	-19.89	-12.60	PbCrO4
PbF2	-12.43	-19.87	-7.44	PbF2
PbHPO4	-9.68	-33.49	-23.81	PbHPO4
Pbmetal	-42.49	-38.25	4.25	Pb
PbMoO4	-1.11	-16.73	-15.62	PbMoO4
PbO:0.3H2O	-9.68	3.30	12.98	PbO:0.33H2O
PbSeO4	-11.21	-18.05	-6.84	PbSeO4
Periclase	-12.62	8.97	21.58	MgO
Phosgenite	-13.81	-33.62	-19.81	PbCl2:PbCO3
Plattnerite	-4.76	44.84	49.60	PbO2
Plumbgummite	-16.86	-49.65	-32.79	PbAl3(PO4)2(OH)5:H2O
Portlandite	-12.73	10.07	22.80	Ca(OH)2
Przhevalskite	-20.67	-65.04	-44.37	Pb(UO2)2(PO4)2
Pyrite	-249.41	-267.92	-18.51	FeS2
Pyrochroite	-15.36	-0.16	15.19	Mn(OH)2
Pyrolusite	0.00	41.38	41.38	MnO2
Pyromorphite	-18.52	-102.95	-84.43	Pb5(PO4)3Cl
Quartz	-2.24	-6.24	-4.00	SiO2
Realgar	-184.54	-204.29	-19.75	AsS
Retgersite	-9.63	-11.67	-2.04	NiSO4:6H2O
Rhodochrosite	-11.62	-22.20	-10.58	MnCO3
Rutherfordine	-4.92	-19.42	-14.50	UO2CO3
Saleeite	-15.72	-59.37	-43.65	Mg(UO2)2(PO4)2
Sb(OH)3	-27.87	-34.98	-7.11	Sb(OH)3
Sb2O4	-31.81	-28.41	3.40	Sb2O4
Sb2O5	-25.82	-35.48	-9.67	Sb2O5
Sb2Se3	-321.28	-389.03	-67.76	Sb2Se3
Sb4O6(cubic)	-121.65	-139.91	-18.26	Sb4O6
Sb4O6(orth)	-122.01	-139.91	-17.90	Sb4O6
SbCl3	-62.82	-62.25	0.57	SbCl3
SbF3	-59.51	-69.74	-10.23	SbF3
Sbmetal	-85.60	-97.29	-11.69	Sb
SbO2	-10.69	-38.51	-27.82	SbO2
Schoepite	-3.38	2.62	5.99	UO2(OH)2:H2O
Semetal(am)	-57.71	-64.82	-7.11	Se
Semetal(hex	-57.11	-64.82	-7.71	Se
Senarmontite	-57.59	-69.95	-12.37	Sb2O3
SeO2	-26.71	-26.59	0.12	SeO2
SeO3	-42.39	-21.35	21.04	SeO3
Sepiolite	-16.53	-0.77	15.76	Mg2Si3O7.5OH:3H2O
Sepiolite(A)	-19.55	-0.77	18.78	Mg2Si3O7.5OH:3H2O
Siderite	-21.82	-32.06	-10.24	FeCO3
SiO2(am-gel)	-3.53	-6.24	-2.71	SiO2
SiO2(am-ppt)	-3.50	-6.24	-2.74	SiO2
Smithsonite	-6.13	-16.13	-10.00	ZnCO3
Sn(OH)2	-45.89	-51.32	-5.43	Sn(OH)2
Sn(OH)4	-6.69	-28.97	-22.28	Sn(OH)4
Sn(SO4)2	-48.17	-63.38	-15.21	Sn(SO4)2
SnCl2	-60.22	-69.50	-9.28	SnCl2
Snmetal(wht)	-90.54	-92.86	-2.33	Sn
SnO	-46.41	-51.32	-4.91	SnO
SnO2	0.00	-28.97	-28.97	SnO2
SnS	-181.93	-201.04	-19.11	SnS
SnS2	-270.96	-328.42	-57.45	SnS2
SnSe	-127.19	-157.68	-30.49	SnSe
SnSe2	-176.58	-241.70	-65.12	SnSe2
SnSO4	-11.55	-68.52	-56.97	SnSO4
Sphalerite	-132.37	-143.82	-11.45	ZnS
Spinel	-14.14	22.71	36.85	MgAl2O4
Sr-Autunite	-17.36	-61.81	-44.46	Sr(UO2)2(PO4)2
SrCrO4	-12.01	-16.66	-4.65	SrCrO4
SrF2	-8.07	-16.65	-8.58	SrF2
SrHPO4	-10.97	-30.26	-19.30	SrHPO4

SrSeO3	-22.36	-20.06	2.30	SrSeO3
SrSeO4	-10.43	-14.83	-4.40	SrSeO4
Stibnite	-468.66	-519.12	-50.46	Sb2S3
Strengite	-12.67	-39.07	-26.40	FePO4:2H2O
Strontianite	-6.24	-15.51	-9.27	SrCO3
Sulfur	-106.03	-108.18	-2.14	S
Tenorite	-9.60	-1.95	7.64	CuO
Thenardite	-11.50	-11.18	0.32	Na2SO4
Thermonatrite	-16.65	-16.01	0.64	Na2CO3:H2O
Tl(OH)3	-4.51	-9.95	-5.44	Tl(OH)3
Tl2CO3	-30.08	-33.92	-3.84	Tl2CO3
Tl2CrO4	-23.06	-35.07	-12.01	Tl2CrO4
Tl2MoO4	-23.92	-31.91	-7.99	Tl2MoO4
Tl2O	-38.97	-11.88	27.09	Tl2O
Tl2S	-154.41	-161.60	-7.19	Tl2S
Tl2Se	-100.14	-118.24	-18.10	Tl2Se
Tl2SeO4	-29.13	-33.23	-4.10	Tl2SeO4
Tl2SO4	-25.30	-29.08	-3.79	Tl2SO4
TlCl	-11.29	-15.03	-3.74	TlCl
Tlmetal	-32.39	-26.71	5.68	Tl
TlNO3	-16.70	-18.31	-1.61	TlNO3
TlOH	-18.86	-5.94	12.92	TlOH
Torbernite	-25.01	-70.29	-45.28	Cu(UO2)2(PO4)2
Tsumebite	-22.35	-32.14	-9.79	Pb2CuPO4(OH)3:3H2O
Tyuyamunite	-1.60	2.48	4.08	Ca(UO2)2(VO4)2
U(HPO4)2:4H2O	-51.70	-103.28	-51.58	U(HPO4)2:4H2O
U3O8	-27.13	-6.04	21.08	U3O8
U3Sb4	-879.96	-727.58	152.38	U3Sb4
U4O9	-74.28	-77.30	-3.02	U4O9
UF4	-46.52	-76.06	-29.54	UF4
UF4:2.5H2O	-43.34	-76.06	-32.72	UF4:2.5H2O
UO2(am)	-30.65	-29.71	0.93	UO2
UO2(NO3)2	-34.28	-22.13	12.15	UO2(NO3)2
UO2(NO3)2:2H2O	-26.98	-22.13	4.85	UO2(NO3)2:2H2O
UO2(NO3)2:3H2O	-25.52	-22.13	3.39	UO2(NO3)2:3H2O
UO2(NO3)2:6H2O	-24.18	-22.13	2.05	UO2(NO3)2:6H2O
UO2(OH)2(beta)	-2.99	2.62	5.61	UO2(OH)2
UO2HPO4	-9.94	-34.17	-24.23	UO2HPO4
UO2SeO4:4H2O	-16.48	-18.73	-2.25	UO2SeO4:4H2O
UO3	-5.08	2.62	7.70	UO3
Uramphite	-135.54	-187.28	-51.75	(NH4)2(UO2)2(PO4)2
Uraninite	-25.04	-29.71	-4.67	UO2
Uranocircite	-22.52	-67.15	-44.63	Ba(UO2)2(PO4)2
USb2	-346.18	-316.60	29.58	USb2
V(OH)3	-32.95	-25.36	7.59	V(OH)3
V2O5	-11.47	-12.83	-1.36	V2O5
V3O5	-74.23	-72.39	1.84	V3O5
V4O7	-89.86	-82.68	7.19	V4O7
V6O13	-60.71	-121.57	-60.86	V6O13
Valentinite	-61.47	-69.95	-8.48	Sb2O3
VCl2	-83.19	-64.31	18.87	VCl2
VCl3	-76.06	-52.63	23.43	VCl3
VF4	-71.56	-56.63	14.93	VF4
Vivianite	-67.64	-103.64	-36.00	Fe3(PO4)2:8H2O
Vmetal	-131.70	-87.68	44.03	V
VO	-60.89	-46.13	14.76	VO
VO(OH)2	-15.43	-10.28	5.15	VO(OH)2
VO2Cl	-18.34	-15.50	2.84	VO2Cl
VOCl	-45.60	-34.45	11.15	VOCl
VOCl2	-41.22	-28.46	12.76	VOCl2
VOSO4	-31.09	-27.49	3.61	VOSO4
Witherite	-12.28	-20.85	-8.57	BaCO3
Wurtzite	-134.87	-143.82	-8.95	ZnS

```
      Zincite          -5.43    5.90   11.33  ZnO
      Zincosite       -15.23  -11.30    3.93  ZnSO4
      Zn(BO2)2        -13.48   -5.19    8.29  Zn(BO2)2
      Zn(NO3)2:6H2O   -22.16  -18.84    3.32  Zn(NO3)2:6H2O
      Zn(OH)2          -6.30    5.90   12.20  Zn(OH)2
      Zn(OH)2(am)      -6.57    5.90   12.47  Zn(OH)2
      Zn(OH)2(beta)    -5.85    5.90   11.75  Zn(OH)2
      Zn(OH)2(epsilon)  -5.63    5.90   11.53  Zn(OH)2
      Zn(OH)2(gamma)   -5.83    5.90   11.73  Zn(OH)2
      Zn2(OH)2SO4     -12.90   -5.40    7.50  Zn2(OH)2SO4
      Zn2(OH)3Cl      -12.48    2.71   15.19  Zn2(OH)3Cl
      Zn3(AsO4)2:2.5H2O -18.24   -4.59   13.65  Zn3(AsO4)2:2.5H2O
      Zn3(PO4)2:4H2O  -20.44  -55.86  -35.42  Zn3(PO4)2:4H2O
      Zn3O(SO4)2      -35.61  -16.70   18.91  Zn3O(SO4)2
      Zn4(OH)6SO4     -22.00    6.40   28.40  Zn4(OH)6SO4
      Zn5(OH)8Cl2     -27.17   11.33   38.50  Zn5(OH)8Cl2
      ZnCl2           -19.33  -12.28    7.05  ZnCl2
      ZnCO3:1H2O       -5.87  -16.13  -10.26  ZnCO3:1H2O
      ZnF2            -16.74  -17.27   -0.53  ZnF2
      Znmetal         -61.43  -35.64   25.79  Zn
      ZnMoO4           -4.00  -14.12  -10.13  ZnMoO4
      ZnO(active)      -5.29    5.90   11.19  ZnO
      ZnS(am)        -134.77 -143.82   -9.05  ZnS
      ZnSb           -143.95 -132.94   11.01  ZnSb
      ZnSe            -86.06 -100.46  -14.40  ZnSe
      ZnSeO4:6H2O     -13.93  -15.45   -1.52  ZnSeO4:6H2O
      ZnSO4:1H2O      -10.66  -11.30   -0.64  ZnSO4:1H2O

------------------
End of simulation.
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Reading input data for simulation 9.
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      SURFACE 8 Double    layer     Adsorption     onto Ferrihydrite
      equilibrate   7
      Hfo_wOH   Ferrihydrite   600  10
      Hfo_sOH   Ferrihydrite   equilibrium_phase   0.001
      diffuse_layer
      SAVE SURFACE 7
      USE SOLUTION 7
      USE GAS_PHASE 1
      EQUILIBRIUM_PHASES  8
      Ferrihydrite   0    0
      END
-------------------------------------------------------
Beginning of initial surface-composition calculations.
-------------------------------------------------------

Surface 8.   Double    layer     Adsorption     onto Ferrihydrite

Hfo
       2.206e-028  Surface + diffuse layer charge, eq
       2.206e-028  Surface charge, eq
      undefined  sigma, C/m**2
       0.000e+000  psi, V
      -0.000e+000  -F*psi/RT
       1.000e+000  exp(-F*psi/RT)
       1.000e+001  specific area, m**2/mol Ferrihydrite
       0.000e+000  m**2 for  0.000e+000 moles of Ferrihydrite
```

Water in diffuse layer: 0.000e+000 kg, 0.0% of total DDL-water.

Total moles in diffuse layer (excluding water)

Element	Moles
Ag	0.0000e+000
Al	0.0000e+000
As	0.0000e+000
B	0.0000e+000
Ba	0.0000e+000
C	0.0000e+000
Ca	0.0000e+000
Cd	0.0000e+000
Cl	0.0000e+000
Co	0.0000e+000
Cr	0.0000e+000
Cu	0.0000e+000
F	0.0000e+000
Fe	0.0000e+000
H	0.0000e+000
Hg	0.0000e+000
K	0.0000e+000
Mg	0.0000e+000
Mn	0.0000e+000
Mo	0.0000e+000
N	0.0000e+000
Na	0.0000e+000
Ni	0.0000e+000
O	0.0000e+000
P	0.0000e+000
Pb	0.0000e+000
S	0.0000e+000
Sb	0.0000e+000
Se	0.0000e+000
Si	0.0000e+000
Sn	0.0000e+000
Sr	0.0000e+000
Tl	0.0000e+000
U	0.0000e+000
V	0.0000e+000
Zn	0.0000e+000

Hfo_s

0.000e+000 moles [0.001 mol/(mol Ferrihydrite)]

Species	Moles	Mole Fraction	Molality	Log Molality
Hfo_sOHCa+2	8.916e-029	0.000	8.916e-029	-28.050
Hfo_sOPb+	2.903e-029	0.000	2.903e-029	-28.537
Hfo_sOH2+	5.546e-030	0.000	5.546e-030	-29.256
Hfo_sOZn+	2.117e-030	0.000	2.117e-030	-29.674
Hfo_sOH	1.000e-030	0.000	1.000e-030	-30.000
Hfo_sONi+	2.277e-031	0.000	2.277e-031	-30.643
Hfo_sOHAsO4-3	2.338e-032	0.000	2.338e-032	-31.631
Hfo_sHAsO4-	1.610e-032	0.000	1.610e-032	-31.793
Hfo_sO-	5.322e-033	0.000	5.322e-033	-32.274
Hfo_sH2AsO4	2.889e-033	0.000	2.889e-033	-32.539
Hfo_sSO4-	1.330e-033	0.000	1.330e-033	-32.876
Hfo_sOCd+	9.287e-034	0.000	9.287e-034	-33.032
Hfo_sOHSO4-2	4.784e-034	0.000	4.784e-034	-33.320
Hfo_sOHVO4-3	3.931e-034	0.000	3.931e-034	-33.405
Hfo_sMoO4-	1.050e-034	0.000	1.050e-034	-33.979
Hfo_sOHMoO4-2	2.933e-035	0.000	2.933e-035	-34.533

Hfo_sHPO4-	1.416e-035	0.000	1.416e-035	-34.849
Hfo_sH2BO3	1.187e-035	0.000	1.187e-035	-34.926
Hfo_sH2PO4	3.199e-036	0.000	3.199e-036	-35.495
Hfo_sOHg+	2.824e-036	0.000	2.824e-036	-35.549
Hfo_sOCu+	2.253e-036	0.000	2.253e-036	-35.647
Hfo_sCrO4-	1.625e-036	0.000	1.625e-036	-35.789
Hfo_sPO4-2	1.064e-036	0.000	1.064e-036	-35.973
Hfo_sOHCrO4-2	6.412e-037	0.000	6.412e-037	-36.193
Hfo_sOHBa+2	3.587e-037	0.000	3.587e-037	-36.445
Hfo_sSeO4-	8.439e-038	0.000	8.439e-038	-37.074
Hfo_sOHSeO4-2	3.486e-038	0.000	3.486e-038	-37.458
Hfo_sOAg	1.513e-039	0.000	1.513e-039	-38.820
Hfo_sOCo+	1.246e-039	0.000	1.246e-039	-38.904
Hfo_sSbO(OH)4	4.549e-040	0.000	4.549e-040	-39.342
Hfo_sOHSbO(OH)4-	1.270e-040	0.000	1.270e-040	-39.896
Hfo_sOCrOH+	9.076e-044	0.000	9.076e-044	-43.042
Hfo_sSeO3-	1.777e-046	0.000	1.777e-046	-45.750
Hfo_sOHSeO3-2	1.886e-047	0.000	1.886e-047	-46.724
Hfo_sOFe+	3.036e-048	0.000	3.036e-048	-47.518

Hfo_w

0.000e+000 moles [600 mol/(mol Ferrihydrite)]

Species	Moles	Mole Fraction	Molality	Log Molality
Hfo_wOH2+	5.546e-030	0.000	5.546e-030	-29.256
Hfo_wOH	1.000e-030	0.000	1.000e-030	-30.000
Hfo_wOHAsO4-3	2.338e-032	0.000	2.338e-032	-31.631
Hfo_wOCO2H	2.165e-032	0.000	2.165e-032	-31.665
Hfo_wHAsO4-	1.610e-032	0.000	1.610e-032	-31.793
Hfo_wOMg+	6.610e-033	0.000	6.610e-033	-32.180
Hfo_wOCa+	4.745e-033	0.000	4.745e-033	-32.324
Hfo_wO-	4.131e-033	0.000	4.131e-033	-32.384
Hfo_wH2AsO4	2.889e-033	0.000	2.889e-033	-32.539
Hfo_wOZn+	2.321e-033	0.000	2.321e-033	-32.634
Hfo_wOCO2-	1.957e-033	0.000	1.957e-033	-32.708
Hfo_wSO4-	1.330e-033	0.000	1.330e-033	-32.876
Hfo_wOPb+	1.129e-033	0.000	1.129e-033	-32.947
Hfo_wOHSO4-2	4.784e-034	0.000	4.784e-034	-33.320
Hfo_wOHVO4-3	3.931e-034	0.000	3.931e-034	-33.405
Hfo_wONi+	3.072e-034	0.000	3.072e-034	-33.513
Hfo_wMoO4-	1.050e-034	0.000	1.050e-034	-33.979
Hfo_wOHMoO4-2	2.933e-035	0.000	2.933e-035	-34.533
Hfo_wHPO4-	1.416e-035	0.000	1.416e-035	-34.849
Hfo_wH2BO3	1.187e-035	0.000	1.187e-035	-34.926
Hfo_wH2PO4	3.199e-036	0.000	3.199e-036	-35.495
Hfo_wCrO4-	1.625e-036	0.000	1.625e-036	-35.789
Hfo_wPO4-2	1.064e-036	0.000	1.064e-036	-35.973
Hfo_wOHCrO4-2	6.412e-037	0.000	6.412e-037	-36.193
Hfo_wOCd+	4.344e-037	0.000	4.344e-037	-36.362
Hfo_wOHg+	1.383e-037	0.000	1.383e-037	-36.859
Hfo_wSeO4-	8.439e-038	0.000	8.439e-038	-37.074
Hfo_wOHSeO4-2	3.486e-038	0.000	3.486e-038	-37.458
Hfo_wOCu+	1.267e-038	0.000	1.267e-038	-37.897
Hfo_wSbO(OH)4	4.549e-040	0.000	4.549e-040	-39.342
Hfo_wOHSbO(OH)4-	1.270e-040	0.000	1.270e-040	-39.896
Hfo_wOCo+	3.512e-042	0.000	3.512e-042	-41.454
Hfo_wOAg	3.981e-043	0.000	3.981e-043	-42.400
Hfo_wOBa+	2.759e-043	0.000	2.759e-043	-42.559
Hfo_wSeO3-	1.777e-046	0.000	1.777e-046	-45.750
Hfo_wOHSeO3-2	1.886e-047	0.000	1.886e-047	-46.724
Hfo_wOFe+	2.833e-050	0.000	2.833e-050	-49.548
Hfo_wOFeOH	2.681e-052	0.000	2.681e-052	-51.572

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Beginning of batch-reaction calculations.
-----------------------------------------

Reaction step 1.

Using solution 7.   Solution after simulation 8.
Using surface 8.    Surface assemblage after simulation 9.
Using pure phase assemblage 8.
Using gas phase 1.

-----------------------------------Gas phase-----------------------------------


Total pressure:   1.0000   atmospheres
    Gas volume:  2.00e-001 liters

                                                          Moles in gas
                                                 ---------------------------------
Component                 log P           P    Initial       Final       Delta

CO2(g)                    -3.40  3.942e-004  1.292e-005  3.224e-006 -9.692e-006
O2(g)                     -0.00  9.996e-001  8.175e-003  8.175e-003  3.288e-007

------------------------------Phase assemblage------------------------------

                                                        Moles in assemblage
Phase                   SI log IAP  log KT      Initial       Final       Delta

Ferrihydrite        -5.91   -2.72    3.19   0.000e+000           0  0.000e+000

-----------------------------Surface composition-----------------------------

Hfo
        2.210e-028  Surface + diffuse layer charge, eq
        2.210e-028  Surface charge, eq
       undefined  sigma, C/m**2
        0.000e+000  psi, V
       -0.000e+000  -F*psi/RT
        1.000e+000  exp(-F*psi/RT)
        1.000e+001  specific area, m**2/mol Ferrihydrite
        0.000e+000  m**2 for  0.000e+000 moles of Ferrihydrite

       Water in diffuse layer: 0.000e+000 kg,  0.0% of total DDL-water.

       Total moles in diffuse layer (excluding water)

       Element                   Moles
       Ag                   0.0000e+000
       Al                   0.0000e+000
       As                   0.0000e+000
       B                    0.0000e+000
       Ba                   0.0000e+000
       C                    0.0000e+000
       Ca                   0.0000e+000
       Cd                   0.0000e+000
       Cl                   0.0000e+000
       Co                   0.0000e+000
       Cr                   0.0000e+000
       Cu                   0.0000e+000
       F                    0.0000e+000
       Fe                   0.0000e+000
```

H	0.0000e+000
Hg	0.0000e+000
K	0.0000e+000
Mg	0.0000e+000
Mn	0.0000e+000
Mo	0.0000e+000
N	0.0000e+000
Na	0.0000e+000
Ni	0.0000e+000
O	0.0000e+000
P	0.0000e+000
Pb	0.0000e+000
S	0.0000e+000
Sb	0.0000e+000
Se	0.0000e+000
Si	0.0000e+000
Sn	0.0000e+000
Sr	0.0000e+000
Tl	0.0000e+000
U	0.0000e+000
V	0.0000e+000
Zn	0.0000e+000

Hfo_s

0.000e+000 moles [0.001 mol/(mol Ferrihydrite)]

Species	Moles	Mole Fraction	Molality	Log Molality
Hfo_sOHCa+2	8.916e-029	0.000	8.916e-029	-28.050
Hfo_sOH2+	1.555e-029	0.000	1.555e-029	-28.808
Hfo_sOPb+	1.078e-029	0.000	1.078e-029	-28.967
Hfo_sOH	1.000e-030	0.000	1.000e-030	-30.000
Hfo_sOZn+	7.564e-031	0.000	7.564e-031	-30.121
Hfo_sONi+	8.122e-032	0.000	8.122e-032	-31.090
Hfo_sHAsO4-	2.043e-032	0.000	2.043e-032	-31.690
Hfo_sH2AsO4	1.028e-032	0.000	1.028e-032	-31.988
Hfo_sOHAsO4-3	3.774e-033	0.000	3.774e-033	-32.423
Hfo_sSO4-	3.729e-033	0.000	3.729e-033	-32.428
Hfo_sO-	1.898e-033	0.000	1.898e-033	-32.722
Hfo_sOHSO4-2	4.784e-034	0.000	4.784e-034	-33.320
Hfo_sOCd+	3.313e-034	0.000	3.313e-034	-33.480
Hfo_sMoO4-	2.921e-034	0.000	2.921e-034	-33.535
Hfo_sOHVO4-3	4.990e-035	0.000	4.990e-035	-34.302
Hfo_sOHMoO4-2	2.909e-035	0.000	2.909e-035	-34.536
Hfo_sHPO4-	1.715e-035	0.000	1.715e-035	-34.766
Hfo_sH2BO3	1.189e-035	0.000	1.189e-035	-34.925
Hfo_sH2PO4	1.086e-035	0.000	1.086e-035	-34.964
Hfo_sCrO4-	2.579e-036	0.000	2.579e-036	-35.589
Hfo_sOHg+	1.142e-036	0.000	1.142e-036	-35.942
Hfo_sOCu+	8.502e-037	0.000	8.502e-037	-36.070
Hfo_sPO4-2	4.597e-037	0.000	4.597e-037	-36.338
Hfo_sOHCrO4-2	3.628e-037	0.000	3.628e-037	-36.440
Hfo_sOHBa+2	3.587e-037	0.000	3.587e-037	-36.445
Hfo_sSeO4-	2.367e-037	0.000	2.367e-037	-36.626
Hfo_sOHSeO4-2	3.486e-038	0.000	3.486e-038	-37.458
Hfo_sSbO(OH)4	1.276e-039	0.000	1.276e-039	-38.894
Hfo_sOAg	5.397e-040	0.000	5.397e-040	-39.268
Hfo_sOCo+	4.445e-040	0.000	4.445e-040	-39.352
Hfo_sOHSbO(OH)4-	1.270e-040	0.000	1.270e-040	-39.896
Hfo_sOCrOH+	1.132e-042	0.000	1.132e-042	-41.946
Hfo_sSeO3-	4.983e-046	0.000	4.983e-046	-45.303
Hfo_sOHSeO3-2	1.887e-047	0.000	1.887e-047	-46.724
Hfo_sOFe+	3.104e-048	0.000	3.104e-048	-47.508

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      Hfo_sH2AsO3      1.464e-058       0.000  1.464e-058     -57.834
      Hfo_sOSn+        3.784e-072       0.000  3.784e-072     -71.422

Hfo_w
       0.000e+000  moles  [600 mol/(mol Ferrihydrite)]
                                        Mole                      Log
      Species                Moles    Fraction    Molality    Molality

      Hfo_wOH2+        1.555e-029       0.000  1.555e-029     -28.808
      Hfo_wOH          1.000e-030       0.000  1.000e-030     -30.000
      Hfo_wOCO2H       6.587e-032       0.000  6.587e-032     -31.181
      Hfo_wHAsO4-      2.043e-032       0.000  2.043e-032     -31.690
      Hfo_wH2AsO4      1.028e-032       0.000  1.028e-032     -31.988
      Hfo_wOHAsO4-3    3.774e-033       0.000  3.774e-033     -32.423
      Hfo_wSO4-        3.729e-033       0.000  3.729e-033     -32.428
      Hfo_wOMg+        2.357e-033       0.000  2.357e-033     -32.628
      Hfo_wOCO2-       2.123e-033       0.000  2.123e-033     -32.673
      Hfo_wOCa+        1.692e-033       0.000  1.692e-033     -32.772
      Hfo_wO-          1.473e-033       0.000  1.473e-033     -32.832
      Hfo_wOZn+        8.294e-034       0.000  8.294e-034     -33.081
      Hfo_wOHSO4-2     4.784e-034       0.000  4.784e-034     -33.320
      Hfo_wOPb+        4.194e-034       0.000  4.194e-034     -33.377
      Hfo_wMoO4-       2.921e-034       0.000  2.921e-034     -33.535
      Hfo_wONi+        1.096e-034       0.000  1.096e-034     -33.960
      Hfo_wOHVO4-3     4.990e-035       0.000  4.990e-035     -34.302
      Hfo_wOHMoO4-2    2.909e-035       0.000  2.909e-035     -34.536
      Hfo_wHPO4-       1.715e-035       0.000  1.715e-035     -34.766
      Hfo_wH2BO3       1.189e-035       0.000  1.189e-035     -34.925
      Hfo_wH2PO4       1.086e-035       0.000  1.086e-035     -34.964
      Hfo_wCrO4-       2.579e-036       0.000  2.579e-036     -35.589
      Hfo_wPO4-2       4.597e-037       0.000  4.597e-037     -36.338
      Hfo_wOHCrO4-2    3.628e-037       0.000  3.628e-037     -36.440
      Hfo_wSeO4-       2.367e-037       0.000  2.367e-037     -36.626
      Hfo_wOCd+        1.550e-037       0.000  1.550e-037     -36.810
      Hfo_wOHg+        5.595e-038       0.000  5.595e-038     -37.252
      Hfo_wOHSeO4-2    3.486e-038       0.000  3.486e-038     -37.458
      Hfo_wOCu+        4.781e-039       0.000  4.781e-039     -38.320
      Hfo_wSbO(OH)4    1.276e-039       0.000  1.276e-039     -38.894
      Hfo_wOHSbO(OH)4-  1.270e-040       0.000  1.270e-040     -39.896
      Hfo_wOCo+        1.253e-042       0.000  1.253e-042     -41.902
      Hfo_wOAg         1.420e-043       0.000  1.420e-043     -42.848
      Hfo_wOBa+        9.838e-044       0.000  9.838e-044     -43.007
      Hfo_wSeO3-       4.983e-046       0.000  4.983e-046     -45.303
      Hfo_wOHSeO3-2    1.887e-047       0.000  1.887e-047     -46.724
      Hfo_wOFe+        2.897e-050       0.000  2.897e-050     -49.538
      Hfo_wOFeOH       9.776e-053       0.000  9.776e-053     -52.010
      Hfo_wH2AsO3      1.464e-058       0.000  1.464e-058     -57.834
      Hfo_wOSn+        3.005e-074       0.000  3.005e-074     -73.522

----------------------------Solution composition-----------------------------

      Elements           Molality       Moles

      Ag               1.919e-013  1.919e-013
      Al               9.810e-010  9.810e-010
      As               2.322e-007  2.322e-007
      B                2.851e-006  2.851e-006
      Ba               1.674e-012  1.674e-012
      C                2.171e-005  2.171e-005
      Ca               1.303e-003  1.303e-003
      Cd               1.633e-010  1.633e-010
      Cl               3.078e-003  3.078e-003
      Co               1.443e-015  1.443e-015
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      Cr                1.894e-010  1.894e-010
      Cu                1.356e-015  1.356e-015
      F                 1.000e-005  1.000e-005
      Fe                4.219e-014  4.219e-014
      Hg                1.450e-011  1.450e-011
      K                 2.171e-004  2.171e-004
      Mg                1.019e-004  1.019e-004
      Mn                7.765e-014  7.765e-014
      Mo                1.579e-007  1.579e-007
      N                 1.609e-006  1.609e-006
      Na                3.152e-004  3.152e-004
      Ni                3.788e-008  3.788e-008
      P                 3.260e-011  3.260e-011
      Pb                2.578e-010  2.578e-010
      S                 1.227e-004  1.227e-004
      Sb                5.912e-009  5.912e-009
      Se                7.437e-009  7.437e-009
      Si                5.811e-007  5.811e-007
      Sn                1.773e-016  1.773e-016
      Sr                3.674e-007  3.674e-007
      Tl                1.134e-010  1.134e-010
      U                 4.163e-010  4.163e-010
      V                 7.495e-008  7.495e-008
      Zn                8.874e-008  8.874e-008

----------------------------Description of solution----------------------------

                                       pH  =   6.098      Charge balance
                                       pe  =  14.674      Adjusted to redox
equilibrium
                         Activity of water  =   1.000
                             Ionic strength  =  4.799e-003
                          Mass of water (kg)  =  1.000e+000
                   Total alkalinity (eq/kg)  =  7.406e-006
                          Total CO2 (mol/kg)  =  2.171e-005
                        Temperature (deg C)  =  25.000
                    Electrical balance (eq)  =  2.593e-018
 Percent error, 100*(Cat-|An|)/(Cat+|An|)  =   0.00
                                 Iterations  =   1
                                    Total H  = 1.110137e+002
                                    Total O  = 5.550988e+001

----------------------------Distribution of species----------------------------

                                                   Log       Log         Log
   Species                  Molality    Activity  Molality  Activity     Gamma

   H+                    8.591e-007  7.975e-007    -6.066    -6.098    -0.032
   OH-                   1.361e-008  1.262e-008    -7.866    -7.899    -0.033
   H2O                   5.551e+001  9.999e-001     1.744    -0.000     0.000
Ag               1.919e-013
   AgCl                  1.318e-013  1.318e-013   -12.880   -12.880     0.000
   AgCl2-                3.558e-014  3.281e-014   -13.449   -13.484    -0.035
   Ag+                   2.433e-014  2.259e-014   -13.614   -13.646    -0.032
   AgCl3-2               1.156e-016  8.356e-017   -15.937   -16.078    -0.141
   AgSO4-                3.793e-017  3.497e-017   -16.421   -16.456    -0.035
   AgCl4-3               1.013e-018  4.876e-019   -17.994   -18.312    -0.318
   AgF                   5.166e-019  5.166e-019   -18.287   -18.287     0.000
   AgOH                  2.852e-020  2.852e-020   -19.545   -19.545     0.000
   AgNO3                 2.673e-020  2.673e-020   -19.573   -19.573     0.000
   AgH2BO3               7.434e-022  7.434e-022   -21.129   -21.129     0.000
   Ag(OH)2-              3.816e-026  3.518e-026   -25.418   -25.454    -0.035
   AgNO2                 7.454e-031  7.454e-031   -30.128   -30.128     0.000
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   AgSeO3-              2.009e-033  1.852e-033   -32.697   -32.732    -0.035
   Ag2MoO4              2.237e-035  2.237e-035   -34.650   -34.650     0.000
   Ag(NO2)2-            0.000e+000  0.000e+000   -48.704   -48.739    -0.035
   Ag(SeO3)2-3          0.000e+000  0.000e+000   -53.357   -53.675    -0.318
   AgNH3+               0.000e+000  0.000e+000   -78.571   -78.607    -0.035
   Ag2Se                0.000e+000  0.000e+000   -85.649   -85.649     0.000
   AgHS                 0.000e+000  0.000e+000  -142.559  -142.559     0.000
   Ag(NH3)2+            0.000e+000  0.000e+000  -142.932  -142.967    -0.035
   AgOH(Se)2-4          0.000e+000  0.000e+000  -214.029  -214.593    -0.565
   Ag(HS)2-             0.000e+000  0.000e+000  -281.150  -281.185    -0.035
   Ag(HS)S4-2           0.000e+000  0.000e+000  -282.465  -282.571    -0.105
   Ag(S4)2-3            0.000e+000  0.000e+000  -285.701  -285.912    -0.212
   AgS4S5-3             0.000e+000  0.000e+000  -286.018  -286.223    -0.205
Al              9.810e-010
   AlF2+                4.601e-010  4.280e-010    -9.337    -9.369    -0.031
   Al(OH)2+             1.765e-010  1.642e-010    -9.753    -9.785    -0.031
   AlF+2                1.577e-010  1.181e-010    -9.802    -9.928    -0.126
   Al(OH)4-             7.076e-011  6.573e-011   -10.150   -10.182    -0.032
   AlF3                 4.905e-011  4.905e-011   -10.309   -10.309     0.000
   Al(OH)3              4.136e-011  4.136e-011   -10.383   -10.383     0.000
   AlOH+2               2.187e-011  1.637e-011   -10.660   -10.786    -0.126
   Al+3                 2.531e-012  1.297e-012   -11.597   -11.887    -0.290
   AlSO4+               8.409e-013  7.812e-013   -12.075   -12.107    -0.032
   AlF4-                2.409e-013  2.238e-013   -12.618   -12.650    -0.032
   Al(SO4)2-            6.990e-016  6.494e-016   -15.155   -15.187    -0.032
   AlMo6O21-3           1.644e-035  7.912e-036   -34.784   -35.102    -0.318
As(3)           5.699e-034
   H3AsO3               5.695e-034  5.695e-034   -33.245   -33.245     0.000
   H2AsO3-              3.972e-037  3.662e-037   -36.401   -36.436    -0.035
   H4AsO3+              2.441e-040  2.250e-040   -39.612   -39.648    -0.035
   HAsO3-2              0.000e+000  0.000e+000   -42.237   -42.378    -0.141
   AsO3-3               0.000e+000  0.000e+000   -49.376   -49.694    -0.318
As(5)           2.322e-007
   H2AsO4-              1.975e-007  1.821e-007    -6.704    -6.740    -0.035
   HAsO4-2              3.465e-008  2.504e-008    -7.460    -7.601    -0.141
   H3AsO4               2.521e-011  2.524e-011   -10.598   -10.598     0.000
   AsO4-3               2.062e-013  9.927e-014   -12.686   -13.003    -0.318
B               2.851e-006
   H3BO3                2.848e-006  2.851e-006    -5.545    -5.545     0.000
   H2BO3-               2.242e-009  2.076e-009    -8.649    -8.683    -0.033
   CaH2BO3+             1.233e-010  1.141e-010    -9.909    -9.943    -0.033
   BF(OH)3-             1.119e-011  1.036e-011   -10.951   -10.985    -0.033
   MgH2BO3+             5.819e-012  5.388e-012   -11.235   -11.269    -0.033
   NaH2BO3              9.625e-013  9.625e-013   -12.017   -12.017     0.000
   SrH2BO3+             2.147e-014  1.988e-014   -13.668   -13.702    -0.033
   BF2(OH)2-            8.684e-015  8.041e-015   -14.061   -14.095    -0.033
   H5(BO3)2-            5.442e-015  5.039e-015   -14.264   -14.298    -0.033
   H8(BO3)3-            1.552e-018  1.437e-018   -17.809   -17.843    -0.033
   BaH2BO3+             8.617e-020  7.980e-020   -19.065   -19.098    -0.033
   BF3OH-               2.453e-020  2.272e-020   -19.610   -19.644    -0.033
   AgH2BO3              7.434e-022  7.434e-022   -21.129   -21.129     0.000
   BF4-                 8.765e-025  8.117e-025   -24.057   -24.091    -0.033
Ba              1.674e-012
   Ba+2                 1.674e-012  1.244e-012   -11.776   -11.905    -0.129
   BaHCO3+              9.586e-017  8.924e-017   -16.018   -16.049    -0.031
   BaNO3+               1.007e-017  9.284e-018   -16.997   -17.032    -0.035
   BaCO3                2.817e-019  2.817e-019   -18.550   -18.550     0.000
   BaH2BO3+             8.617e-020  7.980e-020   -19.065   -19.098    -0.033
   BaOH+                7.371e-020  6.853e-020   -19.132   -19.164    -0.032
   BaNH3+2              0.000e+000  0.000e+000   -80.235   -80.376    -0.141
C(4)            2.171e-005
   H2CO3                1.348e-005  1.348e-005    -4.870    -4.870     0.000
   HCO3-                8.078e-006  7.515e-006    -5.093    -5.124    -0.031
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CaHCO3+	1.436e-007	1.337e-007	-6.843	-6.874	-0.031
MgHCO3+	6.200e-009	5.755e-009	-8.208	-8.240	-0.032
NaHCO3	1.236e-009	1.236e-009	-8.908	-8.908	0.000
CaCO3	6.688e-010	6.688e-010	-9.175	-9.175	0.000
CO3-2	5.946e-010	4.417e-010	-9.226	-9.355	-0.129
UO2CO3	1.148e-010	1.148e-010	-9.940	-9.940	0.000
SrHCO3+	3.532e-011	3.288e-011	-10.452	-10.483	-0.031
NiHCO3+	2.777e-011	2.560e-011	-10.556	-10.592	-0.035
MgCO3	2.750e-011	2.750e-011	-10.561	-10.561	0.000
ZnHCO3+	1.666e-011	1.536e-011	-10.778	-10.814	-0.035
NaCO3-	2.586e-012	2.406e-012	-11.587	-11.619	-0.031
ZnCO3	1.643e-012	1.643e-012	-11.784	-11.784	0.000
UO2(CO3)2-2	1.400e-012	1.011e-012	-11.854	-11.995	-0.141
PbHCO3+	1.015e-012	9.360e-013	-11.993	-12.029	-0.035
NiCO3	4.554e-013	4.554e-013	-12.342	-12.342	0.000
PbCO3	2.226e-013	2.226e-013	-12.652	-12.652	0.000
SrCO3	7.695e-014	7.695e-014	-13.114	-13.114	0.000
CdHCO3+	1.822e-015	1.679e-015	-14.740	-14.775	-0.035
CdCO3	9.883e-016	9.883e-016	-15.005	-15.005	0.000
BaHCO3+	9.586e-017	8.924e-017	-16.018	-16.049	-0.031
UO2(CO3)3-4	8.215e-017	2.239e-017	-16.085	-16.650	-0.565
MnHCO3+	8.931e-018	8.302e-018	-17.049	-17.081	-0.032
HgCO3	8.447e-018	8.447e-018	-17.073	-17.073	0.000
CuCO3	2.491e-018	2.491e-018	-17.604	-17.604	0.000
CoHCO3+	6.483e-019	5.977e-019	-18.188	-18.224	-0.035
CuHCO3+	4.926e-019	4.541e-019	-18.308	-18.343	-0.035
Pb(CO3)2-2	3.925e-019	2.836e-019	-18.406	-18.547	-0.141
BaCO3	2.817e-019	2.817e-019	-18.550	-18.550	0.000
HgHCO3+	1.361e-019	1.254e-019	-18.866	-18.902	-0.035
CoCO3	7.635e-021	7.635e-021	-20.117	-20.117	0.000
Cd(CO3)2-2	4.479e-022	3.236e-022	-21.349	-21.490	-0.141
Hg(CO3)2-2	1.633e-023	1.180e-023	-22.787	-22.928	-0.141
Cu(CO3)2-2	4.099e-024	2.962e-024	-23.387	-23.528	-0.141
FeHCO3+	2.242e-027	2.088e-027	-26.649	-26.680	-0.031
Ca	1.303e-003				
Ca+2	1.286e-003	9.553e-004	-2.891	-3.020	-0.129
CaSO4	1.698e-005	1.698e-005	-4.770	-4.770	0.000
CaHCO3+	1.436e-007	1.337e-007	-6.843	-6.874	-0.031
CaF+	1.021e-007	9.492e-008	-6.991	-7.023	-0.032
CaNO3+	4.881e-009	4.500e-009	-8.311	-8.347	-0.035
CaCO3	6.688e-010	6.688e-010	-9.175	-9.175	0.000
CaOH+	2.585e-010	2.406e-010	-9.588	-9.619	-0.031
CaH2BO3+	1.233e-010	1.141e-010	-9.909	-9.943	-0.033
CaHPO4	9.069e-013	9.069e-013	-12.042	-12.042	0.000
CaH2PO4+	6.008e-013	5.589e-013	-12.221	-12.253	-0.031
CaPO4-	3.253e-015	3.026e-015	-14.488	-14.519	-0.031
CaNH3+2	0.000e+000	0.000e+000	-71.049	-71.191	-0.141
Ca(NH3)2+2	0.000e+000	0.000e+000	-139.720	-139.861	-0.141
Cd	1.633e-010				
Cd+2	1.321e-010	9.817e-011	-9.879	-10.008	-0.129
CdCl+	2.906e-011	2.679e-011	-10.537	-10.572	-0.035
CdSO4	1.785e-012	1.785e-012	-11.748	-11.748	0.000
CdCl2	3.192e-013	3.192e-013	-12.496	-12.496	0.000
CdF+	1.536e-014	1.416e-014	-13.814	-13.849	-0.035
CdOHCl	1.387e-014	1.387e-014	-13.858	-13.858	0.000
CdOH+	1.068e-014	9.844e-015	-13.972	-14.007	-0.035
Cd(SO4)2-2	2.586e-015	1.868e-015	-14.587	-14.729	-0.141
CdHCO3+	1.822e-015	1.679e-015	-14.740	-14.775	-0.035
CdCO3	9.883e-016	9.883e-016	-15.005	-15.005	0.000
CdCl3-	6.242e-016	5.755e-016	-15.205	-15.240	-0.035
CdNO3+	5.016e-016	4.624e-016	-15.300	-15.335	-0.035
CdSeO4	1.010e-016	1.010e-016	-15.996	-15.996	0.000
Cd(OH)2	7.841e-019	7.841e-019	-18.106	-18.106	0.000

CdF2	2.573e-019	2.573e-019	-18.590	-18.590	0.000
Cd(CO3)2-2	4.479e-022	3.236e-022	-21.349	-21.490	-0.141
Cd(NO3)2	3.452e-022	3.452e-022	-21.462	-21.462	0.000
Cd2OH+3	1.006e-023	4.843e-024	-22.997	-23.315	-0.318
Cd(OH)3-	6.559e-025	6.047e-025	-24.183	-24.218	-0.035
Cd(OH)4-2	1.729e-033	1.250e-033	-32.762	-32.903	-0.141
Cd(SeO3)2-2	0.000e+000	0.000e+000	-47.740	-47.881	-0.141
CdHS+	0.000e+000	0.000e+000	-144.692	-144.727	-0.035
Cd(HS)2	0.000e+000	0.000e+000	-280.250	-280.250	0.000
Cd(HS)3-	0.000e+000	0.000e+000	-421.042	-421.077	-0.035
Cd(HS)4-2	0.000e+000	0.000e+000	-561.467	-561.608	-0.141
Cl	3.078e-003				
Cl-	3.078e-003	2.858e-003	-2.512	-2.544	-0.032
ZnCl+	4.999e-010	4.640e-010	-9.301	-9.333	-0.032
NiCl+	2.192e-010	2.021e-010	-9.659	-9.695	-0.035
CdCl+	2.906e-011	2.679e-011	-10.537	-10.572	-0.035
PbCl+	1.844e-011	1.700e-011	-10.734	-10.770	-0.035
HgCl2	1.305e-011	1.305e-011	-10.884	-10.884	0.000
ZnOHCl	7.669e-012	7.669e-012	-11.115	-11.115	0.000
ZnCl2	2.102e-012	2.102e-012	-11.677	-11.677	0.000
HgClOH	1.018e-012	1.018e-012	-11.992	-11.992	0.000
HgCl3-	4.045e-013	3.730e-013	-12.393	-12.428	-0.035
UO2Cl+	3.281e-013	3.025e-013	-12.484	-12.519	-0.035
CdCl2	3.192e-013	3.192e-013	-12.496	-12.496	0.000
PbCl2	2.170e-013	2.170e-013	-12.664	-12.664	0.000
AgCl	1.318e-013	1.318e-013	-12.880	-12.880	0.000
AgCl2-	3.558e-014	3.281e-014	-13.449	-13.484	-0.035
CdOHCl	1.387e-014	1.387e-014	-13.858	-13.858	0.000
TlOHCl+	9.444e-015	8.707e-015	-14.025	-14.060	-0.035
TlCl	8.405e-015	8.405e-015	-14.075	-14.075	0.000
HgCl4-2	5.872e-015	4.243e-015	-14.231	-14.372	-0.141
ZnCl3-	5.140e-015	4.771e-015	-14.289	-14.321	-0.032
NiCl2	2.907e-015	2.907e-015	-14.537	-14.537	0.000
HgCl+	9.883e-016	9.112e-016	-15.005	-15.040	-0.035
CdCl3-	6.242e-016	5.755e-016	-15.205	-15.240	-0.035
PbCl3-	2.678e-016	2.469e-016	-15.572	-15.608	-0.035
MnCl+	2.143e-016	1.992e-016	-15.669	-15.701	-0.032
AgCl3-2	1.156e-016	8.356e-017	-15.937	-16.078	-0.141
TlCl3	8.237e-017	8.237e-017	-16.084	-16.084	0.000
TlCl2+	2.985e-017	2.753e-017	-16.525	-16.560	-0.035
TlCl4-	1.611e-017	1.485e-017	-16.793	-16.828	-0.035
TlCl2-	1.534e-017	1.414e-017	-16.814	-16.849	-0.035
CoCl+	1.096e-017	1.011e-017	-16.960	-16.995	-0.035
ZnCl4-2	9.128e-018	6.818e-018	-17.040	-17.166	-0.127
CuCl+	4.674e-018	4.338e-018	-17.330	-17.363	-0.032
CrO3Cl-	1.833e-018	1.690e-018	-17.737	-17.772	-0.035
AgCl4-3	1.013e-018	4.876e-019	-17.994	-18.312	-0.318
MnCl2	8.042e-019	8.042e-019	-18.095	-18.095	0.000
PbCl4-2	4.463e-019	3.225e-019	-18.350	-18.492	-0.141
TlCl+2	2.316e-020	1.674e-020	-19.635	-19.776	-0.141
CuCl2	4.299e-021	4.299e-021	-20.367	-20.367	0.000
MnCl3-	6.809e-022	6.330e-022	-21.167	-21.199	-0.032
FeCl+2	1.118e-022	8.353e-023	-21.951	-22.078	-0.127
FeCl2+	1.147e-024	1.066e-024	-23.940	-23.972	-0.032
VOCl+	8.072e-025	7.442e-025	-24.093	-24.128	-0.035
CuCl3-	1.235e-025	1.146e-025	-24.908	-24.941	-0.032
CuCl	3.575e-027	3.575e-027	-26.447	-26.447	0.000
CuCl2-	2.299e-027	2.134e-027	-26.638	-26.671	-0.032
FeCl3	3.047e-028	3.047e-028	-27.516	-27.516	0.000
CrCl+2	3.203e-029	2.314e-029	-28.494	-28.636	-0.141
CuCl4-2	2.198e-030	1.642e-030	-29.658	-29.785	-0.127
CuCl3-2	1.746e-030	1.304e-030	-29.758	-29.885	-0.127
CrOHCl2	1.587e-032	1.587e-032	-31.799	-31.799	0.000

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   CrCl2+                 6.807e-033  6.276e-033   -32.167   -32.202    -0.035
   CoCl+2                 1.547e-033  1.118e-033   -32.811   -32.952    -0.141
   UCl+3                  0.000e+000  0.000e+000   -55.237   -55.554    -0.318
   SnCl+                  0.000e+000  0.000e+000   -56.395   -56.430    -0.035
   SnCl2                  0.000e+000  0.000e+000   -58.184   -58.184     0.000
   SnCl3-                 0.000e+000  0.000e+000   -61.866   -61.902    -0.035
   Co(NH3)5Cl+2           0.000e+000  0.000e+000  -348.211  -348.352    -0.141
   Co(NH3)6Cl+2           0.000e+000  0.000e+000  -423.197  -423.338    -0.141
   Cr(NH3)6Cl+2           0.000e+000  0.000e+000  -424.128  -424.270    -0.141
Co(2)           1.443e-015
   Co+2                   1.415e-015  1.023e-015   -14.849   -14.990    -0.141
   CoSO4                  1.583e-017  1.583e-017   -16.801   -16.801     0.000
   CoCl+                  1.096e-017  1.011e-017   -16.960   -16.995    -0.035
   CoHCO3+                6.483e-019  5.977e-019   -18.188   -18.224    -0.035
   CoF+                   3.193e-019  2.944e-019   -18.496   -18.531    -0.035
   CoOH+                  2.794e-019  2.576e-019   -18.554   -18.589    -0.035
   CoCO3                  7.635e-021  7.635e-021   -20.117   -20.117     0.000
   CoSeO4                 2.831e-021  2.831e-021   -20.548   -20.548     0.000
   CoNO3+                 2.618e-021  2.414e-021   -20.582   -20.617    -0.035
   Co(OH)2                2.583e-022  2.583e-022   -21.588   -21.588     0.000
   CoHPO4                 2.317e-024  2.317e-024   -23.635   -23.635     0.000
   Co(NO3)2               7.317e-027  7.317e-027   -26.136   -26.136     0.000
   Co(OH)3-               7.056e-029  6.505e-029   -28.151   -28.187    -0.035
   CoOOH-                 1.770e-029  1.632e-029   -28.752   -28.787    -0.035
   CoNO2+                 1.234e-033  1.138e-033   -32.909   -32.944    -0.035
   Co2OH+3                2.742e-035  1.320e-035   -34.562   -34.879    -0.318
   Co(OH)4-2              1.801e-037  1.302e-037   -36.744   -36.886    -0.141
   Co4(OH)4+4             0.000e+000  0.000e+000   -65.492   -66.057    -0.565
   Co(NH3)+2              0.000e+000  0.000e+000   -81.040   -81.181    -0.141
   Co(NH3)2+2             0.000e+000  0.000e+000  -147.681  -147.822    -0.141
   Co(NH3)3+2             0.000e+000  0.000e+000  -214.851  -214.992    -0.141
   Co(NH3)4+2             0.000e+000  0.000e+000  -282.402  -282.543    -0.141
   Co(NH3)5+2             0.000e+000  0.000e+000  -350.453  -350.594    -0.141
Co(3)           1.706e-028
   CoOH+2                 1.706e-028  1.233e-028   -27.768   -27.909    -0.141
   Co+3                   3.751e-033  1.922e-033   -32.426   -32.716    -0.290
   CoCl+2                 1.547e-033  1.118e-033   -32.811   -32.952    -0.141
   Co(NH3)5Cl+2           0.000e+000  0.000e+000  -348.211  -348.352    -0.141
   Co(NH3)6SO4+           0.000e+000  0.000e+000  -419.944  -419.979    -0.035
   Co(NH3)6Cl+2           0.000e+000  0.000e+000  -423.197  -423.338    -0.141
   Co(NH3)6OH+2           0.000e+000  0.000e+000  -424.352  -424.493    -0.141
Cr(2)           0.000e+000
   Cr+2                   0.000e+000  0.000e+000   -47.358   -47.499    -0.141
Cr(3)           5.342e-024
   Cr(OH)2+               2.879e-024  2.655e-024   -23.541   -23.576    -0.035
   Cr(OH)+2               2.392e-024  1.728e-024   -23.621   -23.762    -0.141
   CrOHSO4                3.182e-026  3.182e-026   -25.497   -25.497     0.000
   Cr+3                   1.300e-026  6.257e-027   -25.886   -26.204    -0.318
   Cr(OH)3                1.259e-026  1.259e-026   -25.900   -25.900     0.000
   CrF+2                  1.250e-026  9.029e-027   -25.903   -26.044    -0.141
   CrSO4+                 1.230e-027  1.134e-027   -26.910   -26.946    -0.035
   CrCl+2                 3.203e-029  2.314e-029   -28.494   -28.636    -0.141
   CrO2-                  8.131e-030  7.497e-030   -29.090   -29.125    -0.035
   Cr(OH)4-               6.862e-030  6.327e-030   -29.164   -29.199    -0.035
   CrOHCl2                1.587e-032  1.587e-032   -31.799   -31.799     0.000
   CrCl2+                 6.807e-033  6.276e-033   -32.167   -32.202    -0.035
   CrNO3+2                5.639e-034  4.074e-034   -33.249   -33.390    -0.141
   CrH2PO4+2              1.317e-034  9.519e-035   -33.880   -34.021    -0.141
   Cr2(OH)2SO4+2          0.000e+000  0.000e+000   -47.163   -47.304    -0.141
   Cr2(OH)2(SO4)2         0.000e+000  0.000e+000   -49.640   -49.640     0.000
   Cr(NH3)5OH+2           0.000e+000  0.000e+000  -354.942  -355.083    -0.141
   Cr(NH3)6+3             0.000e+000  0.000e+000  -422.510  -422.828    -0.318
   Cr(NH3)6Cl+2           0.000e+000  0.000e+000  -424.128  -424.270    -0.141
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Cr(6)	1.894e-010					
HCrO4-		1.278e-010	1.179e-010	-9.893	-9.929	-0.035
CrO4-2		6.147e-011	4.567e-011	-10.211	-10.340	-0.129
NaCrO4-		7.199e-014	6.637e-014	-13.143	-13.178	-0.035
KCrO4-		3.708e-014	3.419e-014	-13.431	-13.466	-0.035
H2CrO4		7.619e-017	7.619e-017	-16.118	-16.118	0.000
CrO3SO4-2		3.074e-018	2.221e-018	-17.512	-17.653	-0.141
CrO3Cl-		1.833e-018	1.690e-018	-17.737	-17.772	-0.035
Cr2O7-2		6.667e-019	4.817e-019	-18.176	-18.317	-0.141
CrO3HPO4-2		1.688e-020	1.220e-020	-19.773	-19.914	-0.141
CrO3H2PO4-		5.082e-024	4.685e-024	-23.294	-23.329	-0.035
Cu(1)	6.953e-027					
CuCl		3.575e-027	3.575e-027	-26.447	-26.447	0.000
CuCl2-		2.299e-027	2.134e-027	-26.638	-26.671	-0.032
Cu+		1.078e-027	9.935e-028	-26.968	-27.003	-0.035
CuCl3-2		1.746e-030	1.304e-030	-29.758	-29.885	-0.127
Cu(S4)2-3		0.000e+000	0.000e+000	-296.662	-296.870	-0.208
CuS4S5-3		0.000e+000	0.000e+000	-297.398	-297.600	-0.202
Cu(2)	1.356e-015					
Cu+2		1.289e-015	9.578e-016	-14.890	-15.019	-0.129
CuOH+		4.119e-017	3.824e-017	-16.385	-16.418	-0.032
CuSO4		1.702e-017	1.702e-017	-16.769	-16.769	0.000
CuCl+		4.674e-018	4.338e-018	-17.330	-17.363	-0.032
CuCO3		2.491e-018	2.491e-018	-17.604	-17.604	0.000
CuF+		5.967e-019	5.502e-019	-18.224	-18.260	-0.035
CuHCO3+		4.926e-019	4.541e-019	-18.308	-18.343	-0.035
Cu(OH)2		9.631e-020	9.631e-020	-19.016	-19.016	0.000
CuNO3+		4.894e-021	4.512e-021	-20.310	-20.346	-0.035
CuCl2		4.299e-021	4.299e-021	-20.367	-20.367	0.000
Cu(CO3)2-2		4.099e-024	2.962e-024	-23.387	-23.528	-0.141
Cu(OH)3-		2.705e-024	2.494e-024	-23.568	-23.603	-0.035
CuCl3-		1.235e-025	1.146e-025	-24.908	-24.941	-0.032
Cu(NO3)2		8.461e-028	8.461e-028	-27.073	-27.073	0.000
Cu2(OH)2+2		5.082e-029	3.672e-029	-28.294	-28.435	-0.141
CuCl4-2		2.198e-030	1.642e-030	-29.658	-29.785	-0.127
Cu(OH)4-2		3.429e-031	2.478e-031	-30.465	-30.606	-0.141
CuNO2+		1.718e-032	1.584e-032	-31.765	-31.800	-0.035
Cu(NO2)2		0.000e+000	0.000e+000	-49.592	-49.592	0.000
CuNH3+2		0.000e+000	0.000e+000	-79.138	-79.279	-0.141
Cu(HS)3-		0.000e+000	0.000e+000	-417.265	-417.301	-0.035
F	1.000e-005					
F-		9.806e-006	9.104e-006	-5.009	-5.041	-0.032
CaF+		1.021e-007	9.492e-008	-6.991	-7.023	-0.032
MgF+		8.229e-008	7.645e-008	-7.085	-7.117	-0.032
HF		1.074e-008	1.074e-008	-7.969	-7.969	0.000
NaF		1.680e-009	1.680e-009	-8.775	-8.775	0.000
AlF2+		4.601e-010	4.280e-010	-9.337	-9.369	-0.031
AlF+2		1.577e-010	1.181e-010	-9.802	-9.928	-0.126
UO2F+		8.895e-011	8.201e-011	-10.051	-10.086	-0.035
AlF3		4.905e-011	4.905e-011	-10.309	-10.309	0.000
ZnF+		1.274e-011	1.174e-011	-10.895	-10.930	-0.035
BF(OH)3-		1.119e-011	1.036e-011	-10.951	-10.985	-0.033
SrF+		9.410e-012	8.676e-012	-11.026	-11.062	-0.035
NiF+		6.854e-012	6.319e-012	-11.164	-11.199	-0.035
UO2F2		2.153e-012	2.153e-012	-11.667	-11.667	0.000
HF2-		4.008e-013	3.717e-013	-12.397	-12.430	-0.033
AlF4-		2.409e-013	2.238e-013	-12.618	-12.650	-0.032
PbF+		1.166e-013	1.075e-013	-12.933	-12.968	-0.035
CdF+		1.536e-014	1.416e-014	-13.814	-13.849	-0.035
VO2F		1.375e-014	1.375e-014	-13.862	-13.862	0.000
BF2(OH)2-		8.684e-015	8.041e-015	-14.061	-14.095	-0.033
UO2F3-		5.340e-015	4.924e-015	-14.272	-14.308	-0.035
H2F2		3.090e-016	3.090e-016	-15.510	-15.510	0.000

VO2F2-	4.931e-017	4.546e-017	-16.307	-16.342	-0.035
MnF+	2.159e-017	2.007e-017	-16.666	-16.697	-0.032
PbF2	1.927e-017	1.927e-017	-16.715	-16.715	0.000
TlF	1.042e-017	1.042e-017	-16.982	-16.982	0.000
CuF+	5.967e-019	5.502e-019	-18.224	-18.260	-0.035
AgF	5.166e-019	5.166e-019	-18.287	-18.287	0.000
UO2F4-2	4.928e-019	3.561e-019	-18.307	-18.448	-0.141
CoF+	3.193e-019	2.944e-019	-18.496	-18.531	-0.035
CdF2	2.573e-019	2.573e-019	-18.590	-18.590	0.000
BF3OH-	2.453e-020	2.272e-020	-19.610	-19.644	-0.033
FeF+2	1.293e-020	9.661e-021	-19.888	-20.015	-0.127
VO2F3-2	7.145e-021	5.162e-021	-20.146	-20.287	-0.141
FeF2+	2.532e-021	2.354e-021	-20.597	-20.628	-0.032
PbF3-	3.608e-022	3.327e-022	-21.443	-21.478	-0.035
FeF3	3.023e-023	3.023e-023	-22.520	-22.520	0.000
HgF+	5.849e-024	5.392e-024	-23.233	-23.268	-0.035
VOF+	5.497e-024	5.069e-024	-23.260	-23.295	-0.035
BF4-	8.765e-025	8.117e-025	-24.057	-24.091	-0.033
VO2F4-3	4.804e-026	2.312e-026	-25.318	-25.636	-0.318
VOF2	1.730e-026	1.730e-026	-25.762	-25.762	0.000
CrF+2	1.250e-026	9.029e-027	-25.903	-26.044	-0.141
PbF4-2	2.006e-027	1.450e-027	-26.698	-26.839	-0.141
VOF3-	6.062e-030	5.589e-030	-29.217	-29.253	-0.035
SiF6-2	2.716e-031	2.029e-031	-30.566	-30.693	-0.127
VOF4-2	2.842e-034	2.054e-034	-33.546	-33.687	-0.141
Sb(OH)2F	3.356e-040	3.356e-040	-39.474	-39.474	0.000
SbOF	3.301e-040	3.301e-040	-39.481	-39.481	0.000
UF3+	0.000e+000	0.000e+000	-48.197	-48.233	-0.035
UF2+2	0.000e+000	0.000e+000	-48.251	-48.392	-0.141
SnF6-2	0.000e+000	0.000e+000	-48.991	-49.132	-0.141
UF+3	0.000e+000	0.000e+000	-50.134	-50.451	-0.318
UF4	0.000e+000	0.000e+000	-51.234	-51.234	0.000
UF5-	0.000e+000	0.000e+000	-54.641	-54.676	-0.035
SnF+	0.000e+000	0.000e+000	-56.044	-56.079	-0.035
UF6-2	0.000e+000	0.000e+000	-57.096	-57.237	-0.141
SnF2	0.000e+000	0.000e+000	-58.316	-58.316	0.000
SnF3-	0.000e+000	0.000e+000	-60.501	-60.537	-0.035
Fe(2)	3.097e-023				
Fe+2	3.054e-023	2.207e-023	-22.515	-22.656	-0.141
FeSO4	4.202e-025	4.202e-025	-24.377	-24.377	0.000
FeOH+	1.193e-026	1.109e-026	-25.923	-25.955	-0.032
FeHCO3+	2.242e-027	2.088e-027	-26.649	-26.680	-0.031
FeH2PO4+	3.107e-031	2.890e-031	-30.508	-30.539	-0.031
FeHPO4	1.825e-031	1.825e-031	-30.739	-30.739	0.000
Fe(OH)2	1.112e-031	1.112e-031	-30.954	-30.954	0.000
Fe(OH)3-	4.775e-034	4.439e-034	-33.321	-33.353	-0.032
Fe(HS)2	0.000e+000	0.000e+000	-299.160	-299.160	0.000
Fe(HS)3-	0.000e+000	0.000e+000	-439.815	-439.850	-0.035
Fe(3)	4.219e-014				
Fe(OH)2+	4.165e-014	3.874e-014	-13.380	-13.412	-0.031
Fe(OH)3	5.253e-016	5.253e-016	-15.280	-15.280	0.000
FeOH+2	1.056e-017	7.889e-018	-16.976	-17.103	-0.127
Fe(OH)4-	6.638e-019	6.174e-019	-18.178	-18.209	-0.031
FeF+2	1.293e-020	9.661e-021	-19.888	-20.015	-0.127
FeF2+	2.532e-021	2.354e-021	-20.597	-20.628	-0.032
Fe+3	1.889e-021	9.679e-022	-20.724	-21.014	-0.290
FeSO4+	9.063e-022	8.425e-022	-21.043	-21.074	-0.032
FeCl+2	1.118e-022	8.353e-023	-21.951	-22.078	-0.127
FeF3	3.023e-023	3.023e-023	-22.520	-22.520	0.000
FeHPO4+	1.785e-023	1.661e-023	-22.748	-22.780	-0.031
Fe(SO4)2-	1.516e-024	1.397e-024	-23.819	-23.855	-0.035
FeCl2+	1.147e-024	1.066e-024	-23.940	-23.972	-0.032
FeNO3+2	1.995e-026	1.442e-026	-25.700	-25.841	-0.141

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   FeH2PO4+2            6.415e-028  4.803e-028   -27.193   -27.318    -0.126
   FeCl3                3.047e-028  3.047e-028   -27.516   -27.516     0.000
   Fe2(OH)2+4           7.561e-033  2.061e-033   -32.121   -32.686    -0.565
   FeHSeO3+2            9.045e-038  6.535e-038   -37.044   -37.185    -0.141
   Fe3(OH)4+5           0.000e+000  0.000e+000   -44.056   -44.938    -0.882
H(0)            0.000e+000
   H2                   0.000e+000  0.000e+000   -44.695   -44.695     0.000
Hg(0)           6.616e-028
   Hg                   6.616e-028  6.616e-028   -27.179   -27.179     0.000
Hg(1)           1.987e-038
   Hg2+2                9.933e-039  7.177e-039   -38.003   -38.144    -0.141
Hg(2)           1.450e-011
   HgCl2                1.305e-011  1.305e-011   -10.884   -10.884     0.000
   HgClOH               1.018e-012  1.018e-012   -11.992   -11.992     0.000
   HgCl3-               4.045e-013  3.730e-013   -12.393   -12.428    -0.035
   Hg(OH)2              1.605e-014  1.607e-014   -13.795   -13.794     0.000
   HgCl4-2              5.872e-015  4.243e-015   -14.231   -14.372    -0.141
   HgCl+                9.883e-016  9.112e-016   -15.005   -15.040    -0.035
   HgOH+                8.710e-018  8.031e-018   -17.060   -17.095    -0.035
   HgCO3                8.447e-018  8.447e-018   -17.073   -17.073     0.000
   HgHCO3+              1.361e-019  1.254e-019   -18.866   -18.902    -0.035
   Hg+2                 2.212e-020  1.598e-020   -19.655   -19.796    -0.141
   HgSO4                3.246e-022  3.246e-022   -21.489   -21.489     0.000
   Hg(OH)3-             2.770e-023  2.554e-023   -22.558   -22.593    -0.035
   Hg(CO3)2-2           1.633e-023  1.180e-023   -22.787   -22.928    -0.141
   HgF+                 5.849e-024  5.392e-024   -23.233   -23.268    -0.035
   HgNO3+               9.533e-027  8.789e-027   -26.021   -26.056    -0.035
   Hg(NO3)2             5.441e-033  5.441e-033   -32.264   -32.264     0.000
   HgNH3+2              0.000e+000  0.000e+000   -79.126   -79.267    -0.141
   Hg(NH3)2+2           0.000e+000  0.000e+000  -138.397  -138.538    -0.141
   Hg(NH3)3+2           0.000e+000  0.000e+000  -206.067  -206.208    -0.141
   Hg(HS)2              0.000e+000  0.000e+000  -266.928  -266.928     0.000
   HgHS2-               0.000e+000  0.000e+000  -267.189  -267.224    -0.035
   HgS2-2               0.000e+000  0.000e+000  -269.693  -269.834    -0.141
   Hg(NH3)4+2           0.000e+000  0.000e+000  -273.438  -273.579    -0.141
K               2.171e-004
   K+                   2.170e-004  2.015e-004    -3.663    -3.696    -0.032
   KSO4-                1.190e-007  1.107e-007    -6.925    -6.956    -0.031
   KCrO4-               3.708e-014  3.419e-014   -13.431   -13.466    -0.035
   KHPO4-               3.413e-015  3.175e-015   -14.467   -14.498    -0.031
Mg              1.019e-004
   Mg+2                 1.007e-004  7.484e-005    -3.997    -4.126    -0.129
   MgSO4                1.057e-006  1.057e-006    -5.976    -5.976     0.000
   MgF+                 8.229e-008  7.645e-008    -7.085    -7.117    -0.032
   MgHCO3+              6.200e-009  5.755e-009    -8.208    -8.240    -0.032
   MgOH+                4.037e-010  3.761e-010    -9.394    -9.425    -0.031
   MgCO3                2.750e-011  2.750e-011   -10.561   -10.561     0.000
   MgH2BO3+             5.819e-012  5.388e-012   -11.235   -11.269    -0.033
   MgH2PO4+             1.014e-013  9.428e-014   -12.994   -13.026    -0.031
   MgHPO4               9.808e-014  9.808e-014   -13.008   -13.008     0.000
   MgPO4-               3.983e-018  3.705e-018   -17.400   -17.431    -0.031
Mn(2)           7.765e-014
   Mn+2                 7.663e-014  5.537e-014   -13.116   -13.257    -0.141
   MnSO4                7.639e-016  7.639e-016   -15.117   -15.117     0.000
   MnCl+                2.143e-016  1.992e-016   -15.669   -15.701    -0.032
   MnF+                 2.159e-017  2.007e-017   -16.666   -16.697    -0.032
   MnHCO3+              8.931e-018  8.302e-018   -17.049   -17.081    -0.032
   MnOH+                1.889e-018  1.756e-018   -17.724   -17.756    -0.032
   MnCl2                8.042e-019  8.042e-019   -18.095   -18.095     0.000
   MnNO3+               1.418e-019  1.307e-019   -18.848   -18.884    -0.035
   MnSeO4               8.234e-020  8.234e-020   -19.084   -19.084     0.000
   MnCl3-               6.809e-022  6.330e-022   -21.167   -21.199    -0.032
   Mn(NO3)2             4.891e-025  4.891e-025   -24.311   -24.311     0.000
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   Mn(OH)3-              1.860e-030  1.729e-030   -29.730   -29.762    -0.032
   Mn(OH)4-2             9.436e-038  7.048e-038   -37.025   -37.152    -0.127
   MnSe                  0.000e+000  0.000e+000  -111.910  -111.910     0.000
Mn(3)            2.279e-024
   Mn+3                  2.279e-024  1.168e-024   -23.642   -23.933    -0.290
Mn(6)            8.514e-025
   MnO4-2                8.514e-025  6.359e-025   -24.070   -24.197    -0.127
Mn(7)            1.376e-019
   MnO4-                 1.376e-019  1.275e-019   -18.861   -18.895    -0.033
Mo               1.579e-007
   MoO4-2                1.559e-007  1.158e-007    -6.807    -6.936    -0.129
   HMoO4-                1.993e-009  1.838e-009    -8.700    -8.736    -0.035
   H2MoO4                1.074e-011  1.074e-011   -10.969   -10.969     0.000
   Ag2MoO4               2.237e-035  2.237e-035   -34.650   -34.650     0.000
   AlMo6O21-3            1.644e-035  7.912e-036   -34.784   -35.102    -0.318
   Mo7O24-6              0.000e+000  0.000e+000   -43.080   -44.350    -1.270
   HMo7O24-5             0.000e+000  0.000e+000   -43.179   -44.061    -0.882
   H2Mo7O24-4            0.000e+000  0.000e+000   -44.813   -45.377    -0.565
   H3Mo7O24-3            0.000e+000  0.000e+000   -47.912   -48.230    -0.318
N(-3)            0.000e+000
   NH4+                  0.000e+000  0.000e+000   -65.092   -65.125    -0.033
   NH4SO4-               0.000e+000  0.000e+000   -68.173   -68.205    -0.032
   NH3                   0.000e+000  0.000e+000   -68.271   -68.271     0.000
   CaNH3+2               0.000e+000  0.000e+000   -71.049   -71.191    -0.141
   NiNH3+2               0.000e+000  0.000e+000   -72.958   -73.099    -0.141
   SrNH3+2               0.000e+000  0.000e+000   -74.798   -74.940    -0.141
   AgNH3+                0.000e+000  0.000e+000   -78.571   -78.607    -0.035
   HgNH3+2               0.000e+000  0.000e+000   -79.126   -79.267    -0.141
   CuNH3+2               0.000e+000  0.000e+000   -79.138   -79.279    -0.141
   BaNH3+2               0.000e+000  0.000e+000   -80.235   -80.376    -0.141
   Co(NH3)+2             0.000e+000  0.000e+000   -81.040   -81.181    -0.141
   Hg(NH3)2+2            0.000e+000  0.000e+000  -138.397  -138.538    -0.141
   Ni(NH3)2+2            0.000e+000  0.000e+000  -139.069  -139.210    -0.141
   Ca(NH3)2+2            0.000e+000  0.000e+000  -139.720  -139.861    -0.141
   Ag(NH3)2+             0.000e+000  0.000e+000  -142.932  -142.967    -0.035
   Co(NH3)2+2            0.000e+000  0.000e+000  -147.681  -147.822    -0.141
   Hg(NH3)3+2            0.000e+000  0.000e+000  -206.067  -206.208    -0.141
   Co(NH3)3+2            0.000e+000  0.000e+000  -214.851  -214.992    -0.141
   Hg(NH3)4+2            0.000e+000  0.000e+000  -273.438  -273.579    -0.141
   Co(NH3)4+2            0.000e+000  0.000e+000  -282.402  -282.543    -0.141
   Co(NH3)5Cl+2          0.000e+000  0.000e+000  -348.211  -348.352    -0.141
   Co(NH3)5+2            0.000e+000  0.000e+000  -350.453  -350.594    -0.141
   Cr(NH3)5OH+2          0.000e+000  0.000e+000  -354.942  -355.083    -0.141
   Co(NH3)6SO4+          0.000e+000  0.000e+000  -419.944  -419.979    -0.035
   Cr(NH3)6+3            0.000e+000  0.000e+000  -422.510  -422.828    -0.318
   Co(NH3)6Cl+2          0.000e+000  0.000e+000  -423.197  -423.338    -0.141
   Cr(NH3)6Cl+2          0.000e+000  0.000e+000  -424.128  -424.270    -0.141
   Co(NH3)6OH+2          0.000e+000  0.000e+000  -424.352  -424.493    -0.141
N(3)             1.704e-019
   NO2-                  1.704e-019  1.579e-019   -18.769   -18.802    -0.033
   TlNO2                 9.704e-031  9.704e-031   -30.013   -30.013     0.000
   AgNO2                 7.454e-031  7.454e-031   -30.128   -30.128     0.000
   CuNO2+                1.718e-032  1.584e-032   -31.765   -31.800    -0.035
   CoNO2+                1.234e-033  1.138e-033   -32.909   -32.944    -0.035
   Ag(NO2)2-             0.000e+000  0.000e+000   -48.704   -48.739    -0.035
   Cu(NO2)2              0.000e+000  0.000e+000   -49.592   -49.592     0.000
N(5)             1.609e-006
   NO3-                  1.604e-006  1.490e-006    -5.795    -5.827    -0.032
   CaNO3+                4.881e-009  4.500e-009    -8.311    -8.347    -0.035
   SrNO3+                1.736e-012  1.600e-012   -11.761   -11.796    -0.035
   ZnNO3+                2.623e-013  2.419e-013   -12.581   -12.616    -0.035
   NiNO3+                1.121e-013  1.034e-013   -12.950   -12.985    -0.035
   PbNO3+                4.006e-015  3.694e-015   -14.397   -14.433    -0.035
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   CdNO3+                 5.016e-016  4.624e-016   -15.300   -15.335    -0.035
   UO2NO3+                2.104e-016  1.940e-016   -15.677   -15.712    -0.035
   BaNO3+                 1.007e-017  9.284e-018   -16.997   -17.032    -0.035
   TlNO3                  2.894e-018  2.894e-018   -17.538   -17.538     0.000
   VO2NO3                 6.490e-019  6.490e-019   -18.188   -18.188     0.000
   MnNO3+                 1.418e-019  1.307e-019   -18.848   -18.884    -0.035
   Zn(NO3)2               7.189e-020  7.189e-020   -19.143   -19.143     0.000
   AgNO3                  2.673e-020  2.673e-020   -19.573   -19.573     0.000
   Pb(NO3)2               9.344e-021  9.344e-021   -20.029   -20.029     0.000
   CuNO3+                 4.894e-021  4.512e-021   -20.310   -20.346    -0.035
   CoNO3+                 2.618e-021  2.414e-021   -20.582   -20.617    -0.035
   Cd(NO3)2               3.452e-022  3.452e-022   -21.462   -21.462     0.000
   Mn(NO3)2               4.891e-025  4.891e-025   -24.311   -24.311     0.000
   FeNO3+2                1.995e-026  1.442e-026   -25.700   -25.841    -0.141
   HgNO3+                 9.533e-027  8.789e-027   -26.021   -26.056    -0.035
   Co(NO3)2               7.317e-027  7.317e-027   -26.136   -26.136     0.000
   TlNO3+2                1.197e-027  8.650e-028   -26.922   -27.063    -0.141
   Cu(NO3)2               8.461e-028  8.461e-028   -27.073   -27.073     0.000
   Hg(NO3)2               5.441e-033  5.441e-033   -32.264   -32.264     0.000
   CrNO3+2                5.639e-034  4.074e-034   -33.249   -33.390    -0.141
   SnNO3+                 0.000e+000  0.000e+000   -60.470   -60.505    -0.035
Na                3.152e-004
   Na+                    3.150e-004  2.925e-004    -3.502    -3.534    -0.032
   NaSO4-                 1.310e-007  1.219e-007    -6.883    -6.914    -0.031
   NaF                    1.680e-009  1.680e-009    -8.775    -8.775     0.000
   NaHCO3                 1.236e-009  1.236e-009    -8.908    -8.908     0.000
   NaCO3-                 2.586e-012  2.406e-012   -11.587   -11.619    -0.031
   NaH2BO3                9.625e-013  9.625e-013   -12.017   -12.017     0.000
   NaCrO4-                7.199e-014  6.637e-014   -13.143   -13.178    -0.035
   NaHPO4-                7.673e-015  7.137e-015   -14.115   -14.146    -0.031
Ni                3.788e-008
   Ni+2                   3.720e-008  2.763e-008    -7.430    -7.559    -0.129
   NiSO4                  4.278e-010  4.278e-010    -9.369    -9.369     0.000
   NiCl+                  2.192e-010  2.021e-010    -9.659    -9.695    -0.035
   NiHCO3+                2.777e-011  2.560e-011   -10.556   -10.592    -0.035
   NiF+                   6.854e-012  6.319e-012   -11.164   -11.199    -0.035
   NiOH+                  4.763e-012  4.392e-012   -11.322   -11.357    -0.035
   NiCO3                  4.554e-013  4.554e-013   -12.342   -12.342     0.000
   NiNO3+                 1.121e-013  1.034e-013   -12.950   -12.985    -0.035
   NiSeO4                 7.141e-014  7.141e-014   -13.146   -13.146     0.000
   Ni(OH)2                4.404e-015  4.404e-015   -14.356   -14.356     0.000
   NiCl2                  2.907e-015  2.907e-015   -14.537   -14.537     0.000
   Ni(SO4)2-2             1.521e-015  1.099e-015   -14.818   -14.959    -0.141
   Ni(OH)3-               6.030e-020  5.559e-020   -19.220   -19.255    -0.035
   NiNH3+2                0.000e+000  0.000e+000   -72.958   -73.099    -0.141
   Ni(NH3)2+2             0.000e+000  0.000e+000  -139.069  -139.210    -0.141
O(0)              2.481e-003
   O2                     1.241e-003  1.242e-003    -2.906    -2.906     0.000
P                 3.260e-011
   H2PO4-                 2.809e-011  2.613e-011   -10.551   -10.583    -0.031
   HPO4-2                 2.781e-012  2.077e-012   -11.556   -11.683    -0.127
   CaHPO4                 9.069e-013  9.069e-013   -12.042   -12.042     0.000
   CaH2PO4+               6.008e-013  5.589e-013   -12.221   -12.253    -0.031
   MgH2PO4+               1.014e-013  9.428e-014   -12.994   -13.026    -0.031
   MgHPO4                 9.808e-014  9.808e-014   -13.008   -13.008     0.000
   NaHPO4-                7.673e-015  7.137e-015   -14.115   -14.146    -0.031
   KHPO4-                 3.413e-015  3.175e-015   -14.467   -14.498    -0.031
   CaPO4-                 3.253e-015  3.026e-015   -14.488   -14.519    -0.031
   H3PO4                  2.930e-015  2.930e-015   -14.533   -14.533     0.000
   UO2HPO4                2.583e-015  2.583e-015   -14.588   -14.588     0.000
   UO2PO4-                1.382e-015  1.274e-015   -14.859   -14.895    -0.035
   UO2(HPO4)2-2           6.739e-016  4.869e-016   -15.171   -15.313    -0.141
   SrHPO4                 1.763e-016  1.763e-016   -15.754   -15.754     0.000
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   SrH2PO4+              5.158e-017  4.755e-017   -16.288   -16.323    -0.035
   MgPO4-                3.983e-018  3.705e-018   -17.400   -17.431    -0.031
   UO2H2PO4+             3.366e-018  3.103e-018   -17.473   -17.508    -0.035
   PO4-3                 2.143e-018  1.098e-018   -17.669   -17.959    -0.290
   CrO3HPO4-2            1.688e-020  1.220e-020   -19.773   -19.914    -0.141
   FeHPO4+               1.785e-023  1.661e-023   -22.748   -22.780    -0.031
   CrO3H2PO4-            5.082e-024  4.685e-024   -23.294   -23.329    -0.035
   CoHPO4                2.317e-024  2.317e-024   -23.635   -23.635     0.000
   UO2(H2PO4)2           1.596e-026  1.596e-026   -25.797   -25.797     0.000
   FeH2PO4+2             6.415e-028  4.803e-028   -27.193   -27.318    -0.126
   FeH2PO4+              3.107e-031  2.890e-031   -30.508   -30.539    -0.031
   FeHPO4                1.825e-031  1.825e-031   -30.739   -30.739     0.000
   CrH2PO4+2             1.317e-034  9.519e-035   -33.880   -34.021    -0.141
   UO2(H2PO4)3-          4.241e-035  3.910e-035   -34.373   -34.408    -0.035
   UHPO4+2               0.000e+000  0.000e+000   -54.184   -54.325    -0.141
   U(HPO4)2              0.000e+000  0.000e+000   -55.993   -55.993     0.000
   U(HPO4)3-2            0.000e+000  0.000e+000   -59.178   -59.319    -0.141
   U(HPO4)4-4            0.000e+000  0.000e+000   -61.893   -62.458    -0.565
Pb              2.578e-010
   Pb+2                  2.256e-010  1.676e-010    -9.647    -9.776    -0.129
   PbCl+                 1.844e-011  1.700e-011   -10.734   -10.770    -0.035
   PbSO4                 6.370e-012  6.370e-012   -11.196   -11.196     0.000
   PbOH+                 5.766e-012  5.316e-012   -11.239   -11.274    -0.035
   PbHCO3+               1.015e-012  9.360e-013   -11.993   -12.029    -0.035
   PbCO3                 2.226e-013  2.226e-013   -12.652   -12.652     0.000
   PbCl2                 2.170e-013  2.170e-013   -12.664   -12.664     0.000
   PbF+                  1.166e-013  1.075e-013   -12.933   -12.968    -0.035
   Pb(SO4)2-2            4.121e-015  2.978e-015   -14.385   -14.526    -0.141
   PbNO3+                4.006e-015  3.694e-015   -14.397   -14.433    -0.035
   Pb(OH)2               2.122e-015  2.122e-015   -14.673   -14.673     0.000
   PbCl3-                2.678e-016  2.469e-016   -15.572   -15.608    -0.035
   PbF2                  1.927e-017  1.927e-017   -16.715   -16.715     0.000
   PbCl4-2               4.463e-019  3.225e-019   -18.350   -18.492    -0.141
   Pb(CO3)2-2            3.925e-019  2.836e-019   -18.406   -18.547    -0.141
   Pb2OH+3               2.934e-020  1.412e-020   -19.533   -19.850    -0.318
   Pb(OH)3-              2.906e-020  2.679e-020   -19.537   -19.572    -0.035
   Pb(NO3)2              9.344e-021  9.344e-021   -20.029   -20.029     0.000
   PbF3-                 3.608e-022  3.327e-022   -21.443   -21.478    -0.035
   Pb(OH)4-2             1.146e-025  8.282e-026   -24.941   -25.082    -0.141
   PbF4-2                2.006e-027  1.450e-027   -26.698   -26.839    -0.141
   Pb3(OH)4+2            2.085e-029  1.506e-029   -28.681   -28.822    -0.141
   Pb4(OH)4+4            7.358e-035  2.006e-035   -34.133   -34.698    -0.565
   Pb(HS)2               0.000e+000  0.000e+000  -279.960  -279.960     0.000
   Pb(HS)3-              0.000e+000  0.000e+000  -421.351  -421.386    -0.035
S(-2)           0.000e+000
   H2S                   0.000e+000  0.000e+000  -141.805  -141.805     0.000
   AgHS                  0.000e+000  0.000e+000  -142.559  -142.559     0.000
   HS-                   0.000e+000  0.000e+000  -142.692  -142.727    -0.035
   CdHS+                 0.000e+000  0.000e+000  -144.692  -144.727    -0.035
   S5-2                  0.000e+000  0.000e+000  -145.853  -145.994    -0.141
   S6-2                  0.000e+000  0.000e+000  -146.369  -146.510    -0.141
   S4-2                  0.000e+000  0.000e+000  -146.448  -146.589    -0.141
   S3-2                  0.000e+000  0.000e+000  -147.254  -147.395    -0.141
   S2-2                  0.000e+000  0.000e+000  -148.270  -148.411    -0.141
   TlHS                  0.000e+000  0.000e+000  -152.294  -152.294     0.000
   S-2                   0.000e+000  0.000e+000  -153.802  -153.929    -0.127
   Tl2HS+                0.000e+000  0.000e+000  -160.801  -160.836    -0.035
   Hg(HS)2               0.000e+000  0.000e+000  -266.928  -266.928     0.000
   HgHS2-                0.000e+000  0.000e+000  -267.189  -267.224    -0.035
   HgS2-2                0.000e+000  0.000e+000  -269.693  -269.834    -0.141
   ZnS(HS)-              0.000e+000  0.000e+000  -279.700  -279.735    -0.035
   Zn(HS)2               0.000e+000  0.000e+000  -279.823  -279.823     0.000
   Pb(HS)2               0.000e+000  0.000e+000  -279.960  -279.960     0.000
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   Cd(HS)2                0.000e+000  0.000e+000  -280.250  -280.250     0.000
   Ag(HS)2-               0.000e+000  0.000e+000  -281.150  -281.185    -0.035
   Ag(HS)S4-2             0.000e+000  0.000e+000  -282.465  -282.571    -0.105
   Ag(S4)2-3              0.000e+000  0.000e+000  -285.701  -285.912    -0.212
   AgS4S5-3               0.000e+000  0.000e+000  -286.018  -286.223    -0.205
   Cu(S4)2-3              0.000e+000  0.000e+000  -296.662  -296.870    -0.208
   CuS4S5-3               0.000e+000  0.000e+000  -297.398  -297.600    -0.202
   Fe(HS)2                0.000e+000  0.000e+000  -299.160  -299.160     0.000
   Tl2(OH)2(HS)2-2        0.000e+000  0.000e+000  -308.267  -308.409    -0.141
   Cu(HS)3-               0.000e+000  0.000e+000  -417.265  -417.301    -0.035
   Zn(HS)3-               0.000e+000  0.000e+000  -419.235  -419.270    -0.035
   Cd(HS)3-               0.000e+000  0.000e+000  -421.042  -421.077    -0.035
   Pb(HS)3-               0.000e+000  0.000e+000  -421.351  -421.386    -0.035
   ZnS(HS)2-2             0.000e+000  0.000e+000  -423.011  -423.152    -0.141
   Fe(HS)3-               0.000e+000  0.000e+000  -439.815  -439.850    -0.035
   Tl2OH(HS)3-2           0.000e+000  0.000e+000  -445.020  -445.161    -0.141
   Cd(HS)4-2              0.000e+000  0.000e+000  -561.467  -561.608    -0.141
   Zn(HS)4-2              0.000e+000  0.000e+000  -563.316  -563.457    -0.141
   Sb2S4-2                0.000e+000  0.000e+000  -602.632  -602.773    -0.141
S(6)            1.227e-004
   SO4-2                  1.044e-004  7.758e-005    -3.981    -4.110    -0.129
   CaSO4                  1.698e-005  1.698e-005    -4.770    -4.770     0.000
   MgSO4                  1.057e-006  1.057e-006    -5.976    -5.976     0.000
   NaSO4-                 1.310e-007  1.219e-007    -6.883    -6.914    -0.031
   KSO4-                  1.190e-007  1.107e-007    -6.925    -6.956    -0.031
   HSO4-                  6.509e-009  6.047e-009    -8.186    -8.218    -0.032
   SrSO4                  4.177e-009  4.177e-009    -8.379    -8.379     0.000
   ZnSO4                  1.097e-009  1.097e-009    -8.960    -8.960     0.000
   NiSO4                  4.278e-010  4.278e-010    -9.369    -9.369     0.000
   UO2SO4                 7.663e-012  7.663e-012   -11.116   -11.116     0.000
   PbSO4                  6.370e-012  6.370e-012   -11.196   -11.196     0.000
   CdSO4                  1.785e-012  1.785e-012   -11.748   -11.748     0.000
   Zn(SO4)2-2             1.026e-012  7.414e-013   -11.989   -12.130    -0.141
   AlSO4+                 8.409e-013  7.812e-013   -12.075   -12.107    -0.032
   UO2(SO4)2-2            1.085e-014  7.837e-015   -13.965   -14.106    -0.141
   Pb(SO4)2-2             4.121e-015  2.978e-015   -14.385   -14.526    -0.141
   Cd(SO4)2-2             2.586e-015  1.868e-015   -14.587   -14.729    -0.141
   TlSO4-                 1.793e-015  1.653e-015   -14.746   -14.782    -0.035
   VO2SO4-                1.731e-015  1.596e-015   -14.762   -14.797    -0.035
   Ni(SO4)2-2             1.521e-015  1.099e-015   -14.818   -14.959    -0.141
   MnSO4                  7.639e-016  7.639e-016   -15.117   -15.117     0.000
   Al(SO4)2-              6.990e-016  6.494e-016   -15.155   -15.187    -0.032
   AgSO4-                 3.793e-017  3.497e-017   -16.421   -16.456    -0.035
   CuSO4                  1.702e-017  1.702e-017   -16.769   -16.769     0.000
   CoSO4                  1.583e-017  1.583e-017   -16.801   -16.801     0.000
   CrO3SO4-2              3.074e-018  2.221e-018   -17.512   -17.653    -0.141
   FeSO4+                 9.063e-022  8.425e-022   -21.043   -21.074    -0.032
   HgSO4                  3.246e-022  3.246e-022   -21.489   -21.489     0.000
   VOSO4                  1.983e-024  1.983e-024   -23.703   -23.703     0.000
   Fe(SO4)2-              1.516e-024  1.397e-024   -23.819   -23.855    -0.035
   FeSO4                  4.202e-025  4.202e-025   -24.377   -24.377     0.000
   CrOHSO4                3.182e-026  3.182e-026   -25.497   -25.497     0.000
   CrSO4+                 1.230e-027  1.134e-027   -26.910   -26.946    -0.035
   VSO4+                  0.000e+000  0.000e+000   -44.608   -44.643    -0.035
   Cr2(OH)2SO4+2          0.000e+000  0.000e+000   -47.163   -47.304    -0.141
   Cr2(OH)2(SO4)2         0.000e+000  0.000e+000   -49.640   -49.640     0.000
   USO4+2                 0.000e+000  0.000e+000   -52.080   -52.221    -0.141
   U(SO4)2                0.000e+000  0.000e+000   -52.431   -52.431     0.000
   NH4SO4-                0.000e+000  0.000e+000   -68.173   -68.205    -0.032
   Co(NH3)6SO4+           0.000e+000  0.000e+000  -419.944  -419.979    -0.035
Sb(3)           5.848e-035
   Sb(OH)3                2.959e-035  2.959e-035   -34.529   -34.529     0.000
   HSbO2                  2.889e-035  2.889e-035   -34.539   -34.539     0.000
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   Sb(OH)2+              6.216e-040  5.731e-040   -39.206   -39.242    -0.035
   Sb(OH)2F              3.356e-040  3.356e-040   -39.474   -39.474     0.000
   SbOF                  3.301e-040  3.301e-040   -39.481   -39.481     0.000
   SbO+                  2.143e-040  1.976e-040   -39.669   -39.704    -0.035
   SbO2-                 0.000e+000  0.000e+000   -40.196   -40.232    -0.035
   Sb(OH)4-              0.000e+000  0.000e+000   -40.438   -40.474    -0.035
   Sb2S4-2               0.000e+000  0.000e+000  -602.632  -602.773    -0.141
Sb(5)            5.912e-009
   SbO3-                 5.905e-009  5.444e-009    -8.229    -8.264    -0.035
   Sb(OH)6-              6.858e-012  6.367e-012   -11.164   -11.196    -0.032
   SbO2+                 1.077e-021  9.934e-022   -20.968   -21.003    -0.035
Se(-2)           0.000e+000
   Ag2Se                 0.000e+000  0.000e+000   -85.649   -85.649     0.000
   HSe-                  0.000e+000  0.000e+000   -99.331   -99.366    -0.035
   H2Se                  0.000e+000  0.000e+000  -101.575  -101.575     0.000
   Se-2                  0.000e+000  0.000e+000  -108.127  -108.268    -0.141
   MnSe                  0.000e+000  0.000e+000  -111.910  -111.910     0.000
   AgOH(Se)2-4           0.000e+000  0.000e+000  -214.029  -214.593    -0.565
Se(4)            2.790e-020
   HSeO3-                2.772e-020  2.555e-020   -19.557   -19.593    -0.035
   SeO3-2                1.765e-022  1.276e-022   -21.753   -21.894    -0.141
   H2SeO3                8.694e-024  8.694e-024   -23.061   -23.061     0.000
   AgSeO3-               2.009e-033  1.852e-033   -32.697   -32.732    -0.035
   FeHSeO3+2             9.045e-038  6.535e-038   -37.044   -37.185    -0.141
   Cd(SeO3)2-2           0.000e+000  0.000e+000   -47.740   -47.881    -0.141
   Ag(SeO3)2-3           0.000e+000  0.000e+000   -53.357   -53.675    -0.318
Se(6)            7.437e-009
   SeO4-2                7.436e-009  5.525e-009    -8.129    -8.258    -0.129
   HSeO4-                2.395e-013  2.208e-013   -12.621   -12.656    -0.035
   NiSeO4                7.141e-014  7.141e-014   -13.146   -13.146     0.000
   ZnSeO4                5.531e-014  5.531e-014   -13.257   -13.257     0.000
   CdSeO4                1.010e-016  1.010e-016   -15.996   -15.996     0.000
   MnSeO4                8.234e-020  8.234e-020   -19.084   -19.084     0.000
   CoSeO4                2.831e-021  2.831e-021   -20.548   -20.548     0.000
   Zn(SeO4)2-2           4.288e-022  3.098e-022   -21.368   -21.509    -0.141
Si               5.811e-007
   H4SiO4                5.810e-007  5.816e-007    -6.236    -6.235     0.000
   H3SiO4-               1.136e-010  1.054e-010    -9.945    -9.977    -0.032
   UO2H3SiO4+            6.334e-013  5.840e-013   -12.198   -12.234    -0.035
   H2SiO4-2              1.114e-017  8.340e-018   -16.953   -17.079    -0.126
   SiF6-2                2.716e-031  2.029e-031   -30.566   -30.693    -0.127
Sn(2)            0.000e+000
   Sn(OH)2               0.000e+000  0.000e+000   -50.424   -50.424     0.000
   SnOH+                 0.000e+000  0.000e+000   -52.790   -52.825    -0.035
   HSnO2-                0.000e+000  0.000e+000   -53.225   -53.260    -0.035
   Sn(OH)3-              0.000e+000  0.000e+000   -53.787   -53.823    -0.035
   Sn+2                  0.000e+000  0.000e+000   -55.385   -55.526    -0.141
   SnF+                  0.000e+000  0.000e+000   -56.044   -56.079    -0.035
   SnCl+                 0.000e+000  0.000e+000   -56.395   -56.430    -0.035
   SnCl2                 0.000e+000  0.000e+000   -58.184   -58.184     0.000
   SnF2                  0.000e+000  0.000e+000   -58.316   -58.316     0.000
   SnNO3+                0.000e+000  0.000e+000   -60.470   -60.505    -0.035
   SnF3-                 0.000e+000  0.000e+000   -60.501   -60.537    -0.035
   SnCl3-                0.000e+000  0.000e+000   -61.866   -61.902    -0.035
   Sn2(OH)2+2            0.000e+000  0.000e+000  -103.509  -103.650    -0.141
   Sn3(OH)4+2            0.000e+000  0.000e+000  -148.933  -149.074    -0.141
Sn(4)            1.773e-016
   Sn(OH)6-2             1.762e-016  1.309e-016   -15.754   -15.883    -0.129
   SnO3-2                1.118e-018  8.077e-019   -17.952   -18.093    -0.141
   Sn+4                  2.050e-031  5.588e-032   -30.688   -31.253    -0.565
   SnF6-2                0.000e+000  0.000e+000   -48.991   -49.132    -0.141
Sr               3.674e-007
   Sr+2                  3.632e-007  2.698e-007    -6.440    -6.569    -0.129
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   SrSO4                  4.177e-009  4.177e-009    -8.379    -8.379     0.000
   SrHCO3+                3.532e-011  3.288e-011   -10.452   -10.483    -0.031
   SrF+                   9.410e-012  8.676e-012   -11.026   -11.062    -0.035
   SrNO3+                 1.736e-012  1.600e-012   -11.761   -11.796    -0.035
   SrCO3                  7.695e-014  7.695e-014   -13.114   -13.114     0.000
   SrOH+                  2.421e-014  2.251e-014   -13.616   -13.648    -0.032
   SrH2BO3+               2.147e-014  1.988e-014   -13.668   -13.702    -0.033
   SrHPO4                 1.763e-016  1.763e-016   -15.754   -15.754     0.000
   SrH2PO4+               5.158e-017  4.755e-017   -16.288   -16.323    -0.035
   SrNH3+2                0.000e+000  0.000e+000   -74.798   -74.940    -0.141
Tl(1)            9.960e-013
   Tl+                    9.858e-013  9.088e-013   -12.006   -12.042    -0.035
   TlCl                   8.405e-015  8.405e-015   -14.075   -14.075     0.000
   TlSO4-                 1.793e-015  1.653e-015   -14.746   -14.782    -0.035
   TlCl2-                 1.534e-017  1.414e-017   -16.814   -16.849    -0.035
   TlF                    1.042e-017  1.042e-017   -16.982   -16.982     0.000
   TlNO3                  2.894e-018  2.894e-018   -17.538   -17.538     0.000
   TlOH                   7.074e-020  7.074e-020   -19.150   -19.150     0.000
   TlNO2                  9.704e-031  9.704e-031   -30.013   -30.013     0.000
   TlHS                   0.000e+000  0.000e+000  -152.294  -152.294     0.000
   Tl2HS+                 0.000e+000  0.000e+000  -160.801  -160.836    -0.035
   Tl2(OH)2(HS)2-2        0.000e+000  0.000e+000  -308.267  -308.409    -0.141
   Tl2OH(HS)3-2           0.000e+000  0.000e+000  -445.020  -445.161    -0.141
Tl(3)            1.124e-010
   Tl(OH)3                1.124e-010  1.125e-010    -9.949    -9.949     0.000
   TlOHCl+                9.444e-015  8.707e-015   -14.025   -14.060    -0.035
   Tl(OH)2+               7.680e-015  7.080e-015   -14.115   -14.150    -0.035
   Tl(OH)4-               3.074e-016  2.834e-016   -15.512   -15.548    -0.035
   TlCl3                  8.237e-017  8.237e-017   -16.084   -16.084     0.000
   TlCl2+                 2.985e-017  2.753e-017   -16.525   -16.560    -0.035
   TlCl4-                 1.611e-017  1.485e-017   -16.793   -16.828    -0.035
   TlOH+2                 4.898e-020  3.539e-020   -19.310   -19.451    -0.141
   TlCl+2                 2.316e-020  1.674e-020   -19.635   -19.776    -0.141
   Tl+3                   2.319e-025  1.116e-025   -24.635   -24.952    -0.318
   TlNO3+2                1.197e-027  8.650e-028   -26.922   -27.063    -0.141
U(3)             0.000e+000
   U+3                    0.000e+000  0.000e+000   -77.863   -78.181    -0.318
U(4)             5.117e-038
   U(OH)5-                4.964e-038  4.577e-038   -37.304   -37.339    -0.035
   U(OH)4                 1.529e-039  1.529e-039   -38.816   -38.816     0.000
   U(OH)3+                0.000e+000  0.000e+000   -41.316   -41.351    -0.035
   U(OH)2+2               0.000e+000  0.000e+000   -44.643   -44.784    -0.141
   UF3+                   0.000e+000  0.000e+000   -48.197   -48.233    -0.035
   UF2+2                  0.000e+000  0.000e+000   -48.251   -48.392    -0.141
   UOH+3                  0.000e+000  0.000e+000   -48.892   -49.209    -0.318
   UF+3                   0.000e+000  0.000e+000   -50.134   -50.451    -0.318
   UF4                    0.000e+000  0.000e+000   -51.234   -51.234     0.000
   USO4+2                 0.000e+000  0.000e+000   -52.080   -52.221    -0.141
   U(SO4)2                0.000e+000  0.000e+000   -52.431   -52.431     0.000
   U+4                    0.000e+000  0.000e+000   -54.146   -54.710    -0.565
   UHPO4+2                0.000e+000  0.000e+000   -54.184   -54.325    -0.141
   UF5-                   0.000e+000  0.000e+000   -54.641   -54.676    -0.035
   UCl+3                  0.000e+000  0.000e+000   -55.237   -55.554    -0.318
   U(HPO4)2               0.000e+000  0.000e+000   -55.993   -55.993     0.000
   UF6-2                  0.000e+000  0.000e+000   -57.096   -57.237    -0.141
   U(HPO4)3-2             0.000e+000  0.000e+000   -59.178   -59.319    -0.141
   U(HPO4)4-4             0.000e+000  0.000e+000   -61.893   -62.458    -0.565
   U6(OH)15+9             0.000e+000  0.000e+000  -251.087  -253.945    -2.858
U(5)             9.137e-023
   UO2+                   9.137e-023  8.424e-023   -22.039   -22.074    -0.035
U(6)             4.163e-010
   UO2CO3                 1.148e-010  1.148e-010    -9.940    -9.940     0.000
   UO2OH+                 1.125e-010  1.037e-010    -9.949    -9.984    -0.035
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UO2F+		8.895e-011	8.201e-011	-10.051	-10.086	-0.035
UO2+2		8.784e-011	6.526e-011	-10.056	-10.185	-0.129
UO2SO4		7.663e-012	7.663e-012	-11.116	-11.116	0.000
UO2F2		2.153e-012	2.153e-012	-11.667	-11.667	0.000
UO2(CO3)2-2		1.400e-012	1.011e-012	-11.854	-11.995	-0.141
UO2H3SiO4+		6.334e-013	5.840e-013	-12.198	-12.234	-0.035
UO2Cl+		3.281e-013	3.025e-013	-12.484	-12.519	-0.035
(UO2)2(OH)2+2		2.470e-014	1.785e-014	-13.607	-13.748	-0.141
UO2(SO4)2-2		1.085e-014	7.837e-015	-13.965	-14.106	-0.141
UO2F3-		5.340e-015	4.924e-015	-14.272	-14.308	-0.035
UO2HPO4		2.583e-015	2.583e-015	-14.588	-14.588	0.000
UO2PO4-		1.382e-015	1.274e-015	-14.859	-14.895	-0.035
UO2(HPO4)2-2		6.739e-016	4.869e-016	-15.171	-15.313	-0.141
(UO2)3(OH)5+		2.427e-016	2.238e-016	-15.615	-15.650	-0.035
UO2NO3+		2.104e-016	1.940e-016	-15.677	-15.712	-0.035
UO2(CO3)3-4		8.215e-017	2.239e-017	-16.085	-16.650	-0.565
UO2H2PO4+		3.366e-018	3.103e-018	-17.473	-17.508	-0.035
UO2F4-2		4.928e-019	3.561e-019	-18.307	-18.448	-0.141
UO2(H2PO4)2		1.596e-026	1.596e-026	-25.797	-25.797	0.000
UO2(H2PO4)3-		4.241e-035	3.910e-035	-34.373	-34.408	-0.035
V(2)	0.000e+000					
V+2		0.000e+000	0.000e+000	-62.050	-62.191	-0.141
VOH+		0.000e+000	0.000e+000	-62.544	-62.580	-0.035
V(3)	1.008e-028					
V(OH)3		1.008e-028	1.008e-028	-27.997	-27.997	0.000
V(OH)2+		5.634e-038	5.194e-038	-37.249	-37.284	-0.035
VOH+2		5.438e-040	3.929e-040	-39.265	-39.406	-0.141
V+3		0.000e+000	0.000e+000	-42.889	-43.207	-0.318
VSO4+		0.000e+000	0.000e+000	-44.608	-44.643	-0.035
V2(OH)2+4		0.000e+000	0.000e+000	-77.447	-78.011	-0.565
V2(OH)3+3		0.000e+000	0.000e+000	-77.921	-78.238	-0.318
V(4)	3.903e-022					
V(OH)3+		2.536e-022	2.338e-022	-21.596	-21.631	-0.035
VO+2		1.285e-022	9.282e-023	-21.891	-22.032	-0.141
VOF+		5.497e-024	5.069e-024	-23.260	-23.295	-0.035
VOSO4		1.983e-024	1.983e-024	-23.703	-23.703	0.000
VOCl+		8.072e-025	7.442e-025	-24.093	-24.128	-0.035
VOF2		1.730e-026	1.730e-026	-25.762	-25.762	0.000
VOF3-		6.062e-030	5.589e-030	-29.217	-29.253	-0.035
VOF4-2		2.842e-034	2.054e-034	-33.546	-33.687	-0.141
H2V2O4+2		3.792e-039	2.740e-039	-38.421	-38.562	-0.141
V(5)	7.495e-008					
H2VO4-		7.360e-008	6.785e-008	-7.133	-7.168	-0.035
H3VO4		5.412e-010	5.412e-010	-9.267	-9.267	0.000
HVO4-2		2.958e-010	2.137e-010	-9.529	-9.670	-0.141
H3V2O7-		2.572e-010	2.371e-010	-9.590	-9.625	-0.035
VO2+		9.278e-013	8.614e-013	-12.033	-12.065	-0.032
VO2F		1.375e-014	1.375e-014	-13.862	-13.862	0.000
HV2O7-3		1.021e-014	4.914e-015	-13.991	-14.309	-0.318
VO2SO4-		1.731e-015	1.596e-015	-14.762	-14.797	-0.035
V3O9-3		6.798e-016	3.272e-016	-15.168	-15.485	-0.318
VO2F2-		4.931e-017	4.546e-017	-16.307	-16.342	-0.035
VO4-3		2.790e-018	1.343e-018	-17.554	-17.872	-0.318
VO2NO3		6.490e-019	6.490e-019	-18.188	-18.188	0.000
V2O7-4		6.084e-019	1.658e-019	-18.216	-18.780	-0.565
V4O12-4		3.396e-020	9.257e-021	-19.469	-20.034	-0.565
VO2F3-2		7.145e-021	5.162e-021	-20.146	-20.287	-0.141
VO2F4-3		4.804e-026	2.312e-026	-25.318	-25.636	-0.318
HV10O28-5		0.000e+000	0.000e+000	-44.200	-45.083	-0.882
H2V10O28-4		0.000e+000	0.000e+000	-45.409	-45.973	-0.565
V10O28-6		0.000e+000	0.000e+000	-45.901	-47.171	-1.270
Zn	8.874e-008					
Zn+2		8.701e-008	6.464e-008	-7.060	-7.189	-0.129

ZnSO4	1.097e-009	1.097e-009	-8.960	-8.960	0.000
ZnCl+	4.999e-010	4.640e-010	-9.301	-9.333	-0.032
ZnOH+	8.851e-011	8.160e-011	-10.053	-10.088	-0.035
ZnHCO3+	1.666e-011	1.536e-011	-10.778	-10.814	-0.035
ZnF+	1.274e-011	1.174e-011	-10.895	-10.930	-0.035
ZnOHCl	7.669e-012	7.669e-012	-11.115	-11.115	0.000
ZnCl2	2.102e-012	2.102e-012	-11.677	-11.677	0.000
ZnCO3	1.643e-012	1.643e-012	-11.784	-11.784	0.000
Zn(SO4)2-2	1.026e-012	7.414e-013	-11.989	-12.130	-0.141
ZnNO3+	2.623e-013	2.419e-013	-12.581	-12.616	-0.035
Zn(OH)2	1.633e-013	1.633e-013	-12.787	-12.787	0.000
ZnSeO4	5.531e-014	5.531e-014	-13.257	-13.257	0.000
ZnCl3-	5.140e-015	4.771e-015	-14.289	-14.321	-0.032
Zn(OH)3-	1.120e-017	1.033e-017	-16.951	-16.986	-0.035
ZnCl4-2	9.128e-018	6.818e-018	-17.040	-17.166	-0.127
Zn(NO3)2	7.189e-020	7.189e-020	-19.143	-19.143	0.000
Zn(SeO4)2-2	4.288e-022	3.098e-022	-21.368	-21.509	-0.141
Zn(OH)4-2	7.185e-024	5.191e-024	-23.144	-23.285	-0.141
ZnS(HS)-	0.000e+000	0.000e+000	-279.700	-279.735	-0.035
Zn(HS)2	0.000e+000	0.000e+000	-279.823	-279.823	0.000
Zn(HS)3-	0.000e+000	0.000e+000	-419.235	-419.270	-0.035
ZnS(HS)2-2	0.000e+000	0.000e+000	-423.011	-423.152	-0.141
Zn(HS)4-2	0.000e+000	0.000e+000	-563.316	-563.457	-0.141

----------Saturation indices----------

Phase	SI	log IAP	log KT	
(Co(NH3)5Cl)(NO3)2	-348.34	-342.05	6.29	(Co(NH3)5Cl)(NO3)2
(Co(NH3)5Cl)Cl2	-339.99	-335.48	4.51	(Co(NH3)5Cl)Cl2
(Co(NH3)5OH2)Cl3	-347.22	-335.48	11.74	(Co(NH3)5OH2)Cl3
(Co(NH3)6)(NO3)3	-422.29	-404.36	17.93	(Co(NH3)6)(NO3)3
(Co(NH3)6)Cl3	-414.54	-394.51	20.03	(Co(NH3)6)Cl3
(NH4)2CrO4	-140.99	-140.59	0.40	(NH4)2CrO4
(NH4)2SeO4	-138.96	-138.51	0.45	(NH4)2SeO4
(UO2)3(PO4)2	-17.07	-66.47	-49.40	(UO2)3(PO4)2
(VO)3(PO4)2	-76.92	-102.02	-25.10	(VO)3(PO4)2
Acanthite	-127.70	-163.92	-36.22	Ag2S
Ag2CO3	-25.56	-36.65	-11.09	Ag2CO3
Ag2CrO4	-26.04	-37.63	-11.59	Ag2CrO4
Ag2HVO4	-22.54	-21.06	1.48	Ag2HVO4
Ag2MoO4	-22.68	-34.23	-11.55	Ag2MoO4
Ag2O	-27.67	-15.10	12.57	Ag2O
Ag2Se	-71.86	-120.56	-48.70	Ag2Se
Ag2SeO3	-33.64	-40.79	-7.15	Ag2SeO3
Ag2SeO4	-26.64	-35.55	-8.91	Ag2SeO4
Ag2SO4	-26.58	-31.40	-4.82	Ag2SO4
Ag3AsO3	-58.05	-55.89	2.16	Ag3AsO3
Ag3AsO4	-30.45	-33.24	-2.79	Ag3AsO4
Ag3H2VO5	-33.79	-28.61	5.18	Ag3H2VO5
Ag3PO4	-41.31	-58.90	-17.59	Ag3PO4
AgF:4H2O	-19.74	-18.69	1.05	AgF:4H2O
Agmetal	-14.81	-28.32	-13.51	Ag
AgVO3	-14.28	-13.51	0.77	AgVO3
Al(OH)3(am)	-4.39	6.41	10.80	Al(OH)3
Al2(MoO4)3	-46.95	-44.58	2.37	Al2(MoO4)3
Al2O3	-6.84	12.82	19.65	Al2O3
Al4(OH)10SO4	-13.38	9.32	22.70	Al4(OH)10SO4
AlAsO4:2H2O	-8.99	-4.19	4.80	AlAsO4:2H2O
AlOHSO4	-6.67	-9.90	-3.23	AlOHSO4
AlSb	-218.38	-152.75	65.62	AlSb
Alunite	-9.59	-10.99	-1.40	KAl3(SO4)2(OH)6
Anglesite	-6.10	-13.89	-7.79	PbSO4

Anhydrite	-2.77	-7.13	-4.36	CaSO4
Anilite	-149.01	-180.89	-31.88	Cu0.25Cu1.5S
Antlerite	-33.56	-24.77	8.79	Cu3(OH)4SO4
Aragonite	-4.07	-12.37	-8.30	CaCO3
Arsenolite	-130.22	-132.98	-2.76	As4O6
Artinite	-15.01	-5.41	9.60	MgCO3:Mg(OH)2:3H2O
As2O5	-27.90	-21.20	6.71	As2O5
Atacamite	-21.68	-14.29	7.39	Cu2(OH)3Cl
Autunite	-15.38	-59.31	-43.93	Ca(UO2)2(PO4)2
Avicennite	-6.90	-19.90	-13.00	Tl2O3
Azurite	-34.66	-51.57	-16.91	Cu3(OH)2(CO3)2
Ba(OH)2:8H2O	-24.10	0.29	24.39	Ba(OH)2:8H2O
Ba2V2O7:2H2O	-27.22	-11.35	15.87	Ba2V2O7:2H2O
Ba3(AsO4)2	-11.41	-20.32	-8.91	Ba3(AsO4)2
Ba3(VO4)2:4H2O	-44.00	-11.06	32.94	Ba3(VO4)2:4H2O
BaCrO4	-12.58	-22.25	-9.67	BaCrO4
BaF2	-16.17	-21.99	-5.82	BaF2
BaHPO4	-16.19	-35.96	-19.77	BaHPO4
BaMoO4	-11.88	-18.84	-6.96	BaMoO4
Barite	-6.04	-16.02	-9.98	BaSO4
BaS	-164.71	-148.53	16.18	BaS
BaSeO3	-27.23	-25.40	1.83	BaSeO3
BaSeO4	-12.70	-20.16	-7.46	BaSeO4
Bassetite	-34.46	-78.95	-44.48	Fe(UO2)2(PO4)2
Bianchite	-9.54	-11.30	-1.76	ZnSO4:6H2O
Birnessite	-2.96	15.13	18.09	MnO2
Bixbyite	-10.63	-11.28	-0.64	Mn2O3
BlaubleiI	-131.38	-155.55	-24.16	Cu0.9Cu0.2S
BlaubleiII	-139.96	-167.24	-27.28	Cu0.6Cu0.8S
Boehmite	-2.17	6.41	8.58	AlOOH
Breithauptite	-115.23	-133.75	-18.52	NiSb
Brochantite	-42.82	-27.60	15.22	Cu4(OH)6SO4
Brucite	-8.77	8.07	16.84	Mg(OH)2
Bunsenite	-7.81	4.64	12.45	NiO
Ca(VO3)2	-8.42	-2.76	5.66	Ca(VO3)2
Ca2V2O7	-11.08	6.42	17.50	Ca2V2O7
Ca2V2O7:2H2O	-15.13	6.42	21.55	Ca2V2O7:2H2O
Ca3(AsO4)2:4H2O	-15.97	6.33	22.30	Ca3(AsO4)2:4H2O
Ca3(PO4)2(beta)	-16.06	-44.98	-28.92	Ca3(PO4)2
Ca3(VO4)2	-23.36	15.60	38.96	Ca3(VO4)2
Ca3(VO4)2:4H2O	-24.26	15.60	39.86	Ca3(VO4)2:4H2O
Ca3Sb2	-433.77	-290.80	142.97	Ca3Sb2
Ca4H(PO4)3:3H2O	-24.98	-72.06	-47.08	Ca4H(PO4)3:3H2O
CaCrO4	-11.09	-13.36	-2.27	CaCrO4
CaHPO4	-7.80	-27.08	-19.27	CaHPO4
CaHPO4:2H2O	-8.08	-27.08	-19.00	CaHPO4:2H2O
Calcite	-3.89	-12.37	-8.48	CaCO3
Calomel	-25.32	-43.23	-17.91	Hg2Cl2
CaMoO4	-2.01	-9.96	-7.95	CaMoO4
Carnotite	-1.78	-1.55	0.23	KUO2VO4
CaSeO3:2H2O	-19.33	-16.51	2.81	CaSeO3:2H2O
CaSeO4:2H2O	-8.26	-11.28	-3.02	CaSeO4:2H2O
Cd(BO2)2	-18.74	-8.90	9.84	Cd(BO2)2
Cd(OH)2	-11.46	2.19	13.64	Cd(OH)2
Cd(OH)2(am)	-11.54	2.19	13.73	Cd(OH)2
Cd3(OH)2(SO4)2	-32.76	-26.05	6.71	Cd3(OH)2(SO4)2
Cd3(OH)4SO4	-32.30	-9.74	22.56	Cd3(OH)4SO4
Cd3(PO4)2	-33.34	-65.94	-32.60	Cd3(PO4)2
Cd4(OH)6SO4	-35.95	-7.55	28.40	Cd4(OH)6SO4
CdCl2	-14.44	-15.10	-0.66	CdCl2
CdCl2:1H2O	-13.40	-15.10	-1.69	CdCl2:1H2O
CdCl2:2.5H2O	-13.18	-15.10	-1.91	CdCl2:2.5H2O
CdF2	-18.88	-20.09	-1.21	CdF2

Cdmetal(alpha)	-52.87	-39.36	13.51	Cd
Cdmetal(gamma)	-52.97	-39.36	13.62	Cd
CdMoO4	-2.79	-16.94	-14.15	CdMoO4
CdOHCl	-9.99	-6.45	3.54	CdOHCl
CdSb	-135.85	-136.20	-0.35	CdSb
CdSe	-83.08	-103.28	-20.20	CdSe
CdSeO4:2H2O	-16.42	-18.27	-1.85	CdSeO4:2H2O
CdSO4	-13.95	-14.12	-0.17	CdSO4
CdSO4:1H2O	-12.39	-14.12	-1.73	CdSO4:1H2O
CdSO4:2.67H2O	-12.25	-14.12	-1.87	CdSO4:2.67H2O
Celestite	-4.06	-10.68	-6.62	SrSO4
Cerargyrite	-6.44	-16.19	-9.75	AgCl
Cerrusite	-6.00	-19.13	-13.13	PbCO3
CH4(g)	-146.68	-187.73	-41.05	CH4
Chalcanthite	-16.49	-19.13	-2.64	CuSO4:5H2O
Chalcedony	-2.69	-6.24	-3.55	SiO2
Chalcocite	-155.71	-190.63	-34.92	Cu2S
Chalcopyrite	-275.66	-310.93	-35.27	CuFeS2
Chrysotile	-20.46	11.74	32.20	Mg3Si2O5(OH)4
Cinnabar	-116.93	-162.62	-45.69	HgS
Claudetite	-129.91	-132.98	-3.06	As4O6
Clausthalite	-75.94	-103.04	-27.10	PbSe
Co(BO2)2	-40.95	-13.88	27.07	Co(BO2)2
Co(OH)2	-15.89	-2.79	13.09	Co(OH)2
Co(OH)3	-12.11	-14.42	-2.31	Co(OH)3
CO2(g)	-3.40	-21.55	-18.15	CO2
Co3(AsO4)2	-42.61	-29.58	13.03	Co3(AsO4)2
Co3(PO4)2	-46.20	-80.89	-34.69	Co3(PO4)2
Co3O4	-21.14	-31.64	-10.50	Co3O4
CoCl2	-28.35	-20.08	8.27	CoCl2
CoCl2:6H2O	-22.62	-20.08	2.54	CoCl2:6H2O
CoCO3	-14.37	-24.35	-9.98	CoCO3
CoF2	-23.47	-25.07	-1.60	CoF2
CoF3	-46.38	-47.84	-1.46	CoF3
CoFe2O4	-4.70	-8.23	-3.53	CoFe2O4
CoHPO4	-19.99	-39.05	-19.06	CoHPO4
CoMoO4	-14.17	-21.93	-7.76	CoMoO4
CoO	-16.38	-2.79	13.59	CoO
CoS(alpha)	-144.18	-151.62	-7.44	CoS
CoS(beta)	-140.55	-151.62	-11.07	CoS
CoSe	-92.06	-108.26	-16.20	CoSe
CoSeO3	-29.80	-28.48	1.32	CoSeO3
CoSeO4:6H2O	-21.72	-23.25	-1.53	CoSeO4:6H2O
CoSO4	-21.90	-19.10	2.80	CoSO4
CoSO4:6H2O	-16.63	-19.10	-2.47	CoSO4:6H2O
Cotunnite	-10.08	-14.86	-4.78	PbCl2
Covellite	-129.35	-151.65	-22.30	CuS
Cr(OH)2	-46.12	-35.30	10.82	Cr(OH)2
Cr(OH)3	-18.81	-17.48	1.34	Cr(OH)3
Cr(OH)3(am)	-16.73	-17.48	-0.75	Cr(OH)3
Cr2O3	-32.60	-34.96	-2.36	Cr2O3
CrCl2	-66.68	-52.59	14.09	CrCl2
CrCl3	-58.52	-43.40	15.11	CrCl3
CrF3	-39.56	-50.89	-11.34	CrF3
Cristobalite	-2.89	-6.24	-3.35	SiO2
Crmetal	-107.33	-76.85	30.48	Cr
CrO3	-19.33	-22.54	-3.21	CrO3
Cryolite	-18.89	-52.73	-33.84	Na3AlF6
Cu(OH)2	-11.50	-2.82	8.67	Cu(OH)2
Cu(SbO3)2	-34.00	11.21	45.21	Cu(SbO3)2
Cu2(OH)3NO3	-26.82	-17.57	9.25	Cu2(OH)3NO3
Cu2Sb:3H2O	-148.01	-182.89	-34.88	Cu2Sb:3H2O
Cu2Se(alpha)	-101.47	-147.27	-45.80	Cu2Se

Cu2SO4	-56.17	-58.12	-1.95	Cu2SO4
Cu3(AsO4)2:2H2O	-35.76	-29.66	6.10	Cu3(AsO4)2:2H2O
Cu3(PO4)2	-44.12	-80.97	-36.85	Cu3(PO4)2
Cu3(PO4)2:3H2O	-45.85	-80.97	-35.12	Cu3(PO4)2:3H2O
Cu3Sb	-179.28	-221.88	-42.59	Cu3Sb
Cu3Se2	-192.07	-255.56	-63.49	Cu3Se2
CuCO3	-12.87	-24.37	-11.50	CuCO3
CuCrO4	-19.92	-25.36	-5.44	CuCrO4
CuF	-27.14	-32.04	-4.91	CuF
CuF2	-26.22	-25.10	1.12	CuF2
CuF2:2H2O	-20.55	-25.10	-4.55	CuF2:2H2O
Cumetal	-32.92	-41.68	-8.76	Cu
CuMoO4	-8.88	-21.96	-13.08	CuMoO4
CuOCuSO4	-32.25	-21.95	10.30	CuOCuSO4
Cupricferrite	-14.25	-8.26	5.99	CuFe2O4
Cuprite	-40.40	-41.81	-1.41	Cu2O
Cuprousferrite	-14.71	-23.62	-8.92	CuFeO2
CuSe	-75.19	-108.29	-33.10	CuSe
CuSe2	-138.84	-172.21	-33.37	CuSe2
CuSeO3:2H2O	-29.02	-28.51	0.51	CuSeO3:2H2O
CuSeO4:5H2O	-20.84	-23.28	-2.44	CuSeO4:5H2O
CuSO4	-22.07	-19.13	2.94	CuSO4
Diaspore	-0.47	6.41	6.87	AlOOH
Djurleite	-154.14	-188.06	-33.92	Cu0.066Cu1.868S
Dolomite(disordered)	-9.32	-25.86	-16.54	CaMg(CO3)2
Dolomite(ordered)	-8.77	-25.86	-17.09	CaMg(CO3)2
Epsomite	-6.11	-8.24	-2.13	MgSO4:7H2O
FCO3Apatite	-25.53	-139.93	-114.40	Ca9.316Na0.36Mg0.144(PO4)4.8(CO3)1.2F2.48
Fe(OH)2	-24.02	-10.46	13.56	Fe(OH)2
Fe(OH)2.7Cl.3	-2.27	-5.31	-3.04	Fe(OH)2.7Cl.3
Fe(VO3)2	-18.67	-22.39	-3.72	Fe(VO3)2
Fe2(OH)4SeO3	-32.68	-31.13	1.55	Fe2(OH)4SeO3
Fe2(SeO3)3:2H2O	-61.89	-82.51	-20.63	Fe2(SeO3)3:2H2O
Fe2(SO4)3	-50.62	-54.36	-3.73	Fe2(SO4)3
Fe3(OH)8	-36.12	-15.90	20.22	Fe3(OH)8
FeAsO4:2H2O	-13.72	-13.32	0.40	FeAsO4:2H2O
FeCr2O4	-52.62	-45.42	7.20	FeCr2O4
FeMoO4	-19.50	-29.59	-10.09	FeMoO4
Ferrihydrite	-5.91	-2.72	3.19	Fe(OH)3
Ferroselite	-161.25	-179.84	-18.60	FeSe2
FeS(ppt)	-156.33	-159.28	-2.95	FeS
FeSe	-104.92	-115.92	-11.00	FeSe
Fluorite	-2.60	-13.10	-10.50	CaF2
Galena	-132.43	-146.40	-13.97	PbS
Gibbsite	-1.88	6.41	8.29	Al(OH)3
Goethite	-3.21	-2.72	0.49	FeOOH
Goslarite	-9.29	-11.30	-2.01	ZnSO4:7H2O
Greenalite	-64.66	-43.85	20.81	Fe3Si2O5(OH)4
Greenockite	-132.28	-146.64	-14.36	CdS
Greigite	-566.16	-611.20	-45.03	Fe3S4
Gummite	-5.66	2.01	7.67	UO3
Gypsum	-2.52	-7.13	-4.61	CaSO4:2H2O
H-Autunite	-20.55	-68.49	-47.93	H2(UO2)2(PO4)2
H-Jarosite	-28.67	-40.77	-12.10	(H3O)Fe3(SO4)2(OH)6
H2MoO4	-6.26	-19.13	-12.88	H2MoO4
H2S(g)	-140.82	-148.83	-8.01	H2S
H2Se(g)	-100.50	-105.46	-4.96	H2Se
H2Sn(OH)6	-4.55	-28.08	-23.53	H2Sn(OH)6
Halite	-7.68	-6.08	1.60	NaCl
Halloysite	-9.23	0.34	9.57	Al2Si2O5(OH)4
Hausmannite	-22.67	38.36	61.03	Mn3O4
Hematite	-4.02	-5.44	-1.42	Fe2O3

Hercynite	-20.54	2.36	22.89	FeAl2O4
Hg(CH3)2(g)	-315.55	-389.25	-73.71	Hg(CH3)2
Hg(g)	-25.87	-33.75	-7.87	Hg
Hg(OH)2	-10.30	-13.79	-3.50	Hg(OH)2
Hg2(g)	-52.54	-67.49	-14.96	Hg2
Hg2(OH)2	-31.21	-25.95	5.26	Hg2(OH)2
Hg2CO3	-31.45	-47.50	-16.05	Hg2CO3
Hg2CrO4	-39.78	-48.48	-8.70	Hg2CrO4
Hg2F2	-37.86	-48.23	-10.36	Hg2F2
Hg2HPO4	-37.43	-62.20	-24.77	Hg2HPO4
Hg2S	-163.10	-174.77	-11.68	Hg2S
Hg2SeO3	-46.98	-51.64	-4.66	Hg2SeO3
Hg2SO4	-36.12	-42.25	-6.13	Hg2SO4
Hg3O2CO3	-33.25	-62.93	-29.68	Hg3O2CO3
HgCl(g)	-41.11	-21.62	19.50	HgCl
HgCl2	-9.82	-31.08	-21.26	HgCl2
HgF(g)	-56.79	-24.11	32.68	HgF
HgF2(g)	-48.64	-36.07	12.57	HgF2
Hgmetal(l)	-20.29	-33.75	-13.45	Hg
HgSe	-63.56	-119.26	-55.69	HgSe
HgSeO3	-27.05	-39.48	-12.43	HgSeO3
HgSO4	-20.68	-30.10	-9.42	HgSO4
Hinsdalite	-28.42	-30.92	-2.50	PbAl3PO4SO4(OH)6
Huntite	-22.85	-52.82	-29.97	CaMg3(CO3)4
Hydrocerrusite	-17.07	-35.84	-18.77	Pb3(OH)2(CO3)2
Hydromagnesite	-37.09	-45.85	-8.77	Mg5(CO3)4(OH)2:4H2O
Hydroxylapatite	-18.55	-62.88	-44.33	Ca5(PO4)3OH
Hydroxylpyromorphite	-33.87	-96.66	-62.79	Pb5(PO4)3OH
K-Alum	-18.63	-23.80	-5.17	KAl(SO4)2:12H2O
K-Autunite	-15.44	-63.68	-48.24	K2(UO2)2(PO4)2
K-Jarosite	-23.57	-38.37	-14.80	KFe3(SO4)2(OH)6
K2Cr2O7	-23.03	-40.27	-17.24	K2Cr2O7
K2CrO4	-17.22	-17.73	-0.51	K2CrO4
K2MoO4	-17.59	-14.33	3.26	K2MoO4
K2SeO4	-14.92	-15.65	-0.73	K2SeO4
Kaolinite	-7.09	0.34	7.43	Al2Si2O5(OH)4
Langite	-45.08	-27.60	17.49	Cu4(OH)6SO4:H2O
Larnakite	-11.03	-11.47	-0.43	PbO:PbSO4
Laurionite	-6.84	-6.22	0.62	PbOHCl
Lepidocrocite	-4.09	-2.72	1.37	FeOOH
Lime	-23.52	9.18	32.70	CaO
Litharge	-10.27	2.42	12.69	PbO
Mackinawite	-155.68	-159.28	-3.60	FeS
Maghemite	-11.83	-5.44	6.39	Fe2O3
Magnesioferrite	-14.23	2.63	16.86	Fe2MgO4
Magnesite	-6.02	-13.48	-7.46	MgCO3
Magnetite	-19.30	-15.90	3.40	Fe3O4
Malachite	-21.89	-27.20	-5.31	Cu2(OH)2CO3
Manganite	-5.63	19.71	25.34	MnOOH
Massicot	-10.47	2.42	12.89	PbO
Matlockite	-8.39	-17.36	-8.97	PbClF
Melanothallite	-26.36	-20.11	6.26	CuCl2
Melanterite	-24.56	-26.77	-2.21	FeSO4:7H2O
Metacinnabar	-117.53	-162.62	-45.09	HgS
Mg(OH)2(active)	-10.72	8.07	18.79	Mg(OH)2
Mg(VO3)2	-15.14	-3.86	11.28	Mg(VO3)2
Mg2Sb3	-432.17	-357.49	74.68	Mg2Sb3
Mg2V2O7	-22.15	4.21	26.36	Mg2V2O7
Mg3(PO4)2	-25.02	-48.30	-23.28	Mg3(PO4)2
MgCr2O4	-43.09	-26.88	16.20	MgCr2O4
MgCrO4	-19.85	-14.47	5.38	MgCrO4
MgF2	-6.08	-14.21	-8.13	MgF2
MgHPO4:3H2O	-10.01	-28.18	-18.18	MgHPO4:3H2O

MgMoO4	-9.21	-11.06	-1.85	MgMoO4
MgSeO3:6H2O	-20.68	-17.62	3.06	MgSeO3:6H2O
MgSeO4:6H2O	-11.18	-12.38	-1.20	MgSeO4:6H2O
Minium	-24.71	48.81	73.52	Pb3O4
Mirabilite	-10.06	-11.18	-1.11	Na2SO4:10H2O
Mn(VO3)2	-17.89	-12.99	4.90	Mn(VO3)2
Mn2(SO4)3	-54.48	-60.20	-5.71	Mn2(SO4)3
Mn2Sb	-243.14	-182.06	61.08	Mn2Sb
Mn3(AsO4)2:8H2O	-36.88	-24.38	12.50	Mn3(AsO4)2:8H2O
Mn3(PO4)2	-51.86	-75.69	-23.83	Mn3(PO4)2
MnCl2:4H2O	-21.06	-18.34	2.72	MnCl2:4H2O
MnHPO4	-11.91	-37.31	-25.40	MnHPO4
MnS(grn)	-150.06	-149.89	0.17	MnS
MnS(pnk)	-153.23	-149.89	3.34	MnS
MnSb	-161.89	-164.80	-2.91	MnSb
MnSe	-110.02	-106.52	3.50	MnSe
MnSeO3	-27.88	-26.75	1.13	MnSeO3
MnSeO3:2H2O	-27.73	-26.75	0.98	MnSeO3:2H2O
MnSeO4:5H2O	-19.46	-21.51	-2.05	MnSeO4:5H2O
MnSO4	-19.95	-17.37	2.58	MnSO4
Monteponite	-12.92	2.19	15.10	CdO
Montroydite	-10.15	-13.79	-3.64	HgO
MoO3	-11.13	-19.13	-8.00	MoO3
Morenosite	-9.52	-11.67	-2.14	NiSO4:7H2O
MoS2	-288.07	-358.33	-70.26	MoS2
Na-Autunite	-15.95	-63.36	-47.41	Na2(UO2)2(PO4)2
Na-Jarosite	-27.01	-38.21	-11.20	NaFe3(SO4)2(OH)6
Na2Cr2O7	-30.05	-39.95	-9.90	Na2Cr2O7
Na2CrO4	-20.34	-17.41	2.93	Na2CrO4
Na2Mo2O7	-16.54	-33.14	-16.60	Na2Mo2O7
Na2MoO4	-15.49	-14.00	1.49	Na2MoO4
Na2MoO4:2H2O	-15.23	-14.00	1.22	Na2MoO4:2H2O
Na2SeO3:5H2O	-30.86	-20.56	10.30	Na2SeO3:5H2O
Na2SeO4	-16.61	-15.33	1.28	Na2SeO4
Na3Sb	-245.92	-151.47	94.45	Na3Sb
Na3VO4	-34.95	1.73	36.68	Na3VO4
Na4V2O7	-39.08	-1.68	37.40	Na4V2O7
Nantokite	-22.82	-29.55	-6.73	CuCl
NaSb	-138.22	-115.05	23.17	NaSb
Natron	-15.11	-16.42	-1.31	Na2CO3:10H2O
NaVO3	-7.26	-3.40	3.86	NaVO3
Nesquehonite	-8.81	-13.48	-4.67	MgCO3:3H2O
Ni(OH)2	-8.16	4.64	12.79	Ni(OH)2
Ni3(AsO4)2:8H2O	-22.98	-7.28	15.70	Ni3(AsO4)2:8H2O
Ni3(PO4)2	-27.29	-58.59	-31.30	Ni3(PO4)2
Ni4(OH)6SO4	-29.76	2.24	32.00	Ni4(OH)6SO4
NiCO3	-10.04	-16.91	-6.87	NiCO3
NiMoO4	-3.35	-14.49	-11.14	NiMoO4
Ningyoite	-39.74	-93.65	-53.91	CaU(PO4)2:2H2O
NiS(alpha)	-138.59	-144.19	-5.60	NiS
NiS(beta)	-133.09	-144.19	-11.10	NiS
NiS(gamma)	-131.39	-144.19	-12.80	NiS
NiSe	-83.13	-100.83	-17.70	NiSe
NiSeO3:2H2O	-23.87	-21.05	2.81	NiSeO3:2H2O
NiSeO4:6H2O	-14.30	-15.82	-1.52	NiSeO4:6H2O
Nsutite	-2.37	15.13	17.50	MnO2
O2(g)	-0.00	83.09	83.09	O2
Orpiment	-451.90	-512.96	-61.07	As2S3
Otavite	-7.36	-19.36	-12.00	CdCO3
Pb(BO2)2	-15.19	-8.67	6.52	Pb(BO2)2
Pb(OH)2	-5.73	2.42	8.15	Pb(OH)2
Pb10(OH)6O(CO3)6	-96.34	-105.10	-8.76	Pb10(OH)6O(CO3)6
Pb2(OH)3Cl	-12.59	-3.80	8.79	Pb2(OH)3Cl

Pb2O(OH)2	-21.35	4.84	26.19	Pb2O(OH)2
Pb2O3	-14.65	46.39	61.04	Pb2O3
Pb2OCO3	-16.15	-16.71	-0.56	Pb2OCO3
Pb2V2O7	-5.19	-7.09	-1.90	Pb2V2O7
Pb3(AsO4)2	-19.73	-13.93	5.80	Pb3(AsO4)2
Pb3(PO4)2	-21.72	-65.25	-43.53	Pb3(PO4)2
Pb3(VO4)2	-10.81	-4.67	6.14	Pb3(VO4)2
Pb3O2CO3	-25.31	-14.29	11.02	Pb3O2CO3
Pb3O2SO4	-19.73	-9.04	10.69	Pb3O2SO4
Pb4(OH)6SO4	-27.72	-6.62	21.10	Pb4(OH)6SO4
Pb4O3SO4	-28.50	-6.62	21.88	Pb4O3SO4
PbCrO4	-7.52	-20.12	-12.60	PbCrO4
PbF2	-12.42	-19.86	-7.44	PbF2
PbHPO4	-10.03	-33.83	-23.81	PbHPO4
Pbmetal	-43.37	-39.12	4.25	Pb
PbMoO4	-1.09	-16.71	-15.62	PbMoO4
PbO:0.3H2O	-10.56	2.42	12.98	PbO:0.33H2O
PbSeO4	-11.19	-18.03	-6.84	PbSeO4
Periclase	-13.51	8.07	21.58	MgO
Phosgenite	-14.18	-33.99	-19.81	PbCl2:PbCO3
Plattnerite	-5.63	43.97	49.60	PbO2
Plumbgummite	-18.07	-50.86	-32.79	PbAl3(PO4)2(OH)5:H2O
Portlandite	-13.63	9.18	22.80	Ca(OH)2
Przhevalskite	-21.70	-66.07	-44.37	Pb(UO2)2(PO4)2
Pyrite	-248.06	-266.57	-18.51	FeS2
Pyrochroite	-16.25	-1.06	15.19	Mn(OH)2
Pyrolusite	-0.90	40.48	41.38	MnO2
Pyromorphite	-20.87	-105.30	-84.43	Pb5(PO4)3Cl
Quartz	-2.24	-6.24	-4.00	SiO2
Realgar	-183.09	-202.84	-19.75	AsS
Retgersite	-9.63	-11.67	-2.04	NiSO4:6H2O
Rhodochrosite	-12.03	-22.61	-10.58	MnCO3
Rutherfordine	-5.04	-19.54	-14.50	UO2CO3
Saleeite	-16.77	-60.42	-43.65	Mg(UO2)2(PO4)2
Sb(OH)3	-27.42	-34.53	-7.11	Sb(OH)3
Sb2O4	-30.92	-27.51	3.40	Sb2O4
Sb2O5	-24.92	-34.59	-9.67	Sb2O5
Sb2Se3	-317.69	-385.45	-67.76	Sb2Se3
Sb4O6(cubic)	-119.85	-138.12	-18.26	Sb4O6
Sb4O6(orth)	-120.21	-138.12	-17.90	Sb4O6
SbCl3	-61.03	-60.46	0.57	SbCl3
SbF3	-57.72	-67.95	-10.23	SbF3
Sbmetal	-85.16	-96.85	-11.69	Sb
SbO2	-10.24	-38.07	-27.82	SbO2
Schoepite	-3.98	2.01	5.99	UO2(OH)2:H2O
Semetal(am)	-56.81	-63.92	-7.11	Se
Semetal(hex	-56.21	-63.92	-7.71	Se
Senarmontite	-56.69	-69.06	-12.37	Sb2O3
SeO2	-25.82	-25.69	0.12	SeO2
SeO3	-41.50	-20.45	21.04	SeO3
Sepiolite	-18.32	-2.56	15.76	Mg2Si3O7.5OH:3H2O
Sepiolite(A)	-21.34	-2.56	18.78	Mg2Si3O7.5OH:3H2O
Siderite	-21.77	-32.01	-10.24	FeCO3
SiO2(am-gel)	-3.53	-6.24	-2.71	SiO2
SiO2(am-ppt)	-3.50	-6.24	-2.74	SiO2
Smithsonite	-6.54	-16.54	-10.00	ZnCO3
Sn(OH)2	-44.99	-50.42	-5.43	Sn(OH)2
Sn(OH)4	-5.80	-28.08	-22.28	Sn(OH)4
Sn(SO4)2	-45.48	-60.69	-15.21	Sn(SO4)2
SnCl2	-58.43	-67.71	-9.28	SnCl2
Snmetal(wht)	-89.64	-91.97	-2.33	Sn
SnO	-45.51	-50.42	-4.91	SnO
SnO2	0.90	-28.08	-28.97	SnO2

SnS	-180.14	-199.25	-19.11	SnS
SnS2	-268.28	-325.73	-57.45	SnS2
SnSe	-125.39	-155.89	-30.49	SnSe
SnSe2	-173.89	-239.01	-65.12	SnSe2
SnSO4	-9.76	-66.73	-56.97	SnSO4
Sphalerite	-132.37	-143.82	-11.45	ZnS
Spinel	-15.96	20.89	36.85	MgAl2O4
Sr-Autunite	-18.40	-62.86	-44.46	Sr(UO2)2(PO4)2
SrCrO4	-12.26	-16.91	-4.65	SrCrO4
SrF2	-8.07	-16.65	-8.58	SrF2
SrHPO4	-11.33	-30.63	-19.30	SrHPO4
SrSeO3	-22.36	-20.06	2.30	SrSeO3
SrSeO4	-10.43	-14.83	-4.40	SrSeO4
Stibnite	-465.07	-515.53	-50.46	Sb2S3
Strengite	-12.57	-38.97	-26.40	FePO4:2H2O
Strontianite	-6.65	-15.92	-9.27	SrCO3
Sulfur	-105.14	-107.28	-2.14	S
Tenorite	-10.47	-2.82	7.64	CuO
Thenardite	-11.50	-11.18	0.32	Na2SO4
Thermonatrite	-17.06	-16.42	0.64	Na2CO3:H2O
Tl(OH)3	-4.51	-9.95	-5.44	Tl(OH)3
Tl2CO3	-29.60	-33.44	-3.84	Tl2CO3
Tl2CrO4	-22.41	-34.42	-12.01	Tl2CrO4
Tl2MoO4	-23.03	-31.02	-7.99	Tl2MoO4
Tl2O	-38.98	-11.89	27.09	Tl2O
Tl2S	-153.52	-160.71	-7.19	Tl2S
Tl2Se	-99.25	-117.35	-18.10	Tl2Se
Tl2SeO4	-28.24	-32.34	-4.10	Tl2SeO4
Tl2SO4	-24.41	-28.19	-3.79	Tl2SO4
TlCl	-10.85	-14.59	-3.74	TlCl
Tlmetal	-32.39	-26.72	5.68	Tl
TlNO3	-16.26	-17.87	-1.61	TlNO3
TlOH	-18.86	-5.94	12.92	TlOH
Torbernite	-26.03	-71.31	-45.28	Cu(UO2)2(PO4)2
Tsumebite	-24.44	-34.23	-9.79	Pb2CuPO4(OH)3:3H2O
Tyuyamunite	-2.81	1.27	4.08	Ca(UO2)2(VO4)2
U(HPO4)2:4H2O	-51.24	-102.83	-51.58	U(HPO4)2:4H2O
U3O8	-28.95	-7.86	21.08	U3O8
U3Sb4	-879.99	-727.60	152.38	U3Sb4
U4O9	-76.71	-79.73	-3.02	U4O9
UF4	-45.34	-74.87	-29.54	UF4
UF4:2.5H2O	-42.16	-74.87	-32.72	UF4:2.5H2O
UO2(am)	-31.25	-30.32	0.93	UO2
UO2(NO3)2	-33.99	-21.84	12.15	UO2(NO3)2
UO2(NO3)2:2H2O	-26.69	-21.84	4.85	UO2(NO3)2:2H2O
UO2(NO3)2:3H2O	-25.23	-21.84	3.39	UO2(NO3)2:3H2O
UO2(NO3)2:6H2O	-23.89	-21.84	2.05	UO2(NO3)2:6H2O
UO2(OH)2(beta)	-3.60	2.01	5.61	UO2(OH)2
UO2HPO4	-10.02	-34.24	-24.23	UO2HPO4
UO2SeO4:4H2O	-16.19	-18.44	-2.25	UO2SeO4:4H2O
UO3	-5.69	2.01	7.70	UO3
Uramphite	-134.79	-186.54	-51.75	(NH4)2(UO2)2(PO4)2
Uraninite	-25.65	-30.32	-4.67	UO2
Uranocircite	-23.56	-68.19	-44.63	Ba(UO2)2(PO4)2
USb2	-345.89	-316.31	29.58	USb2
V(OH)3	-32.50	-24.91	7.59	V(OH)3
V2O5	-10.57	-11.93	-1.36	V2O5
V3O5	-72.89	-71.05	1.84	V3O5
V4O7	-88.07	-80.89	7.19	V4O7
V6O13	-58.03	-118.89	-60.86	V6O13
Valentinite	-60.58	-69.06	-8.48	Sb2O3
VCl2	-81.84	-62.97	18.87	VCl2
VCl3	-74.27	-50.84	23.43	VCl3

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      VF4              -69.32  -54.39   14.93  VF4
      Vivianite        -67.89 -103.89  -36.00  Fe3(PO4)2:8H2O
      Vmetal          -131.25  -87.23   44.03  V
      VO               -60.44  -45.68   14.76  VO
      VO(OH)2          -14.99   -9.84    5.15  VO(OH)2
      VO2Cl            -17.45  -14.61    2.84  VO2Cl
      VOCl             -44.71  -33.55   11.15  VOCl
      VOCl2            -39.88  -27.12   12.76  VOCl2
      VOSO4            -29.75  -26.14    3.61  VOSO4
      Witherite        -12.69  -21.26   -8.57  BaCO3
      Wurtzite        -134.87 -143.82   -8.95  ZnS
      Zincite           -6.33    5.01   11.33  ZnO
      Zincosite        -15.23  -11.30    3.93  ZnSO4
      Zn(BO2)2         -14.37   -6.08    8.29  Zn(BO2)2
      Zn(NO3)2:6H2O    -22.16  -18.84    3.32  Zn(NO3)2:6H2O
      Zn(OH)2           -7.19    5.01   12.20  Zn(OH)2
      Zn(OH)2(am)       -7.47    5.01   12.47  Zn(OH)2
      Zn(OH)2(beta)     -6.75    5.01   11.75  Zn(OH)2
      Zn(OH)2(epsilon)  -6.53    5.01   11.53  Zn(OH)2
      Zn(OH)2(gamma)    -6.73    5.01   11.73  Zn(OH)2
      Zn2(OH)2SO4      -13.79   -6.29    7.50  Zn2(OH)2SO4
      Zn2(OH)3Cl       -13.82    1.37   15.19  Zn2(OH)3Cl
      Zn3(AsO4)2:2.5H2O -19.82   -6.17   13.65  Zn3(AsO4)2:2.5H2O
      Zn3(PO4)2:4H2O   -22.07  -57.49  -35.42  Zn3(PO4)2:4H2O
      Zn3O(SO4)2       -36.51  -17.59   18.91  Zn3O(SO4)2
      Zn4(OH)6SO4      -24.68    3.72   28.40  Zn4(OH)6SO4
      Zn5(OH)8Cl2      -30.75    7.75   38.50  Zn5(OH)8Cl2
      ZnCl2            -19.33  -12.28    7.05  ZnCl2
      ZnCO3:1H2O        -6.28  -16.54  -10.26  ZnCO3:1H2O
      ZnF2             -16.74  -17.27   -0.53  ZnF2
      Znmetal          -62.33  -36.54   25.79  Zn
      ZnMoO4            -4.00  -14.13  -10.13  ZnMoO4
      ZnO(active)       -6.18    5.01   11.19  ZnO
      ZnS(am)         -134.77 -143.82   -9.05  ZnS
      ZnSb            -144.40 -133.38   11.01  ZnSb
      ZnSe             -86.06 -100.46  -14.40  ZnSe
      ZnSeO4:6H2O      -13.93  -15.45   -1.52  ZnSeO4:6H2O
      ZnSO4:1H2O       -10.66  -11.30   -0.64  ZnSO4:1H2O

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End of simulation.
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Reading input data for simulation 10.
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End of run.
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APPENDIX B

(MASS BALANCE /PHREEQC MODEL OUTPUT FOR GCP CORAKOGLU WRD, MEDIAN LOADING RATES, PIT RUN WASTE, PORE WATER)

(Yellow highlights indicate solution concentrations that exceed either EU, Canadian or Turkish regulations)

YEAR		pH	S(6)	Cl	F	N	Alkalinity
TURKISH	mg/L	6.5 to 9	250	250	1.5		
EU	mg/L	6.5 to 9.5	250	250	1.5		
CANADA	mg/L	6.5 to 9		230			
1	MAX	9.37	33.5	344.4	0.603	0.073	5
1	MIN	9.37	33.5	344.4	0.603	0.073	5
2	MAX	9.42	40.1	412.0	0.719	0.086	3
2	MIN	9.37	33.5	345.2	0.603	0.073	3
3	MAX	9.45	47.0	470.7	0.822	0.099	4
3	MIN	9.42	40.1	412.4	0.720	0.087	3
4	MAX	9.47	51.6	508.7	0.888	0.106	4
4	MIN	9.45	47.0	471.2	0.822	0.099	3
5	MAX	9.48	55.3	537.10	0.937	0.112	4
5	MIN	9.46	51.7	509.20	0.888	0.106	4
10	MAX	9.49	67.12	624.13	1.087	0.129	4
10	MIN	9.49	65.31	611.37	1.065	0.127	4
15	MAX	9.49	74.64	678.83	1.182	0.140	4
15	MIN	9.49	73.35	669.62	1.166	0.1380	4
20	MAX	9.49	81.49	729.31	1.3E+00	1.5E-01	4.4
20	MIN	9.49	80.21	720.131	1.3E+00	1.5E-01	4.4
25	MAX	9.50	88.35	780.255	1.4E+00	1.6E-01	4.6
25	MIN	9.50	87.09	771.108	1.3E+00	1.6E-01	4.6
30	MAX	9.51	95.25	831.834	1.4E+00	1.7E-01	4.9
30	MIN	9.51	93.99	822.653	1.4E+00	1.7E-01	4.8
35	MAX	9.51	102.21	884.194	1.5E+00	1.8E-01	5.1
35	MIN	9.51	100.96	875.048	1.5E+00	1.8E-01	5.0
40	MAX	9.52	109.26	937.55	1.6E+00	1.9E-01	5.3
40	MIN	9.51	108.01	928.33	1.6E+00	1.9E-01	5.2
ALL	MAX	9.52	109	937.55	1.627	0.1912	5
ALL	MIN	9.37	33	344.39	6.0E-01	7.3E-02	3.1E+00

YEAR		Ag	Al	As	B	Ba	Ca
TURKISH	mg/L		0.2	0.01	1		
EU	mg/L		0.2	0.01	1		
CANADA	mg/L		0.75				
1	MAX	0.0	1.1E-02	0.0470	0.09186	0.0	166
1	MIN	0.0	1.1E-02	0.0470	0.09186	0.0	166
2	MAX	0.0	1.2E-02	0.0563	0.10976	0.0	198
2	MIN	0.0	1.1E-02	0.0470	0.09191	0.0	166
3	MAX	0.0	1.3E-02	0.0659	0.12660	0.0	226
3	MIN	0.0	1.2E-02	0.0563	0.10984	0.0	198
4	MAX	0.0	1.4E-02	0.0730	0.13808	0.0	244
4	MIN	0.0	1.3E-02	0.0660	0.12670	0.0	2.3E+02
5	MAX	0.0	1.4E-02	0.0790	0.14709	0.0	2.6E+02
5	MIN	0.0	1.4E-02	0.0731	0.13820	0.0	2.4E+02
10	MAX	0.0	1.5E-02	0.09879	0.17576	0.0	3.0E+02
10	MIN	0.0	1.5E-02	0.09579	0.17148	0.0	2.9E+02
15	MAX	0.0	1.5E-02	0.11127	0.19383	0.0	3.2E+02
15	MIN	0.0	1.5E-02	0.10913	0.19075	0.0	3.2E+02
20	MAX	0.0	1.5E-02	1.2E-01	0.21036	0.0	3.5E+02
20	MIN	0.0	1.5E-02	1.2E-01	0.20731	0.0	3.4E+02
25	MAX	0.0	1.5E-02	1.3E-01	0.22700	0.0	3.7E+02
25	MIN	0.0	1.5E-02	1.3E-01	2.2E-01	0.0	3.7E+02
30	MAX	0.0	1.6E-02	1.5E-01	2.4E-01	0.0	4.0E+02
30	MIN	0.0	1.6E-02	1.4E-01	2.4E-01	0.0	3.9E+02
35	MAX	0.0	1.6E-02	1.6E-01	2.6E-01	0.0	4.2E+02
35	MIN	0.0	1.6E-02	1.5E-01	2.6E-01	0.0	4.2E+02
40	MAX	0.00	1.6E-02	1.7E-01	2.8E-01	0.0	4.5E+02
40	MIN	0.00	1.6E-02	1.7E-01	2.8E-01	0.0	4.4E+02
ALL	MAX	0.0	1.6E-02	1.7E-01	0.278076	0.0	446.70939
ALL	MIN	3.51E-09	1.1E-02	4.7E-02	0.091858	0.0	1.7E+02

YEAR		Cd	Co	Cr	Cu	Fe	Hg
TURKISH	mg/L	0.005		0.05	2	0.2	0.001
EU	mg/L	0.005		0.05	2	0.2	0.001
CANADA	mg/L	0.0005			0.005		
1	MAX	0.0	2.7E-16	4.6E-05	6.0E-12	0.0	2.2E-10
1	MIN	0.0	2.7E-16	4.6E-05	6.0E-12	0.0	2.2E-10
2	MAX	0.0	2.7E-16	4.9E-05	1.8E-11	0.0	1.6E-06
2	MIN	0.0	2.5E-16	4.6E-05	6.2E-12	0.0	2.1E-10
3	MAX	0.0	2.4E-16	5.2E-05	1.8E-11	0.0	1.6E-06
3	MIN	0.0	6.2E-19	4.9E-05	7.5E-12	0.0	1.9E-10
4	MAX	0.0	2.3E-16	5.4E-05	1.5E-11	0.0	7.7E-06
4	MIN	0.0	5.9E-19	5.2E-05	1.5E-11	0.0	1.5E-06
5	MAX	0.0	2.24E-16	5.5E-05	1.5E-11	0.0	1.2E-05
5	MIN	0.0	2.2E-16	5.4E-05	1.5E-11	0.0	7.7E-06
10	MAX	0.0	2.2E-16	5.7E-05	1.9E-11	0.0	1.5E-05
10	MIN	0.0	5.6E-19	5.7E-05	1.7E-11	0.0	1.3E-05
15	MAX	0.0	2.2E-16	5.7E-05	3.0E-11	0.0	2.4E-05
15	MIN	0.0	5.0E-18	5.7E-05	2.7E-11	0.0	2.2E-05
20	MAX	0.0	2.2E-16	5.8E-05	3.4E-11	0.0	3.1E-05
20	MIN	0.0	5.2E-18	5.8E-05	3.3E-11	0.0	3.0E-05
25	MAX	0.0	2.2E-16	5.9E-05	3.6E-11	0.0	3.8E-05
25	MIN	0.0	5.2E-18	5.9E-05	3.6E-11	0.0	3.7E-05
30	MAX	0.0	2.2E-16	6.0E-05	3.8E-11	0.0	4.5E-05
30	MIN	0.00	5.6E-19	6.0E-05	3.8E-11	0.0	4.4E-05
35	MAX	0.00	2.2E-16	6.1E-05	4.1E-11	0.0	5.3E-05
35	MIN	0.00	5.7E-18	6.1E-05	4.0E-11	0.0	5.1E-05
40	MAX	0.00	2.3E-16	6.2E-05	4.3E-11	0.0	6.0E-05
40	MIN	0.00	6.1E-18	6.1E-05	4.2E-11	0.0	5.8E-05
ALL	MAX	0.0	2.7E-16	6.2E-05	4.3E-11	0.0	6.0E-05
ALL	MIN	0.00	5.5E-19	4.6E-05	2.0E-14	0.0	1.9E-10

YEAR		K	Mg	Mn	Mo	Na	Ni
TURKISH	mg/L			0.05		200	0.02
EU	mg/L			0.05		200	0.02
CANADA	mg/L				0.073		0.15
1	MAX	2.3E+01	7.85	0.0977	0.0404	22.4	0.0
1	MIN	2.3E+01	7.85	0.0977	0.0404	22.4	0.0
2	MAX	2.8E+01	9.37	0.1175	0.0485	26.7	0.0
2	MIN	2.4E+01	7.86	0.0978	0.0404	22.4	0.0
3	MAX	3.3E+01	10.71	0.1384	0.0570	30.6	0.0
3	MIN	2.8E+01	9.38	0.1167	0.0485	26.7	0.0
4	MAX	3.6E+01	11.57	0.1496	0.0632	33.2	0.0
4	MIN	3.3E+01	10.72	0.1367	0.0570	30.6	0.0
5	MAX	3.9E+01	12.21	0.1549	0.0685	35.2	0.0
5	MIN	3.6E+01	11.58	0.1472	0.0633	33.2	0.0
10	MAX	4.8E+01	14.16	0.1342	0.0860	41.4	0.0
10	MIN	4.7E+01	13.88	0.1293	0.0833	40.5	0.0
15	MAX	5.4E+01	15.40	0.0818	0.0972	45.3	0.0
15	MIN	5.3E+01	15.19	0.0777	0.0953	44.6	0.0
20	MAX	5.9E+01	16.53	0.0708	1.1E-01	48.88	0.0
20	MIN	5.8E+01	16.33	0.0694	0.10562	48.22	0.0
25	MAX	6.5E+01	17.68	0.0692	0.11786	52.49	0.0
25	MIN	6.4E+01	17.47	0.0678	0.11597	51.84	0.0
30	MAX	7.0E+01	18.84	0.0682	0.12831	56.14	0.0
30	MIN	6.9E+01	18.63	0.0668	0.12643	55.49	0.0
35	MAX	7.5E+01	20.02	0.0676	0.13889	59.84	0.0
35	MIN	7.4E+01	19.81	0.06636	0.13700	59.19	0.0
40	MAX	8.1E+01	21.225	0.1	1.5E-01	64	0.0
40	MIN	8.0E+01	21.0170	0.1	1.5E-01	62.96	0.0
ALL	MAX	8.1E+01	21.23	0.156	0.1497	63.6	0.0
ALL	MIN	2.3E+01	7.8549	0.1	0.040414	22.4	0.0

YEAR		P	Pb	Se	Sb	Si	Sn
TURKISH	mg/L		0.01	0.01	0.005		
EU	mg/L		0.01	0.01	0.005		
CANADA	mg/L	0.03	0.007				
1	MAX	9.35E-06	2.4E-07	0.0004	0.00201	3.26	4.8E-11
1	MIN	9.35E-06	2.4E-07	0.0004	0.00201	3.256	4.8E-11
2	MAX	9.35E-06	1.6E-05	0.00075	0.00241	1.523	9.9E-08
2	MIN	7.99E-06	2.4E-07	0.0004	0.00201	0.5650	4.8E-11
3	MAX	7.99E-06	1.6E-05	0.00131	0.00281	0.5574	9.9E-08
3	MIN	7.15E-06	2.4E-07	0.00075	0.00241	0.2643	8.8E-11
4	MAX	7.15E-06	8.3E-05	0.00177	0.00309	0.3524	5.6E-08
4	MIN	6.73E-06	1.6E-05	0.00131	0.00281	0.1770	4.2E-08
5	MAX	6.73E-06	1.3E-04	0.00213	0.00333	0.2534	4.2E-08
5	MIN	6.47E-06	8.3E-05	0.00177	0.00310	0.1168	3.7E-08
10	MAX	5.98E-06	2.9E-04	0.0033	4.1E-03	0.1058	6.4E-08
10	MIN	5.91E-06	2.7E-04	0.00311	4.0E-03	0.0427	5.2E-08
15	MAX	5.74E-06	3.9E-04	4.0E-03	4.6E-03	0.0711	3.2E-07
15	MIN	5.70E-06	3.7E-04	3.9E-03	4.5E-03	0.0263	2.3E-07
20	MAX	5.51E-06	4.7E-04	4.6E-03	5.0E-03	0.0709	4.4E-07
20	MIN	5.47E-06	4.5E-04	4.5E-03	4.9E-03	0.0261	4.2E-07
25	MAX	5.30E-06	5.5E-04	5.2E-03	5.5E-03	0.0708	4.8E-07
25	MIN	5.26E-06	5.3E-04	5.1E-03	5.4E-03	0.0261	4.7E-07
30	MAX	5.11E-06	6.3E-04	5.8E-03	5.9E-03	0.071	5.1E-07
30	MIN	5.07E-06	6.2E-04	5.7E-03	5.8E-03	0.0261	5.0E-07
35	MAX	4.94E-06	7.1E-04	6.5E-03	6.4E-03	0.0705	5.4E-07
35	MIN	4.91E-06	7.0E-04	6.3E-03	6.3E-03	0.0262	5.3E-07
40	MAX	4.78E-06	7.9E-04	7.1E-03	6.8E-03	7.0E-02	5.6E-07
40	MIN	4.76E-06	7.8E-04	7.0E-03	6.8E-03	2.6E-02	5.5E-07
ALL	MAX	9.35E-06	7.9E-04	0.0071	0.0068	3.26	5.6E-07
ALL	MIN	4.8E-06	2.4E-07	4.2E-04	2.0E-03	2.6E-02	4.8E-11

YEAR		Sr	Tl	U	V	Zn	pe
TURKISH	mg/L						
EU	mg/L						
CANADA	mg/L				0.006	0.03	
1	MAX	1.0E-01	0.0	2.4E-04	1.2E-02	9.92E-03	0.26
1	MIN	1.0E-01	0.0	2.4E-04	1.2E-02	9.92E-03	0.26
2	MAX	1.2E-01	0.0	2.9E-04	1.4E-02	1.24E-02	2.00
2	MIN	1.0E-01	0.0	2.4E-04	1.2E-02	9.93E-03	0.24
3	MAX	1.4E-01	0.0	3.4E-04	1.7E-02	1.75E-02	1.81
3	MIN	1.2E-01	0.0	2.9E-04	1.4E-02	1.24E-02	0.24
4	MAX	1.5E-01	0.0	3.8E-04	1.8E-02	2.05E-02	1.61
4	MIN	1.4E-01	0.0	3.4E-04	1.7E-02	1.75E-02	1.50
5	MAX	1.6E-01	0.0	4.2E-04	1.9E-02	2.33E-02	1.51
5	MIN	1.5E-01	0.0	3.9E-04	1.8E-02	2.06E-02	1.45
10	MAX	1.8E-01	0.0	5.6E-04	2.2E-02	3.25E-02	1.54
10	MIN	1.8E-01	0.0	5.4E-04	2.1E-02	3.10E-02	1.52
15	MAX	2.0E-01	0.0	6.7E-04	2.4E-02	3.89E-02	1.91
15	MIN	2.0E-01	0.0	6.5E-04	2.3E-02	3.78E-02	1.88
20	MAX	2.1E-01	0.0	7.8E-04	2.6E-02	4.46E-02	1.98
20	MIN	2.1E-01	0.0	7.6E-04	2.5E-02	4.35E-02	1.96
25	MAX	2.3E-01	0.0	9.0E-04	2.7E-02	5.03E-02	1.99
25	MIN	2.2E-01	0.0	8.8E-04	2.7E-02	4.92E-02	1.97
30	MAX	2.4E-01	0.0	1.0E-03	2.9E-02	5.60E-02	2.0
30	MIN	2.4E-01	0.0	1.0E-03	2.9E-02	5.49E-02	2E+00
35	MAX	2.6E-01	0.0	1.2E-03	3.1E-02	6.17E-02	2E+00
35	MIN	2.5E-01	0.0	1.1E-03	3.1E-02	6.06E-02	2E+00
40	MAX	2.7E-01	0.0	1.3E-03	3.3E-02	6.74E-02	2E+00
40	MIN	2.7E-01	0.0	1.3E-03	3.2E-02	6.64E-02	2E+00
ALL	MAX	2.7E-01	0.0	1.3E-03	3.3E-02	6.74E-02	2.0
ALL	MIN	1.0E-01	0E+00	2.4E-04	1.2E-02	9.9E-03	2.4E-01

APPENDIX C

(MASS BALANCE /PHREEQC MODEL OUTPUT FOR GCP CORAKOGLU WRD, MEDIAN LOADING RATES, PIT RUN WASTE, TOE OF DUMP)

(Yellow highlights indicate solution concentrations that exceed either EU, Canadian or Turkish regulations)

YEAR		pH	pe	S(6)	Cl	F	N
TURKISH	mg/L	6.5 to 9		250	250	1.5	
EU	mg/L	6.5 to 9.5		250	250	1.5	
CANADA	mg/L	6.5 to 9			230		
1	MAX	5.56	15	0.0	0.00	0.000	0.0000
1	MIN	5.56	15	0.0	0.00	0.000	0.0000
2	MAX	8.51	15	12.8	192.15	0.462	0.3281
2	MIN	5.57	12	0.0	0.30	0.001	0.0005
3	MAX	8.48	15	15.7	232.04	0.557	0.3956
3	MIN	5.68	12	0.6	9.23	0.022	0.0157
4	MAX	8.53	15	18.0	259.74	0.624	0.4417
4	MIN	5.68	12	0.7	9.96	0.024	0.0169
5	MAX	8.56	15	19.55	278.30	0.668	0.4721
5	MIN	5.75	12	1.17	16.69	0.040	0.0283
10	MAX	8.65	15	24.35	330.11	0.791	0.5551
10	MIN	5.99	12	3.27	44.51	0.107	0.0749
15	MAX	8.70	15	27.24	360.60	0.864	0.6039
15	MIN	6.18	12	5.40	71.57	0.1714	0.1199
20	MAX	8.74	15	29.77	3.88E+02	9.28E-01	6.48E-01
20	MIN	6.21	12	5.88	7.67E+01	1.83E-01	1.28E-01
25	MAX	8.76	15	32.31	4.15E+02	9.92E-01	6.92E-01
25	MIN	6.23	12	6.36	8.17E+01	1.95E-01	1.36E-01
30	MAX	8.78	15	34.85	4.43E+02	1.06E+00	7.36E-01
30	MIN	6.25	12	6.83	8.68E+01	2.07E-01	1.44E-01
35	MAX	8.80	15	37.42	4.71E+02	1.12E+00	7.81E-01
35	MIN	6.27	12	7.30	9.18E+01	2.19E-01	1.52E-01
40	MAX	8.81	14	40.027	4.99E+02	1.19E+00	8.28E-01
40	MIN	6.28	12	7.764	9.69E+01	2.31E-01	1.61E-01
ALL	MAX	8.81	15	40.0	499.23	1.192	0.8276
ALL	MIN	5.56	12	0.0000	2.68E-11	3.69E-11	2.18E-10

YEAR		Alkalinity	Ag	Al	As	B	Ba
TURKISH	mg/L			0.2	0.01	1	
EU	mg/L			0.2	0.01	1	
CANADA	mg/L			0.75			
1	MAX	0	1.3E-11	0.0000	0.0	0.000	1.5E-11
1	MIN	0	1.3E-11	0.0000	0.0	0.000	1.5E-11
2	MAX	4	8.8E-10	0.0119	0.00704	1.212	5.7E-07
2	MIN	0	2.6E-11	0.0000	0.00001	0.002	9.8E-10
3	MAX	4	6.9E-09	0.0122	0.0086	1.470	5.1E-07
3	MIN	0	5.7E-11	0.0001	0.00035	0.059	1.8E-08
4	MAX	4	2.0E-08	0.0128	0.0099	1.661	4.7E-07
4	MIN	0	7.9E-10	0.0001	0.0004	0.063	1.9E-08
5	MAX	4	1.3E-08	0.0132	0.01085	1.796	4.4E-07
5	MIN	0	7.8E-10	0.0001	0.00065	0.107	2.8E-08
10	MAX	5	2.0E-08	0.01447	0.01398	2.198	4.0E-07
10	MIN	1	2.2E-09	0.00007	0.00188	0.296	5.4E-08
15	MAX	5	2.4E-07	0.01520	0.01586	2.437	3.8E-07
15	MIN	1	3.5E-08	0.00009	0.00314	0.483	7.6E-08
20	MAX	5.1	4.7E-07	1.6E-02	0.01749	2.647	3.7E-07
20	MIN	1.0	9.0E-08	9.4E-05	0.00345	0.523	7.4E-08
25	MAX	5.3	5.5E-07	1.6E-02	0.01913	2.859	3.6E-07
25	MIN	1.0	1.0E-07	1.0E-04	3.8E-03	0.563	7.1E-08
30	MAX	5.5	6.2E-07	1.7E-02	2.1E-02	3.072	3.5E-07
30	MIN	1.1	1.2E-07	1.1E-04	4.1E-03	0.6021	6.8E-08
35	MAX	5.7	7.0E-07	1.7E-02	2.2E-02	3.2880	3.4E-07
35	MIN	1.1	1.3E-07	1.2E-04	4.4E-03	0.6413	6.7E-08
40	MAX	5.94	7.8E-07	1.7E-02	2.4E-02	3.5077	3.3E-07
40	MIN	1.14	1.5E-07	1.3E-04	4.7E-03	0.6805	6.5E-08
ALL	MAX	6	7.8E-07	1.7E-02	0.024137	3.508	5.7E-07
ALL	MIN	1.44E-09	1.3E-11	1.4E-10	7.21E-12	0.000	1.5E-11

YEAR		Ca	Cd	Co	Cr	Cu	Fe
TURKISH	mg/L		0.005		0.05	2	0.2
EU	mg/L		0.005		0.05	2	0.2
CANADA	mg/L		0.0005			0.005	
1	MAX	0	2.6E-11	4.4E-11	6.1E-11	4.4E-11	1.8E-10
1	MIN	0	2.6E-11	4.4E-11	6.1E-11	4.4E-11	1.8E-10
2	MAX	484	7.8E-06	8.8E-11	5.7E-05	8.8E-11	3.9E-08
2	MIN	1	1.2E-08	2.3E-16	9.0E-08	5.5E-12	4.2E-10
3	MAX	584	1.4E-05	8.5E-11	6.2E-05	8.5E-11	4.2E-08
3	MIN	23	7.2E-07	2.1E-16	2.4E-06	6.6E-12	2.0E-09
4	MAX	653	2.3E-05	8.5E-11	6.5E-05	8.5E-11	4.4E-08
4	MIN	25	8.2E-07	2.0E-16	2.5E-06	1.3E-11	2.1E-09
5	MAX	699	2.918E-05	8.3E-11	6.7E-05	8.3E-11	4.5E-08
5	MIN	42	1.7E-06	2.0E-16	4.0E-06	1.3E-11	3.1E-09
10	MAX	827.2	5.1E-05	7.6E-11	7.0E-05	7.8E-11	4.7E-08
10	MIN	111.5	6.8E-06	1.9E-16	9.5E-06	1.6E-11	6.8E-09
15	MAX	902.5	6.6E-05	6.9E-11	7.0E-05	7.5E-11	4.7E-08
15	MIN	179.1	1.3E-05	6.4E-19	1.4E-05	2.5E-11	9.7E-09
20	MAX	969.4	7.9E-05	7.1E-11	7.1E-05	7.6E-11	4.8E-08
20	MIN	191.7	1.6E-05	2.4E-16	1.4E-05	3.0E-11	9.8E-09
25	MAX	1036.8	9.2E-05	6.9E-11	7.2E-05	7.7E-11	4.9E-08
25	MIN	204.2	1.8E-05	2.0E-16	1.4E-05	3.2E-11	9.4E-09
30	MAX	1105.1	1.0E-04	7.1E-11	7.3E-05	7.7E-11	4.9E-08
30	MIN	216.70	2.0E-05	2.4E-16	1.4E-05	3.4E-11	1.0E-08
35	MAX	1174.46	1.2E-04	6.9E-11	7.4E-05	7.8E-11	5.0E-08
35	MIN	229.17	2.3E-05	2.0E-16	1.5E-05	3.5E-11	9.5E-09
40	MAX	1244.94	1.3E-04	7.1E-11	7.5E-05	7.8E-11	5.0E-08
40	MIN	241.61	2.5E-05	2.0E-16	1.5E-05	3.7E-11	1.0E-08
ALL	MAX	1245	1.3E-04	8.8E-11	7.5E-05	8.8E-11	5.0E-08
ALL	MIN	0.00	2.6E-11	0.0E+00	6.1E-11	5.5E-12	1.8E-10

YEAR		Hg	K	Mg	Mn	Mo	Na
TURKISH	mg/L	0.001			0.05		200
EU	mg/L	0.001			0.05		200
CANADA	mg/L					0.073	
1	MAX	9.7E-12	0.00	0.00	8.734E-11	0.00000	0.0
1	MIN	9.7E-12	0.00	0.00	8.734E-11	0.00000	0.0
2	MAX	4.1E-11	15.17	18.44	2.583E-07	0.01006	59.3
2	MIN	2.0E-11	0.02	0.03	8.07E-11	0.00002	0.1
3	MAX	2.6E-08	18.50	22.26	1.371E-07	0.01232	71.7
3	MIN	2.0E-11	0.74	0.89	8.262E-11	0.00050	2.9
4	MAX	7.3E-07	21.16	24.92	1.359E-07	0.01418	80.6
4	MIN	1.2E-08	0.80	0.96	8.7E-11	0.00054	3.1
5	MAX	1.8E-06	23.16	26.69	8.928E-08	0.01561	86.7
5	MIN	9.2E-08	1.38	1.60	8.982E-11	0.00093	5.2
10	MAX	2.7E-06	29.45	31.60	1.765E-08	0.02019	104
10	MIN	3.5E-07	3.96	4.26	9.867E-11	0.00271	14
15	MAX	4.4E-06	33.22	34.50	3.409E-09	0.02300	114.5
15	MIN	8.6E-07	6.58	6.85	3.056E-11	0.00455	22.7
20	MAX	5.9E-06	36.51	37.07	2.7E-09	0.02547	123.7
20	MIN	1.1E-06	7.21	7.33	2.043E-11	0.00503	24.5
25	MAX	7.3E-06	39.81	39.66	2.138E-09	0.02794	132.93
25	MIN	1.4E-06	7.83	7.81	1.79E-11	0.00549	26.17
30	MAX	8.7E-06	43.13	42.29	1.723E-09	0.03045	142.24
30	MIN	1.7E-06	8.45	8.29	1.783E-11	0.00596	27.89
35	MAX	1.0E-05	46.48	44.95	1.403E-09	0.03298	151.69
35	MIN	2.0E-06	9.06	8.771	1.868E-11	0.006427	29.59
40	MAX	1.1E-05	49.886	47.671	1.151E-09	0.035563	161.32
40	MIN	2.2E-06	9.6739	9.2516	1.991E-11	0.0068931	31.301
ALL	MAX	1.1E-05	49.89	47.67	2.583E-07	0.03556	161
ALL	MIN	9.7E-12	0.0000	0.0000	1.77E-11	0.0000000	0.000

YEAR		Ni	P	Pb	Se	Sb	Si
TURKISH	mg/L	0.02		0.01	0.01	0.005	
EU	mg/L	0.02		0.01	0.01	0.005	
CANADA	mg/L	0.15	0.03	0.007			
1	MAX	2.64E-11	3.34E-10	1.91E-11	7.71E-11	1.15E-11	9.88E-11
1	MIN	2.64E-11	3.34E-10	1.91E-11	7.71E-11	1.15E-11	9.88E-11
2	MAX	0.003136	1.04E-05	9.2E-08	0.000808	0.000482	3.657195
2	MIN	4.86E-06	1.01E-07	1.83E-10	1.04E-06	7.47E-07	0.017736
3	MAX	0.003873	7.95E-06	5.2E-07	0.001468	0.000588	1.63721
3	MIN	0.000157	1.81E-06	3.56E-09	6.89E-05	2.36E-05	0.082539
4	MAX	0.004501	6.66E-06	1.52E-05	0.002268	0.000671	1.095295
4	MIN	0.000171	1.89E-06	2.46E-07	7.96E-05	2.56E-05	0.052541
5	MAX	0.004976	5.99E-06	3.87E-05	0.002927	0.000733	0.788422
5	MIN	0.000295	2.76E-06	1.93E-06	0.000167	4.37E-05	0.050276
10	MAX	0.006514	9.29E-06	0.000106	0.004893	0.000927	0.331739
10	MIN	0.000874	4.61E-06	1.4E-05	0.000651	0.000125	0.041977
15	MAX	0.007455	1.23E-05	0.000143	0.006015	0.001044	0.21731
15	MIN	0.001476	4.03E-06	2.81E-05	0.001187	0.000207	0.035761
20	MAX	0.008278	1.19E-05	0.000174	0.006976	0.001147	0.217642
20	MIN	0.001634	3.63E-06	3.42E-05	0.001373	0.000226	0.03555
25	MAX	0.009102	1.15E-05	0.000206	0.007931	0.00125	0.218591
25	MIN	0.001789	3.31E-06	4.02E-05	0.001556	0.000246	0.035721
30	MAX	0.009931	1.11E-05	0.000237	0.008887	0.001354	0.219624
30	MIN	0.001944	3.04E-06	4.62E-05	0.001737	0.000265	0.035906
35	MAX	0.010768	1.08E-05	0.000268	0.009845	0.001459	0.220763
35	MIN	0.002098	2.81E-06	5.2E-05	0.001916	0.000284	0.03611
40	MAX	0.011615	1.05E-05	0.000299	0.01081	0.001566	0.22201
40	MIN	0.002252	2.61E-06	5.78E-05	0.002093	0.000304	0.036332
ALL	MAX	0.011615	1.23E-05	0.000299	0.01081	0.001566	3.657195
ALL	MIN	2.64E-11	3.34E-10	1.91E-11	7.71E-11	1.15E-11	9.88E-11

YEAR		Sn	Sr	Tl	U	V	Zn
TURKISH	mg/L						
EU	mg/L						
CANADA	mg/L					0.006	0.03
1	MAX	2.3E-13	0.000	5.8E-11	1.1E-11	0.00000	0.00000
1	MIN	2.3E-13	0.000	5.8E-11	1.1E-11	0.00000	0.00000
2	MAX	4.1E-11	0.253	7.8E-05	5.3E-05	0.01613	0.01513
2	MIN	2.5E-13	0.000	1.2E-07	8.1E-08	0.00002	0.00002
3	MAX	6.5E-11	0.305	9.5E-05	6.5E-05	0.01948	0.02089
3	MIN	4.9E-13	0.012	3.8E-06	2.6E-06	0.00078	0.00092
4	MAX	3.8E-08	0.340	1.1E-04	7.6E-05	0.02181	0.02724
4	MIN	5.9E-13	0.013	4.1E-06	2.9E-06	0.00084	0.00101
5	MAX	3.0E-08	0.363	1.2E-04	8.5E-05	0.02336	0.03161
5	MIN	9.7E-13	0.022	7.1E-06	5.0E-06	0.00140	0.00185
10	MAX	4.4E-08	0.4248	1.5E-04	1.2E-04	0.02766	0.04635
10	MIN	6.1E-12	0.0573	2.0E-05	1.6E-05	0.00373	0.00618
15	MAX	2.1E-07	0.4611	1.7E-04	1.4E-04	0.03021	0.05609
15	MIN	3.6E-11	0.0916	3.4E-05	2.8E-05	0.00600	0.01107
20	MAX	3.2E-07	0.4935	1.9E-04	1.6E-04	0.03248	0.06454
20	MIN	4.7E-11	0.0976	3.7E-05	3.2E-05	0.00642	0.01271
25	MAX	3.5E-07	0.5262	2.0E-04	1.9E-04	0.03477	0.07292
25	MIN	6.1E-11	0.1037	4.0E-05	3.7E-05	0.00685	0.01431
30	MAX	3.8E-07	0.5594	2.2E-04	2.2E-04	0.03709	0.08128
30	MIN	7.7E-11	0.1097	4.3E-05	4.2E-05	7.3E-03	1.6E-02
35	MAX	4.0E-07	0.5931	2.4E-04	2.4E-04	3.9E-02	9.0E-02
35	MIN	9.6E-11	0.1157	4.7E-05	4.7E-05	7.7E-03	1.7E-02
40	MAX	4.2E-07	0.62747	2.6E-04	2.8E-04	4.2E-02	9.8E-02
40	MIN	1.2E-10	0.121796	5.0E-05	5.3E-05	8.1E-03	1.9E-02
ALL	MAX	4.2E-07	0.627	2.6E-04	2.8E-04	0.0419	0.09806
ALL	MIN	2.3E-13	1.2E-10	5.8E-11	1.1E-11	6.4E-11	7.3E-11

APPENDIX D

(MASS BALANCE /PHREEQC MODEL OUTPUT FOR GCP CORAKOGLU WRD, 95th PERCENTILE LOADING RATES, PIT RUN WASTE, PORE WATER)

(Yellow highlights indicate solution concentrations that exceed either EU, Canadian or Turkish regulations)

YEAR		pH	S(6)	Cl	F	N	Alkalinity
TURKISH	mg/L	6.5 to 9	250	250	1.5		
EU	mg/L	6.5 to 9.5	250	250	1.5		
CANADA	mg/L	6.5 to 9		230			
1	MAX	9.68	349.1	892.1	1.165	0.073	15
1	MIN	9.68	349.1	892.1	1.165	0.073	15
2	MAX	9.70	419.2	1075.8	1.396	0.087	11
2	MIN	9.68	349.7	896.4	1.167	0.073	9
3	MAX	9.71	486.5	1244.7	1.600	0.100	10
3	MIN	9.68	420.1	1078.8	1.399	0.087	8
4	MAX	9.70	534.1	1363.5	1.735	0.108	10
4	MIN	9.68	487.7	1248.3	1.604	0.100	9
5	MAX	9.69	572.9	1459.72	1.826	0.115	9
5	MIN	9.67	535.6	1367.73	1.740	0.109	9
10	MAX	9.75	713.23	1807.38	1.770	0.138	11
10	MIN	9.74	691.47	1753.68	1.761	0.134	11
15	MAX	9.77	826.67	2091.87	1.727	0.157	12
15	MIN	9.77	807.46	2043.91	1.721	0.1541	12
20	MAX	9.79	949.97	2402.87	1.7E+00	1.8E-01	13.8
20	MIN	9.79	928.37	2348.775	1.7E+00	1.8E-01	13.5
25	MAX	9.80	1094.56	2769.496	1.7E+00	2.0E-01	15.3
25	MIN	9.80	1069.58	2706.608	1.7E+00	2.0E-01	15.0
30	MAX	9.81	1169.87	3213.401	1.6E+00	2.4E-01	17.1
30	MIN	9.81	1165.64	3138.672	1.6E+00	2.3E-01	16.7
35	MAX	9.82	1141.53	3752.383	1.6E+00	2.7E-01	19.1
35	MIN	9.82	1137.01	3662.694	1.6E+00	2.7E-01	18.6
40	MAX	9.83	1110.02	4426.29	1.6E+00	3.2E-01	21.5
40	MIN	9.83	1104.93	4314.27	1.6E+00	3.1E-01	21.0
ALL	MAX	9.83	1178	4426.29	1.826	0.3215	22
ALL	MIN	9.67	349	892.13	1.2E+00	7.3E-02	8.2E+00

YEAR		Ag	Al	As	B	Ba	Ca
TURKISH	mg/L		0.2	0.01	1		
EU	mg/L		0.2	0.01	1		
CANADA	mg/L		0.75				
1	MAX	3.51E-09	2.4E-02	0.1993	0.28890	8.44E-07	506
1	MIN	3.51E-09	2.4E-02	0.1993	0.28890	8.44E-07	506
2	MAX	3.52E-09	2.5E-02	0.2401	0.34631	8.50E-07	607
2	MIN	3.52E-09	2.4E-02	0.1997	0.28945	8.19E-07	507
3	MAX	3.56E-09	2.6E-02	0.2825	0.39730	8.24E-07	703
3	MIN	3.53E-09	2.4E-02	0.2406	0.34711	8.01E-07	609
4	MAX	5.72E-09	2.6E-02	0.3149	0.43134	8.19E-07	771
4	MIN	3.57E-09	2.5E-02	0.2833	0.39836	8.06E-07	7.0E+02
5	MAX	2.04E-06	2.5E-02	0.3426	0.45791	8.23E-07	8.3E+02
5	MIN	5.74E-09	2.4E-02	0.3158	0.43261	8.12E-07	7.7E+02
10	MAX	2.70E-05	2.9E-02	0.44510	0.55216	7.42E-07	1.0E+03
10	MIN	2.33E-05	2.9E-02	0.42907	0.53771	7.33E-07	9.9E+02
15	MAX	4.26E-05	3.1E-02	0.52626	0.63090	7.14E-07	1.2E+03
15	MIN	3.98E-05	3.1E-02	0.51244	0.61768	7.11E-07	1.2E+03
20	MAX	5.79E-05	3.3E-02	6.1E-01	0.71804	7.06E-07	1.4E+03
20	MIN	5.50E-05	3.3E-02	6.0E-01	0.70302	7.04E-07	1.3E+03
25	MAX	7.51E-05	3.5E-02	7.2E-01	0.82130	7.08E-07	1.6E+03
25	MIN	7.19E-05	3.4E-02	7.0E-01	8.0E-01	7.08E-07	1.5E+03
30	MAX	9.49E-05	3.6E-02	8.4E-01	9.5E-01	7.14E-07	1.8E+03
30	MIN	9.13E-05	3.6E-02	8.2E-01	9.3E-01	7.13E-07	1.8E+03
35	MAX	1.18E-04	3.7E-02	9.8E-01	1.1E+00	7.20E-07	2.0E+03
35	MIN	1.14E-04	3.7E-02	9.6E-01	1.1E+00	7.19E-07	1.9E+03
40	MAX	1.46E-04	3.8E-02	1.2E+00	1.3E+00	7.40E-07	2.2E+03
40	MIN	1.41E-04	3.8E-02	1.1E+00	1.3E+00	7.36E-07	2.2E+03
ALL	MAX	1.46E-04	3.8E-02	1.2E+00	1.2923355	8.50E-07	2241.72285
ALL	MIN	3.51E-09	2.4E-02	2.0E-01	0.28889725	7.04E-07	5.1E+02

YEAR		Cd	Co	Cr	Cu	Fe	Hg
TURKISH	mg/L	0.005		0.05	2	0.2	0.001
EU	mg/L	0.005		0.05	2	0.2	0.001
CANADA	mg/L	0.0005			0.005		
1	MAX	8.4E-05	1.6E-16	8.5E-05	1.4E-11	2.0E-08	4.1E-09
1	MIN	8.4E-05	1.6E-16	8.5E-05	1.4E-11	2.0E-08	4.1E-09
2	MAX	1.0E-04	1.6E-16	8.9E-05	1.9E-11	2.0E-08	4.1E-09
2	MIN	8.5E-05	4.5E-25	8.3E-05	4.3E-18	1.9E-08	2.7E-10
3	MAX	1.4E-04	1.6E-16	9.1E-05	2.4E-11	2.1E-08	6.5E-10
3	MIN	1.0E-04	7.6E-19	8.6E-05	1.7E-11	1.9E-08	2.0E-10
4	MAX	1.6E-04	1.7E-16	9.1E-05	3.0E-11	2.0E-08	6.1E-08
4	MIN	1.4E-04	2.8E-17	8.7E-05	2.6E-11	2.0E-08	6.5E-10
5	MAX	1.8E-04	1.782E-16	9.0E-05	6.0E-11	2.0E-08	6.8E-05
5	MIN	1.6E-04	1.8E-16	8.7E-05	3.1E-11	1.9E-08	6.1E-08
10	MAX	2.6E-04	1.6E-16	1.0E-04	7.9E-11	2.3E-08	3.3E-04
10	MIN	2.5E-04	1.6E-16	1.0E-04	7.7E-11	2.2E-08	2.9E-04
15	MAX	3.2E-04	1.6E-16	1.1E-04	9.2E-11	2.4E-08	4.9E-04
15	MIN	3.1E-04	1.6E-16	1.1E-04	9.0E-11	2.4E-08	4.6E-04
20	MAX	3.8E-04	1.6E-16	1.2E-04	1.1E-10	2.5E-08	6.6E-04
20	MIN	3.7E-04	1.6E-16	1.2E-04	1.0E-10	2.5E-08	6.3E-04
25	MAX	4.6E-04	1.7E-16	1.3E-04	1.3E-10	2.6E-08	8.5E-04
25	MIN	4.4E-04	1.7E-16	1.2E-04	1.2E-10	2.6E-08	8.1E-04
30	MAX	5.4E-04	1.7E-16	1.3E-04	1.5E-10	2.7E-08	1.1E-03
30	MIN	5.3E-04	1.7E-16	1.3E-04	1.5E-10	2.7E-08	1.0E-03
35	MAX	6.5E-04	1.8E-16	1.4E-04	1.9E-10	2.8E-08	1.3E-03
35	MIN	6.3E-04	4.4E-19	1.4E-04	1.8E-10	2.8E-08	1.3E-03
40	MAX	7.8E-04	1.9E-16	1.4E-04	2.5E-10	2.8E-08	1.6E-03
40	MIN	7.6E-04	2.9E-24	1.4E-04	2.4E-10	2.8E-08	1.6E-03
ALL	MAX	7.8E-04	1.9E-16	1.4E-04	2.5E-10	2.8E-08	1.6E-03
ALL	MIN	8.4E-05	4.5E-25	8.3E-05	4.3E-18	1.9E-08	2.0E-10

YEAR		K	Mg	Mn	Mo	Na	Ni
TURKISH	mg/L			0.05		200	0.02
EU	mg/L			0.05		200	0.02
CANADA	mg/L				0.073		0.15
1	MAX	5.2E+01	36.98	0.7958	8.4E-02	71.3	2.5E-02
1	MIN	5.2E+01	36.98	0.7958	8.4E-02	71.3	2.5E-02
2	MAX	6.2E+01	44.33	0.7540	1.0E-01	85.7	3.0E-02
2	MIN	5.2E+01	37.05	0.6861	8.4E-02	71.5	2.5E-02
3	MAX	7.3E+01	50.95	0.6012	1.2E-01	99.0	3.5E-02
3	MIN	6.2E+01	44.44	0.5054	1.0E-01	85.8	3.0E-02
4	MAX	8.1E+01	55.41	0.3800	1.3E-01	108.4	3.9E-02
4	MIN	7.3E+01	51.08	0.2448	1.2E-01	99.3	3.5E-02
5	MAX	8.7E+01	58.91	0.1295	1.4E-01	115.9	4.3E-02
5	MIN	8.1E+01	55.57	0.0374	1.3E-01	108.7	3.9E-02
10	MAX	1.1E+02	71.40	0.0271	1.9E-01	143.2	5.6E-02
10	MIN	1.1E+02	69.48	0.0264	1.8E-01	139.0	5.4E-02
15	MAX	1.3E+02	81.78	0.0250	2.2E-01	165.5	6.6E-02
15	MIN	1.3E+02	80.03	0.0247	2.1E-01	161.7	6.4E-02
20	MAX	1.5E+02	93.23	0.0246	2.6E-01	189.87	7.7E-02
20	MIN	1.5E+02	91.25	0.0245	2.5E-01	185.62	7.5E-02
25	MAX	1.8E+02	106.79	0.0251	2.7E-01	218.62	9.0E-02
25	MIN	1.7E+02	104.47	0.0250	2.7E-01	213.68	8.8E-02
30	MAX	2.1E+02	123.27	0.0262	2.5E-01	253.40	1.1E-01
30	MIN	2.0E+02	120.51	0.0260	2.5E-01	247.56	1.0E-01
35	MAX	2.4E+02	143.34	0.0278	2.4E-01	295.70	1.2E-01
35	MIN	2.4E+02	140.01	0.02746	2.4E-01	288.64	1.2E-01
40	MAX	2.9E+02	168.497	0.0	2.2E-01	349	1.5E-01
40	MIN	2.8E+02	164.3285	0.0	2.2E-01	339.8	1.4E-01
ALL	MAX	2.9E+02	168.50	0.796	2.8E-01	348.6	1.5E-01
ALL	MIN	5.2E+01	36.9752	0.0	8.4E-02	71.3	2.5E-02

YEAR		P	Pb	Se	Sb	Si	Sn
TURKISH	mg/L		0.01	0.01	0.005		
EU	mg/L		0.01	0.01	0.005		
CANADA	mg/L	0.03	0.007				
1	MAX	3.9E-06	9.2E-09	0.00000	0.01262	8.04	4.7E-13
1	MIN	3.9E-06	9.2E-09	0.00000	0.01262	8.036	4.7E-13
2	MAX	3.9E-06	1.6E-07	0.00136	0.01520	3.764	1.3E-10
2	MIN	3.6E-06	9.3E-09	0.00000	0.01265	1.4022	2.6E-25
3	MAX	3.6E-06	1.2E-06	0.00556	0.01785	1.3907	3.9E-10
3	MIN	3.4E-06	1.6E-07	0.00137	0.01524	0.6569	1.3E-10
4	MAX	3.4E-06	1.2E-04	0.00834	0.01986	0.8884	4.1E-09
4	MIN	3.3E-06	1.2E-06	0.00558	0.01790	0.4443	3.9E-10
5	MAX	3.3E-06	3.9E-04	0.01039	0.02157	0.6453	1.3E-06
5	MIN	3.2E-06	1.2E-04	0.00836	0.01992	0.2964	4.1E-09
10	MAX	2.8E-06	1.3E-03	0.01653	2.8E-02	0.2734	3.9E-06
10	MIN	2.8E-06	1.1E-03	0.01562	2.7E-02	0.1109	3.5E-06
15	MAX	2.6E-06	1.8E-03	2.1E-02	3.3E-02	0.1842	5.5E-06
15	MIN	2.5E-06	1.7E-03	2.0E-02	3.2E-02	0.0685	5.2E-06
20	MAX	2.4E-06	2.4E-03	2.5E-02	3.8E-02	0.1837	6.8E-06
20	MIN	2.3E-06	2.3E-03	2.4E-02	3.7E-02	0.0679	6.6E-06
25	MAX	2.2E-06	3.0E-03	3.0E-02	4.5E-02	0.1834	7.9E-06
25	MIN	2.2E-06	2.9E-03	2.9E-02	4.4E-02	0.0680	7.7E-06
30	MAX	2.1E-06	3.8E-03	3.6E-02	5.2E-02	0.183	9.5E-06
30	MIN	2.1E-06	3.6E-03	3.5E-02	5.1E-02	0.0682	9.1E-06
35	MAX	2.0E-06	4.7E-03	4.3E-02	6.2E-02	0.1827	1.2E-05
35	MIN	1.9E-06	4.5E-03	4.2E-02	6.0E-02	0.0684	1.2E-05
40	MAX	1.8E-06	5.7E-03	5.2E-02	7.3E-02	1.8E-01	1.5E-05
40	MIN	1.8E-06	5.5E-03	5.0E-02	7.1E-02	6.9E-02	1.4E-05
ALL	MAX	3.9E-06	5.7E-03	0.05170	0.07311	8.04	1.5E-05
ALL	MIN	1.8E-06	9.2E-09	2.3E-09	1.3E-02	6.8E-02	2.6E-25

YEAR		Sr	Tl	U	V	Zn	pe
TURKISH	mg/L						
EU	mg/L						
CANADA	mg/L				0.006	0.03	
1	MAX	4.3E-01	1.6E-04	2.2E-03	4.2E-02	7.0E-03	-1.3
1	MIN	4.3E-01	1.6E-04	2.2E-03	4.2E-02	7.0E-03	-1.3
2	MAX	5.2E-01	1.9E-04	2.7E-03	5.1E-02	8.9E-03	-0.1
2	MIN	4.3E-01	1.6E-04	2.2E-03	4.2E-02	7.0E-03	-0.2
3	MAX	6.0E-01	2.3E-04	3.2E-03	5.8E-02	1.3E-02	0.1
3	MIN	5.2E-01	1.9E-04	2.7E-03	5.1E-02	8.9E-03	0.0
4	MAX	6.5E-01	2.5E-04	3.6E-03	6.3E-02	1.6E-02	0.7
4	MIN	6.0E-01	2.3E-04	3.2E-03	5.8E-02	1.3E-02	0.4
5	MAX	6.9E-01	2.8E-04	4.0E-03	6.6E-02	1.8E-02	1.9
5	MIN	6.5E-01	2.5E-04	3.6E-03	6.3E-02	1.6E-02	1.1
10	MAX	8.5E-01	3.6E-04	5.4E-03	7.9E-02	2.6E-02	2.0
10	MIN	8.3E-01	3.4E-04	5.2E-03	7.7E-02	2.5E-02	2.0
15	MAX	9.8E-01	4.2E-04	6.8E-03	8.9E-02	3.3E-02	2.0
15	MIN	9.6E-01	4.1E-04	6.5E-03	8.8E-02	3.2E-02	2.0
20	MAX	1.1E+00	4.9E-04	8.3E-03	1.0E-01	4.0E-02	2.0
20	MIN	1.1E+00	4.8E-04	8.1E-03	9.9E-02	3.8E-02	2.0
25	MAX	1.3E+00	5.7E-04	1.0E-02	1.2E-01	4.8E-02	2.0
25	MIN	1.3E+00	5.6E-04	9.9E-03	1.1E-01	4.6E-02	2.0
30	MAX	1.5E+00	6.7E-04	1.3E-02	1.3E-01	5.7E-02	2.0
30	MIN	1.5E+00	6.5E-04	1.2E-02	1.3E-01	5.5E-02	2.0
35	MAX	1.7E+00	7.9E-04	1.6E-02	1.5E-01	6.8E-02	2.0
35	MIN	1.7E+00	7.7E-04	1.5E-02	1.5E-01	6.6E-02	2.0
40	MAX	2.0E+00	9.3E-04	2.0E-02	1.8E-01	8.2E-02	2.0
40	MIN	2.0E+00	9.1E-04	1.9E-02	1.8E-01	8.0E-02	2.0
ALL	MAX	2.0E+00	9.3E-04	2.0E-02	1.8E-01	8.2E-02	2.0
ALL	MIN	4.3E-01	0.0E+00	2.2E-03	4.2E-02	7.0E-03	-1.3

YEAR		Sr	Tl	U	V	Zn	pe
TURKISH	mg/L						
EU	mg/L						
CANADA	mg/L				0.006	0.03	
1	MAX	4.3E-01	1.6E-04	2.2E-03	4.2E-02	7.0E-03	-1.3
1	MIN	4.3E-01	1.6E-04	2.2E-03	4.2E-02	7.0E-03	-1.3
2	MAX	5.2E-01	1.9E-04	2.7E-03	5.1E-02	8.9E-03	-0.1
2	MIN	4.3E-01	1.6E-04	2.2E-03	4.2E-02	7.0E-03	-0.2
3	MAX	6.0E-01	2.3E-04	3.2E-03	5.8E-02	1.3E-02	0.1
3	MIN	5.2E-01	1.9E-04	2.7E-03	5.1E-02	8.9E-03	0.0
4	MAX	6.5E-01	2.5E-04	3.6E-03	6.3E-02	1.6E-02	0.7
4	MIN	6.0E-01	2.3E-04	3.2E-03	5.8E-02	1.3E-02	0.4
5	MAX	6.9E-01	2.8E-04	4.0E-03	6.6E-02	1.8E-02	1.9
5	MIN	6.5E-01	2.5E-04	3.6E-03	6.3E-02	1.6E-02	1.1
10	MAX	8.5E-01	3.6E-04	5.4E-03	7.9E-02	2.6E-02	2.0
10	MIN	8.3E-01	3.4E-04	5.2E-03	7.7E-02	2.5E-02	2.0
15	MAX	9.8E-01	4.2E-04	6.8E-03	8.9E-02	3.3E-02	2.0
15	MIN	9.6E-01	4.1E-04	6.5E-03	8.8E-02	3.2E-02	2.0
20	MAX	1.1E+00	4.9E-04	8.3E-03	1.0E-01	4.0E-02	2.0
20	MIN	1.1E+00	4.8E-04	8.1E-03	9.9E-02	3.8E-02	2.0
25	MAX	1.3E+00	5.7E-04	1.0E-02	1.2E-01	4.8E-02	2.0
25	MIN	1.3E+00	5.6E-04	9.9E-03	1.1E-01	4.6E-02	2.0
30	MAX	1.5E+00	6.7E-04	1.3E-02	1.3E-01	5.7E-02	2.0
30	MIN	1.5E+00	6.5E-04	1.2E-02	1.3E-01	5.5E-02	2.0
35	MAX	1.7E+00	7.9E-04	1.6E-02	1.5E-01	6.8E-02	2.0
35	MIN	1.7E+00	7.7E-04	1.5E-02	1.5E-01	6.6E-02	2.0
40	MAX	2.0E+00	9.3E-04	2.0E-02	1.8E-01	8.2E-02	2.0
40	MIN	2.0E+00	9.1E-04	1.9E-02	1.8E-01	8.0E-02	2.0
ALL	MAX	2.0E+00	9.3E-04	2.0E-02	1.8E-01	8.2E-02	2.0
ALL	MIN	4.3E-01	0.0E+00	2.2E-03	4.2E-02	7.0E-03	-1.3

APPENDIX E

(MASS BALANCE /PHREEQC MODEL OUTPUT FOR GCP CORAKOGLU WRD, 95th PERCENTILE LOADING RATES, PIT RUN WASTE, TOE OF DUMP)

(Yellow highlights indicate solution concentrations that exceed either EU, Canadian or Turkish regulations)

YEAR		pH	pe	S(6)	Cl	F	N
TURKISH	mg/L	6.5 to 9		250	250	1.5	
EU	mg/L	6.5 to 9.5		250	250	1.5	
CANADA	mg/L	6.5 to 9			230		
1	MAX	5.56	15	0.0	0.00	0.000	0.0000
1	MIN	5.56	15	0.0	0.00	0.000	0.0000
2	MAX	9.28	15	134.1	499.74	0.894	0.3295
2	MIN	5.59	11	0.2	0.77	0.001	0.0005
3	MAX	9.28	15	163.6	609.08	1.084	0.3994
3	MIN	5.91	11	6.5	24.31	0.043	0.0159
4	MAX	9.33	15	186.0	690.82	1.217	0.4486
4	MIN	5.92	11	7.1	26.32	0.047	0.0172
5	MAX	9.37	15	202.58	750.57	1.309	0.4825
5	MIN	6.11	11	12.06	44.72	0.078	0.0289
10	MAX	9.49	14	258.03	949.96	1.302	0.5909
10	MIN	6.96	11	34.58	127.32	0.178	0.0793
15	MAX	9.53	12	300.43	1104.14	1.272	0.6762
15	MIN	8.44	11	59.25	217.76	0.2544	0.1335
20	MAX	9.57	12	345.34	1.27E+03	1.25E+00	7.69E-01
20	MIN	8.58	11	67.81	2.49E+02	2.48E-01	1.51E-01
25	MAX	9.60	12	397.86	1.46E+03	1.22E+00	8.78E-01
25	MIN	8.69	11	77.74	2.86E+02	2.43E-01	1.72E-01
30	MAX	9.62	12	431.21	1.70E+03	1.20E+00	1.01E+00
30	MIN	8.78	11	85.20	3.29E+02	2.38E-01	1.97E-01
35	MAX	9.64	12	420.72	1.98E+03	1.19E+00	1.17E+00
35	MIN	8.85	11	82.74	3.82E+02	2.34E-01	2.27E-01
40	MAX	9.65	12	409.022	2.33E+03	1.18E+00	1.38E+00
40	MIN	8.92	11	80.028	4.47E+02	2.31E-01	2.64E-01
ALL	MAX	9.65	15	434.4	2331.81	1.341	1.3775
ALL	MIN	5.56	11	0.0000	2.68E-11	3.69E-11	2.18E-10

YEAR		Alkalinity	Ag	Al	As	B	Ba
TURKISH	mg/L			0.2	0.01	1	
EU	mg/L			0.2	0.01	1	
CANADA	mg/L			0.75			
1	MAX	0	1.3E-11	1.4E-10	7.2E-12	6.4E-10	1.5E-11
1	MIN	0	1.3E-11	1.4E-10	7.2E-12	6.4E-10	1.5E-11
2	MAX	12	8.8E-10	0.0357	0.02995	3.821	2.5E-07
2	MIN	0	2.6E-11	0.0001	0.00005	0.006	4.3E-10
3	MAX	12	8.8E-10	0.0374	0.03679	4.634	2.4E-07
3	MIN	0	5.7E-11	0.0001	0.00148	0.184	8.8E-09
4	MAX	13	9.7E-10	0.0412	0.04247	5.211	2.4E-07
4	MIN	1	5.9E-11	0.0001	0.00161	0.199	9.3E-09
5	MAX	13	4.2E-08	0.0449	0.04694	5.611	2.4E-07
5	MIN	1	1.1E-10	0.0001	0.00278	0.335	1.5E-08
10	MAX	16	6.2E-06	0.05724	0.06273	6.896	2.2E-07
10	MIN	2	7.9E-07	0.00484	0.00839	0.926	2.9E-08
15	MAX	19	1.0E-05	0.06336	0.07462	7.904	2.1E-07
15	MIN	4	2.0E-06	0.01205	0.01470	1.560	4.2E-08
20	MAX	20.6	1.4E-05	6.8E-02	0.08703	8.996	2.1E-07
20	MIN	4.3	2.7E-06	1.4E-02	0.01707	1.768	4.1E-08
25	MAX	23.0	1.8E-05	7.2E-02	0.10147	10.285	2.1E-07
25	MIN	4.7	3.5E-06	1.5E-02	2.0E-02	2.011	4.1E-08
30	MAX	25.6	2.3E-05	7.6E-02	1.2E-01	11.852	2.1E-07
30	MIN	5.2	4.5E-06	1.7E-02	2.3E-02	2.3036	4.1E-08
35	MAX	28.7	2.9E-05	7.9E-02	1.4E-01	13.7605	2.1E-07
35	MIN	5.8	5.6E-06	1.9E-02	2.7E-02	2.6583	4.1E-08
40	MAX	32.48	3.6E-05	8.1E-02	1.7E-01	16.1473	2.2E-07
40	MIN	6.49	6.8E-06	2.0E-02	3.2E-02	3.0976	4.2E-08
ALL	MAX	32	3.6E-05	8.1E-02	0.16556596	16.147	2.5E-07
ALL	MIN	1.44E-09	1.3E-11	1.4E-10	7.2142E-12	6.4E-10	1.5E-11

YEAR		Ca	Cd	Co	Cr	Cu	Fe
TURKISH	mg/L		0.005		0.05	2	0.2
EU	mg/L		0.005		0.05	2	0.2
CANADA	mg/L		0.0005			0.005	
1	MAX	0	2.6E-11	4.4E-11	6.1E-11	4.4E-11	1.8E-10
1	MIN	0	2.6E-11	4.4E-11	6.1E-11	4.4E-11	1.8E-10
2	MAX	1477	4.6E-05	8.8E-11	1.0E-04	8.8E-11	6.9E-08
2	MIN	2	7.1E-08	2.9E-17	1.7E-07	1.3E-11	4.7E-10
3	MAX	1799	6.1E-05	3.9E-11	1.1E-04	8.5E-11	7.2E-08
3	MIN	72	2.6E-06	1.0E-16	4.2E-06	1.8E-11	2.8E-09
4	MAX	2042	7.7E-05	8.5E-11	1.1E-04	8.5E-11	7.1E-08
4	MIN	78	2.9E-06	1.2E-16	4.4E-06	2.4E-11	3.2E-09
5	MAX	2221	8.862E-05	8.2E-11	1.1E-04	8.4E-11	7.0E-08
5	MIN	132	5.2E-06	3.3E-19	6.7E-06	3.3E-11	4.7E-09
10	MAX	2817.2	1.3E-04	1.6E-14	1.3E-04	8.5E-11	8.1E-08
10	MIN	377.6	1.7E-05	1.2E-16	1.7E-05	6.8E-11	1.1E-08
15	MAX	3276.5	1.6E-04	2.2E-15	1.4E-04	8.6E-11	8.6E-08
15	MIN	646.3	3.2E-05	1.2E-16	2.7E-05	7.9E-11	1.7E-08
20	MAX	3765.4	2.0E-04	1.9E-15	1.4E-04	9.3E-11	9.0E-08
20	MIN	739.5	3.8E-05	0.0E+00	2.9E-05	8.9E-11	1.8E-08
25	MAX	4339.1	2.3E-04	1.7E-15	1.5E-04	1.1E-10	9.4E-08
25	MIN	847.9	4.6E-05	1.2E-16	3.0E-05	9.2E-11	1.8E-08
30	MAX	4936.8	2.8E-04	1.6E-15	1.6E-04	1.3E-10	9.7E-08
30	MIN	963.75	5.4E-05	0.0E+00	3.1E-05	9.6E-11	1.9E-08
35	MAX	5500.22	3.3E-04	1.5E-15	1.7E-04	1.7E-10	9.9E-08
35	MIN	1067.00	6.4E-05	1.4E-17	3.2E-05	1.0E-10	1.9E-08
40	MAX	6206.16	4.0E-04	1.4E-15	1.7E-04	2.1E-10	1.0E-07
40	MIN	1195.37	7.7E-05	1.4E-16	3.4E-05	1.1E-10	1.9E-08
ALL	MAX	6206	4.0E-04	8.8E-11	1.7E-04	2.1E-10	1.0E-07
ALL	MIN	0.00	2.6E-11	0.0E+00	6.1E-11	1.3E-11	1.8E-10

YEAR		Hg	K	Mg	Mn	Mo	Na
TURKISH	mg/L	0.001			0.05		200
EU	mg/L	0.001			0.05		200
CANADA	mg/L					0.073	
1	MAX	9.7E-12	0.00	0.00	8.73E-11	1.2E-11	0.0
1	MIN	9.7E-12	0.00	0.00	8.73E-11	1.2E-11	0.0
2	MAX	5.5E-11	33.38	87.02	2.32E-07	2.1E-02	189.7
2	MIN	2.1E-11	0.05	0.13	2.48E-10	3.2E-05	0.3
3	MAX	8.2E-11	40.91	105.61	2.95E-08	2.6E-02	230.9
3	MIN	2.0E-11	1.64	4.20	2.61E-10	1.0E-03	9.2
4	MAX	1.4E-09	46.97	118.95	2.88E-08	3.0E-02	261.7
4	MIN	2.4E-11	1.78	4.54	2.88E-10	1.1E-03	10.0
5	MAX	3.2E-06	51.67	128.31	6.64E-09	3.3E-02	284.1
5	MIN	7.4E-10	3.07	7.66	2.58E-10	1.9E-03	16.9
10	MAX	5.9E-05	67.99	158.57	4.06E-10	4.3E-02	359
10	MIN	7.5E-06	9.10	21.28	3.34E-11	5.8E-03	48
15	MAX	9.2E-05	80.36	182.25	4.53E-10	5.2E-02	416.1
15	MIN	1.8E-05	15.83	35.97	8.2E-11	1.0E-02	82.1
20	MAX	1.2E-04	93.32	207.78	4.89E-10	6.0E-02	477.6
20	MIN	2.4E-05	18.31	40.82	9.34E-11	1.2E-02	93.8
25	MAX	1.6E-04	108.43	237.90	5.22E-10	6.5E-02	549.78
25	MIN	3.1E-05	21.17	46.50	1.05E-10	1.3E-02	107.42
30	MAX	2.0E-04	126.59	274.47	5.51E-10	6.1E-02	637.00
30	MIN	3.9E-05	24.58	53.34	1.16E-10	1.2E-02	123.77
35	MAX	2.5E-04	148.51	318.97	5.77E-10	5.7E-02	742.88
35	MIN	4.8E-05	28.67	61.618	1.28E-10	1.1E-02	143.47
40	MAX	3.1E-04	175.725	374.540	6.01E-10	5.3E-02	874.94
40	MIN	5.9E-05	33.6940	71.8534	1.42E-10	1.0E-02	167.809
ALL	MAX	3.1E-04	175.73	374.54	2.32E-07	0.06620	875
ALL	MIN	9.7E-12	0.0000	0.0000	1.75E-11	1.2E-11	0.000

YEAR		Ni	P	Pb	Se	Sb	Si
TURKISH	mg/L	0.02		0.01	0.01	0.005	
EU	mg/L	0.02		0.01	0.01	0.005	
CANADA	mg/L	0.15	0.03	0.007			
1	MAX	2.64E-11	3.34E-10	1.91E-11	7.71E-11	1.15E-11	9.88E-11
1	MIN	2.64E-11	3.34E-10	1.91E-11	7.71E-11	1.15E-11	9.88E-11
2	MAX	0.013523	2.16E-06	6.22E-08	0.001572	0.003032	9.047501
2	MIN	2.09E-05	4.3E-08	4.37E-11	1.6E-10	4.68E-06	0.043826
3	MAX	0.016655	2.01E-06	1.77E-07	0.00457	0.003722	4.081156
3	MIN	0.000671	8.42E-07	2.69E-09	0.000156	0.00015	0.205168
4	MAX	0.01928	1.59E-06	1.83E-05	0.010145	0.004287	2.758356
4	MIN	0.00073	8.89E-07	1.77E-08	0.000339	0.000163	0.1319
5	MAX	0.021346	2.24E-06	8.26E-05	0.014023	0.00473	2.006336
5	MIN	0.001264	1.34E-06	2.82E-06	0.000787	0.00028	0.127592
10	MAX	0.02865	4.36E-06	0.000445	0.024594	0.006287	0.857808
10	MIN	0.00383	1.23E-06	5.78E-05	0.003264	0.000841	0.108868
15	MAX	0.034171	4.83E-06	0.00067	0.031224	0.007467	0.562757
15	MIN	0.00673	1.16E-06	0.000131	0.00613	0.001471	0.092979
20	MAX	0.039929	4.25E-06	0.000886	0.037845	0.008704	0.563825
20	MIN	0.007832	1.1E-06	0.000173	0.007406	0.001707	0.092524
25	MAX	0.046631	3.78E-06	0.001128	0.04543	0.010146	0.566543
25	MIN	0.009103	1.04E-06	0.000219	0.008853	0.001981	0.093086
30	MAX	0.054663	3.4E-06	0.001408	0.054382	0.011877	0.569534
30	MIN	0.010613	9.89E-07	0.000272	0.010544	0.002306	0.093707
35	MAX	0.064364	3.09E-06	0.001737	0.065071	0.013968	0.57275
35	MIN	0.012422	9.42E-07	0.000334	0.012546	0.002696	0.094361
40	MAX	0.076382	2.82E-06	0.002136	0.078194	0.016565	0.576335
40	MIN	0.014642	8.93E-07	0.000409	0.014978	0.003176	0.095103
ALL	MAX	0.076382	5.2E-06	0.002136	0.078194	0.016565	9.047501
ALL	MIN	2.64E-11	3.34E-10	1.91E-11	7.71E-11	1.15E-11	9.88E-11

YEAR		Sn	Sr	Tl	U	V	Zn
TURKISH	mg/L						
EU	mg/L						
CANADA	mg/L					0.006	0.03
1	MAX	2.3E-13	0.000	5.8E-11	1.1E-11	0.00000	0.00000
1	MIN	2.3E-13	0.000	5.8E-11	1.1E-11	0.00000	0.00000
2	MAX	8.2E-11	1.048	2.0E-04	4.9E-04	0.05657	0.01064
2	MIN	9.7E-14	0.002	3.0E-07	7.6E-07	0.00009	0.00002
3	MAX	1.7E-10	1.274	2.4E-04	6.1E-04	0.06848	0.01534
3	MIN	3.3E-12	0.051	9.6E-06	2.5E-05	0.00272	0.00069
4	MAX	9.3E-10	1.440	2.8E-04	7.2E-04	0.07668	0.02068
4	MIN	3.5E-12	0.055	1.0E-05	2.7E-05	0.00294	0.00076
5	MAX	4.7E-08	1.559	3.1E-04	8.0E-04	0.08221	0.02422
5	MIN	1.7E-11	0.093	1.8E-05	4.7E-05	0.00492	0.00141
10	MAX	2.6E-06	1.9488	4.1E-04	1.1E-03	0.09955	0.03688
10	MIN	2.1E-07	0.2613	5.4E-05	1.5E-04	0.01337	0.00490
15	MAX	3.9E-06	2.2519	4.8E-04	1.4E-03	0.11334	0.04691
15	MIN	7.7E-07	0.4442	9.5E-05	2.8E-04	0.02238	0.00921
20	MAX	4.8E-06	2.5762	5.6E-04	1.7E-03	0.12845	0.05705
20	MIN	9.6E-07	0.5060	1.1E-04	3.4E-04	0.02524	0.01116
25	MAX	5.7E-06	2.9582	6.6E-04	2.1E-03	0.14635	0.06860
25	MIN	1.1E-06	0.5781	1.3E-04	4.2E-04	0.02861	0.01337
30	MAX	6.8E-06	3.4209	7.7E-04	2.6E-03	0.16819	0.08220
30	MIN	1.3E-06	0.6647	1.5E-04	5.1E-04	3.3E-02	1.6E-02
35	MAX	8.6E-06	3.9838	9.0E-04	3.3E-03	1.9E-01	9.8E-02
35	MIN	1.7E-06	0.7694	1.7E-04	6.3E-04	3.8E-02	1.9E-02
40	MAX	1.1E-05	4.68480	1.1E-03	4.1E-03	2.3E-01	1.2E-01
40	MIN	2.1E-06	0.898638	2.1E-04	7.8E-04	4.4E-02	2.3E-02
ALL	MAX	1.1E-05	4.685	1.1E-03	4.1E-03	0.2282	0.11819
ALL	MIN	9.7E-14	1.2E-10	5.8E-11	1.1E-11	6.4E-11	7.3E-11

APPENDIX F

(MASS BALANCE /PHREEQC MODEL OUTPUT FOR GCP CORAKOGLU WRD, MEDIAN LOADING RATES, PIT RUN WASTE, PORE WATER, WITH ENGINEERED COVER)

(Yellow highlights indicate solution concentrations that exceed either EU, Canadian or Turkish regulations)

YEAR		pH	S(6)	Cl	F	N	Alkalinity
TURKISH	mg/L	6.5 to 9	250	250	1.5		
EU	mg/L	6.5 to 9.5	250	250	1.5		
CANADA	mg/L	6.5 to 9		230			
1	MAX	9.37	33.5	344.4	0.603	0.073	5
1	MIN	9.37	33.5	344.4	0.603	0.073	5
2	MAX	9.42	40.1	412.0	0.719	0.086	3
2	MIN	9.37	33.5	345.2	0.603	0.073	3
3	MAX	9.45	47.0	470.7	0.822	0.099	4
3	MIN	9.42	40.1	412.4	0.720	0.087	3
4	MAX	9.47	51.6	508.7	0.888	0.106	4
4	MIN	9.45	47.0	471.2	0.822	0.099	3
5	MAX	9.48	55.3	537.10	0.937	0.112	4
5	MIN	9.46	51.7	509.20	0.888	0.106	4
10	MAX	9.49	67.12	624.13	1.087	0.129	4
10	MIN	9.49	65.31	611.37	1.065	0.127	4
15	MAX	9.49	73.35	669.62	1.166	0.138	4
15	MIN	9.48	73.10	667.70	1.162	0.1376	4
20	MAX	9.47	72.42	663.48	1.2E+00	1.4E-01	4.3
20	MIN	9.47	72.13	661.249	1.2E+00	1.4E-01	4.3
25	MAX	9.45	71.29	655.506	1.1E+00	1.4E-01	4.4
25	MIN	9.45	70.97	652.954	1.1E+00	1.3E-01	4.4
30	MAX	9.44	69.97	645.793	1.1E+00	1.3E-01	4.5
30	MIN	9.43	69.61	642.850	1.1E+00	1.3E-01	4.5
35	MAX	9.42	68.44	634.130	1.1E+00	1.3E-01	4.6
35	MIN	9.42	68.05	630.868	1.1E+00	1.3E-01	4.6
40	MAX	9.40	66.72	620.55	1.1E+00	1.3E-01	4.8
40	MIN	9.40	66.28	616.94	1.1E+00	1.3E-01	4.7
ALL	MAX	9.49	73	669.62	1.166	0.1380	4.8
ALL	MIN	9.37	33	344.39	6.0E-01	7.3E-02	3.1E+00

YEAR		Ag	Al	As	B	Ba	Ca
TURKISH	mg/L		0.2	0.01	1		
EU	mg/L		0.2	0.01	1		
CANADA	mg/L		0.75				
1	MAX	3.5E-09	1.1E-02	0.0470	0.09186	2.0E-06	166
1	MIN	3.5E-09	1.1E-02	0.0470	0.09186	2.0E-06	166
2	MAX	3.3E-07	1.2E-02	0.0563	0.10976	2.0E-06	198
2	MIN	3.5E-09	1.1E-02	0.0470	0.09191	1.8E-06	166
3	MAX	3.3E-07	1.3E-02	0.0659	0.12660	1.8E-06	226
3	MIN	3.5E-09	1.2E-02	0.0563	0.10984	1.6E-06	198
4	MAX	9.6E-08	1.4E-02	0.0730	0.13808	1.6E-06	244
4	MIN	5.4E-08	1.3E-02	0.0660	0.12670	1.5E-06	2.3E+02
5	MAX	5.4E-08	1.4E-02	0.0790	0.14709	1.5E-06	2.6E+02
5	MIN	4.2E-08	1.4E-02	0.0731	0.13820	1.5E-06	2.4E+02
10	MAX	9.0E-08	1.5E-02	0.09879	0.17576	1.4E-06	3.0E+02
10	MIN	6.4E-08	1.5E-02	0.09579	0.17148	1.3E-06	2.9E+02
15	MAX	1.0E-06	2.0E-02	0.10913	0.19075	2.6E-05	3.2E+02
15	MIN	7.0E-07	1.5E-02	0.10879	0.19018	1.3E-06	3.2E+02
20	MAX	2.6E-06	4.5E-02	1.1E-01	0.18881	1.6E-04	3.2E+02
20	MIN	2.3E-06	4.0E-02	1.1E-01	0.18813	1.3E-04	3.2E+02
25	MAX	4.2E-06	7.1E-02	1.1E-01	0.18635	2.9E-04	3.1E+02
25	MIN	3.9E-06	6.6E-02	1.1E-01	1.9E-01	2.7E-04	3.1E+02
30	MAX	6.0E-06	9.9E-02	1.0E-01	1.8E-01	4.4E-04	3.1E+02
30	MIN	5.6E-06	9.3E-02	1.0E-01	1.8E-01	4.1E-04	3.1E+02
35	MAX	7.8E-06	1.3E-01	1.0E-01	1.8E-01	5.9E-04	3.0E+02
35	MIN	7.4E-06	1.2E-01	1.0E-01	1.8E-01	5.6E-04	3.0E+02
40	MAX	9.6E-06	1.6E-01	1.0E-01	1.8E-01	7.4E-04	3.0E+02
40	MIN	9.3E-06	1.5E-01	1.0E-01	1.7E-01	7.1E-04	2.9E+02
ALL	MAX	9.6E-06	1.6E-01	1.1E-01	0.190753	7.4E-04	320.21921
ALL	MIN	3.51E-09	1.1E-02	4.7E-02	0.091858	1.3E-06	1.7E+02

YEAR		Cd	Co	Cr	Cu	Fe	Hg
TURKISH	mg/L	0.005		0.05	2	0.2	0.001
EU	mg/L	0.005		0.05	2	0.2	0.001
CANADA	mg/L	0.0005			0.005		
1	MAX	1.4E-05	2.7E-16	4.6E-05	6.0E-12	1.1E-08	2.2E-10
1	MIN	1.4E-05	2.7E-16	4.6E-05	6.0E-12	1.1E-08	2.2E-10
2	MAX	2.0E-05	2.7E-16	4.9E-05	1.8E-11	1.1E-08	1.6E-06
2	MIN	1.4E-05	2.5E-16	4.6E-05	6.2E-12	1.1E-08	2.1E-10
3	MAX	4.0E-05	2.4E-16	5.2E-05	1.8E-11	1.2E-08	1.6E-06
3	MIN	2.0E-05	6.2E-19	4.9E-05	7.5E-12	1.1E-08	1.9E-10
4	MAX	5.2E-05	2.3E-16	5.4E-05	1.5E-11	1.3E-08	7.7E-06
4	MIN	4.0E-05	5.9E-19	5.2E-05	1.5E-11	1.2E-08	1.5E-06
5	MAX	6.3E-05	2.24E-16	5.5E-05	1.5E-11	1.3E-08	1.2E-05
5	MIN	5.2E-05	2.2E-16	5.4E-05	1.5E-11	1.3E-08	7.7E-06
10	MAX	1.0E-04	2.2E-16	5.7E-05	1.9E-11	1.3E-08	1.5E-05
10	MIN	9.5E-05	5.6E-19	5.7E-05	1.7E-11	1.3E-08	1.3E-05
15	MAX	1.2E-04	7.9E-06	6.0E-05	5.2E-05	5.2E-04	2.2E-05
15	MIN	1.2E-04	1.4E-21	5.7E-05	2.7E-11	1.3E-08	2.2E-05
20	MAX	1.2E-04	4.8E-05	7.4E-05	3.2E-04	3.2E-03	2.3E-05
20	MIN	1.2E-04	4.0E-05	7.1E-05	2.7E-04	2.7E-03	2.3E-05
25	MAX	1.2E-04	9.1E-05	8.9E-05	6.0E-04	6.1E-03	2.3E-05
25	MIN	1.2E-04	8.3E-05	8.6E-05	5.4E-04	5.5E-03	2.3E-05
30	MAX	1.2E-04	1.4E-04	1.0E-04	9.0E-04	9.1E-03	2.3E-05
30	MIN	1.2E-04	1.3E-04	1.0E-04	8.4E-04	8.5E-03	2.3E-05
35	MAX	1.1E-04	1.8E-04	1.2E-04	1.2E-03	1.2E-02	2.3E-05
35	MIN	1.1E-04	1.7E-04	1.2E-04	1.1E-03	1.2E-02	2.3E-05
40	MAX	1.1E-04	2.3E-04	1.4E-04	1.5E-03	1.5E-02	2.4E-05
40	MIN	1.1E-04	2.2E-04	1.3E-04	1.5E-03	1.5E-02	2.4E-05
ALL	MAX	1.2E-04	2.3E-04	1.4E-04	1.5E-03	1.5E-02	2.4E-05
ALL	MIN	1.4E-05	1.4E-21	4.6E-05	6.0E-12	1.1E-08	1.9E-10

YEAR		K	Mg	Mn	Mo	Na	Ni
TURKISH	mg/L			0.05		200	0.02
EU	mg/L			0.05		200	0.02
CANADA	mg/L				0.073		0.15
1	MAX	2.3E+01	7.85	0.10	0.0404	22.4	0.0
1	MIN	2.3E+01	7.85	0.10	0.0404	22.4	0.0
2	MAX	2.8E+01	9.37	0.12	0.0485	26.7	0.0
2	MIN	2.4E+01	7.86	0.10	0.0404	22.4	0.0
3	MAX	3.3E+01	10.71	0.14	0.0570	30.6	0.0
3	MIN	2.8E+01	9.38	0.12	0.0485	26.7	0.0
4	MAX	3.6E+01	11.57	0.15	0.0632	33.2	0.0
4	MIN	3.3E+01	10.72	0.14	0.0570	30.6	0.0
5	MAX	3.9E+01	12.21	0.15	0.0685	35.2	0.0
5	MIN	3.6E+01	11.58	0.15	0.0633	33.2	0.0
10	MAX	4.8E+01	14.16	0.13	0.0860	41.4	0.0
10	MIN	4.7E+01	13.88	0.13	0.0833	40.5	0.0
15	MAX	5.3E+01	15.19	0.08	0.0953	44.6	0.0
15	MIN	5.3E+01	15.14	0.08	0.0951	44.5	0.0
20	MAX	5.3E+01	15.05	0.08	9.5E-02	44.21	0.0
20	MIN	5.2E+01	15.00	0.08	0.09430	44.06	0.0
25	MAX	5.2E+01	14.86	0.08	0.09363	43.66	0.0
25	MIN	5.2E+01	14.81	0.08	0.09327	43.48	0.0
30	MAX	5.1E+01	14.64	0.08	0.09236	42.99	0.0
30	MIN	5.1E+01	14.57	0.08	0.09195	42.79	0.0
35	MAX	5.0E+01	14.37	0.08	0.09079	42.20	0.0
35	MIN	5.0E+01	14.30	0.08	0.09033	41.98	0.0
40	MAX	4.9E+01	14.065	0.08	8.9E-02	41	0.0
40	MIN	4.8E+01	13.9827	0.08	8.8E-02	41.03	0.0
ALL	MAX	5.3E+01	15.19	0.16	0.0953	44.6	0.0
ALL	MIN	2.3E+01	7.8549	0.08	0.04041355	22.4	0.0

YEAR		P	Pb	Se	Sb	Si	Sn
TURKISH	mg/L		0.01	0.01	0.005		
EU	mg/L		0.01	0.01	0.005		
CANADA	mg/L	0.03	0.007				
1	MAX	9.4E-06	2.4E-07	4.2E-04	2.0E-03	3.3E+00	4.8E-11
1	MIN	9.4E-06	2.4E-07	4.2E-04	2.0E-03	3.3E+00	4.8E-11
2	MAX	9.3E-06	1.6E-05	7.5E-04	2.4E-03	1.5E+00	9.9E-08
2	MIN	8.0E-06	2.4E-07	4.2E-04	2.0E-03	5.7E-01	4.8E-11
3	MAX	8.0E-06	1.6E-05	1.3E-03	2.8E-03	5.6E-01	9.9E-08
3	MIN	7.1E-06	2.4E-07	7.5E-04	2.4E-03	2.6E-01	8.8E-11
4	MAX	7.2E-06	8.3E-05	1.8E-03	3.1E-03	3.5E-01	5.6E-08
4	MIN	6.7E-06	1.6E-05	1.3E-03	2.8E-03	1.8E-01	4.2E-08
5	MAX	6.7E-06	1.3E-04	2.1E-03	3.3E-03	2.5E-01	4.2E-08
5	MIN	6.5E-06	8.3E-05	1.8E-03	3.1E-03	1.2E-01	3.7E-08
10	MAX	6.0E-06	2.9E-04	3.3E-03	4.1E-03	1.1E-01	6.4E-08
10	MIN	5.9E-06	2.7E-04	3.1E-03	4.0E-03	4.3E-02	5.2E-08
15	MAX	3.1E-04	3.7E-04	3.9E-03	4.5E-03	2.6E-02	1.7E-06
15	MIN	5.7E-06	3.7E-04	3.8E-03	4.5E-03	9.4E-03	2.3E-07
20	MAX	1.9E-03	3.7E-04	3.8E-03	4.5E-03	9.6E-03	9.5E-06
20	MIN	1.6E-03	3.7E-04	3.8E-03	4.4E-03	3.5E-03	8.0E-06
25	MAX	3.5E-03	3.7E-04	3.8E-03	4.4E-03	1.0E-02	1.8E-05
25	MIN	3.2E-03	3.7E-04	3.8E-03	4.4E-03	3.8E-03	1.6E-05
30	MAX	5.2E-03	3.7E-04	3.8E-03	4.3E-03	1.1E-02	2.6E-05
30	MIN	4.9E-03	3.7E-04	3.7E-03	4.3E-03	4.1E-03	2.5E-05
35	MAX	7.0E-03	3.7E-04	3.7E-03	4.3E-03	1.2E-02	3.5E-05
35	MIN	6.7E-03	3.6E-04	3.7E-03	4.2E-03	4.5E-03	3.3E-05
40	MAX	8.9E-03	3.6E-04	3.6E-03	4.2E-03	1.3E-02	4.4E-05
40	MIN	8.5E-03	3.6E-04	3.6E-03	4.1E-03	4.8E-03	4.2E-05
ALL	MAX	8.9E-03	3.7E-04	3.9E-03	4.5E-03	3.3E+00	4.4E-05
ALL	MIN	5.7E-06	2.4E-07	4.2E-04	2.0E-03	3.4E-03	4.8E-11

YEAR		Sr	Tl	U	V	Zn	pe
TURKISH	mg/L						
EU	mg/L						
CANADA	mg/L				0.006	0.03	
1	MAX	1.0E-01	6.4E-05	2.4E-04	1.2E-02	0.00992	0.26
1	MIN	1.0E-01	6.4E-05	2.4E-04	1.2E-02	0.00992	0.26
2	MAX	1.2E-01	7.6E-05	2.9E-04	1.4E-02	0.01243	2.00
2	MIN	1.0E-01	6.4E-05	2.4E-04	1.2E-02	0.00993	0.24
3	MAX	1.4E-01	8.9E-05	3.4E-04	1.7E-02	0.01745	1.81
3	MIN	1.2E-01	7.7E-05	2.9E-04	1.4E-02	0.01243	0.24
4	MAX	1.5E-01	9.9E-05	3.8E-04	1.8E-02	0.02055	1.61
4	MIN	1.4E-01	8.9E-05	3.4E-04	1.7E-02	0.01746	1.50
5	MAX	1.6E-01	1.1E-04	4.2E-04	1.9E-02	0.02327	1.51
5	MIN	1.5E-01	9.9E-05	3.9E-04	1.8E-02	0.02056	1.45
10	MAX	1.8E-01	1.3E-04	5.6E-04	2.2E-02	0.03255	1.54
10	MIN	1.8E-01	1.3E-04	5.4E-04	2.1E-02	0.03098	1.52
15	MAX	2.0E-01	1.5E-04	6.6E-04	2.3E-02	0.03778	2.00
15	MIN	2.0E-01	1.4E-04	6.5E-04	2.3E-02	0.03762	1.88
20	MAX	2.0E-01	1.4E-04	7.0E-04	2.3E-02	0.03712	2.00
20	MIN	1.9E-01	1.4E-04	6.9E-04	2.3E-02	0.03694	2.00
25	MAX	1.9E-01	1.4E-04	7.3E-04	2.3E-02	0.03636	2.00
25	MIN	1.9E-01	1.4E-04	7.3E-04	2.3E-02	0.036155	2.00
30	MAX	1.9E-01	1.4E-04	7.7E-04	2.3E-02	0.035484	2.0
30	MIN	1.9E-01	1.4E-04	7.7E-04	2.3E-02	3.5E-02	2.0E+00
35	MAX	1.9E-01	1.4E-04	8.1E-04	2.2E-02	3.5E-02	2.0E+00
35	MIN	1.9E-01	1.4E-04	8.1E-04	2.2E-02	3.4E-02	2.0E+00
40	MAX	1.8E-01	1.3E-04	8.4E-04	2.2E-02	3.3E-02	2.0E+00
40	MIN	1.8E-01	1.3E-04	8.4E-04	2.2E-02	3.3E-02	2.0E+00
ALL	MAX	2.0E-01	1.5E-04	8.4E-04	2.3E-02	0.03778	2.0
ALL	MIN	1.0E-01	0.0E+00	2.4E-04	1.2E-02	9.9E-03	2.4E-01

APPENDIX G

(MASS BALANCE /PHREEQC MODEL OUTPUT FOR GCP CORAKOGLU WRD, MEDIAN LOADING RATES, PIT RUN WASTE, TOE OF DUMP, WITH ENGINEERED COVER)

(Yellow highlights indicate solution concentrations that exceed either EU, Canadian or Turkish regulations)

YEAR		pH	pe	S(6)	Cl	F	N
TURKISH	mg/L	6.5 to 9		250	250	1.5	
EU	mg/L	6.5 to 9.5		250	250	1.5	
CANADA	mg/L	6.5 to 9			230		
1	MAX	5.56	15	0.0	0.00	0.000	0.0000
1	MIN	5.56	15	0.0	0.00	0.000	0.0000
2	MAX	8.51	15	12.8	192.15	0.462	0.3281
2	MIN	5.57	12	0.0	0.30	0.001	0.0005
3	MAX	8.48	15	15.7	232.04	0.557	0.3956
3	MIN	5.68	12	0.6	9.23	0.022	0.0157
4	MAX	8.53	15	18.0	259.74	0.624	0.4417
4	MIN	5.68	12	0.7	9.96	0.024	0.0169
5	MAX	8.56	15	19.55	278.30	0.668	0.4721
5	MIN	5.75	12	1.17	16.69	0.040	0.0283
10	MAX	8.65	15	24.35	330.11	0.791	0.5551
10	MIN	5.99	12	3.27	44.51	0.107	0.0749
15	MAX	7.94	15	20.43	259.34	0.467	0.4723
15	MIN	5.72	13	1.20	15.85	0.0380	0.0266
20	MAX	8.93	14	19.96	2.75E+02	4.46E-01	4.64E-01
20	MIN	6.45	12	6.45	8.89E+01	1.44E-01	1.50E-01
25	MAX	8.93	14	19.47	2.69E+02	4.23E-01	4.55E-01
25	MIN	6.39	12	6.12	8.47E+01	1.33E-01	1.43E-01
30	MAX	8.93	14	18.95	2.64E+02	4.00E-01	4.45E-01
30	MIN	6.34	12	5.80	8.06E+01	1.23E-01	1.36E-01
35	MAX	8.93	14	18.42	2.57E+02	3.76E-01	4.35E-01
35	MIN	6.29	12	5.49	7.67E+01	1.12E-01	1.30E-01
40	MAX	8.93	15	17.876	2.51E+02	3.52E-01	4.25E-01
40	MIN	6.24	12	5.193	7.29E+01	1.03E-01	1.23E-01
ALL	MAX	8.93	15	26.7	355.21	0.851	0.5953
ALL	MIN	5.56	12	0.0000	2.68E-11	3.69E-11	2.18E-10

YEAR		Alkalinity	Ag	Al	As	B	Ba
TURKISH	mg/L			0.2	0.01	1	
EU	mg/L			0.2	0.01	1	
CANADA	mg/L			0.75			
1	MAX	0	1.3E-11	1.4E-10	7.2E-12	0.000	1.5E-11
1	MIN	0	1.3E-11	1.4E-10	7.2E-12	0.000	1.5E-11
2	MAX	4	8.8E-10	1.2E-02	7.0E-03	1.212	5.7E-07
2	MIN	0	2.6E-11	4.9E-05	1.1E-05	0.002	9.8E-10
3	MAX	4	6.9E-09	1.2E-02	8.6E-03	1.470	5.1E-07
3	MIN	0	5.7E-11	9.9E-05	3.5E-04	0.059	1.8E-08
4	MAX	4	2.0E-08	1.3E-02	9.9E-03	1.661	4.7E-07
4	MIN	0	7.9E-10	1.2E-04	3.8E-04	0.063	1.9E-08
5	MAX	4	1.3E-08	1.3E-02	1.1E-02	1.796	4.4E-07
5	MIN	0	7.8E-10	9.7E-05	6.5E-04	0.107	2.8E-08
10	MAX	5	2.0E-08	1.4E-02	1.4E-02	2.198	4.0E-07
10	MIN	1	2.2E-09	7.2E-05	1.9E-03	0.296	5.4E-08
15	MAX	74	8.2E-06	2.7E-03	1.2E-02	1.854	8.0E-06
15	MIN	0	7.7E-09	8.7E-05	7.0E-04	0.107	1.7E-08
20	MAX	6.1	8.6E-06	1.9E-02	1.1E-02	1.816	3.3E-06
20	MIN	1.5	8.8E-08	6.0E-04	0.00368	0.587	1.2E-07
25	MAX	6.1	8.9E-06	1.9E-02	0.01083	1.776	3.6E-06
25	MIN	1.4	8.7E-08	3.2E-04	3.5E-03	0.558	1.2E-07
30	MAX	6.1	9.3E-06	1.9E-02	1.1E-02	1.733	3.9E-06
30	MIN	1.3	8.7E-08	2.0E-04	3.3E-03	0.5302	1.1E-07
35	MAX	6.1	9.6E-06	1.9E-02	1.0E-02	1.6892	4.3E-06
35	MIN	1.2	8.7E-08	1.4E-04	3.1E-03	0.5033	1.1E-07
40	MAX	6.16	1.0E-05	1.9E-02	9.9E-03	1.6434	4.8E-06
40	MIN	1.06	8.7E-08	1.1E-04	3.0E-03	0.4774	1.0E-07
ALL	MAX	74	1.0E-05	1.9E-02	0.015529	2.395	8.0E-06
ALL	MIN	1.44E-09	1.3E-11	1.4E-10	7.21E-12	6.4E-10	1.5E-11

YEAR		Ca	Cd	Co	Cr	Cu	Fe
TURKISH	mg/L		0.005		0.05	2	0.2
EU	mg/L		0.005		0.05	2	0.2
CANADA	mg/L		0.0005			0.005	
1	MAX	0	2.6E-11	4.4E-11	6.1E-11	4.4E-11	1.8E-10
1	MIN	0	2.6E-11	4.4E-11	6.1E-11	4.4E-11	1.8E-10
2	MAX	484	7.8E-06	8.8E-11	5.7E-05	8.8E-11	3.9E-08
2	MIN	1	1.2E-08	2.3E-16	9.0E-08	5.5E-12	4.2E-10
3	MAX	584	1.4E-05	8.5E-11	6.2E-05	8.5E-11	4.2E-08
3	MIN	23	7.2E-07	2.1E-16	2.4E-06	6.6E-12	2.0E-09
4	MAX	653	2.3E-05	8.5E-11	6.5E-05	8.5E-11	4.4E-08
4	MIN	25	8.2E-07	2.0E-16	2.5E-06	1.3E-11	2.1E-09
5	MAX	699	2.918E-05	8.3E-11	6.7E-05	8.3E-11	4.5E-08
5	MIN	42	1.7E-06	2.0E-16	4.0E-06	1.3E-11	3.1E-09
10	MAX	827.2	5.1E-05	7.6E-11	7.0E-05	7.8E-11	4.7E-08
10	MIN	111.5	6.8E-06	1.9E-16	9.5E-06	1.6E-11	6.8E-09
15	MAX	676.2	4.0E-05	8.4E-11	4.3E-04	1.4E-10	3.2E-04
15	MIN	39.7	2.9E-06	0.0E+00	3.1E-06	1.3E-11	2.4E-09
20	MAX	689.8	3.8E-05	1.9E-13	4.4E-04	6.8E-11	1.7E-04
20	MIN	222.8	1.2E-05	0.0E+00	2.2E-05	1.5E-12	1.4E-08
25	MAX	675.9	3.7E-05	1.7E-11	4.6E-04	6.9E-11	1.7E-04
25	MIN	212.4	1.2E-05	0.0E+00	2.0E-05	1.5E-12	1.4E-08
30	MAX	661.3	3.5E-05	5.9E-11	4.7E-04	7.0E-11	1.7E-04
30	MIN	202.25	1.1E-05	0.0E+00	1.9E-05	1.5E-12	1.3E-08
35	MAX	645.95	3.3E-05	6.8E-13	4.9E-04	7.1E-11	1.7E-04
35	MIN	192.43	9.9E-06	0.0E+00	1.8E-05	1.5E-12	1.2E-08
40	MAX	630.09	3.1E-05	6.6E-11	5.0E-04	7.2E-11	1.8E-04
40	MIN	182.97	9.1E-06	0.0E+00	1.7E-05	1.5E-12	1.2E-08
ALL	MAX	889	6.3E-05	8.8E-11	5.0E-04	1.4E-10	3.2E-04
ALL	MIN	0.00	2.6E-11	0.0E+00	6.1E-11	1.5E-12	1.8E-10

YEAR		Hg	K	Mg	Mn	Mo	Na
TURKISH	mg/L	0.001			0.05		200
EU	mg/L	0.001			0.05		200
CANADA	mg/L					0.073	
1	MAX	9.7E-12	0.00	0.00	8.73E-11	0.000	0.0
1	MIN	9.7E-12	0.00	0.00	8.73E-11	0.000	0.0
2	MAX	4.1E-11	15.17	18.44	2.58E-07	0.01006	59.3
2	MIN	2.0E-11	0.02	0.03	8.07E-11	0.00002	0.1
3	MAX	2.6E-08	18.50	22.26	1.37E-07	0.01232	71.7
3	MIN	2.0E-11	0.74	0.89	8.26E-11	0.00050	2.9
4	MAX	7.3E-07	21.16	24.92	1.36E-07	0.01418	80.6
4	MIN	1.2E-08	0.80	0.96	8.7E-11	0.00054	3.1
5	MAX	1.8E-06	23.16	26.69	8.93E-08	0.01561	86.7
5	MIN	9.2E-08	1.38	1.60	8.98E-11	0.00093	5.2
10	MAX	2.7E-06	29.45	31.60	1.76E-08	0.02019	104
10	MIN	3.5E-07	3.96	4.26	9.87E-11	0.00271	14
15	MAX	5.6E-06	24.64	26.84	1.1E-07	0.01686	88.2
15	MIN	1.9E-07	1.46	1.52	2.03E-11	0.00101	5.0
20	MAX	5.7E-06	24.08	26.34	1.31E-10	0.01651	86.5
20	MIN	1.4E-06	7.78	8.51	2.13E-11	0.00533	27.9
25	MAX	5.8E-06	23.49	25.81	1.7E-10	0.01613	84.69
25	MIN	1.3E-06	7.38	8.11	1.98E-11	0.00507	26.61
30	MAX	5.8E-06	22.87	25.25	4.64E-10	0.01573	82.77
30	MIN	1.3E-06	7.00	7.72	1.86E-11	0.00481	25.32
35	MAX	5.9E-06	22.22	24.66	1.01E-09	0.01531	80.78
35	MIN	1.2E-06	6.62	7.348	1.76E-11	0.004561	24.07
40	MAX	6.0E-06	21.560	24.055	1.87E-09	0.014864	78.71
40	MIN	1.2E-06	6.2639	6.9865	1.69E-11	0.004318	22.860
ALL	MAX	6.0E-06	32.56	33.98	2.58E-07	0.02250	113
ALL	MIN	9.7E-12	0.0000	0.0000	1.69E-11	0.0	0.000

YEAR		Ni	P	Pb	Se	Sb	Si
TURKISH	mg/L	0.02		0.01	0.01	0.005	
EU	mg/L	0.02		0.01	0.01	0.005	
CANADA	mg/L	0.15	0.03	0.007			
1	MAX	2.64E-11	3.34E-10	1.91E-11	7.71E-11	1.15E-11	9.88E-11
1	MIN	2.64E-11	3.34E-10	1.91E-11	7.71E-11	1.15E-11	9.88E-11
2	MAX	0.003136	1.04E-05	9.2E-08	0.000808	0.000482	3.657195
2	MIN	4.86E-06	1.01E-07	1.83E-10	1.04E-06	7.47E-07	0.017736
3	MAX	0.003873	7.95E-06	5.2E-07	0.001468	0.000588	1.63721
3	MIN	0.000157	1.81E-06	3.56E-09	6.89E-05	2.36E-05	0.082539
4	MAX	0.004501	6.66E-06	1.52E-05	0.002268	0.000671	1.095295
4	MIN	0.000171	1.89E-06	2.46E-07	7.96E-05	2.56E-05	0.052541
5	MAX	0.004976	5.99E-06	3.87E-05	0.002927	0.000733	0.788422
5	MIN	0.000295	2.76E-06	1.93E-06	0.000167	4.37E-05	0.050276
10	MAX	0.006514	9.29E-06	0.000106	0.004893	0.000927	0.331739
10	MIN	0.000874	4.61E-06	1.4E-05	0.000651	0.000125	0.041977
15	MAX	0.005417	7.59E-05	0.000138	0.005055	0.000777	6.165946
15	MIN	0.000327	1.7E-06	6.22E-06	0.000263	4.58E-05	0.004916
20	MAX	0.005218	0.000151	9.22E-05	0.004997	0.000761	6.404394
20	MIN	0.001709	6.05E-06	4.46E-05	0.001613	0.000246	0.004736
25	MAX	0.005083	0.000187	9.18E-05	0.004932	0.000743	6.670141
25	MIN	0.00162	6.32E-06	4.23E-05	0.001549	0.000234	0.004849
30	MAX	0.004941	0.000232	9.13E-05	0.004862	0.000724	6.936481
30	MIN	0.001533	6.61E-06	3.99E-05	0.001486	0.000222	0.004958
35	MAX	0.004793	0.000292	9.07E-05	0.004787	0.000705	7.202584
35	MIN	0.001449	6.94E-06	3.75E-05	0.001425	0.00021	0.005063
40	MAX	0.004641	0.000369	8.99E-05	0.004707	0.000685	7.467619
40	MIN	0.001368	7.3E-06	3.5E-05	0.001366	0.000199	0.005164
ALL	MAX	0.007291	0.000369	0.000138	0.005822	0.001024	7.467619
ALL	MIN	2.64E-11	3.34E-10	1.91E-11	7.71E-11	1.15E-11	9.88E-11

YEAR		Sn	Sr	Tl	U	V	Zn
TURKISH	mg/L						
EU	mg/L						
CANADA	mg/L					0.006	0.03
1	MAX	2.3E-13	0.000	5.8E-11	1.1E-11	0.00000	0.00000
1	MIN	2.3E-13	0.000	5.8E-11	1.1E-11	0.00000	0.00000
2	MAX	4.1E-11	0.253	7.8E-05	5.3E-05	0.01613	0.01513
2	MIN	2.5E-13	0.000	1.2E-07	8.1E-08	0.00002	0.00002
3	MAX	6.5E-11	0.305	9.5E-05	6.5E-05	0.01948	0.02089
3	MIN	4.9E-13	0.012	3.8E-06	2.6E-06	0.00078	0.00092
4	MAX	3.8E-08	0.340	1.1E-04	7.6E-05	0.02181	0.02724
4	MIN	5.9E-13	0.013	4.1E-06	2.9E-06	0.00084	0.00101
5	MAX	3.0E-08	0.363	1.2E-04	8.5E-05	0.02336	0.03161
5	MIN	9.7E-13	0.022	7.1E-06	5.0E-06	0.00140	0.00185
10	MAX	4.4E-08	0.4248	1.5E-04	1.2E-04	0.02766	0.04635
10	MIN	6.1E-12	0.0573	2.0E-05	1.6E-05	0.00373	0.00618
15	MAX	6.2E-08	0.3618	1.3E-04	9.9E-05	0.02350	0.03754
15	MIN	7.8E-13	0.0203	7.5E-06	6.1E-06	0.00133	0.00245
20	MAX	3.5E-06	0.3553	1.2E-04	1.0E-04	0.02239	0.03552
20	MIN	3.0E-09	0.1148	4.0E-05	3.3E-05	0.00746	0.01173
25	MAX	3.5E-06	0.3484	1.2E-04	1.0E-04	0.02194	0.03420
25	MIN	8.5E-10	0.1095	3.8E-05	3.3E-05	0.00711	0.01098
30	MAX	3.5E-06	0.3411	1.2E-04	1.1E-04	0.02146	0.03285
30	MIN	3.0E-10	0.1043	3.6E-05	3.2E-05	6.8E-03	1.0E-02
35	MAX	3.5E-06	0.3334	1.1E-04	1.1E-04	2.1E-02	3.1E-02
35	MIN	1.3E-10	0.0993	3.4E-05	3.2E-05	6.4E-03	9.6E-03
40	MAX	3.5E-06	0.32552	1.1E-04	1.1E-04	2.0E-02	3.0E-02
40	MIN	7.0E-11	0.094522	3.2E-05	3.1E-05	6.1E-03	8.9E-03
ALL	MAX	3.5E-06	0.455	1.7E-04	1.4E-04	0.0298	0.05440
ALL	MIN	2.3E-13	1.2E-10	5.8E-11	1.1E-11	6.4E-11	7.3E-11

APPENDIX H

(MASS BALANCE /PHREEQC MODEL OUTPUT FOR GCP CORAKOGLU WRD, 95th PERCENTILE LOADING RATES, PIT RUN WASTE, PORE WATER, WITH ENGINEERED COVER)

(Yellow highlights indicate solution concentrations that exceed either EU, Canadian or Turkish regulations)

YEAR		pH	S(6)	Cl	F	N	Alkalinity
TURKISH	mg/L	6.5 to 9	250	250	1.5		
EU	mg/L	6.5 to 9.5	250	250	1.5		
CANADA	mg/L	6.5 to 9		230			
1	MAX	9.68	349.1	892.1	1.165	0.073	15
1	MIN	9.68	349.1	892.1	1.165	0.073	15
2	MAX	9.70	419.2	1075.8	1.396	0.087	11
2	MIN	9.68	349.7	896.4	1.167	0.073	9
3	MAX	9.71	486.5	1244.7	1.600	0.100	10
3	MIN	9.68	420.1	1078.8	1.399	0.087	8
4	MAX	9.70	534.1	1363.5	1.735	0.108	10
4	MIN	9.68	487.7	1248.3	1.604	0.100	9
5	MAX	9.69	572.9	1459.72	1.826	0.115	9
5	MIN	9.67	535.6	1367.73	1.740	0.109	9
10	MAX	9.75	713.23	1807.38	1.771	0.138	11
10	MIN	9.74	691.47	1753.68	1.762	0.134	11
15	MAX	9.77	803.60	2034.79	1.730	0.154	12
15	MIN	9.77	798.79	2021.71	1.728	0.1525	12
20	MAX	9.76	846.62	2150.11	1.7E+00	1.6E-01	12.2
20	MIN	9.76	841.47	2136.111	1.7E+00	1.6E-01	12.2
25	MAX	9.75	893.47	2275.713	1.7E+00	1.7E-01	12.4
25	MIN	9.75	887.97	2260.647	1.7E+00	1.7E-01	12.4
30	MAX	9.74	944.69	2413.117	1.7E+00	1.8E-01	12.7
30	MIN	9.74	938.76	2396.952	1.7E+00	1.8E-01	12.7
35	MAX	9.73	1000.90	2564.134	1.7E+00	1.9E-01	13.0
35	MIN	9.73	994.47	2546.622	1.7E+00	1.9E-01	13.0
40	MAX	9.72	1062.86	2730.71	1.7E+00	2.1E-01	13.4
40	MIN	9.72	1055.94	2711.75	1.7E+00	2.1E-01	13.3
ALL	MAX	9.77	1063	2730.71	1.826	0.2065	15
ALL	MIN	9.67	349	892.13	1.2E+00	7.3E-02	8.2E+00

YEAR		Ag	Al	As	B	Ba	Ca
TURKISH	mg/L		0.2	0.01	1		
EU	mg/L		0.2	0.01	1		
CANADA	mg/L		0.75				
1	MAX	3.5E-09	2.4E-02	0.1993	0.28890	8.4E-07	506
1	MIN	3.5E-09	2.4E-02	0.1993	0.28890	8.4E-07	506
2	MAX	3.5E-09	2.5E-02	0.2401	0.34631	8.5E-07	607
2	MIN	3.5E-09	2.4E-02	0.1997	0.28945	8.2E-07	507
3	MAX	3.6E-09	2.6E-02	0.2825	0.39730	8.2E-07	703
3	MIN	3.5E-09	2.4E-02	0.2406	0.34711	8.0E-07	609
4	MAX	5.7E-09	2.6E-02	0.3149	0.43134	8.2E-07	771
4	MIN	3.6E-09	2.5E-02	0.2833	0.39836	8.1E-07	7.0E+02
5	MAX	2.0E-06	2.5E-02	0.3426	0.45791	8.2E-07	8.3E+02
5	MIN	5.7E-09	2.4E-02	0.3158	0.43261	8.1E-07	7.7E+02
10	MAX	2.7E-05	2.9E-02	0.44510	0.55216	7.4E-07	1.0E+03
10	MIN	2.3E-05	2.9E-02	0.42907	0.53771	7.4E-07	9.9E+02
15	MAX	3.9E-05	3.1E-02	0.50963	0.61527	7.2E-07	1.2E+03
15	MIN	3.9E-05	3.1E-02	0.50651	0.61131	7.1E-07	1.1E+03
20	MAX	4.3E-05	3.1E-02	5.4E-01	0.65007	7.3E-07	1.2E+03
20	MIN	4.2E-05	3.0E-02	5.3E-01	0.64582	7.3E-07	1.2E+03
25	MAX	4.7E-05	3.0E-02	5.7E-01	0.68800	7.5E-07	1.3E+03
25	MIN	4.6E-05	3.0E-02	5.6E-01	6.8E-01	7.5E-07	1.3E+03
30	MAX	5.1E-05	2.9E-02	6.0E-01	7.3E-01	7.7E-07	1.4E+03
30	MIN	5.0E-05	2.9E-02	6.0E-01	7.2E-01	7.7E-07	1.4E+03
35	MAX	5.6E-05	2.9E-02	6.4E-01	7.8E-01	7.9E-07	1.4E+03
35	MIN	5.5E-05	2.9E-02	6.3E-01	7.7E-01	7.9E-07	1.4E+03
40	MAX	6.1E-05	2.8E-02	6.8E-01	8.3E-01	8.1E-07	1.5E+03
40	MIN	6.0E-05	2.8E-02	6.7E-01	8.2E-01	8.1E-07	1.5E+03
ALL	MAX	6.1E-05	3.1E-02	6.8E-01	0.82544079	8.5E-07	1541.52011
ALL	MIN	3.51E-09	2.4E-02	2.0E-01	0.28889725	7.1E-07	5.1E+02

YEAR		Cd	Co	Cr	Cu	Fe	Hg
TURKISH	mg/L	0.005		0.05	2	0.2	0.001
EU	mg/L	0.005		0.05	2	0.2	0.001
CANADA	mg/L	0.0005			0.005		
1	MAX	8.4E-05	1.6E-16	8.5E-05	1.4E-11	2.0E-08	4.1E-09
1	MIN	8.4E-05	1.6E-16	8.5E-05	1.4E-11	2.0E-08	4.1E-09
2	MAX	1.0E-04	1.6E-16	8.9E-05	1.9E-11	2.0E-08	4.1E-09
2	MIN	8.5E-05	4.5E-25	8.3E-05	4.3E-18	1.9E-08	2.7E-10
3	MAX	1.4E-04	1.6E-16	9.1E-05	2.4E-11	2.1E-08	6.5E-10
3	MIN	1.0E-04	7.6E-19	8.6E-05	1.7E-11	1.9E-08	2.0E-10
4	MAX	1.6E-04	1.7E-16	9.1E-05	3.0E-11	2.0E-08	6.1E-08
4	MIN	1.4E-04	2.8E-17	8.7E-05	2.6E-11	2.0E-08	6.5E-10
5	MAX	1.8E-04	1.782E-16	9.0E-05	6.0E-11	2.0E-08	6.8E-05
5	MIN	1.6E-04	1.8E-16	8.7E-05	3.1E-11	1.9E-08	6.1E-08
10	MAX	2.6E-04	1.7E-16	1.0E-04	7.9E-11	2.3E-08	3.3E-04
10	MIN	2.5E-04	1.6E-16	1.0E-04	7.7E-11	2.2E-08	2.9E-04
15	MAX	3.1E-04	1.6E-16	1.1E-04	9.0E-11	2.4E-08	4.6E-04
15	MIN	3.0E-04	1.6E-16	1.1E-04	8.9E-11	2.4E-08	4.5E-04
20	MAX	3.2E-04	1.7E-16	1.1E-04	9.6E-11	2.4E-08	4.9E-04
20	MIN	3.2E-04	1.7E-16	1.1E-04	9.5E-11	2.3E-08	4.9E-04
25	MAX	3.4E-04	1.8E-16	1.1E-04	1.0E-10	2.3E-08	5.3E-04
25	MIN	3.4E-04	1.8E-16	1.1E-04	1.0E-10	2.3E-08	5.2E-04
30	MAX	3.6E-04	1.8E-16	1.1E-04	1.1E-10	2.3E-08	5.6E-04
30	MIN	3.6E-04	1.8E-16	1.1E-04	1.1E-10	2.3E-08	5.6E-04
35	MAX	3.8E-04	1.9E-16	1.1E-04	1.2E-10	2.2E-08	6.1E-04
35	MIN	3.8E-04	1.9E-16	1.1E-04	1.2E-10	2.2E-08	6.0E-04
40	MAX	4.0E-04	2.0E-16	1.0E-04	1.4E-10	2.2E-08	6.5E-04
40	MIN	4.0E-04	2.0E-16	1.0E-04	1.3E-10	2.2E-08	6.5E-04
ALL	MAX	4.0E-04	2.0E-16	1.1E-04	1.4E-10	2.4E-08	6.5E-04
ALL	MIN	8.4E-05	4.5E-25	8.3E-05	4.3E-18	1.9E-08	2.0E-10

YEAR		K	Mg	Mn	Mo	Na	Ni
TURKISH	mg/L			0.05		200	0.02
EU	mg/L			0.05		200	0.02
CANADA	mg/L				0.073		0.15
1	MAX	5.2E+01	36.98	0.7958	0.0841	71.3	0.025
1	MIN	5.2E+01	36.98	0.7958	0.0841	71.3	0.025
2	MAX	6.2E+01	44.33	0.7540	0.1013	85.7	0.030
2	MIN	5.2E+01	37.05	0.6861	0.0843	71.5	0.025
3	MAX	7.3E+01	50.95	0.6012	0.1191	99.0	0.035
3	MIN	6.2E+01	44.44	0.5054	0.1016	85.8	0.030
4	MAX	8.1E+01	55.41	0.3800	0.1324	108.4	0.039
4	MIN	7.3E+01	51.08	0.2448	0.1194	99.3	0.035
5	MAX	8.7E+01	58.91	0.1295	0.1438	115.9	0.043
5	MIN	8.1E+01	55.57	0.0374	0.1328	108.7	0.039
10	MAX	1.1E+02	71.40	0.0272	0.1858	143.2	0.056
10	MIN	1.1E+02	69.48	0.0264	0.1792	139.0	0.054
15	MAX	1.3E+02	79.71	0.0252	0.2128	161.0	0.064
15	MIN	1.3E+02	79.20	0.0248	0.2114	160.0	0.063
20	MAX	1.3E+02	84.21	0.0276	2.3E-01	170.03	0.067
20	MIN	1.3E+02	83.66	0.0272	0.22384	168.93	0.067
25	MAX	1.4E+02	89.11	0.0305	0.23911	179.87	0.071
25	MIN	1.4E+02	88.52	0.0300	0.23746	178.70	0.071
30	MAX	1.5E+02	94.47	0.0337	0.25411	190.63	0.075
30	MIN	1.5E+02	93.84	0.0332	0.25234	189.37	0.075
35	MAX	1.6E+02	100.37	0.0375	0.27063	202.46	0.080
35	MIN	1.6E+02	99.69	0.03690	0.26871	201.09	0.080
40	MAX	1.7E+02	106.88	0.0	2.7E-01	216	0.085
40	MIN	1.7E+02	106.13	0.0	2.7E-01	214.03	0.085
ALL	MAX	1.7E+02	106.88	0.796	0.2751	215.5	0.085
ALL	MIN	5.2E+01	36.9752	0.0	0.084119496	71.3	0.025

YEAR		P	Pb	Se	Sb	Si	Sn
TURKISH	mg/L		0.01	0.01	0.005		
EU	mg/L		0.01	0.01	0.005		
CANADA	mg/L	0.03	0.007				
1	MAX	3.9E-06	9.2E-09	0.00000	0.01262	8.04	4.7E-13
1	MIN	3.9E-06	9.2E-09	0.00000	0.01262	8.036	4.7E-13
2	MAX	3.9E-06	1.6E-07	0.00136	0.01520	3.764	1.3E-10
2	MIN	3.6E-06	9.3E-09	0.00000	0.01265	1.4022	2.6E-25
3	MAX	3.6E-06	1.2E-06	0.00556	0.01785	1.3907	3.9E-10
3	MIN	3.4E-06	1.6E-07	0.00137	0.01524	0.6569	1.3E-10
4	MAX	3.4E-06	1.2E-04	0.00834	0.01986	0.8884	4.1E-09
4	MIN	3.3E-06	1.2E-06	0.00558	0.01790	0.4443	3.9E-10
5	MAX	3.3E-06	3.9E-04	0.01039	0.02157	0.6453	1.3E-06
5	MIN	3.2E-06	1.2E-04	0.00836	0.01992	0.2964	4.1E-09
10	MAX	2.8E-06	1.3E-03	0.01653	2.8E-02	0.2734	3.9E-06
10	MIN	2.8E-06	1.1E-03	0.01562	2.7E-02	0.1109	3.5E-06
15	MAX	2.6E-06	1.7E-03	2.0E-02	3.2E-02	0.0747	5.2E-06
15	MIN	2.6E-06	1.7E-03	2.0E-02	3.2E-02	0.0244	5.1E-06
20	MAX	2.5E-06	1.8E-03	2.1E-02	3.4E-02	0.0237	4.6E-06
20	MIN	2.5E-06	1.8E-03	2.1E-02	3.3E-02	0.0088	4.4E-06
25	MAX	2.5E-06	1.9E-03	2.3E-02	3.6E-02	0.0256	4.0E-06
25	MIN	2.5E-06	1.9E-03	2.3E-02	3.5E-02	0.0095	3.9E-06
30	MAX	2.5E-06	2.1E-03	2.5E-02	3.8E-02	0.028	3.4E-06
30	MIN	2.5E-06	2.1E-03	2.4E-02	3.8E-02	0.0102	3.3E-06
35	MAX	2.4E-06	2.2E-03	2.6E-02	4.0E-02	0.0299	2.9E-06
35	MIN	2.4E-06	2.2E-03	2.6E-02	4.0E-02	0.0111	2.9E-06
40	MAX	2.4E-06	2.4E-03	2.8E-02	4.3E-02	3.2E-02	2.5E-06
40	MIN	2.4E-06	2.4E-03	2.8E-02	4.2E-02	1.2E-02	2.4E-06
ALL	MAX	3.9E-06	2.4E-03	0.02847	0.04279	8.04	5.2E-06
ALL	MIN	2.4E-06	9.2E-09	2.3E-09	1.3E-02	8.5E-03	2.6E-25

YEAR		Sr	Tl	U	V	Zn	pe
TURKISH	mg/L						
EU	mg/L						
CANADA	mg/L				0.006	0.03	
1	MAX	4.3E-01	1.6E-04	2.2E-03	4.2E-02	0.0070	-1.33
1	MIN	4.3E-01	1.6E-04	2.2E-03	4.2E-02	0.0070	-1.33
2	MAX	5.2E-01	1.9E-04	2.7E-03	5.1E-02	0.0089	-0.12
2	MIN	4.3E-01	1.6E-04	2.2E-03	4.2E-02	0.0070	-0.21
3	MAX	6.0E-01	2.3E-04	3.2E-03	5.8E-02	0.0132	0.11
3	MIN	5.2E-01	1.9E-04	2.7E-03	5.1E-02	0.0089	-0.04
4	MAX	6.5E-01	2.5E-04	3.6E-03	6.3E-02	0.0157	0.66
4	MIN	6.0E-01	2.3E-04	3.2E-03	5.8E-02	0.0132	0.37
5	MAX	6.9E-01	2.8E-04	4.0E-03	6.6E-02	0.0179	1.93
5	MIN	6.5E-01	2.5E-04	3.6E-03	6.3E-02	0.0157	1.14
10	MAX	8.5E-01	3.6E-04	5.4E-03	7.9E-02	0.0260	2.00
10	MIN	8.3E-01	3.4E-04	5.2E-03	7.7E-02	0.0246	1.99
15	MAX	9.5E-01	4.1E-04	6.5E-03	8.7E-02	0.0313	2.00
15	MIN	9.5E-01	4.1E-04	6.4E-03	8.7E-02	0.0311	2.00
20	MAX	1.0E+00	4.3E-04	7.4E-03	9.2E-02	0.0328	2.00
20	MIN	1.0E+00	4.3E-04	7.3E-03	9.2E-02	0.0326	2.00
25	MAX	1.1E+00	4.5E-04	8.4E-03	9.8E-02	0.0344	2.00
25	MIN	1.1E+00	4.5E-04	8.3E-03	9.7E-02	0.0342	2.00
30	MAX	1.1E+00	4.8E-04	9.5E-03	1.0E-01	0.0362	2.0
30	MIN	1.1E+00	4.8E-04	9.4E-03	1.0E-01	0.0360	2.0E+00
35	MAX	1.2E+00	5.1E-04	1.1E-02	1.1E-01	0.0381	2.0E+00
35	MIN	1.2E+00	5.1E-04	1.1E-02	1.1E-01	0.0379	2.0E+00
40	MAX	1.3E+00	5.4E-04	1.2E-02	1.2E-01	0.0403	2.0E+00
40	MIN	1.3E+00	5.4E-04	1.2E-02	1.2E-01	0.0401	2.0E+00
ALL	MAX	1.3E+00	5.4E-04	1.2E-02	1.2E-01	0.0403	2.0
ALL	MIN	4.3E-01	0.0E+00	2.2E-03	4.2E-02	0.0070	-1.3E+00

APPENDIX I

(MASS BALANCE /PHREEQC MODEL OUTPUT FOR GCP CORAKOGLU WRD, 95th PERCENTILE LOADING RATES, PIT RUN WASTE, TOE OF DUMP, WITH ENGINEERED COVER)

(Yellow highlights indicate solution concentrations that exceed either EU, Canadian or Turkish regulations)

YEAR		pH	pe	S(6)	Cl	F	N
TURKISH	mg/L	6.5 to 9		250	250	1.5	
EU	mg/L	6.5 to 9.5		250	250	1.5	
CANADA	mg/L	6.5 to 9			230		
1	MAX	5.56	15	0.0	0.00	0.000	0.0000
1	MIN	5.56	15	0.0	0.00	0.000	0.0000
2	MAX	9.28	15	134.1	499.74	0.894	0.3295
2	MIN	5.59	11	0.2	0.77	0.001	0.0005
3	MAX	9.28	15	163.6	609.08	1.084	0.3994
3	MIN	5.91	11	6.5	24.31	0.043	0.0159
4	MAX	9.33	15	186.0	690.82	1.217	0.4486
4	MIN	5.92	11	7.1	26.32	0.047	0.0172
5	MAX	9.37	15	202.58	750.57	1.309	0.4825
5	MIN	6.11	11	12.06	44.72	0.078	0.0289
10	MAX	9.49	14	258.03	949.96	1.303	0.5909
10	MIN	6.96	11	34.58	127.32	0.178	0.0793
15	MAX	9.58	12	220.15	811.71	0.697	0.5085
15	MIN	8.41	11	57.63	211.83	0.2325	0.1302
20	MAX	9.58	12	225.33	8.33E+02	6.66E-01	5.22E-01
20	MIN	9.18	11	72.48	2.68E+02	2.16E-01	1.68E-01
25	MAX	9.57	12	230.61	8.54E+02	6.37E-01	5.36E-01
25	MIN	9.15	11	72.14	2.67E+02	2.01E-01	1.68E-01
30	MAX	9.56	12	236.00	8.76E+02	6.07E-01	5.50E-01
30	MIN	9.12	11	71.85	2.67E+02	1.86E-01	1.67E-01
35	MAX	9.55	12	241.53	8.98E+02	5.78E-01	5.64E-01
35	MIN	9.09	11	71.61	2.66E+02	1.73E-01	1.67E-01
40	MAX	9.55	12	247.253	9.21E+02	5.49E-01	5.79E-01
40	MIN	9.05	11	71.439	2.66E+02	1.60E-01	1.67E-01
ALL	MAX	9.58	15	289.0	1062.25	1.341	0.6525
ALL	MIN	5.56	11	0.0000	2.68E-11	3.69E-11	2.18E-10

YEAR		Alkalinity	Ag	Al	As	B	Ba
TURKISH	mg/L			0.2	0.01	1	
EU	mg/L			0.2	0.01	1	
CANADA	mg/L			0.75			
1	MAX	0	1.3E-11	0.0000	0.00000	0.000	1.5E-11
1	MIN	0	1.3E-11	0.0000	0.00000	0.000	1.5E-11
2	MAX	12	8.8E-10	0.0357	0.02995	3.821	2.5E-07
2	MIN	0	2.6E-11	0.0001	0.00005	0.006	4.3E-10
3	MAX	12	8.8E-10	0.0374	0.03679	4.634	2.4E-07
3	MIN	0	5.7E-11	0.0001	0.00148	0.184	8.8E-09
4	MAX	13	9.7E-10	0.0412	0.04247	5.211	2.4E-07
4	MIN	1	5.9E-11	0.0001	0.00161	0.199	9.3E-09
5	MAX	13	4.2E-08	0.0449	0.04694	5.611	2.4E-07
5	MIN	1	1.1E-10	0.0001	0.00278	0.335	1.5E-08
10	MAX	16	6.2E-06	0.05726	0.06273	6.896	2.2E-07
10	MIN	2	7.9E-07	0.00484	0.00839	0.926	3.0E-08
15	MAX	20	1.3E-05	0.05509	0.05307	5.930	4.8E-07
15	MIN	4	1.8E-06	0.01183	0.01424	1.522	4.2E-08
20	MAX	20.6	1.4E-05	5.4E-02	0.05434	6.085	5.0E-07
20	MIN	6.0	3.4E-06	2.1E-02	0.01748	1.957	6.8E-08
25	MAX	20.8	1.5E-05	5.3E-02	0.05563	6.242	5.1E-07
25	MIN	5.8	3.5E-06	1.9E-02	1.7E-02	1.952	6.6E-08
30	MAX	21.1	1.5E-05	5.2E-02	5.7E-02	6.403	5.2E-07
30	MIN	5.6	3.6E-06	1.8E-02	1.7E-02	1.9490	6.4E-08
35	MAX	21.3	1.6E-05	5.2E-02	5.8E-02	6.5684	5.3E-07
35	MIN	5.4	3.7E-06	1.7E-02	1.7E-02	1.9469	6.2E-08
40	MAX	21.53	1.7E-05	5.1E-02	6.0E-02	6.7391	5.4E-07
40	MIN	5.15	3.8E-06	1.5E-02	1.7E-02	1.9468	6.0E-08
ALL	MAX	22	1.7E-05	6.2E-02	0.071492	7.625	5.4E-07
ALL	MIN	1.44E-09	1.3E-11	1.4E-10	7.21E-12	0.000	1.5E-11

YEAR		Ca	Cd	Co	Cr	Cu	Fe
TURKISH	mg/L		0.005		0.05	2	0.2
EU	mg/L		0.005		0.05	2	0.2
CANADA	mg/L		0.0005			0.005	
1	MAX	0	2.6E-11	4.4E-11	6.1E-11	4.4E-11	1.8E-10
1	MIN	0	2.6E-11	4.4E-11	6.1E-11	4.4E-11	1.8E-10
2	MAX	1477	4.6E-05	8.8E-11	1.0E-04	8.8E-11	6.9E-08
2	MIN	2	7.1E-08	2.9E-17	1.7E-07	1.3E-11	4.7E-10
3	MAX	1799	6.1E-05	3.9E-11	1.1E-04	8.5E-11	7.2E-08
3	MIN	72	2.6E-06	1.0E-16	4.2E-06	1.8E-11	2.8E-09
4	MAX	2042	7.7E-05	8.5E-11	1.1E-04	8.5E-11	7.1E-08
4	MIN	78	2.9E-06	1.2E-16	4.4E-06	2.4E-11	3.2E-09
5	MAX	2221	8.862E-05	8.2E-11	1.1E-04	8.4E-11	7.0E-08
5	MIN	132	5.2E-06	3.3E-19	6.7E-06	3.3E-11	4.7E-09
10	MAX	2817.2	1.3E-04	1.6E-14	1.3E-04	8.5E-11	8.1E-08
10	MIN	377.6	1.7E-05	5.0E-17	1.7E-05	6.8E-11	1.1E-08
15	MAX	2407.0	1.1E-04	2.2E-15	3.6E-03	8.6E-11	4.7E-04
15	MIN	628.6	3.1E-05	0.0E+00	2.7E-05	1.8E-12	1.7E-08
20	MAX	2467.5	1.1E-04	7.4E-16	3.7E-03	8.6E-11	4.6E-04
20	MIN	793.7	3.6E-05	0.0E+00	4.2E-05	1.8E-12	2.7E-08
25	MAX	2529.1	1.1E-04	8.8E-16	3.9E-03	8.8E-11	4.6E-04
25	MIN	791.2	3.5E-05	0.0E+00	4.0E-05	1.8E-12	2.5E-08
30	MAX	2592.2	1.2E-04	1.1E-15	4.0E-03	9.1E-11	4.5E-04
30	MIN	789.12	3.5E-05	0.0E+00	3.7E-05	1.8E-12	2.3E-08
35	MAX	2656.81	1.2E-04	1.3E-15	4.1E-03	9.3E-11	4.5E-04
35	MIN	787.66	3.5E-05	0.0E+00	3.5E-05	1.8E-12	2.1E-08
40	MAX	2723.81	1.2E-04	1.6E-15	4.3E-03	9.5E-11	4.4E-04
40	MIN	786.97	3.5E-05	0.0E+00	3.3E-05	1.8E-12	2.0E-08
ALL	MAX	3152	1.6E-04	8.8E-11	4.3E-03	9.5E-11	4.7E-04
ALL	MIN	0.00	2.6E-11	0.0E+00	6.1E-11	1.8E-12	1.8E-10

YEAR		Hg	K	Mg	Mn	Mo	Na
TURKISH	mg/L	0.001			0.05		200
EU	mg/L	0.001			0.05		200
CANADA	mg/L					0.073	
1	MAX	9.7E-12	0.00	0.00	8.7335E-11	0.00000	0.0
1	MIN	9.7E-12	0.00	0.00	8.7335E-11	0.00000	0.0
2	MAX	5.5E-11	33.38	87.02	2.3166E-07	0.02099	189.7
2	MIN	2.1E-11	0.05	0.13	2.4768E-10	0.00003	0.3
3	MAX	8.2E-11	40.91	105.61	2.9522E-08	0.02578	230.9
3	MIN	2.0E-11	1.64	4.20	2.6068E-10	0.00104	9.2
4	MAX	1.4E-09	46.97	118.95	2.8806E-08	0.02970	261.7
4	MIN	2.4E-11	1.78	4.54	2.879E-10	0.00113	10.0
5	MAX	3.2E-06	51.67	128.31	6.6417E-09	0.03276	284.1
5	MIN	7.4E-10	3.07	7.66	2.5837E-10	0.00194	16.9
10	MAX	5.9E-05	67.99	158.57	4.0653E-10	0.04349	359
10	MIN	7.5E-06	9.10	21.28	3.3396E-11	0.00582	48
15	MAX	9.0E-05	57.69	136.21	3.8919E-10	0.03690	306.7
15	MIN	1.7E-05	15.36	35.06	8.0411E-11	0.00986	79.9
20	MAX	9.4E-05	59.08	139.73	3.83E-10	0.03790	314.5
20	MIN	3.0E-05	19.00	44.94	1.4176E-10	0.01219	101.2
25	MAX	9.7E-05	60.50	143.33	3.7675E-10	0.03892	322.49
25	MIN	3.0E-05	18.92	44.83	1.3183E-10	0.01217	100.86
30	MAX	1.0E-04	61.95	147.01	3.7106E-10	0.03997	330.62
30	MIN	3.1E-05	18.86	44.75	1.2247E-10	0.01216	100.64
35	MAX	1.0E-04	63.43	150.79	3.6565E-10	0.04104	338.97
35	MIN	3.1E-05	18.80	44.699	1.137E-10	0.012164	100.48
40	MAX	1.1E-04	64.977	154.689	3.6055E-10	0.040297	347.61
40	MIN	3.1E-05	18.7722	44.6888	1.0555E-10	0.0117373	100.418
ALL	MAX	1.1E-04	77.08	175.72	2.3166E-07	0.04953	401
ALL	MIN	9.7E-12	0.0000	0.0000	1.7462E-11	0.00	0.000

YEAR		Ni	P	Pb	Se	Sb	Si
TURKISH	mg/L	0.02		0.01	0.01	0.005	
EU	mg/L	0.02		0.01	0.01	0.005	
CANADA	mg/L	0.15	0.03	0.007			
1	MAX	2.64E-11	3.34E-10	1.91E-11	7.71E-11	1.15E-11	9.88E-11
1	MIN	2.64E-11	3.34E-10	1.91E-11	7.71E-11	1.15E-11	9.88E-11
2	MAX	0.013523	2.16E-06	6.22E-08	0.001572	0.003032	9.047501
2	MIN	2.09E-05	4.3E-08	4.37E-11	1.6E-10	4.68E-06	0.043826
3	MAX	0.016655	2.01E-06	1.77E-07	0.00457	0.003722	4.081156
3	MIN	0.000671	8.42E-07	2.69E-09	0.000156	0.00015	0.205168
4	MAX	0.01928	1.59E-06	1.83E-05	0.010145	0.004287	2.758356
4	MIN	0.00073	8.89E-07	1.77E-08	0.000339	0.000163	0.1319
5	MAX	0.021346	2.24E-06	8.26E-05	0.014023	0.00473	2.006336
5	MIN	0.001264	1.34E-06	2.82E-06	0.000787	0.00028	0.127592
10	MAX	0.02865	4.37E-06	0.000445	0.024594	0.006287	0.857808
10	MIN	0.00383	1.23E-06	5.78E-05	0.003264	0.000841	0.108868
15	MAX	0.024226	7.31E-06	0.000631	0.031503	0.005327	15.19707
15	MIN	0.006514	1.82E-06	0.000121	0.005868	0.001425	0.134238
20	MAX	0.024817	7.85E-06	0.000653	0.032688	0.005462	15.77627
20	MIN	0.007982	1.85E-06	0.00021	0.010325	0.001757	0.011737
25	MAX	0.025421	8.29E-06	0.000676	0.033897	0.005599	16.43026
25	MIN	0.007951	1.88E-06	0.000211	0.010489	0.001751	0.012023
30	MAX	0.026037	8.75E-06	0.0007	0.035131	0.005738	17.08661
30	MIN	0.007925	1.91E-06	0.000213	0.010662	0.001747	0.012301
35	MAX	0.026674	9.23E-06	0.000724	0.036396	0.005882	17.74178
35	MIN	0.007906	1.94E-06	0.000215	0.010785	0.001744	0.012569
40	MAX	0.027334	9.74E-06	0.000749	0.037694	0.006031	18.39458
40	MIN	0.007897	1.98E-06	0.000216	0.010886	0.001742	0.012828
ALL	MAX	0.032721	9.74E-06	0.000749	0.037694	0.007155	18.39458
ALL	MIN	2.64E-11	3.34E-10	1.91E-11	7.71E-11	1.15E-11	9.88E-11

YEAR		Sn	Sr	Tl	U	V	Zn
TURKISH	mg/L						
EU	mg/L						
CANADA	mg/L					0.006	0.03
1	MAX	2.3E-13	0.000	5.8E-11	1.1E-11	0.00000	0.00000
1	MIN	2.3E-13	0.000	5.8E-11	1.1E-11	0.00000	0.00000
2	MAX	8.2E-11	1.048	2.0E-04	4.9E-04	0.05657	0.01064
2	MIN	9.7E-14	0.002	3.0E-07	7.6E-07	0.00009	0.00002
3	MAX	1.7E-10	1.274	2.4E-04	6.1E-04	0.06848	0.01534
3	MIN	3.3E-12	0.051	9.6E-06	2.5E-05	0.00272	0.00069
4	MAX	9.3E-10	1.440	2.8E-04	7.2E-04	0.07668	0.02068
4	MIN	3.5E-12	0.055	1.0E-05	2.7E-05	0.00294	0.00076
5	MAX	4.7E-08	1.559	3.1E-04	8.0E-04	0.08221	0.02422
5	MIN	1.7E-11	0.093	1.8E-05	4.7E-05	0.00492	0.00141
10	MAX	2.6E-06	1.9488	4.1E-04	1.1E-03	0.09955	0.03688
10	MIN	2.1E-07	0.2613	5.4E-05	1.5E-04	0.01337	0.00490
15	MAX	3.4E-05	1.6700	3.4E-04	9.7E-04	0.08587	0.03033
15	MIN	7.1E-07	0.4327	9.2E-05	2.6E-04	0.02186	0.00880
20	MAX	3.3E-05	1.7129	3.5E-04	1.0E-03	0.08820	0.03084
20	MIN	1.1E-06	0.5509	1.1E-04	3.4E-04	0.02836	0.00993
25	MAX	3.2E-05	1.7565	3.6E-04	1.1E-03	0.09058	0.03137
25	MIN	8.8E-07	0.5494	1.1E-04	3.5E-04	0.02833	0.00982
30	MAX	3.1E-05	1.8009	3.7E-04	1.2E-03	0.09300	0.03190
30	MIN	7.2E-07	0.5482	1.1E-04	3.7E-04	2.8E-02	9.7E-03
35	MAX	3.0E-05	1.8468	3.8E-04	1.3E-03	9.5E-02	3.2E-02
35	MIN	5.8E-07	0.5474	1.1E-04	3.9E-04	2.8E-02	9.6E-03
40	MAX	2.9E-05	1.89389	3.9E-04	1.4E-03	9.8E-02	3.3E-02
40	MIN	4.7E-07	0.547146	1.1E-04	4.1E-04	2.8E-02	9.5E-03
ALL	MAX	3.4E-05	2.169	4.6E-04	1.4E-03	0.1095	0.04440
ALL	MIN	9.7E-14	1.2E-10	5.8E-11	1.1E-11	6.4E-11	7.3E-11