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 Reading data base.  
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SOLUTION\_MASTER\_SPECIES  
 SOLUTION\_SPECIES  
 SOLUTION\_SPECIES  
 PHASES  
 SURFACE\_MASTER\_SPECIES  
 SURFACE\_SPECIES  
 END

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 Reading input data for simulation 1.  
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DATABASE C:\Program Files (x86)\USGS\Phreeqc Interactive 2.18.5570\database  
 \minteq.dat

SOLUTION 1 UGA1  
     temp        25  
     pH          4.44  
     pe          12  
     redox       pe  
     units       mg/l  
     density     1  
     Cl          51.73  
     S(6)        261.82  
     Al          1.14  
     As          0.01  
     Ca          35.55  
     Cu          0.13  
     Fe          5.48  
     K           25.35  
     Mg          3.69  
     Mn          5.09  
     Na          18.1  
     Zn          0.56  
     C(4)        0  
     N(5)        50.06  
     water       1 # kg

SOLUTION 2 UGA2  
     temp        25  
     pH          2.46  
     pe          12  
     redox       pe  
     units       mg/l  
     density     1  
     Cl          35.56  
     S(6)        1972  
     Al          19.29  
     As          0.68  
     Ca          33.94  
     Cu          51.26  
     Fe          407.65  
     K           1.44  
     Mg          7.37  
     Mn          23.20  
     Na          8.26  
     Zn          2.8  
     C(4)        0.0  
     N(5)        48.65

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water      1 # kg
SOLUTION 3 UGA3
temp       25
pH         4.10
pe         12
redox      pe
units      mg/l
density    1
Cl         33.72
S(6)       636.24
Al         14.93
As         5.51
Ca         69.45
Cu         42.76
Fe         130.06
K          0.00
Mg         6.39
Mn         34.80
Na         8.90
Zn         0.78
C(4)       0.0
N(5)       44.39
water      1 # kg

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SOLUTION 4 UGA4
temp       25
pH         3.36
pe         12
redox      pe
units      mg/l
density    1
Cl         61.60
S(6)       2301.59
Al         91.15
As         18.81
Ca         828.48
Cu         80.57
Fe         299.63
K          292.40
Mg         77.66
Mn         34.67
Na         112.32
Zn         82.01
C(4)       0
N(5)       85.69
water      1 # kg

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MIX 1
1      0.4
2      0.2
3      0.2
4      0.2

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SELECTED_OUTPUT
file      MISDAMFLUJO3
ph        true
percent_error  true
totals    Al  As  Cu  Fe  Mg  Mn  Zn

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Beginning of initial solution calculations.  
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Initial solution 1.      UGA1

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

Elements	Molality	Moles
Al	4.227e-005	4.227e-005
As	1.335e-007	1.335e-007

Ca	8.874e-004	8.874e-004
Cl	1.460e-003	1.460e-003
Cu	2.047e-006	2.047e-006
Fe	9.817e-005	9.817e-005
K	6.486e-004	6.486e-004
Mg	1.518e-004	1.518e-004
Mn	9.269e-005	9.269e-005
N(5)	3.576e-003	3.576e-003
Na	7.877e-004	7.877e-004
S(6)	2.727e-003	2.727e-003
Zn	8.571e-006	8.571e-006

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

pH	=	4.440
pe	=	12.000
Activity of water	=	1.000
Ionic strength	=	1.027e-002
Mass of water (kg)	=	1.000e+000
Total alkalinity (eq/kg)	=	-5.551e-005
Total carbon (mol/kg)	=	0.000e+000
Total CO2 (mol/kg)	=	0.000e+000
Temperature (deg C)	=	25.000
Electrical balance (eq)	=	-6.486e-003
Percent error, 100*(Cat- An )/(Cat+ An )	=	-47.87
Iterations	=	11
Total H	=	1.110127e+002
Total O	=	5.552804e+001

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

Species	Molality	Activity	Log Molality	Log Activity	Log Gamma
H+	3.979e-005	3.631e-005	-4.400	-4.440	-0.040
OH-	3.077e-010	2.766e-010	-9.512	-9.558	-0.046
H2O	5.551e+001	9.998e-001	1.744	-0.000	0.000
Al	4.227e-005				
Al+3	1.963e-005	8.619e-006	-4.707	-5.065	-0.357
AlSO4+	1.630e-005	1.470e-005	-4.788	-4.833	-0.045
AlOH+2	3.634e-006	2.429e-006	-5.440	-5.615	-0.175
Al(SO4)2-	2.110e-006	1.903e-006	-5.676	-5.721	-0.045
Al(OH)2+	5.742e-007	5.192e-007	-6.241	-6.285	-0.044
Al(OH)3	1.796e-008	1.800e-008	-7.746	-7.745	0.001
Al(OH)4-	5.496e-011	4.956e-011	-10.260	-10.305	-0.045
As(3)	2.761e-023				
H3AsO3	2.761e-023	2.767e-023	-22.559	-22.558	0.001
H4AsO3+	5.525e-028	4.978e-028	-27.258	-27.303	-0.045
H2AsO3-	5.005e-028	4.509e-028	-27.301	-27.346	-0.045
HAsO3-2	1.490e-035	9.819e-036	-34.827	-35.008	-0.181
AsO3-3	0.000e+000	0.000e+000	-43.574	-43.982	-0.408
As(5)	1.335e-007				
H2AsO4-	1.319e-007	1.188e-007	-6.880	-6.925	-0.045
HAsO4-2	8.673e-010	5.715e-010	-9.062	-9.243	-0.181
H3AsO4	7.533e-010	7.551e-010	-9.123	-9.122	0.001
AsO4-3	1.020e-016	3.990e-017	-15.991	-16.399	-0.408
Ca	8.874e-004				
Ca+2	7.252e-004	4.898e-004	-3.140	-3.310	-0.170
CaSO4	1.622e-004	1.626e-004	-3.790	-3.789	0.001
CaOH+	3.758e-012	3.404e-012	-11.425	-11.468	-0.043
Cl	1.460e-003				
Cl-	1.459e-003	1.310e-003	-2.836	-2.883	-0.047
MnCl+	3.043e-007	2.749e-007	-6.517	-6.561	-0.044
ZnCl+	1.787e-008	1.609e-008	-7.748	-7.793	-0.046
CuCl+	4.249e-009	3.825e-009	-8.372	-8.417	-0.046
FeCl+2	2.783e-009	1.851e-009	-8.556	-8.733	-0.177
MnCl2	9.761e-011	9.784e-011	-10.011	-10.009	0.001

ZnCl2	2.202e-011	2.208e-011	-10.657	-10.656	0.001
FeCl2+	1.200e-011	1.084e-011	-10.921	-10.965	-0.044
ZnOHC1	5.438e-012	5.451e-012	-11.265	-11.264	0.001
CuCl2	2.686e-012	2.692e-012	-11.571	-11.570	0.001
MnCl3-	6.400e-014	5.780e-014	-13.194	-13.238	-0.044
ZnCl3-	3.605e-014	3.246e-014	-13.443	-13.489	-0.046
FeCl3	1.417e-015	1.420e-015	-14.849	-14.848	0.001
CuCl2-	3.433e-016	3.091e-016	-15.464	-15.510	-0.046
ZnCl4-2	3.197e-017	2.127e-017	-16.495	-16.672	-0.177
CuCl3-	1.390e-017	1.252e-017	-16.857	-16.902	-0.046
CuCl3-2	9.650e-019	6.420e-019	-18.015	-18.192	-0.177
CuCl4-2	1.236e-022	8.221e-023	-21.908	-22.085	-0.177
Cu(1)	9.795e-016				
Cu+	6.352e-016	5.692e-016	-15.197	-15.245	-0.048
CuCl2-	3.433e-016	3.091e-016	-15.464	-15.510	-0.046
CuCl3-2	9.650e-019	6.420e-019	-18.015	-18.192	-0.177
Cu(2)	2.047e-006				
Cu+2	1.682e-006	1.085e-006	-5.774	-5.965	-0.191
CuSO4	3.599e-007	3.608e-007	-6.444	-6.443	0.001
CuCl+	4.249e-009	3.825e-009	-8.372	-8.417	-0.046
CuOH+	3.317e-010	2.987e-010	-9.479	-9.525	-0.046
Cu(OH)2	1.714e-011	1.718e-011	-10.766	-10.765	0.001
CuCl2	2.686e-012	2.692e-012	-11.571	-11.570	0.001
Cu2(OH)2+2	5.924e-014	3.903e-014	-13.227	-13.409	-0.181
CuCl3-	1.390e-017	1.252e-017	-16.857	-16.902	-0.046
Cu(OH)3-	3.172e-020	2.858e-020	-19.499	-19.544	-0.045
CuCl4-2	1.236e-022	8.221e-023	-21.908	-22.085	-0.177
Cu(OH)4-2	2.378e-028	1.567e-028	-27.624	-27.805	-0.181
Fe(2)	8.940e-007				
Fe+2	7.484e-007	5.036e-007	-6.126	-6.298	-0.172
FeSO4	1.455e-007	1.459e-007	-6.837	-6.836	0.001
FeOH+	4.856e-012	4.385e-012	-11.314	-11.358	-0.044
Fe(OH)2	1.025e-018	1.028e-018	-17.989	-17.988	0.001
Fe(OH)3-	1.164e-024	1.052e-024	-23.934	-23.978	-0.044
Fe(3)	9.728e-005				
Fe(OH)2+	8.388e-005	7.584e-005	-4.076	-4.120	-0.044
FeOH+2	1.250e-005	8.317e-006	-4.903	-5.080	-0.177
FeSO4+	7.019e-007	6.339e-007	-6.154	-6.198	-0.044
Fe+3	1.065e-007	4.678e-008	-6.972	-7.330	-0.357
Fe(SO4)2-	3.625e-008	3.266e-008	-7.441	-7.486	-0.045
Fe(OH)3	2.448e-008	2.454e-008	-7.611	-7.610	0.001
Fe2(OH)2+4	9.879e-009	1.862e-009	-8.005	-8.730	-0.725
FeCl+2	2.783e-009	1.851e-009	-8.556	-8.733	-0.177
Fe3(OH)4+5	4.002e-010	2.950e-011	-9.398	-10.530	-1.132
FeCl2+	1.200e-011	1.084e-011	-10.921	-10.965	-0.044
Fe(OH)4-	7.473e-012	6.757e-012	-11.126	-11.170	-0.044
FeCl3	1.417e-015	1.420e-015	-14.849	-14.848	0.001
H(0)	1.862e-036				
H2	9.310e-037	9.333e-037	-36.031	-36.030	0.001
K	6.486e-004				
K+	6.413e-004	5.758e-004	-3.193	-3.240	-0.047
KSO4-	7.290e-006	6.592e-006	-5.137	-5.181	-0.044
Mg	1.518e-004				
Mg+2	1.269e-004	8.626e-005	-3.896	-4.064	-0.168
MgSO4	2.493e-005	2.499e-005	-4.603	-4.602	0.001
MgOH+	4.302e-012	3.902e-012	-11.366	-11.409	-0.042
Mn(2)	9.269e-005				
Mn+2	7.705e-005	5.184e-005	-4.113	-4.285	-0.172
MnSO4	1.533e-005	1.537e-005	-4.814	-4.813	0.001
MnCl+	3.043e-007	2.749e-007	-6.517	-6.561	-0.044
Mn(NO3)2	2.121e-009	2.126e-009	-8.673	-8.672	0.001
MnCl2	9.761e-011	9.784e-011	-10.011	-10.009	0.001
MnOH+	4.063e-011	3.670e-011	-10.391	-10.435	-0.044
MnCl3-	6.400e-014	5.780e-014	-13.194	-13.238	-0.044
Mn(OH)3-	1.900e-026	1.716e-026	-25.721	-25.766	-0.044
Mn(3)	3.674e-018				
Mn+3	3.674e-018	1.613e-018	-17.435	-17.792	-0.357

Mn(6)	9.363e-040					
MnO4-2	9.363e-040	6.229e-040	-39.029	-39.206	-0.177	
Mn(7)	2.866e-037					
MnO4-	2.866e-037	2.573e-037	-36.543	-36.590	-0.047	
N(5)	3.576e-003					
NO3-	3.576e-003	3.209e-003	-2.447	-2.494	-0.047	
Mn(NO3)2	2.121e-009	2.126e-009	-8.673	-8.672	0.001	
Na	7.877e-004					
Na+	7.813e-004	7.048e-004	-3.107	-3.152	-0.045	
NaSO4-	6.364e-006	5.754e-006	-5.196	-5.240	-0.044	
O(0)	9.547e-021					
O2	4.773e-021	4.785e-021	-20.321	-20.320	0.001	
S(6)	2.727e-003					
SO4-2	2.481e-003	1.629e-003	-2.605	-2.788	-0.183	
CaSO4	1.622e-004	1.626e-004	-3.790	-3.789	0.001	
MgSO4	2.493e-005	2.499e-005	-4.603	-4.602	0.001	
AlSO4+	1.630e-005	1.470e-005	-4.788	-4.833	-0.045	
MnSO4	1.533e-005	1.537e-005	-4.814	-4.813	0.001	
KSO4-	7.290e-006	6.592e-006	-5.137	-5.181	-0.044	
HSO4-	6.365e-006	5.740e-006	-5.196	-5.241	-0.045	
NaSO4-	6.364e-006	5.754e-006	-5.196	-5.240	-0.044	
Al(SO4)2-	2.110e-006	1.903e-006	-5.676	-5.721	-0.045	
ZnSO4	1.738e-006	1.742e-006	-5.760	-5.759	0.001	
FeSO4+	7.019e-007	6.339e-007	-6.154	-6.198	-0.044	
CuSO4	3.599e-007	3.608e-007	-6.444	-6.443	0.001	
FeSO4	1.455e-007	1.459e-007	-6.837	-6.836	0.001	
Fe(SO4)2-	3.625e-008	3.266e-008	-7.441	-7.486	-0.045	
Zn(SO4)2-2	3.501e-008	2.307e-008	-7.456	-7.637	-0.181	
Zn	8.571e-006					
Zn+2	6.780e-006	4.561e-006	-5.169	-5.341	-0.172	
ZnSO4	1.738e-006	1.742e-006	-5.760	-5.759	0.001	
Zn(SO4)2-2	3.501e-008	2.307e-008	-7.456	-7.637	-0.181	
ZnCl+	1.787e-008	1.609e-008	-7.748	-7.793	-0.046	
ZnOH+	1.529e-010	1.377e-010	-9.816	-9.861	-0.045	
ZnCl2	2.202e-011	2.208e-011	-10.657	-10.656	0.001	
ZnOHCl	5.438e-012	5.451e-012	-11.265	-11.264	0.001	
Zn(OH)2	4.354e-014	4.365e-014	-13.361	-13.360	0.001	
ZnCl3-	3.605e-014	3.246e-014	-13.443	-13.489	-0.046	
ZnCl4-2	3.197e-017	2.127e-017	-16.495	-16.672	-0.177	
Zn(OH)3-	4.219e-021	3.801e-021	-20.375	-20.420	-0.045	
Zn(OH)4-2	2.518e-029	1.659e-029	-28.599	-28.780	-0.181	

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

Phase	SI	log IAP	log KT	
Al(OH)3(a)	-2.12	8.26	10.38	Al(OH)3
Al2O3	-6.47	16.51	22.98	Al2O3
Al4(OH)10SO4	-1.35	21.35	22.70	Al4(OH)10SO4
AlAsO4:2H2O	-5.67	-0.87	4.80	AlAsO4:2H2O
AlOHSO4	-0.18	-3.41	-3.23	AlOHSO4
AlumK	-8.71	-13.88	-5.17	KAl(SO4)2:12H2O
Alunite	3.98	2.63	-1.35	KAl3(SO4)2(OH)6
Anhydrite	-1.46	-6.10	-4.64	CaSO4
Antlerite	-11.21	-2.92	8.29	Cu3(OH)4SO4
Arsenolite	-87.43	-90.23	-2.80	As4O6
As2O5	-24.94	-18.24	6.70	As2O5
Atacamite	-8.83	-1.49	7.34	Cu2(OH)3Cl
Bianchite	-6.36	-8.13	-1.76	ZnSO4:6H2O
Birnessite	-6.12	11.97	18.09	MnO2
Bixbyite	-8.33	-8.94	-0.61	Mn2O3
Boehmite	-0.32	8.26	8.58	AlOOH
Brochantite	-15.35	-0.01	15.34	Cu4(OH)6SO4
Brucite	-11.98	4.82	16.79	Mg(OH)2
Ca3(AsO4)2:6H2O	-23.83	-1.53	22.30	Ca3(AsO4)2:6H2O
Chalcanthite	-6.11	-8.75	-2.64	CuSO4:5H2O
Claudetite	-87.17	-90.23	-3.06	As4O6

Cu(OH)2	-5.72	2.92	8.64	Cu(OH)2
Cu2(OH)3NO3	-10.34	-1.10	9.24	Cu2(OH)3NO3
Cu2SO4	-31.33	-33.28	-1.95	Cu2SO4
Cu3(AsO4)2:6H2O	-15.60	-9.50	6.10	Cu3(AsO4)2:6H2O
CuMetal	-18.48	-27.24	-8.76	Cu
CuOCuSO4	-17.37	-5.84	11.53	CuO:CuSO4
CupricFerrite	9.02	14.90	5.88	CuFe2O4
Cuprite	-20.06	-21.61	-1.55	Cu2O
CuprousFerrite	4.11	-4.81	-8.92	CuFeO2
CuSO4	-11.76	-8.75	3.01	CuSO4
Diaspore	1.38	8.26	6.87	AlOOH
Epsomite	-4.71	-6.85	-2.14	MgSO4:7H2O
Fe(OH)2.7Cl0.3	6.83	3.79	-3.04	Fe(OH)2.7Cl0.3
Fe2(SO4)3	-26.60	-23.02	3.58	Fe2(SO4)3
Fe3(OH)8	-5.66	14.56	20.22	Fe3(OH)8
FeAsO4:2H2O	-3.53	-3.13	0.40	FeAsO4:2H2O
Ferrihydrite	1.10	5.99	4.89	Fe(OH)3
Gibbsite(C)	-0.51	8.26	8.77	Al(OH)3
Goethite	5.49	5.99	0.50	FeOOH
Goslarite	-6.17	-8.13	-1.96	ZnSO4:7H2O
Gypsum	-1.49	-6.10	-4.61	CaSO4:2H2O
Halite	-7.62	-6.03	1.58	NaCl
Hausmannite	-14.88	46.66	61.54	Mn3O4
Hematite	15.99	11.98	-4.01	Fe2O3
Hercynite	-8.07	19.09	27.16	FeAl2O4
Jarosite-H	6.73	-5.37	-12.10	(H3O)Fe3(SO4)2(OH)6
Jarosite-K	10.63	-4.17	-14.80	KFe3(SO4)2(OH)6
Jarosite-Na	7.12	-4.08	-11.20	NaFe3(SO4)2(OH)6
Langite	-16.80	-0.01	16.79	Cu4(OH)6SO4:H2O
Lepidocrocite	4.62	5.99	1.37	FeOOH
Lime	-27.23	5.57	32.80	CaO
Maghemite	5.59	11.98	6.39	Fe2O3
Magnetite	10.82	14.56	3.74	Fe3O4
Manganite	-4.23	-4.47	-0.24	MnOOH
Melanothallite	-15.46	-11.73	3.73	CuCl2
Melanterite	-6.62	-9.09	-2.47	FeSO4:7H2O
Mg-Ferrite	0.03	16.80	16.77	MgFe2O4
Mirabilite	-7.98	-9.09	-1.11	Na2SO4:10H2O
Mn2(SO4)3	-38.24	-43.95	-5.71	Mn2(SO4)3
Mn3(AsO4)2:8H2O	-16.96	-4.46	12.50	Mn3(AsO4)2:8H2O
MnCl2:4H2O	-12.76	-10.05	2.71	MnCl2:4H2O
MnSO4	-9.74	-7.07	2.67	MnSO4
Nantokite	-11.37	-18.13	-6.76	CuCl
Nsutite	-5.54	11.97	17.50	MnO2
O2(g)	-17.36	65.76	83.12	O2
Periclase	-16.69	4.82	21.51	MgO
Portlandite	-17.11	5.57	22.68	Ca(OH)2
Pyrocroite	-10.49	4.59	15.09	Mn(OH)2
Pyrolusite	-3.89	11.97	15.86	MnO2
Spinel	-15.01	21.33	36.33	MgAl2O4
Tenorite	-4.70	2.92	7.62	CuO
Thenardite	-8.91	-9.09	-0.18	Na2SO4
Zincite	-7.60	3.54	11.14	ZnO
Zincosite	-11.14	-8.13	3.01	ZnSO4
Zn(NO3)2:6H2O	-13.77	-10.33	3.44	Zn(NO3)2:6H2O
Zn(OH)2(A)	-8.91	3.54	12.45	Zn(OH)2
Zn(OH)2(B)	-8.21	3.54	11.75	Zn(OH)2
Zn(OH)2(C)	-8.66	3.54	12.20	Zn(OH)2
Zn(OH)2(E)	-7.96	3.54	11.50	Zn(OH)2
Zn(OH)2(G)	-8.17	3.54	11.71	Zn(OH)2
Zn2(OH)2SO4	-12.09	-4.59	7.50	Zn2(OH)2SO4
Zn2(OH)3Cl	-15.44	-0.24	15.20	Zn2(OH)3Cl
Zn3(AsO4)2:2.5H2O	-21.28	-7.63	13.65	Zn3(AsO4)2:2.5H2O
Zn3O(SO4)2	-31.74	-12.72	19.02	Zn3O(SO4)2
Zn4(OH)6SO4	-25.91	2.49	28.40	Zn4(OH)6SO4
Zn5(OH)8Cl2	-35.45	3.05	38.50	Zn5(OH)8Cl2
ZnCl2	-18.14	-11.11	7.03	ZnCl2

ZnMetal	-55.10	-29.34	25.76	Zn
ZnO(Active)	-7.77	3.54	11.31	ZnO
ZnSO4:H2O	-7.56	-8.13	-0.57	ZnSO4:H2O

Initial solution 2. UGA2

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

Elements	Molality	Moles
Al	7.168e-004	7.168e-004
As	9.100e-006	9.100e-006
Ca	8.490e-004	8.490e-004
Cl	1.006e-003	1.006e-003
Cu	8.088e-004	8.088e-004
Fe	7.319e-003	7.319e-003
K	3.692e-005	3.692e-005
Mg	3.039e-004	3.039e-004
Mn	4.234e-004	4.234e-004
N(5)	3.482e-003	3.482e-003
Na	3.602e-004	3.602e-004
S(6)	2.058e-002	2.058e-002
Zn	4.295e-005	4.295e-005

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

pH	=	2.460
pe	=	12.000
Activity of water	=	0.999
Ionic strength	=	3.928e-002
Mass of water (kg)	=	1.000e+000
Total alkalinity (eq/kg)	=	-1.593e-002
Total carbon (mol/kg)	=	0.000e+000
Total CO2 (mol/kg)	=	0.000e+000
Temperature (deg C)	=	25.000
Electrical balance (eq)	=	-1.274e-002
Percent error, 100*(Cat- An )/(Cat+ An )	=	-27.38
Iterations	=	10
Total H	=	1.110189e+002
Total O	=	5.559935e+001

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

Species	Molality	Activity	Log Molality	Log Activity	Log Gamma
H+	4.015e-003	3.467e-003	-2.396	-2.460	-0.064
OH-	3.499e-012	2.896e-012	-11.456	-11.538	-0.082
H2O	5.551e+001	9.994e-001	1.744	-0.000	0.000
Al	7.168e-004				
AlSO4+	3.611e-004	3.017e-004	-3.442	-3.520	-0.078
Al+3	2.036e-004	5.444e-005	-3.691	-4.264	-0.573
Al(SO4)2-	1.518e-004	1.268e-004	-3.819	-3.897	-0.078
AlOH+2	3.195e-007	1.606e-007	-6.496	-6.794	-0.299
Al(OH)2+	4.267e-010	3.593e-010	-9.370	-9.445	-0.075
Al(OH)3	1.292e-013	1.304e-013	-12.889	-12.885	0.004
Al(OH)4-	4.498e-018	3.758e-018	-17.347	-17.425	-0.078
As(3)	1.019e-015				
H3AsO3	1.017e-015	1.026e-015	-14.993	-14.989	0.004
H4AsO3+	2.111e-018	1.763e-018	-17.675	-17.754	-0.078
H2AsO3-	2.097e-022	1.751e-022	-21.678	-21.757	-0.078
HAsO3-2	8.208e-032	3.993e-032	-31.086	-31.399	-0.313
AsO3-3	0.000e+000	0.000e+000	-41.649	-42.353	-0.704
As(5)	9.100e-006				
H2AsO4-	6.058e-006	5.059e-006	-5.218	-5.296	-0.078
H3AsO4	3.042e-006	3.069e-006	-5.517	-5.513	0.004
HAsO4-2	5.236e-010	2.547e-010	-9.281	-9.594	-0.313

AsO4-3	9.423e-019	1.862e-019	-18.026	-18.730	-0.704
Ca	8.490e-004				
Ca+2	5.458e-004	2.839e-004	-3.263	-3.547	-0.284
CaSO4	3.033e-004	3.060e-004	-3.518	-3.514	0.004
CaOH+	2.440e-014	2.065e-014	-13.613	-13.685	-0.073
Cl	1.006e-003				
Cl-	1.001e-003	8.250e-004	-3.000	-3.084	-0.084
FeCl+2	3.665e-006	1.817e-006	-5.436	-5.741	-0.305
CuCl+	6.548e-007	5.445e-007	-6.184	-6.264	-0.080
MnCl+	5.787e-007	4.856e-007	-6.238	-6.314	-0.076
ZnCl+	3.482e-008	2.895e-008	-7.458	-7.538	-0.080
FeCl2+	7.981e-009	6.697e-009	-8.098	-8.174	-0.076
CuCl2	2.391e-010	2.412e-010	-9.621	-9.618	0.004
MnCl2	1.079e-010	1.088e-010	-9.967	-9.963	0.004
ZnCl2	2.479e-011	2.501e-011	-10.606	-10.602	0.004
FeCl3	5.475e-013	5.525e-013	-12.262	-12.258	0.004
ZnOHC1	1.018e-013	1.027e-013	-12.992	-12.989	0.004
MnCl3-	4.823e-014	4.048e-014	-13.317	-13.393	-0.076
CuCl2-	3.331e-014	2.770e-014	-13.477	-13.558	-0.080
ZnCl3-	2.784e-014	2.315e-014	-13.555	-13.635	-0.080
CuCl3-	8.492e-016	7.061e-016	-15.071	-15.151	-0.080
CuCl3-2	7.303e-017	3.622e-017	-16.136	-16.441	-0.305
ZnCl4-2	1.926e-017	9.551e-018	-16.715	-17.020	-0.305
CuCl4-2	5.888e-021	2.920e-021	-20.230	-20.535	-0.305
Cu(1)	1.906e-013				
Cu+	1.572e-013	1.287e-013	-12.804	-12.890	-0.087
CuCl2-	3.331e-014	2.770e-014	-13.477	-13.558	-0.080
CuCl3-2	7.303e-017	3.622e-017	-16.136	-16.441	-0.305
Cu(2)	8.088e-004				
Cu+2	5.455e-004	2.452e-004	-3.263	-3.610	-0.347
CuSO4	2.626e-004	2.650e-004	-3.581	-3.577	0.004
CuCl+	6.548e-007	5.445e-007	-6.184	-6.264	-0.080
CuOH+	8.500e-010	7.069e-010	-9.071	-9.151	-0.080
CuCl2	2.391e-010	2.412e-010	-9.621	-9.618	0.004
Cu2(OH)2+2	4.494e-013	2.186e-013	-12.347	-12.660	-0.313
Cu(OH)2	4.219e-013	4.257e-013	-12.375	-12.371	0.004
CuCl3-	8.492e-016	7.061e-016	-15.071	-15.151	-0.080
CuCl4-2	5.888e-021	2.920e-021	-20.230	-20.535	-0.305
Cu(OH)3-	8.873e-024	7.410e-024	-23.052	-23.130	-0.078
Cu(OH)4-2	8.741e-034	4.252e-034	-33.058	-33.371	-0.313
Fe(2)	2.265e-003				
Fe+2	1.532e-003	7.853e-004	-2.815	-3.105	-0.290
FeSO4	7.323e-004	7.390e-004	-3.135	-3.131	0.004
FeOH+	8.530e-011	7.158e-011	-10.069	-10.145	-0.076
Fe(OH)2	1.740e-019	1.756e-019	-18.759	-18.755	0.004
Fe(OH)3-	2.241e-027	1.881e-027	-26.650	-26.726	-0.076
Fe(3)	5.054e-003				
FeSO4+	3.826e-003	3.211e-003	-2.417	-2.493	-0.076
Fe(SO4)2-	6.434e-004	5.374e-004	-3.191	-3.270	-0.078
FeOH+2	2.738e-004	1.358e-004	-3.563	-3.867	-0.305
Fe+3	2.729e-004	7.295e-005	-3.564	-4.137	-0.573
Fe(OH)2+	1.539e-005	1.296e-005	-4.813	-4.887	-0.075
Fe2(OH)2+4	8.859e-006	4.961e-007	-5.053	-6.304	-1.252
FeCl+2	3.665e-006	1.817e-006	-5.436	-5.741	-0.305
Fe3(OH)4+5	1.214e-007	1.343e-009	-6.916	-8.872	-1.956
FeCl2+	7.981e-009	6.697e-009	-8.098	-8.174	-0.076
Fe(OH)3	4.349e-011	4.388e-011	-10.362	-10.358	0.004
FeCl3	5.475e-013	5.525e-013	-12.262	-12.258	0.004
Fe(OH)4-	1.502e-016	1.265e-016	-15.823	-15.898	-0.075
H(0)	1.687e-032				
H2	8.435e-033	8.511e-033	-32.074	-32.070	0.004
K	3.692e-005				
K+	3.563e-005	2.937e-005	-4.448	-4.532	-0.084
KSO4-	1.297e-006	1.092e-006	-5.887	-5.962	-0.075
Mg	3.039e-004				
Mg+2	2.034e-004	1.078e-004	-3.692	-3.967	-0.276
MgSO4	1.005e-004	1.014e-004	-3.998	-3.994	0.004



MgOH+	6.008e-014	5.103e-014	-13.221	-13.292	-0.071
Mn(2)	4.234e-004				
Mn+2	2.840e-004	1.455e-004	-3.547	-3.837	-0.290
MnSO4	1.389e-004	1.401e-004	-3.857	-3.853	0.004
MnCl+	5.787e-007	4.856e-007	-6.238	-6.314	-0.076
Mn(NO3)2	4.719e-009	4.761e-009	-8.326	-8.322	0.004
MnCl2	1.079e-010	1.088e-010	-9.967	-9.963	0.004
MnOH+	1.285e-012	1.078e-012	-11.891	-11.967	-0.076
MnCl3-	4.823e-014	4.048e-014	-13.317	-13.393	-0.076
Mn(OH)3-	6.581e-032	5.523e-032	-31.182	-31.258	-0.076
Mn(3)	1.694e-017				
Mn+3	1.694e-017	4.528e-018	-16.771	-17.344	-0.573
Mn(6)	0.000e+000				
MnO4-2	0.000e+000	0.000e+000	-54.293	-54.598	-0.305
Mn(7)	0.000e+000				
MnO4-	0.000e+000	0.000e+000	-51.898	-51.982	-0.084
N(5)	3.482e-003				
NO3-	3.482e-003	2.867e-003	-2.458	-2.543	-0.084
Mn(NO3)2	4.719e-009	4.761e-009	-8.326	-8.322	0.004
Na	3.602e-004				
Na+	3.510e-004	2.939e-004	-3.455	-3.532	-0.077
NaSO4-	9.257e-006	7.794e-006	-5.034	-5.108	-0.075
O(0)	1.139e-028				
O2	5.696e-029	5.748e-029	-28.244	-28.240	0.004
S(6)	2.058e-002				
SO4-2	1.111e-002	5.292e-003	-1.954	-2.276	-0.322
FeSO4+	3.826e-003	3.211e-003	-2.417	-2.493	-0.076
HSO4-	2.131e-003	1.781e-003	-2.671	-2.749	-0.078
FeSO4	7.323e-004	7.390e-004	-3.135	-3.131	0.004
Fe(SO4)2-	6.434e-004	5.374e-004	-3.191	-3.270	-0.078
AlSO4+	3.611e-004	3.017e-004	-3.442	-3.520	-0.078
CaSO4	3.033e-004	3.060e-004	-3.518	-3.514	0.004
CuSO4	2.626e-004	2.650e-004	-3.581	-3.577	0.004
Al(SO4)2-	1.518e-004	1.268e-004	-3.819	-3.897	-0.078
MnSO4	1.389e-004	1.401e-004	-3.857	-3.853	0.004
MgSO4	1.005e-004	1.014e-004	-3.998	-3.994	0.004
ZnSO4	1.603e-005	1.618e-005	-4.795	-4.791	0.004
NaSO4-	9.257e-006	7.794e-006	-5.034	-5.108	-0.075
Zn(SO4)2-2	1.430e-006	6.959e-007	-5.845	-6.157	-0.313
KSO4-	1.297e-006	1.092e-006	-5.887	-5.962	-0.075
Zn	4.295e-005				
Zn+2	2.545e-005	1.304e-005	-4.594	-4.885	-0.290
ZnSO4	1.603e-005	1.618e-005	-4.795	-4.791	0.004
Zn(SO4)2-2	1.430e-006	6.959e-007	-5.845	-6.157	-0.313
ZnCl+	3.482e-008	2.895e-008	-7.458	-7.538	-0.080
ZnCl2	2.479e-011	2.501e-011	-10.606	-10.602	0.004
ZnOH+	4.935e-012	4.121e-012	-11.307	-11.385	-0.078
ZnOHCl	1.018e-013	1.027e-013	-12.992	-12.989	0.004
ZnCl3-	2.784e-014	2.315e-014	-13.555	-13.635	-0.080
ZnCl4-2	1.926e-017	9.551e-018	-16.715	-17.020	-0.305
Zn(OH)2	1.355e-017	1.367e-017	-16.868	-16.864	0.004
Zn(OH)3-	1.492e-026	1.246e-026	-25.826	-25.904	-0.078
Zn(OH)4-2	1.170e-036	5.693e-037	-35.932	-36.245	-0.313

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

Phase	SI	log IAP	log KT	
Al(OH)3(a)	-7.26	3.12	10.38	Al(OH)3
Al2O3	-16.75	6.23	22.98	Al2O3
Al4(OH)10SO4	-17.44	5.26	22.70	Al4(OH)10SO4
AlAsO4:2H2O	-7.20	-2.40	4.80	AlAsO4:2H2O
AlOHSO4	-0.85	-4.08	-3.23	AlOHSO4
AlumK	-8.18	-13.35	-5.17	KAl(SO4)2:12H2O
Alunite	-5.77	-7.12	-1.35	KAl3(SO4)2(OH)6
Anhydrite	-1.19	-5.82	-4.64	CaSO4
Antlerite	-11.56	-3.27	8.29	Cu3(OH)4SO4

Arsenolite	-57.15	-59.95	-2.80	As4O6
As2O5	-17.72	-11.03	6.70	As2O5
Atacamite	-10.27	-2.93	7.34	Cu2(OH)3Cl
Bianchite	-5.40	-7.16	-1.76	ZnSO4:6H2O
Birnessite	-13.60	4.50	18.09	MnO2
Bixbyite	-19.32	-19.93	-0.61	Mn2O3
Boehmite	-5.46	3.12	8.58	AlOOH
Brochantite	-17.30	-1.96	15.34	Cu4(OH)6SO4
Brucite	-15.84	0.95	16.79	Mg(OH)2
Ca3(AsO4)2:6H2O	-29.21	-6.91	22.30	Ca3(AsO4)2:6H2O
Chalcanthite	-3.25	-5.89	-2.64	CuSO4:5H2O
Claudetite	-56.89	-59.95	-3.06	As4O6
Cu(OH)2	-7.33	1.31	8.64	Cu(OH)2
Cu2(OH)3NO3	-11.62	-2.38	9.24	Cu2(OH)3NO3
Cu2SO4	-26.11	-28.06	-1.95	Cu2SO4
Cu3(AsO4)2:6H2O	-13.20	-7.10	6.10	Cu3(AsO4)2:6H2O
CuMetal	-16.13	-24.89	-8.76	Cu
CuOCuSO4	-16.11	-4.58	11.53	CuO:CuSO4
CupricFerrite	1.91	7.79	5.88	CuFe2O4
Cuprite	-19.31	-20.86	-1.55	Cu2O
CuprousFerrite	1.73	-7.19	-8.92	CuFeO2
CuSO4	-8.90	-5.89	3.01	CuSO4
Diaspore	-3.76	3.12	6.87	AlOOH
Epsomite	-4.11	-6.25	-2.14	MgSO4:7H2O
Fe(OH)2.7Cl0.3	4.62	1.58	-3.04	Fe(OH)2.7Cl0.3
Fe2(SO4)3	-18.68	-15.10	3.58	Fe2(SO4)3
Fe3(OH)8	-11.92	8.30	20.22	Fe3(OH)8
FeAsO4:2H2O	-2.67	-2.27	0.40	FeAsO4:2H2O
Ferrihydrite	-1.65	3.24	4.89	Fe(OH)3
Gibbsite(C)	-5.65	3.12	8.77	Al(OH)3
Goethite	2.74	3.24	0.50	FeOOH
Goslarite	-5.20	-7.16	-1.96	ZnSO4:7H2O
Gypsum	-1.21	-5.82	-4.61	CaSO4:2H2O
Halite	-8.20	-6.62	1.58	NaCl
Hausmannite	-29.37	32.17	61.54	Mn3O4
Hematite	10.49	6.49	-4.01	Fe2O3
Hercynite	-19.12	8.05	27.16	FeAl2O4
Jarosite-H	7.43	-4.67	-12.10	(H3O)Fe3(SO4)2(OH)6
Jarosite-K	8.06	-6.74	-14.80	KFe3(SO4)2(OH)6
Jarosite-Na	5.46	-5.74	-11.20	NaFe3(SO4)2(OH)6
Langite	-18.75	-1.96	16.79	Cu4(OH)6SO4:H2O
Lepidocrocite	1.87	3.24	1.37	FeOOH
Lime	-31.42	1.37	32.80	CaO
Maghemite	0.10	6.49	6.39	Fe2O3
Magnetite	4.56	8.30	3.74	Fe3O4
Manganite	-9.73	-9.96	-0.24	MnOOH
Melanothallite	-13.51	-9.78	3.73	CuCl2
Melanterite	-2.91	-5.38	-2.47	FeSO4:7H2O
Mg-Ferrite	-9.33	7.44	16.77	MgFe2O4
Mirabilite	-8.23	-9.34	-1.11	Na2SO4:10H2O
Mn2(SO4)3	-35.81	-41.52	-5.71	Mn2(SO4)3
Mn3(AsO4)2:8H2O	-20.28	-7.78	12.50	Mn3(AsO4)2:8H2O
MnCl2:4H2O	-12.72	-10.01	2.71	MnCl2:4H2O
MnSO4	-8.78	-6.11	2.67	MnSO4
Nantokite	-9.21	-15.97	-6.76	CuCl
Nsutite	-13.01	4.50	17.50	MnO2
O2(g)	-25.28	57.84	83.12	O2
Periclase	-20.56	0.95	21.51	MgO
Portlandite	-21.30	1.37	22.68	Ca(OH)2
Pyrocroite	-14.01	1.08	15.09	Mn(OH)2
Pyrolusite	-11.37	4.50	15.86	MnO2
Spinel	-29.15	7.18	36.33	MgAl2O4
Tenorite	-6.31	1.31	7.62	CuO
Thenardite	-9.16	-9.34	-0.18	Na2SO4
Zincite	-11.10	0.04	11.14	ZnO
Zincosite	-10.17	-7.16	3.01	ZnSO4
Zn(NO3)2:6H2O	-13.41	-9.97	3.44	Zn(NO3)2:6H2O

Zn(OH)2(A)	-12.42	0.03	12.45	Zn(OH)2
Zn(OH)2(B)	-11.72	0.03	11.75	Zn(OH)2
Zn(OH)2(C)	-12.17	0.03	12.20	Zn(OH)2
Zn(OH)2(E)	-11.47	0.03	11.50	Zn(OH)2
Zn(OH)2(G)	-11.68	0.03	11.71	Zn(OH)2
Zn2(OH)2SO4	-14.63	-7.13	7.50	Zn2(OH)2SO4
Zn2(OH)3Cl	-20.67	-5.47	15.20	Zn2(OH)3Cl
Zn3(AsO4)2:2.5H2O	-24.57	-10.92	13.65	Zn3(AsO4)2:2.5H2O
Zn3O(SO4)2	-33.31	-14.29	19.02	Zn3O(SO4)2
Zn4(OH)6SO4	-35.46	-7.06	28.40	Zn4(OH)6SO4
Zn5(OH)8Cl2	-49.41	-10.91	38.50	Zn5(OH)8Cl2
ZnCl2	-18.08	-11.05	7.03	ZnCl2
ZnMetal	-54.64	-28.88	25.76	Zn
ZnO(Active)	-11.27	0.04	11.31	ZnO
ZnSO4:H2O	-6.59	-7.16	-0.57	ZnSO4:H2O

Initial solution 3. UGA3

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

Elements	Molality	Moles
Al	5.539e-004	5.539e-004
As	7.362e-005	7.362e-005
Ca	1.735e-003	1.735e-003
Cl	9.521e-004	9.521e-004
Cu	6.736e-004	6.736e-004
Fe	2.331e-003	2.331e-003
Mg	2.631e-004	2.631e-004
Mn	6.341e-004	6.341e-004
N(5)	3.172e-003	3.172e-003
Na	3.875e-004	3.875e-004
S(6)	6.630e-003	6.630e-003
Zn	1.194e-005	1.194e-005

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

pH	=	4.100
pe	=	12.000
Activity of water	=	1.000
Ionic strength	=	2.149e-002
Mass of water (kg)	=	1.000e+000
Total alkalinity (eq/kg)	=	-9.800e-004
Total carbon (mol/kg)	=	0.000e+000
Total CO2 (mol/kg)	=	0.000e+000
Temperature (deg C)	=	25.000
Electrical balance (eq)	=	-5.373e-003
Percent error, 100*(Cat- An )/(Cat+ An )	=	-22.22
Iterations	=	11
Total H	=	1.110163e+002
Total O	=	5.554617e+001

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

Species	Molality	Activity	Log Molality	Log Activity	Log Gamma
H+	8.956e-005	7.943e-005	-4.048	-4.100	-0.052
OH-	1.465e-010	1.264e-010	-9.834	-9.898	-0.064
H2O	5.551e+001	9.997e-001	1.744	-0.000	0.000
Al	5.539e-004				
AlSO4+	2.599e-004	2.257e-004	-3.585	-3.647	-0.061
Al+3	2.160e-004	7.338e-005	-3.666	-4.134	-0.469
Al(SO4)2-	6.063e-005	5.264e-005	-4.217	-4.279	-0.061
AlOH+2	1.631e-005	9.450e-006	-4.788	-5.025	-0.237
Al(OH)2+	1.058e-006	9.232e-007	-5.975	-6.035	-0.059
Al(OH)3	1.456e-008	1.463e-008	-7.837	-7.835	0.002

Al(OH)4-	2.121e-011	1.841e-011	-10.674	-10.735	-0.061
As(3)	1.526e-019				
H3AsO3	1.526e-019	1.533e-019	-18.816	-18.814	0.002
H4AsO3+	6.958e-024	6.035e-024	-23.158	-23.219	-0.062
H2AsO3-	1.317e-024	1.142e-024	-23.881	-23.942	-0.062
HAsO3-2	2.009e-032	1.137e-032	-31.697	-31.944	-0.247
AsO3-3	0.000e+000	0.000e+000	-40.702	-41.258	-0.557
As(5)	7.362e-005				
H2AsO4-	7.251e-005	6.288e-005	-4.140	-4.201	-0.062
H3AsO4	8.697e-007	8.740e-007	-6.061	-6.058	0.002
HAsO4-2	2.443e-007	1.382e-007	-6.612	-6.859	-0.247
AsO4-3	1.589e-014	4.411e-015	-13.799	-14.355	-0.557
Ca	1.735e-003				
Ca+2	1.283e-003	7.586e-004	-2.892	-3.120	-0.228
CaSO4	4.516e-004	4.538e-004	-3.345	-3.343	0.002
CaOH+	2.753e-012	2.409e-012	-11.560	-11.618	-0.058
Cl	9.521e-004				
Cl-	9.501e-004	8.182e-004	-3.022	-3.087	-0.065
MnCl+	1.076e-006	9.368e-007	-5.968	-6.028	-0.060
CuCl+	7.003e-007	6.062e-007	-6.155	-6.217	-0.063
FeCl+2	1.620e-007	9.304e-008	-6.791	-7.031	-0.241
ZnCl+	1.255e-008	1.086e-008	-7.901	-7.964	-0.063
FeCl2+	3.906e-010	3.400e-010	-9.408	-9.468	-0.060
CuCl2	2.651e-010	2.664e-010	-9.577	-9.574	0.002
MnCl2	2.072e-010	2.082e-010	-9.684	-9.681	0.002
ZnCl2	9.260e-012	9.306e-012	-11.033	-11.031	0.002
ZnOHCl	1.674e-012	1.682e-012	-11.776	-11.774	0.002
MnCl3-	8.822e-014	7.680e-014	-13.054	-13.115	-0.060
CuCl2-	3.533e-014	3.059e-014	-13.452	-13.514	-0.063
FeCl3	2.769e-014	2.782e-014	-13.558	-13.556	0.002
ZnCl3-	9.868e-015	8.543e-015	-14.006	-14.068	-0.063
CuCl3-	8.933e-016	7.734e-016	-15.049	-15.112	-0.063
CuCl3-2	6.904e-017	3.966e-017	-16.161	-16.402	-0.241
ZnCl4-2	6.085e-018	3.495e-018	-17.216	-17.457	-0.241
CuCl4-2	5.521e-021	3.171e-021	-20.258	-20.499	-0.241
Cu(1)	2.038e-013				
Cu+	1.684e-013	1.445e-013	-12.774	-12.840	-0.067
CuCl2-	3.533e-014	3.059e-014	-13.452	-13.514	-0.063
CuCl3-2	6.904e-017	3.966e-017	-16.161	-16.402	-0.241
Cu(2)	6.736e-004				
Cu+2	5.086e-004	2.753e-004	-3.294	-3.560	-0.267
CuSO4	1.643e-004	1.651e-004	-3.784	-3.782	0.002
CuCl+	7.003e-007	6.062e-007	-6.155	-6.217	-0.063
CuOH+	4.002e-008	3.465e-008	-7.398	-7.460	-0.063
Cu2(OH)2+2	9.284e-010	5.253e-010	-9.032	-9.280	-0.247
Cu(OH)2	9.066e-010	9.111e-010	-9.043	-9.040	0.002
CuCl2	2.651e-010	2.664e-010	-9.577	-9.574	0.002
CuCl3-	8.933e-016	7.734e-016	-15.049	-15.112	-0.063
Cu(OH)3-	7.985e-019	6.925e-019	-18.098	-18.160	-0.062
CuCl4-2	5.521e-021	3.171e-021	-20.258	-20.499	-0.241
Cu(OH)4-2	3.067e-027	1.735e-027	-26.513	-26.761	-0.247
Fe(2)	9.017e-005				
Fe+2	6.911e-005	4.053e-005	-4.160	-4.392	-0.232
FeSO4	2.106e-005	2.117e-005	-4.676	-4.674	0.002
FeOH+	1.853e-010	1.613e-010	-9.732	-9.792	-0.060
Fe(OH)2	1.720e-017	1.728e-017	-16.765	-16.762	0.002
Fe(OH)3-	9.282e-024	8.081e-024	-23.032	-23.093	-0.060
Fe(3)	2.241e-003				
Fe(OH)2+	1.462e-003	1.275e-003	-2.835	-2.894	-0.059
FeOH+2	5.326e-004	3.060e-004	-3.274	-3.514	-0.241
FeSO4+	1.057e-004	9.198e-005	-3.976	-4.036	-0.060
Fe2(OH)2+4	2.459e-005	2.520e-006	-4.609	-5.599	-0.989
Fe3(OH)4+5	2.359e-005	6.713e-007	-4.627	-6.173	-1.546
Fe+3	1.108e-005	3.765e-006	-4.955	-5.424	-0.469
Fe(SO4)2-	9.849e-006	8.542e-006	-5.007	-5.068	-0.062
Fe(OH)3	1.876e-007	1.886e-007	-6.727	-6.725	0.002
FeCl+2	1.620e-007	9.304e-008	-6.791	-7.031	-0.241

FeCl2+	3.906e-010	3.400e-010	-9.408	-9.468	-0.060
Fe(OH)4-	2.720e-011	2.373e-011	-10.565	-10.625	-0.059
FeCl3	2.769e-014	2.782e-014	-13.558	-13.556	0.002
H(0)	8.890e-036				
H2	4.445e-036	4.467e-036	-35.352	-35.350	0.002
Mg	2.631e-004				
Mg+2	2.007e-004	1.201e-004	-3.697	-3.921	-0.223
MgSO4	6.239e-005	6.270e-005	-4.205	-4.203	0.002
MgOH+	2.829e-012	2.482e-012	-11.548	-11.605	-0.057
Mn(2)	6.341e-004				
Mn+2	4.825e-004	2.830e-004	-3.316	-3.548	-0.232
MnSO4	1.505e-004	1.512e-004	-3.822	-3.820	0.002
MnCl+	1.076e-006	9.368e-007	-5.968	-6.028	-0.060
Mn(NO3)2	8.354e-009	8.396e-009	-8.078	-8.076	0.002
MnCl2	2.072e-010	2.082e-010	-9.684	-9.681	0.002
MnOH+	1.052e-010	9.155e-011	-9.978	-10.038	-0.060
MnCl3-	8.822e-014	7.680e-014	-13.054	-13.115	-0.060
Mn(OH)3-	1.027e-026	8.942e-027	-25.988	-26.049	-0.060
Mn(3)	2.592e-017				
Mn+3	2.592e-017	8.806e-018	-16.586	-17.055	-0.469
Mn(6)	0.000e+000				
MnO4-2	0.000e+000	0.000e+000	-40.948	-41.189	-0.241
Mn(7)	3.108e-039				
MnO4-	3.108e-039	2.675e-039	-38.507	-38.573	-0.065
N(5)	3.172e-003				
NO3-	3.172e-003	2.730e-003	-2.499	-2.564	-0.065
Mn(NO3)2	8.354e-009	8.396e-009	-8.078	-8.076	0.002
Na	3.875e-004				
Na+	3.819e-004	3.319e-004	-3.418	-3.479	-0.061
NaSO4-	5.599e-006	4.885e-006	-5.252	-5.311	-0.059
O(0)	4.156e-022				
O2	2.078e-022	2.088e-022	-21.682	-21.680	0.002
S(6)	6.630e-003				
SO4-2	5.238e-003	2.937e-003	-2.281	-2.532	-0.251
CaSO4	4.516e-004	4.538e-004	-3.345	-3.343	0.002
AlSO4+	2.599e-004	2.257e-004	-3.585	-3.647	-0.061
CuSO4	1.643e-004	1.651e-004	-3.784	-3.782	0.002
MnSO4	1.505e-004	1.512e-004	-3.822	-3.820	0.002
FeSO4+	1.057e-004	9.198e-005	-3.976	-4.036	-0.060
MgSO4	6.239e-005	6.270e-005	-4.205	-4.203	0.002
Al(SO4)2-	6.063e-005	5.264e-005	-4.217	-4.279	-0.061
HSO4-	2.607e-005	2.264e-005	-4.584	-4.645	-0.061
FeSO4	2.106e-005	2.117e-005	-4.676	-4.674	0.002
Fe(SO4)2-	9.849e-006	8.542e-006	-5.007	-5.068	-0.062
NaSO4-	5.599e-006	4.885e-006	-5.252	-5.311	-0.059
ZnSO4	3.379e-006	3.396e-006	-5.471	-5.469	0.002
Zn(SO4)2-2	1.433e-007	8.106e-008	-6.844	-7.091	-0.247
Zn	1.194e-005				
Zn+2	8.410e-006	4.932e-006	-5.075	-5.307	-0.232
ZnSO4	3.379e-006	3.396e-006	-5.471	-5.469	0.002
Zn(SO4)2-2	1.433e-007	8.106e-008	-6.844	-7.091	-0.247
ZnCl+	1.255e-008	1.086e-008	-7.901	-7.964	-0.063
ZnOH+	7.848e-011	6.806e-011	-10.105	-10.167	-0.062
ZnCl2	9.260e-012	9.306e-012	-11.033	-11.031	0.002
ZnOHCl	1.674e-012	1.682e-012	-11.776	-11.774	0.002
ZnCl3-	9.868e-015	8.543e-015	-14.006	-14.068	-0.063
Zn(OH)2	9.809e-015	9.858e-015	-14.008	-14.006	0.002
ZnCl4-2	6.085e-018	3.495e-018	-17.216	-17.457	-0.241
Zn(OH)3-	4.524e-022	3.924e-022	-21.344	-21.406	-0.062
Zn(OH)4-2	1.383e-030	7.826e-031	-29.859	-30.106	-0.247

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

Phase	SI	log IAP	log KT	
Al(OH)3(a)	-2.21	8.17	10.38	Al(OH)3
Al2O3	-6.65	16.33	22.98	Al2O3

Al4(OH)10SO4	-0.77	21.93	22.70	Al4(OH)10SO4
AlAsO4:2H2O	-2.69	2.11	4.80	AlAsO4:2H2O
AlOHSO4	0.66	-2.57	-3.23	AlOHSO4
Anhydrite	-1.02	-5.65	-4.64	CaSO4
Antlerite	-5.10	3.19	8.29	Cu3(OH)4SO4
Arsenolite	-72.46	-75.26	-2.80	As4O6
As2O5	-18.82	-12.12	6.70	As2O5
Atacamite	-5.25	2.09	7.34	Cu2(OH)3Cl
Bianchite	-6.07	-7.84	-1.76	ZnSO4:6H2O
Birnessite	-6.75	11.34	18.09	MnO2
Bixbyite	-8.90	-9.51	-0.61	Mn2O3
Boehmite	-0.41	8.17	8.58	AlOOH
Brochantite	-7.51	7.83	15.34	Cu4(OH)6SO4
Brucite	-12.51	4.28	16.79	Mg(OH)2
Ca3(AsO4)2:6H2O	-19.18	3.12	22.30	Ca3(AsO4)2:6H2O
Chalcanthite	-3.45	-6.09	-2.64	CuSO4:5H2O
Claudetite	-72.19	-75.26	-3.06	As4O6
Cu(OH)2	-4.00	4.64	8.64	Cu(OH)2
Cu2(OH)3NO3	-6.62	2.62	9.24	Cu2(OH)3NO3
Cu2SO4	-26.26	-28.21	-1.95	Cu2SO4
Cu3(AsO4)2:6H2O	-4.30	1.80	6.10	Cu3(AsO4)2:6H2O
CuMetal	-16.08	-24.84	-8.76	Cu
CuOCuSO4	-12.98	-1.45	11.53	CuO:CuSO4
CupricFerrite	12.51	18.39	5.88	CuFe2O4
Cuprite	-15.93	-17.48	-1.55	Cu2O
CuprousFerrite	7.06	-1.86	-8.92	CuFeO2
CuSO4	-9.10	-6.09	3.01	CuSO4
Diaspore	1.29	8.17	6.87	AlOOH
Epsomite	-4.31	-6.45	-2.14	MgSO4:7H2O
Fe(OH)2.7Cl0.3	7.76	4.72	-3.04	Fe(OH)2.7Cl0.3
Fe2(SO4)3	-22.02	-18.44	3.58	Fe2(SO4)3
Fe3(OH)8	-2.66	17.56	20.22	Fe3(OH)8
FeAsO4:2H2O	0.42	0.82	0.40	FeAsO4:2H2O
Ferrihydrite	1.98	6.88	4.89	Fe(OH)3
Gibbsite(C)	-0.60	8.17	8.77	Al(OH)3
Goethite	6.38	6.88	0.50	FeOOH
Goslarite	-5.88	-7.84	-1.96	ZnSO4:7H2O
Gypsum	-1.04	-5.65	-4.61	CaSO4:2H2O
Halite	-8.15	-6.57	1.58	NaCl
Hausmannite	-15.39	46.15	61.54	Mn3O4
Hematite	17.76	13.75	-4.01	Fe2O3
Hercynite	-7.02	20.14	27.16	FeAl2O4
Jarosite-H	11.26	-0.84	-12.10	(H3O)Fe3(SO4)2(OH)6
Jarosite-Na	10.98	-0.22	-11.20	NaFe3(SO4)2(OH)6
Langite	-8.96	7.83	16.79	Cu4(OH)6SO4:H2O
Lepidocrocite	5.50	6.88	1.37	FeOOH
Lime	-27.72	5.08	32.80	CaO
Maghemite	7.37	13.75	6.39	Fe2O3
Magnetite	13.82	17.56	3.74	Fe3O4
Manganite	-4.52	-4.76	-0.24	MnOOH
Melanothallite	-13.46	-9.73	3.73	CuCl2
Melanterite	-4.46	-6.93	-2.47	FeSO4:7H2O
Mg-Ferrite	1.27	18.03	16.77	MgFe2O4
Mirabilite	-8.38	-9.49	-1.11	Na2SO4:10H2O
Mn2(SO4)3	-36.00	-41.71	-5.71	Mn2(SO4)3
Mn3(AsO4)2:8H2O	-10.66	1.84	12.50	Mn3(AsO4)2:8H2O
MnCl2:4H2O	-12.43	-9.72	2.71	MnCl2:4H2O
MnSO4	-8.75	-6.08	2.67	MnSO4
Nantokite	-9.17	-15.93	-6.76	CuCl
Nsutite	-6.16	11.34	17.50	MnO2
O2(g)	-18.72	64.40	83.12	O2
Periclase	-17.23	4.28	21.51	MgO
Portlandite	-17.60	5.08	22.68	Ca(OH)2
Pyrocroite	-10.44	4.65	15.09	Mn(OH)2
Pyrolusite	-4.52	11.34	15.86	MnO2
Spinel	-15.72	20.61	36.33	MgAl2O4
Tenorite	-2.98	4.64	7.62	CuO

Thenardite	-9.31	-9.49	-0.18	Na2SO4
Zincite	-8.25	2.89	11.14	ZnO
Zincosite	-10.85	-7.84	3.01	ZnSO4
Zn(NO3)2:6H2O	-13.88	-10.44	3.44	Zn(NO3)2:6H2O
Zn(OH)2(A)	-9.56	2.89	12.45	Zn(OH)2
Zn(OH)2(B)	-8.86	2.89	11.75	Zn(OH)2
Zn(OH)2(C)	-9.31	2.89	12.20	Zn(OH)2
Zn(OH)2(E)	-8.61	2.89	11.50	Zn(OH)2
Zn(OH)2(G)	-8.82	2.89	11.71	Zn(OH)2
Zn2(OH)2SO4	-12.45	-4.95	7.50	Zn2(OH)2SO4
Zn2(OH)3Cl	-16.60	-1.40	15.20	Zn2(OH)3Cl
Zn3(AsO4)2:2.5H2O	-17.09	-3.44	13.65	Zn3(AsO4)2:2.5H2O
Zn3O(SO4)2	-31.81	-12.79	19.02	Zn3O(SO4)2
Zn4(OH)6SO4	-27.56	0.84	28.40	Zn4(OH)6SO4
Zn5(OH)8Cl2	-38.41	0.09	38.50	Zn5(OH)8Cl2
ZnCl2	-18.51	-11.48	7.03	ZnCl2
ZnMetal	-55.06	-29.31	25.76	Zn
ZnO(Active)	-8.42	2.89	11.31	ZnO
ZnSO4:H2O	-7.27	-7.84	-0.57	ZnSO4:H2O

Initial solution 4. UGA4

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

Elements	Molality	Moles
Al	3.393e-003	3.393e-003
As	2.522e-004	2.522e-004
Ca	2.076e-002	2.076e-002
Cl	1.745e-003	1.745e-003
Cu	1.273e-003	1.273e-003
Fe	5.389e-003	5.389e-003
K	7.511e-003	7.511e-003
Mg	3.208e-003	3.208e-003
Mn	6.338e-004	6.338e-004
N(5)	6.145e-003	6.145e-003
Na	4.907e-003	4.907e-003
S(6)	2.406e-002	2.406e-002
Zn	1.260e-003	1.260e-003

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

pH	=	3.360
pe	=	12.000
Activity of water	=	0.999
Ionic strength	=	9.161e-002
Mass of water (kg)	=	1.000e+000
Total alkalinity (eq/kg)	=	-6.238e-003
Total carbon (mol/kg)	=	0.000e+000
Total CO2 (mol/kg)	=	0.000e+000
Temperature (deg C)	=	25.000
Electrical balance (eq)	=	3.328e-002
Percent error, 100*(Cat- An )/(Cat+ An )	=	33.39
Iterations	=	10
Total H	=	1.110169e+002
Total O	=	5.562513e+001

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

Species	Molality	Activity	Log Molality	Log Activity	Log Gamma
H+	5.265e-004	4.365e-004	-3.279	-3.360	-0.081
OH-	2.991e-011	2.299e-011	-10.524	-10.639	-0.114
H2O	5.551e+001	9.988e-001	1.744	-0.001	0.000
Al	3.393e-003				
AlSO4+	1.479e-003	1.157e-003	-2.830	-2.937	-0.107

Al+3	1.398e-003	2.589e-004	-2.855	-3.587	-0.732
Al(SO4)2-	5.013e-004	3.922e-004	-3.300	-3.406	-0.107
AlOH+2	1.527e-005	6.061e-006	-4.816	-5.217	-0.401
Al(OH)2+	1.356e-007	1.077e-007	-6.868	-6.968	-0.100
Al(OH)3	3.037e-010	3.101e-010	-9.518	-9.508	0.009
Al(OH)4-	9.069e-014	7.097e-014	-13.042	-13.149	-0.107
As(3)	7.424e-017				
H3AsO3	7.422e-017	7.580e-017	-16.129	-16.120	0.009
H4AsO3+	2.085e-020	1.639e-020	-19.681	-19.785	-0.104
H2AsO3-	1.306e-022	1.027e-022	-21.884	-21.988	-0.104
HAsO3-2	4.865e-031	1.861e-031	-30.313	-30.730	-0.417
AsO3-3	1.428e-040	0.000e+000	-39.845	-40.784	-0.939
As(5)	2.522e-004				
H2AsO4-	2.380e-004	1.871e-004	-3.623	-3.728	-0.104
H3AsO4	1.400e-005	1.430e-005	-4.854	-4.845	0.009
HAsO4-2	1.957e-007	7.485e-008	-6.708	-7.126	-0.417
AsO4-3	3.778e-015	4.347e-016	-14.423	-15.362	-0.939
Ca	2.076e-002				
Ca+2	1.524e-002	6.484e-003	-1.817	-2.188	-0.371
CaSO4	5.520e-003	5.637e-003	-2.258	-2.249	0.009
CaOH+	4.676e-012	3.744e-012	-11.330	-11.427	-0.097
Cl	1.745e-003				
Cl-	1.737e-003	1.326e-003	-2.760	-2.877	-0.117
FeCl+2	3.172e-006	1.229e-006	-5.499	-5.911	-0.412
ZnCl+	1.652e-006	1.282e-006	-5.782	-5.892	-0.110
CuCl+	1.474e-006	1.143e-006	-5.832	-5.942	-0.110
MnCl+	1.346e-006	1.062e-006	-5.871	-5.974	-0.103
FeCl2+	9.224e-009	7.277e-009	-8.035	-8.138	-0.103
ZnCl2	1.742e-009	1.780e-009	-8.759	-8.750	0.009
CuCl2	7.970e-010	8.140e-010	-9.099	-9.089	0.009
MnCl2	3.746e-010	3.826e-010	-9.426	-9.417	0.009
ZnOHCl	3.533e-011	3.608e-011	-10.452	-10.443	0.009
ZnCl3-	3.413e-012	2.648e-012	-11.467	-11.577	-0.110
FeCl3	9.448e-013	9.649e-013	-12.025	-12.016	0.009
MnCl3-	2.899e-013	2.287e-013	-12.538	-12.641	-0.103
CuCl2-	1.205e-013	9.346e-014	-12.919	-13.029	-0.110
CuCl3-	4.937e-015	3.829e-015	-14.307	-14.417	-0.110
ZnCl4-2	4.532e-015	1.755e-015	-14.344	-14.756	-0.412
CuCl3-2	5.071e-016	1.964e-016	-15.295	-15.707	-0.412
CuCl4-2	6.571e-020	2.545e-020	-19.182	-19.594	-0.412
Cu(1)	3.443e-013				
Cu+	2.234e-013	1.681e-013	-12.651	-12.774	-0.123
CuCl2-	1.205e-013	9.346e-014	-12.919	-13.029	-0.110
CuCl3-2	5.071e-016	1.964e-016	-15.295	-15.707	-0.412
Cu(2)	1.273e-003				
Cu+2	9.987e-004	3.203e-004	-3.001	-3.494	-0.494
CuSO4	2.733e-004	2.791e-004	-3.563	-3.554	0.009
CuCl+	1.474e-006	1.143e-006	-5.832	-5.942	-0.110
CuOH+	9.448e-009	7.329e-009	-8.025	-8.135	-0.110
CuCl2	7.970e-010	8.140e-010	-9.099	-9.089	0.009
Cu2(OH)2+2	6.144e-011	2.350e-011	-10.212	-10.629	-0.417
Cu(OH)2	3.430e-011	3.504e-011	-10.465	-10.455	0.009
CuCl3-	4.937e-015	3.829e-015	-14.307	-14.417	-0.110
CuCl4-2	6.571e-020	2.545e-020	-19.182	-19.594	-0.412
Cu(OH)3-	6.157e-021	4.842e-021	-20.211	-20.315	-0.104
Cu(OH)4-2	5.766e-030	2.205e-030	-29.239	-29.656	-0.417
Fe(2)	1.049e-003				
Fe+2	8.038e-004	3.303e-004	-3.095	-3.481	-0.386
FeSO4	2.454e-004	2.507e-004	-3.610	-3.601	0.009
FeOH+	3.029e-010	2.390e-010	-9.519	-9.622	-0.103
Fe(OH)2	4.557e-018	4.654e-018	-17.341	-17.332	0.009
Fe(OH)3-	5.016e-025	3.957e-025	-24.300	-24.403	-0.103
Fe(3)	4.339e-003				
FeSO4+	1.381e-003	1.089e-003	-2.860	-2.963	-0.103
FeOH+2	1.170e-003	4.533e-004	-2.932	-3.344	-0.412
Fe(OH)2+	4.327e-004	3.435e-004	-3.364	-3.464	-0.100
Fe2(OH)2+4	2.583e-004	5.530e-006	-3.588	-5.257	-1.669



Fe(SO <sub>4</sub> ) <sub>2</sub> -	1.869e-004	1.470e-004	-3.728	-3.833	-0.104
Fe+3	1.657e-004	3.068e-005	-3.781	-4.513	-0.732
Fe <sub>3</sub> (OH) <sub>4</sub> +5	1.611e-004	3.968e-007	-3.793	-6.401	-2.608
FeCl+2	3.172e-006	1.229e-006	-5.499	-5.911	-0.412
FeCl <sub>2</sub> +	9.224e-009	7.277e-009	-8.035	-8.138	-0.103
Fe(OH) <sub>3</sub>	9.041e-009	9.233e-009	-8.044	-8.035	0.009
FeCl <sub>3</sub>	9.448e-013	9.649e-013	-12.025	-12.016	0.009
Fe(OH) <sub>4</sub> -	2.662e-013	2.113e-013	-12.575	-12.675	-0.100
H(0)	2.642e-034				
H <sub>2</sub>	1.321e-034	1.349e-034	-33.879	-33.870	0.009
K	7.511e-003				
K+	7.300e-003	5.571e-003	-2.137	-2.254	-0.117
KS <sub>4</sub> -	2.105e-004	1.671e-004	-3.677	-3.777	-0.100
Mg	3.208e-003				
Mg+2	2.417e-003	1.064e-003	-2.617	-2.973	-0.356
MgSO <sub>4</sub>	7.909e-004	8.077e-004	-3.102	-3.093	0.009
MgOH+	4.963e-012	4.000e-012	-11.304	-11.398	-0.094
Mn(2)	6.338e-004				
Mn+2	4.819e-004	1.980e-004	-3.317	-3.703	-0.386
MnSO <sub>4</sub>	1.506e-004	1.538e-004	-3.822	-3.813	0.009
MnCl+	1.346e-006	1.062e-006	-5.871	-5.974	-0.103
Mn(NO <sub>3</sub> ) <sub>2</sub>	1.687e-008	1.722e-008	-7.773	-7.764	0.009
MnCl <sub>2</sub>	3.746e-010	3.826e-010	-9.426	-9.417	0.009
MnOH+	1.476e-011	1.165e-011	-10.831	-10.934	-0.103
MnCl <sub>3</sub> -	2.899e-013	2.287e-013	-12.538	-12.641	-0.103
Mn(OH) <sub>3</sub> -	4.766e-029	3.760e-029	-28.322	-28.425	-0.103
Mn(3)	3.327e-017				
Mn+3	3.327e-017	6.161e-018	-16.478	-17.210	-0.732
Mn(6)	0.000e+000				
MnO <sub>4</sub> -2	0.000e+000	0.000e+000	-46.853	-47.265	-0.412
Mn(7)	0.000e+000				
MnO <sub>4</sub> -	0.000e+000	0.000e+000	-44.531	-44.649	-0.119
N(5)	6.145e-003				
NO <sub>3</sub> -	6.145e-003	4.675e-003	-2.212	-2.330	-0.119
Mn(NO <sub>3</sub> ) <sub>2</sub>	1.687e-008	1.722e-008	-7.773	-7.764	0.009
Na	4.907e-003				
Na+	4.805e-003	3.787e-003	-2.318	-2.422	-0.103
NaSO <sub>4</sub> -	1.020e-004	8.100e-005	-3.991	-4.092	-0.100
O(0)	4.476e-025				
O <sub>2</sub>	2.238e-025	2.286e-025	-24.650	-24.641	0.009
S(6)	2.406e-002				
SO <sub>4</sub> -2	1.189e-002	4.268e-003	-1.925	-2.370	-0.445
CaSO <sub>4</sub>	5.520e-003	5.637e-003	-2.258	-2.249	0.009
AlSO <sub>4</sub> +	1.479e-003	1.157e-003	-2.830	-2.937	-0.107
FeSO <sub>4</sub> +	1.381e-003	1.089e-003	-2.860	-2.963	-0.103
MgSO <sub>4</sub>	7.909e-004	8.077e-004	-3.102	-3.093	0.009
Al(SO <sub>4</sub> ) <sub>2</sub> -	5.013e-004	3.922e-004	-3.300	-3.406	-0.107
ZnSO <sub>4</sub>	3.518e-004	3.593e-004	-3.454	-3.445	0.009
CuSO <sub>4</sub>	2.733e-004	2.791e-004	-3.563	-3.554	0.009
FeSO <sub>4</sub>	2.454e-004	2.507e-004	-3.610	-3.601	0.009
HSO <sub>4</sub> -	2.310e-004	1.808e-004	-3.636	-3.743	-0.107
KS <sub>4</sub> -	2.105e-004	1.671e-004	-3.677	-3.777	-0.100
Fe(SO <sub>4</sub> ) <sub>2</sub> -	1.869e-004	1.470e-004	-3.728	-3.833	-0.104
MnSO <sub>4</sub>	1.506e-004	1.538e-004	-3.822	-3.813	0.009
NaSO <sub>4</sub> -	1.020e-004	8.100e-005	-3.991	-4.092	-0.100
Zn(SO <sub>4</sub> ) <sub>2</sub> -2	3.259e-005	1.246e-005	-4.487	-4.904	-0.417
Zn	1.260e-003				
Zn+2	8.740e-004	3.591e-004	-3.058	-3.445	-0.386
ZnSO <sub>4</sub>	3.518e-004	3.593e-004	-3.454	-3.445	0.009
Zn(SO <sub>4</sub> ) <sub>2</sub> -2	3.259e-005	1.246e-005	-4.487	-4.904	-0.417
ZnCl+	1.652e-006	1.282e-006	-5.782	-5.892	-0.110
ZnCl <sub>2</sub>	1.742e-009	1.780e-009	-8.759	-8.750	0.009
ZnOH+	1.146e-009	9.010e-010	-8.941	-9.045	-0.104
ZnOHC1	3.533e-011	3.608e-011	-10.452	-10.443	0.009
ZnCl <sub>3</sub> -	3.413e-012	2.648e-012	-11.467	-11.577	-0.110
Zn(OH) <sub>2</sub>	2.323e-014	2.373e-014	-13.634	-13.625	0.009
ZnCl <sub>4</sub> -2	4.532e-015	1.755e-015	-14.344	-14.756	-0.412

Zn(OH)3-	2.183e-022	1.717e-022	-21.661	-21.765	-0.104
Zn(OH)4-2	1.628e-031	6.226e-032	-30.788	-31.206	-0.417

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

Phase	SI	log IAP	log KT	
Al(OH)3(a)	-3.89	6.49	10.38	Al(OH)3
Al2O3	-10.00	12.98	22.98	Al2O3
Al4(OH)10SO4	-5.82	16.88	22.70	Al4(OH)10SO4
AlAsO4:2H2O	-3.15	1.65	4.80	AlAsO4:2H2O
AlOHSO4	0.63	-2.60	-3.23	AlOHSO4
AlumK	-5.42	-10.59	-5.17	KAl(SO4)2:12H2O
Alunite	3.75	2.40	-1.35	KAl3(SO4)2(OH)6
Anhydrite	0.08	-4.56	-4.64	CaSO4
Antlerite	-7.71	0.58	8.29	Cu3(OH)4SO4
Arsenolite	-61.68	-64.48	-2.80	As4O6
As2O5	-16.39	-9.69	6.70	As2O5
Atacamite	-7.13	0.21	7.34	Cu2(OH)3Cl
Bianchite	-4.05	-5.82	-1.76	ZnSO4:6H2O
Birnessite	-9.86	8.23	18.09	MnO2
Bixbyite	-13.65	-14.26	-0.61	Mn2O3
Boehmite	-2.09	6.49	8.58	AlOOH
Brochantite	-11.53	3.81	15.34	Cu4(OH)6SO4
Brucite	-13.05	3.75	16.79	Mg(OH)2
Ca3(AsO4)2:6H2O	-18.40	3.90	22.30	Ca3(AsO4)2:6H2O
Chalcanthite	-3.23	-5.87	-2.64	CuSO4:5H2O
Claudetite	-61.41	-64.48	-3.06	As4O6
Cu(OH)2	-5.42	3.22	8.64	Cu(OH)2
Cu2(OH)3NO3	-8.48	0.76	9.24	Cu2(OH)3NO3
Cu2SO4	-25.97	-27.92	-1.95	Cu2SO4
Cu3(AsO4)2:6H2O	-6.12	-0.02	6.10	Cu3(AsO4)2:6H2O
CuMetal	-16.01	-24.77	-8.76	Cu
CuOCuSO4	-14.17	-2.64	11.53	CuO:CuSO4
CupricFerrite	8.48	14.36	5.88	CuFe2O4
Cuprite	-17.28	-18.83	-1.55	Cu2O
CuprousFerrite	5.07	-3.85	-8.92	CuFeO2
CuSO4	-8.87	-5.86	3.01	CuSO4
Diaspore	-0.38	6.49	6.87	AlOOH
Epsomite	-3.21	-5.35	-2.14	MgSO4:7H2O
Fe(OH)2.7Cl0.3	6.73	3.69	-3.04	Fe(OH)2.7Cl0.3
Fe2(SO4)3	-19.72	-16.14	3.58	Fe2(SO4)3
Fe3(OH)8	-5.85	14.37	20.22	Fe3(OH)8
FeAsO4:2H2O	0.32	0.72	0.40	FeAsO4:2H2O
Ferrihydrite	0.67	5.57	4.89	Fe(OH)3
Gibbsite(C)	-2.28	6.49	8.77	Al(OH)3
Goethite	5.07	5.57	0.50	FeOOH
Goslarite	-3.86	-5.82	-1.96	ZnSO4:7H2O
Gypsum	0.05	-4.56	-4.61	CaSO4:2H2O
Halite	-6.88	-5.30	1.58	NaCl
Hausmannite	-21.77	39.77	61.54	Mn3O4
Hematite	15.14	11.13	-4.01	Fe2O3
Hercynite	-10.94	16.22	27.16	FeAl2O4
Jarosite-H	10.62	-1.48	-12.10	(H3O)Fe3(SO4)2(OH)6
Jarosite-K	14.42	-0.38	-14.80	KFe3(SO4)2(OH)6
Jarosite-Na	10.66	-0.54	-11.20	NaFe3(SO4)2(OH)6
Langite	-12.98	3.81	16.79	Cu4(OH)6SO4:H2O
Lepidocrocite	4.19	5.57	1.37	FeOOH
Lime	-28.27	4.53	32.80	CaO
Maghemite	4.75	11.13	6.39	Fe2O3
Magnetite	10.63	14.37	3.74	Fe3O4
Manganite	-6.89	-7.13	-0.24	MnOOH
Melanothallite	-12.98	-9.25	3.73	CuCl2
Melanterite	-3.38	-5.85	-2.47	FeSO4:7H2O
Mg-Ferrite	-1.89	14.88	16.77	MgFe2O4
Mirabilite	-6.10	-7.22	-1.11	Na2SO4:10H2O
Mn2(SO4)3	-35.82	-41.53	-5.71	Mn2(SO4)3

Mn3(AsO4)2:8H2O	-13.14	-0.64	12.50	Mn3(AsO4)2:8H2O
MnCl2:4H2O	-12.17	-9.46	2.71	MnCl2:4H2O
MnSO4	-8.74	-6.07	2.67	MnSO4
Nantokite	-8.89	-15.65	-6.76	CuCl
Nsutite	-9.28	8.23	17.50	MnO2
O2(g)	-21.68	61.44	83.12	O2
Periclase	-17.76	3.75	21.51	MgO
Portlandite	-18.14	4.53	22.68	Ca(OH)2
Pyrocroite	-12.07	3.02	15.09	Mn(OH)2
Pyrolusite	-7.63	8.23	15.86	MnO2
Spinel	-19.60	16.73	36.33	MgAl2O4
Tenorite	-4.39	3.23	7.62	CuO
Thenardite	-7.03	-7.21	-0.18	Na2SO4
Zincite	-7.87	3.27	11.14	ZnO
Zincosite	-8.82	-5.81	3.01	ZnSO4
Zn(NO3)2:6H2O	-11.55	-8.11	3.44	Zn(NO3)2:6H2O
Zn(OH)2(A)	-9.18	3.27	12.45	Zn(OH)2
Zn(OH)2(B)	-8.48	3.27	11.75	Zn(OH)2
Zn(OH)2(C)	-8.93	3.27	12.20	Zn(OH)2
Zn(OH)2(E)	-8.23	3.27	11.50	Zn(OH)2
Zn(OH)2(G)	-8.44	3.27	11.71	Zn(OH)2
Zn2(OH)2SO4	-10.04	-2.54	7.50	Zn2(OH)2SO4
Zn2(OH)3Cl	-14.89	0.31	15.20	Zn2(OH)3Cl
Zn3(AsO4)2:2.5H2O	-13.52	0.13	13.65	Zn3(AsO4)2:2.5H2O
Zn3O(SO4)2	-27.37	-8.35	19.02	Zn3O(SO4)2
Zn4(OH)6SO4	-24.39	4.01	28.40	Zn4(OH)6SO4
Zn5(OH)8Cl2	-34.60	3.90	38.50	Zn5(OH)8Cl2
ZnCl2	-16.23	-9.20	7.03	ZnCl2
ZnMetal	-53.20	-27.44	25.76	Zn
ZnO(Active)	-8.04	3.27	11.31	ZnO
ZnSO4:H2O	-5.25	-5.82	-0.57	ZnSO4:H2O

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Beginning of batch-reaction calculations.  
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Reaction step 1.

Using mix 1.

Mixture 1.

4.000e-001	Solution 1	UGA1
2.000e-001	Solution 2	UGA2
2.000e-001	Solution 3	UGA3
2.000e-001	Solution 4	UGA4

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

Elements	Molality	Moles
Al	9.497e-004	9.497e-004
As	6.703e-005	6.703e-005
Ca	5.024e-003	5.024e-003
Cl	1.324e-003	1.324e-003
Cu	5.520e-004	5.520e-004
Fe	3.047e-003	3.047e-003
K	1.769e-003	1.769e-003
Mg	8.158e-004	8.158e-004
Mn	3.753e-004	3.753e-004
N	3.990e-003	3.990e-003
Na	1.446e-003	1.446e-003
S	1.135e-002	1.135e-002
Zn	2.664e-004	2.664e-004

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

pH = 3.169 Charge balance  
 pe = 12.185 Adjusted to redox equilibrium  
 Activity of water = 1.000  
 Ionic strength = 3.504e-002  
 Mass of water (kg) = 1.000e+000  
 Total alkalinity (eq/kg) = -4.709e-003  
 Total carbon (mol/kg) = 0.000e+000  
 Total CO2 (mol/kg) = 0.000e+000  
 Temperature (deg C) = 25.000  
 Electrical balance (eq) = 4.377e-004  
 Percent error, 100\*(Cat-|An|)/(Cat+|An|) = 1.10  
 Iterations = 6  
 Total H = 1.110155e+002  
 Total O = 5.556534e+001

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

Species	Molality	Activity	Log Molality	Log Activity	Log Gamma
H+	7.800e-004	6.771e-004	-3.108	-3.169	-0.061
OH-	1.777e-011	1.483e-011	-10.750	-10.829	-0.078
H2O	5.551e+001	9.995e-001	1.744	-0.000	0.000
Al	9.497e-004				
AlSO4+	4.474e-004	3.767e-004	-3.349	-3.424	-0.075
Al+3	3.786e-004	1.061e-004	-3.422	-3.974	-0.552
Al(SO4)2-	1.205e-004	1.015e-004	-3.919	-3.994	-0.075
AlOH+2	3.099e-006	1.603e-006	-5.509	-5.795	-0.286
Al(OH)2+	2.166e-008	1.836e-008	-7.664	-7.736	-0.072
Al(OH)3	3.385e-011	3.413e-011	-10.470	-10.467	0.004
Al(OH)4-	5.983e-015	5.038e-015	-14.223	-14.298	-0.075
As(3)	3.283e-017				
H3AsO3	3.282e-017	3.309e-017	-16.484	-16.480	0.004
H4AsO3+	1.319e-020	1.110e-020	-19.880	-19.955	-0.075
H2AsO3-	3.435e-023	2.891e-023	-22.464	-22.539	-0.075
HAsO3-2	6.731e-032	3.375e-032	-31.172	-31.472	-0.300
AsO3-3	0.000e+000	0.000e+000	-41.042	-41.716	-0.675
As(5)	6.703e-005				
H2AsO4-	6.097e-005	5.131e-005	-4.215	-4.290	-0.075
H3AsO4	6.031e-006	6.079e-006	-5.220	-5.216	0.004
HAsO4-2	2.638e-008	1.323e-008	-7.579	-7.878	-0.300
AsO4-3	2.341e-016	4.952e-017	-15.631	-16.305	-0.675
Ca	5.024e-003				
Ca+2	3.679e-003	1.963e-003	-2.434	-2.707	-0.273
CaSO4	1.345e-003	1.356e-003	-2.871	-2.868	0.004
CaOH+	8.584e-013	7.312e-013	-12.066	-12.136	-0.070
Cl	1.324e-003				
Cl-	1.320e-003	1.098e-003	-2.879	-2.959	-0.080
FeCl+2	2.308e-006	1.179e-006	-5.637	-5.929	-0.292
MnCl+	7.839e-007	6.627e-007	-6.106	-6.179	-0.073
CuCl+	6.874e-007	5.764e-007	-6.163	-6.239	-0.077
ZnCl+	3.434e-007	2.879e-007	-6.464	-6.541	-0.077
FeCl2+	6.841e-009	5.784e-009	-8.165	-8.238	-0.073
CuCl2	3.372e-010	3.399e-010	-9.472	-9.469	0.004
ZnCl2	3.285e-010	3.311e-010	-9.483	-9.480	0.004
MnCl2	1.961e-010	1.977e-010	-9.707	-9.704	0.004
ZnOHCl	5.187e-012	5.229e-012	-11.285	-11.282	0.004
FeCl3	6.301e-013	6.352e-013	-12.201	-12.197	0.004
ZnCl3-	4.867e-013	4.081e-013	-12.313	-12.389	-0.077
MnCl3-	1.158e-013	9.789e-014	-12.936	-13.009	-0.073
CuCl2-	3.041e-014	2.550e-014	-13.517	-13.593	-0.077
CuCl3-	1.580e-015	1.325e-015	-14.801	-14.878	-0.077
ZnCl4-2	4.387e-016	2.241e-016	-15.358	-15.650	-0.292
CuCl3-2	8.689e-017	4.439e-017	-16.061	-16.353	-0.292
CuCl4-2	1.427e-020	7.292e-021	-19.845	-20.137	-0.292
Cu(1)	1.114e-013				
Cu+	8.086e-014	6.685e-014	-13.092	-13.175	-0.083

CuCl2-	3.041e-014	2.550e-014	-13.517	-13.593	-0.077
CuCl3-2	8.689e-017	4.439e-017	-16.061	-16.353	-0.292
Cu(S4)2-3	0.000e+000	0.000e+000	-192.714	-193.070	-0.356
CuS4S5-3	0.000e+000	0.000e+000	-193.462	-193.800	-0.338
Cu(2)	5.520e-004				
Cu+2	4.174e-004	1.950e-004	-3.379	-3.710	-0.331
CuSO4	1.339e-004	1.350e-004	-3.873	-3.870	0.004
CuCl+	6.874e-007	5.764e-007	-6.163	-6.239	-0.077
CuOH+	3.433e-009	2.878e-009	-8.464	-8.541	-0.077
CuCl2	3.372e-010	3.399e-010	-9.472	-9.469	0.004
Cu(OH)2	8.805e-012	8.876e-012	-11.055	-11.052	0.004
Cu2(OH)2+2	7.229e-012	3.625e-012	-11.141	-11.441	-0.300
CuCl3-	1.580e-015	1.325e-015	-14.801	-14.878	-0.077
CuCl4-2	1.427e-020	7.292e-021	-19.845	-20.137	-0.292
Cu(OH)3-	9.403e-022	7.913e-022	-21.027	-21.102	-0.075
Cu(OH)4-2	4.637e-031	2.325e-031	-30.334	-30.634	-0.300
Cu(HS)3-	0.000e+000	0.000e+000	-262.172	-262.247	-0.075
Fe(2)	6.243e-004				
Fe+2	4.748e-004	2.500e-004	-3.323	-3.602	-0.279
FeSO4	1.495e-004	1.507e-004	-3.825	-3.822	0.004
FeOH+	1.380e-010	1.167e-010	-9.860	-9.933	-0.073
Fe(OH)2	1.454e-018	1.466e-018	-17.837	-17.834	0.004
Fe(OH)3-	9.510e-026	8.040e-026	-25.022	-25.095	-0.073
Fe(HS)2	0.000e+000	0.000e+000	-184.279	-184.276	0.004
Fe(HS)3-	0.000e+000	0.000e+000	-276.976	-277.051	-0.075
Fe(3)	2.423e-003				
FeSO4+	1.186e-003	1.002e-003	-2.926	-2.999	-0.073
FeOH+2	6.631e-004	3.388e-004	-3.178	-3.470	-0.292
Fe(OH)2+	1.952e-004	1.656e-004	-3.709	-3.781	-0.072
Fe(SO4)2-	1.277e-004	1.075e-004	-3.894	-3.969	-0.075
Fe+3	1.268e-004	3.554e-005	-3.897	-4.449	-0.552
Fe2(OH)2+4	4.887e-005	3.089e-006	-4.311	-5.510	-1.199
Fe3(OH)4+5	7.991e-006	1.069e-007	-5.097	-6.971	-1.874
FeCl+2	2.308e-006	1.179e-006	-5.637	-5.929	-0.292
FeCl2+	6.841e-009	5.784e-009	-8.165	-8.238	-0.073
Fe(OH)3	2.849e-009	2.872e-009	-8.545	-8.542	0.004
FeCl3	6.301e-013	6.352e-013	-12.201	-12.197	0.004
Fe(OH)4-	4.998e-014	4.239e-014	-13.301	-13.373	-0.072
H(0)	2.749e-034				
H2	1.374e-034	1.385e-034	-33.862	-33.858	0.004
K	1.769e-003				
K+	1.729e-003	1.438e-003	-2.762	-2.842	-0.080
KSO4-	4.039e-005	3.425e-005	-4.394	-4.465	-0.072
Mg	8.158e-004				
Mg+2	6.159e-004	3.342e-004	-3.210	-3.476	-0.265
MgSO4	1.999e-004	2.015e-004	-3.699	-3.696	0.004
MgOH+	9.479e-013	8.103e-013	-12.023	-12.091	-0.068
Mn(2)	3.753e-004				
Mn+2	2.833e-004	1.491e-004	-3.548	-3.826	-0.279
MnSO4	9.127e-005	9.201e-005	-4.040	-4.036	0.004
MnCl+	7.839e-007	6.627e-007	-6.106	-6.179	-0.073
Mn(NO3)2	6.380e-009	6.432e-009	-8.195	-8.192	0.004
MnCl2	1.961e-010	1.977e-010	-9.707	-9.704	0.004
MnOH+	6.693e-012	5.659e-012	-11.174	-11.247	-0.073
MnCl3-	1.158e-013	9.789e-014	-12.936	-13.009	-0.073
Mn(OH)3-	8.992e-030	7.602e-030	-29.046	-29.119	-0.073
Mn(3)	2.535e-017				
Mn+3	2.535e-017	7.104e-018	-16.596	-17.149	-0.552
Mn(6)	0.000e+000				
MnO4-2	0.000e+000	0.000e+000	-47.881	-48.173	-0.292
Mn(7)	0.000e+000				
MnO4-	0.000e+000	0.000e+000	-45.292	-45.372	-0.080
N(-3)	3.338e-013				
NH4+	3.202e-013	2.647e-013	-12.495	-12.577	-0.083
NH4SO4-	1.368e-014	1.156e-014	-13.864	-13.937	-0.073
NH3	2.210e-019	2.228e-019	-18.656	-18.652	0.004
N(3)	2.845e-005				

NO2-	2.845e-005	2.394e-005	-4.546	-4.621	-0.075
N(5)	3.962e-003				
NO3-	3.962e-003	3.291e-003	-2.402	-2.483	-0.080
Mn(NO3)2	6.380e-009	6.432e-009	-8.195	-8.192	0.004
Na	1.446e-003				
Na+	1.422e-003	1.199e-003	-2.847	-2.921	-0.074
NaSO4-	2.403e-005	2.038e-005	-4.619	-4.691	-0.072
O(0)	4.305e-025				
O2	2.152e-025	2.170e-025	-24.667	-24.664	0.004
S(-2)	0.000e+000				
H2S	0.000e+000	0.000e+000	-91.043	-91.039	0.004
HS-	0.000e+000	0.000e+000	-94.733	-94.812	-0.078
S5-2	0.000e+000	0.000e+000	-100.938	-101.238	-0.300
S4-2	0.000e+000	0.000e+000	-101.172	-101.472	-0.300
S6-2	0.000e+000	0.000e+000	-101.224	-101.524	-0.300
S-2	0.000e+000	0.000e+000	-104.269	-104.561	-0.292
S3-2	0.000e+000	0.000e+000	-104.625	-104.925	-0.300
S2-2	0.000e+000	0.000e+000	-105.871	-106.171	-0.300
Zn(HS)2	0.000e+000	0.000e+000	-178.699	-178.695	0.004
Fe(HS)2	0.000e+000	0.000e+000	-184.279	-184.276	0.004
Cu(S4)2-3	0.000e+000	0.000e+000	-192.714	-193.070	-0.356
CuS4S5-3	0.000e+000	0.000e+000	-193.462	-193.800	-0.338
Cu(HS)3-	0.000e+000	0.000e+000	-262.172	-262.247	-0.075
Zn(HS)3-	0.000e+000	0.000e+000	-272.272	-272.347	-0.075
Fe(HS)3-	0.000e+000	0.000e+000	-276.976	-277.051	-0.075
S(6)	1.135e-002				
SO4-2	6.883e-003	3.390e-003	-2.162	-2.470	-0.308
CaSO4	1.345e-003	1.356e-003	-2.871	-2.868	0.004
FeSO4+	1.186e-003	1.002e-003	-2.926	-2.999	-0.073
AlSO4+	4.474e-004	3.767e-004	-3.349	-3.424	-0.075
HSO4-	2.646e-004	2.228e-004	-3.577	-3.652	-0.075
MgSO4	1.999e-004	2.015e-004	-3.699	-3.696	0.004
FeSO4	1.495e-004	1.507e-004	-3.825	-3.822	0.004
CuSO4	1.339e-004	1.350e-004	-3.873	-3.870	0.004
Fe(SO4)2-	1.277e-004	1.075e-004	-3.894	-3.969	-0.075
Al(SO4)2-	1.205e-004	1.015e-004	-3.919	-3.994	-0.075
MnSO4	9.127e-005	9.201e-005	-4.040	-4.036	0.004
ZnSO4	7.680e-005	7.742e-005	-4.115	-4.111	0.004
KSO4-	4.039e-005	3.425e-005	-4.394	-4.465	-0.072
NaSO4-	2.403e-005	2.038e-005	-4.619	-4.691	-0.072
Zn(SO4)2-2	4.255e-006	2.134e-006	-5.371	-5.671	-0.300
NH4SO4-	1.368e-014	1.156e-014	-13.864	-13.937	-0.073
Zn	2.664e-004				
Zn+2	1.850e-004	9.741e-005	-3.733	-4.011	-0.279
ZnSO4	7.680e-005	7.742e-005	-4.115	-4.111	0.004
Zn(SO4)2-2	4.255e-006	2.134e-006	-5.371	-5.671	-0.300
ZnCl+	3.434e-007	2.879e-007	-6.464	-6.541	-0.077
ZnCl2	3.285e-010	3.311e-010	-9.483	-9.480	0.004
ZnOH+	1.874e-010	1.577e-010	-9.727	-9.802	-0.075
ZnOHCl	5.187e-012	5.229e-012	-11.285	-11.282	0.004
ZnCl3-	4.867e-013	4.081e-013	-12.313	-12.389	-0.077
Zn(OH)2	2.657e-015	2.678e-015	-14.576	-14.572	0.004
ZnCl4-2	4.387e-016	2.241e-016	-15.358	-15.650	-0.292
Zn(OH)3-	1.486e-023	1.250e-023	-22.828	-22.903	-0.075
Zn(OH)4-2	5.833e-033	2.925e-033	-32.234	-32.534	-0.300
Zn(HS)2	0.000e+000	0.000e+000	-178.699	-178.695	0.004
Zn(HS)3-	0.000e+000	0.000e+000	-272.272	-272.347	-0.075

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

Phase	SI	log IAP	log KT	
Al(OH)3(a)	-4.85	5.53	10.38	Al(OH)3
Al2O3	-11.91	11.07	22.98	Al2O3
Al4(OH)10SO4	-9.38	13.32	22.70	Al4(OH)10SO4
AlAsO4:2H2O	-4.48	0.32	4.80	AlAsO4:2H2O
AlOHSO4	-0.04	-3.27	-3.23	AlOHSO4

AlumK	-6.59	-11.76	-5.17	KAl(SO <sub>4</sub> ) <sub>2</sub> ·12H <sub>2</sub> O
Alunite	0.66	-0.69	-1.35	KAl <sub>3</sub> (SO <sub>4</sub> ) <sub>2</sub> (OH) <sub>6</sub>
Anhydrite	-0.54	-5.18	-4.64	CaSO <sub>4</sub>
Anilite	-80.45	-112.33	-31.88	Cu <sub>0.25</sub> Cu <sub>1.5</sub> S
Antlerite	-9.21	-0.92	8.29	Cu <sub>3</sub> (OH) <sub>4</sub> SO <sub>4</sub>
Arsenolite	-63.12	-65.92	-2.80	As <sub>4</sub> O <sub>6</sub>
As <sub>2</sub> O <sub>5</sub>	-17.13	-10.43	6.70	As <sub>2</sub> O <sub>5</sub>
Atacamite	-8.21	-0.87	7.34	Cu <sub>2</sub> (OH) <sub>3</sub> Cl
Bianchite	-4.72	-6.48	-1.76	ZnSO <sub>4</sub> ·6H <sub>2</sub> O
Birnessite	-10.38	7.71	18.09	MnO <sub>2</sub>
Bixbyite	-14.67	-15.28	-0.61	Mn <sub>2</sub> O <sub>3</sub>
BlaubleiI	-73.45	-97.62	-24.16	Cu <sub>0.9</sub> Cu <sub>0.2</sub> S
BlaubleiIII	-77.13	-104.41	-27.28	Cu <sub>0.6</sub> Cu <sub>0.8</sub> S
Boehmite	-3.04	5.53	8.58	AlOOH
Brochantite	-13.64	1.70	15.34	Cu <sub>4</sub> (OH) <sub>6</sub> SO <sub>4</sub>
Brucite	-13.93	2.86	16.79	Mg(OH) <sub>2</sub>
Ca <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	-21.84	0.46	22.30	Ca <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub> ·6H <sub>2</sub> O
Chalcanthite	-3.54	-6.18	-2.64	CuSO <sub>4</sub> ·5H <sub>2</sub> O
Chalcocite	-83.37	-117.99	-34.62	Cu <sub>2</sub> S
Chalcopyrite	-155.33	-190.60	-35.27	CuFeS <sub>2</sub>
Claudetite	-62.86	-65.92	-3.06	As <sub>4</sub> O <sub>6</sub>
Covellite	-72.31	-95.35	-23.04	CuS
Cu(OH) <sub>2</sub>	-6.01	2.63	8.64	Cu(OH) <sub>2</sub>
Cu <sub>2</sub> (OH) <sub>3</sub> NO <sub>3</sub>	-9.64	-0.40	9.24	Cu <sub>2</sub> (OH) <sub>3</sub> NO <sub>3</sub>
Cu <sub>2</sub> SO <sub>4</sub>	-26.87	-28.82	-1.95	Cu <sub>2</sub> SO <sub>4</sub>
Cu <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub> ·6H <sub>2</sub> O	-8.65	-2.55	6.10	Cu <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub> ·6H <sub>2</sub> O
CuMetal	-16.60	-25.36	-8.76	Cu
CuOCuSO <sub>4</sub>	-15.08	-3.55	11.53	CuO:CuSO <sub>4</sub>
CupricFerrite	6.87	12.75	5.88	CuFe <sub>2</sub> O <sub>4</sub>
Cuprite	-18.46	-20.01	-1.55	Cu <sub>2</sub> O
CuprousFerrite	3.97	-4.95	-8.92	CuFeO <sub>2</sub>
CuSO <sub>4</sub>	-9.19	-6.18	3.01	CuSO <sub>4</sub>
Diaspore	-1.34	5.53	6.87	AlOOH
Djurleite	-82.58	-116.50	-33.92	Cu <sub>0.066</sub> Cu <sub>1.868</sub> S
Epsomite	-3.81	-5.95	-2.14	MgSO <sub>4</sub> ·7H <sub>2</sub> O
Fe(OH) <sub>2</sub> ·7Cl <sub>0.3</sub>	6.26	3.22	-3.04	Fe(OH) <sub>2</sub> ·7Cl <sub>0.3</sub>
Fe <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	-19.89	-16.31	3.58	Fe <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>
Fe <sub>3</sub> (OH) <sub>8</sub>	-7.37	12.85	20.22	Fe <sub>3</sub> (OH) <sub>8</sub>
FeAsO <sub>4</sub> ·2H <sub>2</sub> O	-0.56	-0.16	0.40	FeAsO <sub>4</sub> ·2H <sub>2</sub> O
Ferrihydrite	0.17	5.06	4.89	Fe(OH) <sub>3</sub>
FeS(ppt)	-91.33	-95.24	-3.92	FeS
Gibbsite(C)	-3.24	5.53	8.77	Al(OH) <sub>3</sub>
Goethite	4.56	5.06	0.50	FeOOH
Goslarite	-4.52	-6.48	-1.96	ZnSO <sub>4</sub> ·7H <sub>2</sub> O
Greigite	-334.04	-379.07	-45.03	Fe <sub>3</sub> S <sub>4</sub>
Gypsum	-0.57	-5.18	-4.61	CaSO <sub>4</sub> ·2H <sub>2</sub> O
Halite	-7.46	-5.88	1.58	NaCl
Hausmannite	-23.30	38.24	61.54	Mn <sub>3</sub> O <sub>4</sub>
Hematite	14.12	10.12	-4.01	Fe <sub>2</sub> O <sub>3</sub>
Hercynite	-13.36	13.80	27.16	FeAl <sub>2</sub> O <sub>4</sub>
Jarosite-H	9.66	-2.44	-12.10	(H <sub>3</sub> O)Fe <sub>3</sub> (SO <sub>4</sub> ) <sub>2</sub> (OH) <sub>6</sub>
Jarosite-K	12.69	-2.11	-14.80	KFe <sub>3</sub> (SO <sub>4</sub> ) <sub>2</sub> (OH) <sub>6</sub>
Jarosite-Na	9.01	-2.19	-11.20	NaFe <sub>3</sub> (SO <sub>4</sub> ) <sub>2</sub> (OH) <sub>6</sub>
Langite	-15.09	1.70	16.79	Cu <sub>4</sub> (OH) <sub>6</sub> SO <sub>4</sub> ·H <sub>2</sub> O
Lepidocrocite	3.69	5.06	1.37	FeOOH
Lime	-29.17	3.63	32.80	CaO
Mackinawite	-90.60	-95.24	-4.65	FeS
Maghemite	3.73	10.12	6.39	Fe <sub>2</sub> O <sub>3</sub>
Magnetite	9.12	12.85	3.74	Fe <sub>3</sub> O <sub>4</sub>
Manganite	-7.40	-7.64	-0.24	MnOOH
Melanothallite	-13.36	-9.63	3.73	CuCl <sub>2</sub>
Melanterite	-3.60	-6.07	-2.47	FeSO <sub>4</sub> ·7H <sub>2</sub> O
Mg-Ferrite	-3.79	12.98	16.77	MgFe <sub>2</sub> O <sub>4</sub>
Mirabilite	-7.20	-8.31	-1.11	Na <sub>2</sub> SO <sub>4</sub> ·10H <sub>2</sub> O
Mn <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	-36.00	-41.71	-5.71	Mn <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>
Mn <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub> ·8H <sub>2</sub> O	-15.40	-2.90	12.50	Mn <sub>3</sub> (AsO <sub>4</sub> ) <sub>2</sub> ·8H <sub>2</sub> O
MnCl <sub>2</sub> ·4H <sub>2</sub> O	-12.46	-9.75	2.71	MnCl <sub>2</sub> ·4H <sub>2</sub> O

MnS(Green)	-99.27	-95.47	3.80	MnS
MnSO4	-8.97	-6.30	2.67	MnSO4
Nantokite	-9.37	-16.13	-6.76	CuCl
Nsutite	-9.79	7.71	17.50	MnO2
O2(g)	-21.70	61.42	83.12	O2
Oripment	-265.93	-326.90	-60.97	As2S3
Periclase	-18.65	2.86	21.51	MgO
Portlandite	-19.04	3.63	22.68	Ca(OH)2
Pyrite	-144.04	-162.52	-18.48	FeS2
Pyrocroite	-12.58	2.51	15.09	Mn(OH)2
Pyrolusite	-8.15	7.71	15.86	MnO2
Realgar	-110.07	-129.82	-19.75	AsS
Sphalerite	-84.04	-95.65	-11.62	ZnS
Spinel	-22.40	13.93	36.33	MgAl2O4
Sulfur	-65.16	-67.27	-2.11	S
Tenorite	-4.99	2.63	7.62	CuO
Thenardite	-8.13	-8.31	-0.18	Na2SO4
Wurtzite	-85.97	-95.65	-9.68	ZnS
Zincite	-8.81	2.33	11.14	ZnO
Zincosite	-9.49	-6.48	3.01	ZnSO4
Zn(NO3)2:6H2O	-12.42	-8.98	3.44	Zn(NO3)2:6H2O
Zn(OH)2(A)	-10.12	2.33	12.45	Zn(OH)2
Zn(OH)2(B)	-9.42	2.33	11.75	Zn(OH)2
Zn(OH)2(C)	-9.87	2.33	12.20	Zn(OH)2
Zn(OH)2(E)	-9.17	2.33	11.50	Zn(OH)2
Zn(OH)2(G)	-9.38	2.33	11.71	Zn(OH)2
Zn2(OH)2SO4	-11.65	-4.15	7.50	Zn2(OH)2SO4
Zn2(OH)3Cl	-16.67	-1.47	15.20	Zn2(OH)3Cl
Zn3(AsO4)2:2.5H2O	-17.10	-3.45	13.65	Zn3(AsO4)2:2.5H2O
Zn3O(SO4)2	-29.66	-10.64	19.02	Zn3O(SO4)2
Zn4(OH)6SO4	-27.90	0.50	28.40	Zn4(OH)6SO4
Zn5(OH)8Cl2	-39.12	-0.62	38.50	Zn5(OH)8Cl2
ZnCl2	-16.96	-9.93	7.03	ZnCl2
ZnMetal	-54.14	-28.38	25.76	Zn
ZnO(Active)	-8.98	2.33	11.31	ZnO
ZnS(A)	-86.60	-95.65	-9.05	ZnS
ZnSO4:H2O	-5.91	-6.48	-0.57	ZnSO4:H2O

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End of simulation.  
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Reading input data for simulation 2.  
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End of run.  
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