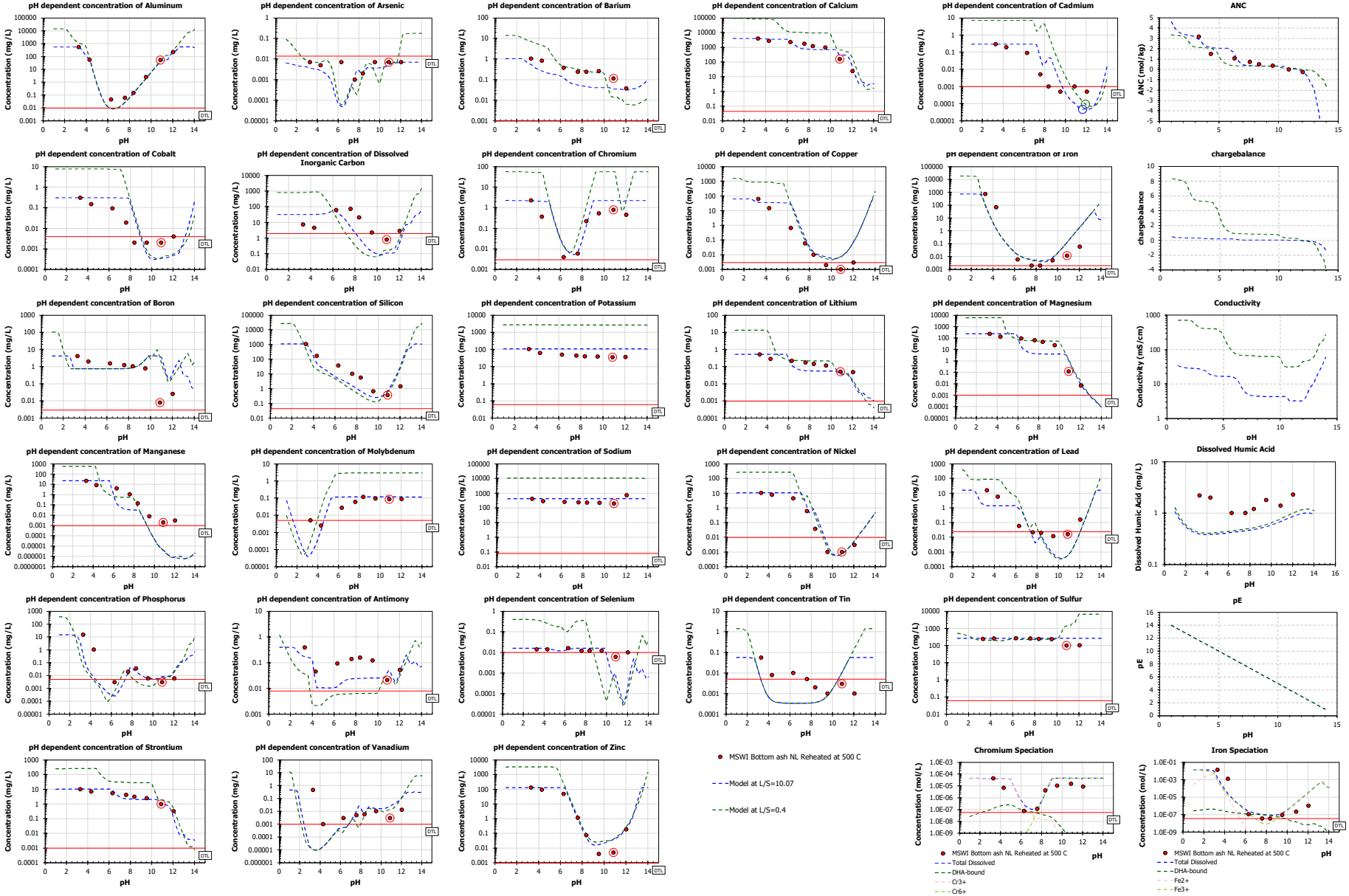
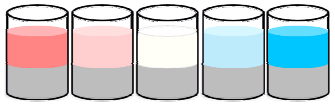
MSWI BOTTOM ASH REHEATED AT 500 C

COMPARISON pH DEPENDENCE WITH MODEL



Object pH Dependent Leaching Test Model
Name MSWI Bottom ash NL Reheated 500 C

pH Dependent Leaching Test Scenario



Lab Test

Extra L/S Simulation

Lab Test

Model Parameters

Entity	Unit	Default
c0		-5.682
c1		-0.7876
c2		0.2265
c3		-0.03096
c4		0.002052
c5		-5.186E-05
Clay	mg/kg	3000
Hydrous Ferric Oxide	mg/kg	150.0
L/S	L/kg	10.07
pE		4.130
pH		10.87
Solid Humic Acid	mg/kg	60.00
Simulated Low L/S	L/kg	0.4000

Available Content

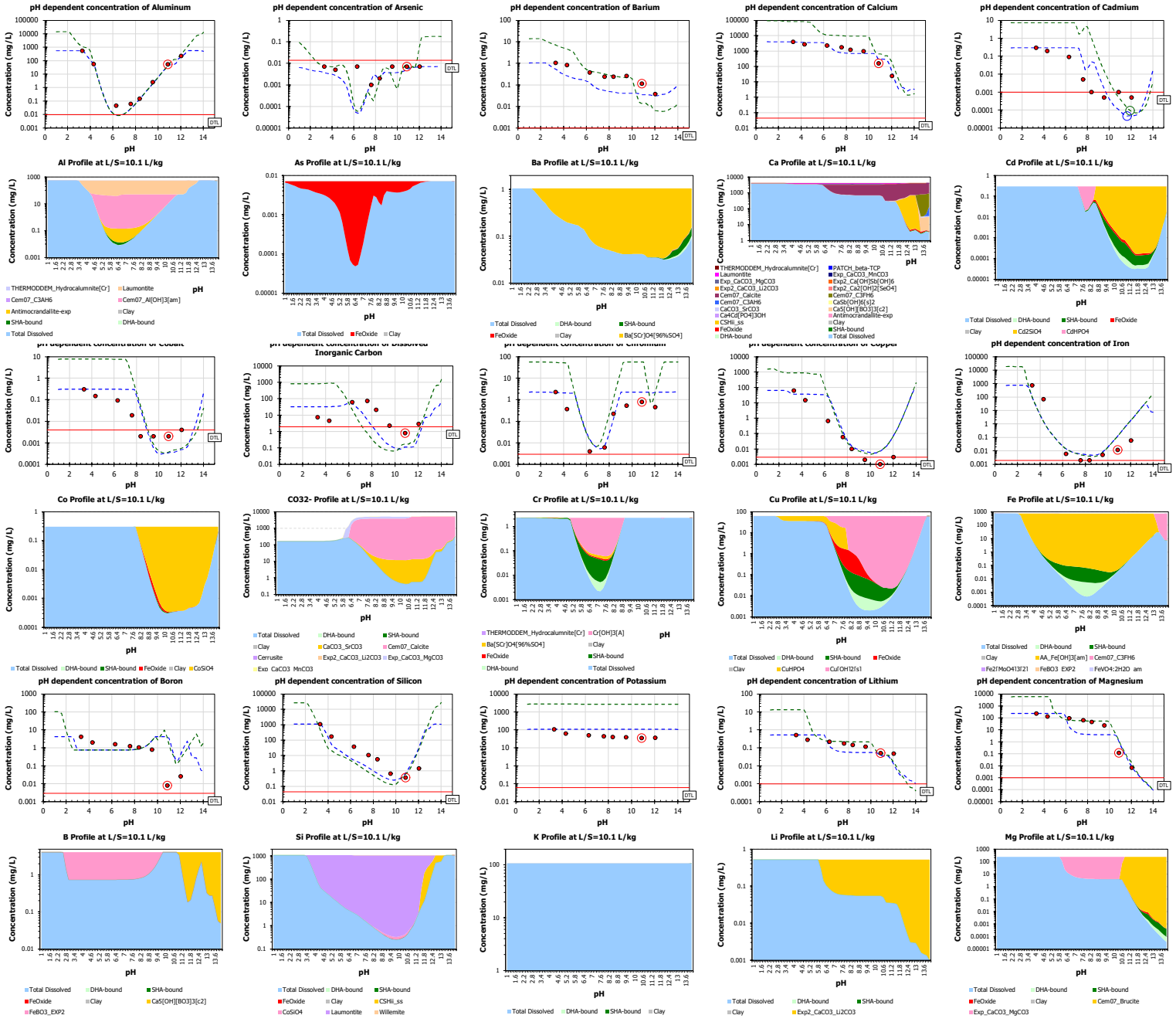
Entity	mg/kg	Entity	mg/kg	Entity	mg/kg
Al	5647	Si	1.100E+04	Sb	3.996
Ba	10.64	K	1083	Sn	0.5723
Ca	4.065E+04	Li	5.222	SO4	8015
Cd	2.974	Mg	2371	Sr	102.3
Cl	2390	Mn	228.9	V	4.630
Co	3.056	Mo	1.184	Zn	1307
CO32-	5.002E+04	Na	4191		
Cr	22.93	Ni	105.8		
Cu	628.8	Pb	161.9		
Fe	7388	PO4	468.1		
B	41.62				

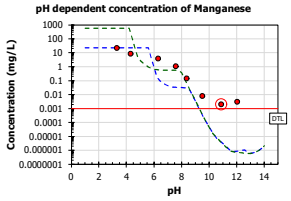
Solid Solutions

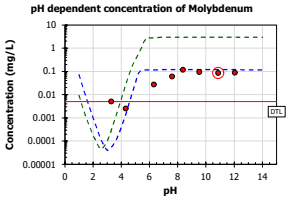
Name	End Member	Log(K)	Reaction
CSHii_ss	Cem07_Jenn_ss	-7.799	Cem07_Jenn_ss + 1.33333 H+ -> 1 CSHii_ss + 1.66667 Ca+2 + 1.76667 H2O + 1 H2SiO4-2
	Cem07_Tob_II_ss	10.36	Cem07_Tob_II_ss -> 1 CSHii_ss + 0.83333 Ca+2 + 0.33333 H+ + 0.16667 H2O + 1 H2SiO4-2

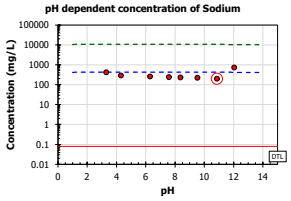
Minerals

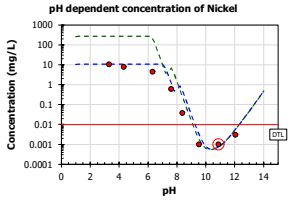
Name	Log(K)	Reaction
AA_Fe[OH]3[am]	16.60	AA_Fe[OH]3[am] + 1 H2O -> 1 Fe[OH]4- + 1 H+
Antimocrandallite-exp	63.00	Antimocrandallite-exp + 8 H2O -> 3 Al[OH]4- + 1 Ca+2 + 3 H+ + 2 Sb[OH]6-
Ba[SCr]O4[96%SO4]	9.790	Ba[SCr]O4[96%SO4] -> 1 Ba+2 + 0.04 CrO4-2 + 0.96 SO4-2
BaSrSO4[50%Ba]	8.221	BaSrSO4[50%Ba] -> 0.5 Ba+2 + 1 SO4-2 + 0.5 Sr+2
Ca4Cd[PO4]3OH	39.23	Ca4Cd[PO4]3OH + 1 H+ -> 4 Ca+2 + 1 Cd+2 + 1 H2O + 3 PO4-3
Ca5[OH][AsO4]3[c]	26.13	Ca5[OH][AsO4]3[c] + 1 H+ -> 3 AsO4-3 + 5 Ca+2 + 1 H2O
Ca5[OH][BO3]3[c2]	-53.00	Ca5[OH][BO3]3[c2] + 7 H+ -> 5 Ca+2 + 3 H2BO3- + 1 H2O
CaCO3_SrCO3	19.85	CaCO3_SrCO3 -> 2 CO3-2 + 1 Ca+2 + 1 Sr+2
CaSb[OH]6[s]2	19.41	CaSb[OH]6[s]2 -> 1 Ca+2 + 2 Sb[OH]6-
Cd[OH]2[C]	-13.65	Cd[OH]2[C] + 2 H+ -> 1 Cd+2 + 2 H2O
CdHPO4	26.48	CdHPO4 -> 1 Cd+2 + 1 H+ + 1 PO4-3
Cem07_Al[OH]3[am]	13.76	Cem07_Al[OH]3[am] + 1 H2O -> 1 Al[OH]4- + 1 H+
Cem07_Brucite	-16.83	Cem07_Brucite + 2 H+ -> 2 H2O + 1 Mg+2
Cem07_C3AH6	-35.14	Cem07_C3AH6 + 4 H+ -> 2 Al[OH]4- + 3 Ca+2 + 4 H2O
Cem07_C3FH6	-30.82	Cem07_C3FH6 + 4 H+ -> 3 Ca+2 + 2 Fe[OH]4- + 4 H2O
Cem07_CAH10	7.505	Cem07_CAH10 -> 2 Al[OH]4- + 1 Ca+2 + 6 H2O
Cem07_Calcite	8.485	Cem07_Calcite -> 1 CO3-2 + 1 Ca+2
Cem07_Gypsum	4.583	Cem07_Gypsum -> 1 Ca+2 + 2 H2O + 1 SO4-2
Cerrusite	13.13	Cerrusite -> 1 CO3-2 + 1 Pb+2
Cd2SiO4	6.059	CdSiO4 + 2 H+ -> 2 Cd+2 + 1 H2SiO4-2
CoSiO4	6.289	CoSiO4 + 2 H+ -> 2 Co+2 + 1 H2SiO4-2
Cr[OH]3[A]	68.13	Cr[OH]3[A] + 1 H2O -> 1 CrO4-2 + 5 H+ + 3 e-
Cu[OH]2[s]	-8.640	Cu[OH]2[s] + 2 H+ -> 1 Cu+2 + 2 H2O
CuHPO4	26.00	CuHPO4 -> 1 Cu+2 + 1 H+ + 1 PO4-3
Exp_CaCO3_MgCO3	19.00	Exp_CaCO3_MgCO3 -> 2 CO3-2 + 1 Ca+2 + 1 Mg+2
Exp_CaCO3_MnCO3	21.48	Exp_CaCO3_MnCO3 -> 2 CO3-2 + 1 Ca+2 + 1 Mn+2
Exp2_Ca[OH]Sb[OH]6	1.000	Exp2_Ca[OH]Sb[OH]6 + 1 H+ -> 1 Ca+2 + 1 H2O + 1 Sb[OH]6-
Exp2_Ca2[OH]2[SeO4]	-8.000	Exp2_Ca2[OH]2[SeO4] + 2 H+ -> 2 Ca+2 + 2 H2O + 1 SeO4-2
Exp2_CaCO3_Li2CO3	25.14	Exp2_CaCO3_Li2CO3 -> 2 CO3-2 + 1 Ca+2 + 2 Li+
Fe2[MoO4]3[2]	86.35	Fe2[MoO4]3[2] + 8 H2O -> 2 Fe[OH]4- + 8 H+ + 3 MoO4-2
FeBO3_EXP2	30.00	FeBO3_EXP2 + 2 H2O -> 1 Fe[OH]4- + 2 H+ + 1 H2BO3-
FeVO4:2H2O_am	23.48	FeVO4:2H2O_am + 2 H2O -> 1 Fe[OH]4- + 1 VO2+
Laumontite	118.0	Laumontite + 8 H2O -> 2 Al[OH]4- + 1 Ca+2 + 8 H+ + 4 H2SiO4-2
Li2_CaO_Al2O3_SiO2_8H2O|	22.69	Li2_CaO_Al2O3_SiO2_8H2O[s] -> 2 Al[OH]4- + 1 Ca+2 + 3 H2O + 1 H2SiO4-2 + 2 Li+
Manganite	-25.27	Manganite + 3 H+ + 1 e- -> 2 H2O + 1 Mn+2
Ni[OH]2[s]	-10.80	Ni[OH]2[s] + 2 H+ -> 2 H2O + 1 Ni+2
NiHPO4	25.00	NiHPO4 -> 1 H+ + 1 Ni+2 + 1 PO4-3
PATCH_beta-TCP	28.93	PATCH_beta-TCP -> 3 Ca+2 + 2 PO4-3
Pb[OH]2[C]	-8.150	Pb[OH]2[C] + 2 H+ -> 2 H2O + 1 Pb+2
Pb2V2O7	0.9500	Pb2V2O7 + 3 H+ -> 1.5 H2O + 1 Pb+2 + 1 VO2+
Pb3[VO4]2	-3.070	Pb3[VO4]2 + 4 H+ -> 2 H2O + 1.5 Pb+2 + 1 VO2+
PbHPO4	28.00	PbHPO4 -> 1 H+ + 1 PO4-3 + 1 Pb+2
Sn[OH]2[s]	1.447	Sn[OH]2[s] + 2 H+ -> 2 H2O + 1 Sn+2
THERMODDEM_Hydrocalum	-25.34	THERMODDEM_Hydrocalumnite[Cr] + 4 H+ -> 2 Al[OH]4- + 4 Ca+2 + 1 CrO4-2 + 13 H2O
Willemite	6.289	Willemite + 2 H+ -> 1 H2SiO4-2 + 2 Zn+2

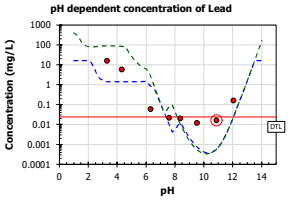

pH dependent concentration of Aluminum
pH dependent concentration of Arsenic
pH dependent concentration of Barium
pH dependent concentration of Calcium
pH dependent concentration of Cadmium
Al Profile at L/S=10.1 L/kg
As Profile at L/S=10.1 L/kg
Ba Profile at L/S=10.1 L/kg
Ca Profile at L/S=10.1 L/kg
Cd Profile at L/S=10.1 L/kg
Inorganic Carbon
pH dependent concentration of Iron
Co Profile at L/S=10.1 L/kg
CO32- Profile at L/S=10.1 L/kg
Cr Profile at L/S=10.1 L/kg
Cu Profile at L/S=10.1 L/kg
Fe Profile at L/S=10.1 L/kg
pH dependent concentration of Boron
pH dependent concentration of Silicon
pH dependent concentration of Potassium
pH dependent concentration of Lithium
pH dependent concentration of Magnesium
B Profile at L/S=10.1 L/kg
Si Profile at L/S=10.1 L/kg
K Profile at L/S=10.1 L/kg
Li Profile at L/S=10.1 L/kg
Mg Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
DTL

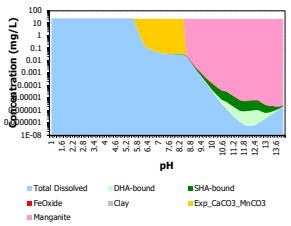

pH dependent concentration of Manganese
Concentration (mg/L)
pH
DTL

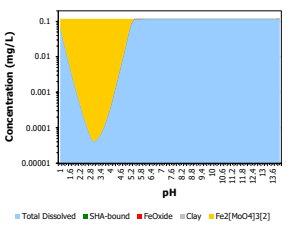

pH dependent concentration of Molybdenum
Concentration (mg/L)
pH
DTL

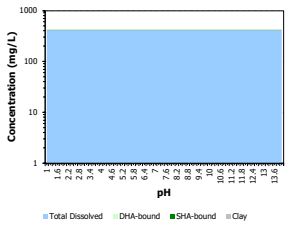

pH dependent concentration of Sodium
Concentration (mg/L)
pH
DTL

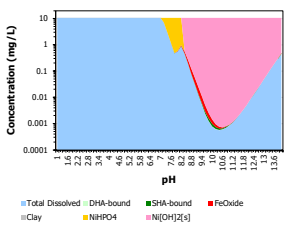

pH dependent concentration of Nickel
Concentration (mg/L)
pH
DTL

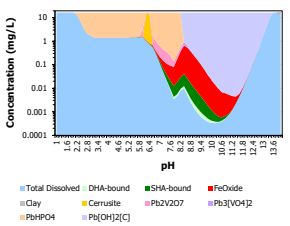

pH dependent concentration of Lead
Concentration (mg/L)
pH
DTL

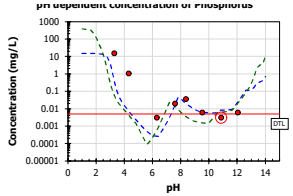

Mn Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
Total Dissolved
DHA-bound
SHA-bound
FeOxide
Clay
Exp_CaCO3_MnCO3
Manganite

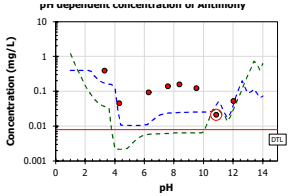

Mo Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
Total Dissolved
SHA-bound
FeOxide
Clay
Fe2[MoO4]3[2]

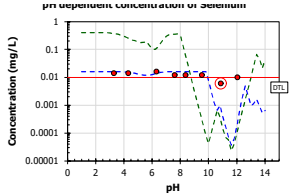

Na Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
Total Dissolved
DHA-bound
SHA-bound
Clay

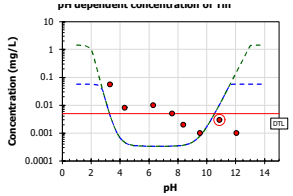

Ni Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
Total Dissolved
DHA-bound
SHA-bound
FeOxide
Clay
NiHPO4
Ni[OH]2[s]

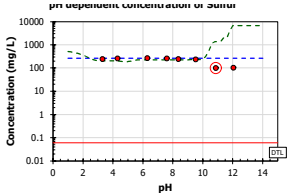

Pb Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
Total Dissolved
DHA-bound
SHA-bound
FeOxide
Clay
Cerrusite
Pb2V2O7
Pb3[VO4]2
PbHPO4
Pb[OH]2[C]

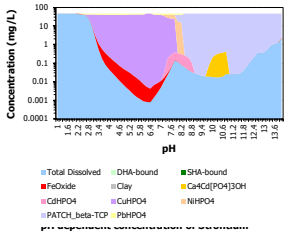

pH dependent concentration of Phosphorus
Concentration (mg/L)
pH
DTL

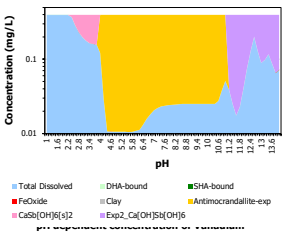

pH dependent concentration of Antimony
Concentration (mg/L)
pH
DTL

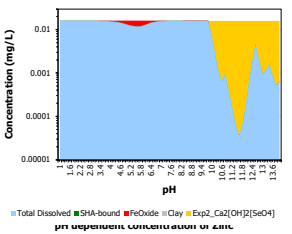

pH dependent concentration of Selenium
Concentration (mg/L)
pH
DTL

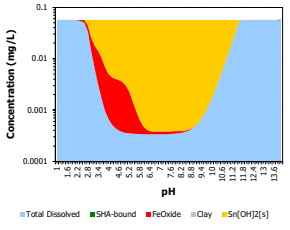

pH dependent concentration of Tin
Concentration (mg/L)
pH
DTL

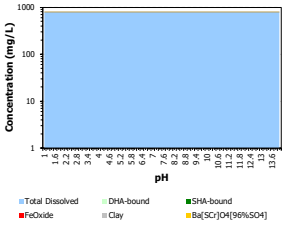

pH dependent concentration of Sulfur
Concentration (mg/L)
pH
DTL

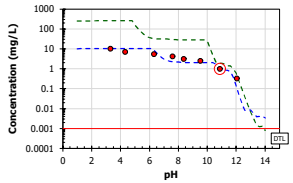

PO4 Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
Total Dissolved
DHA-bound
SHA-bound
FeOxide
Clay
Ca4Cd[PO4]3OH
CdHPO4
CuHPO4
NiHPO4
PATCH_beta-TCP
PbHPO4

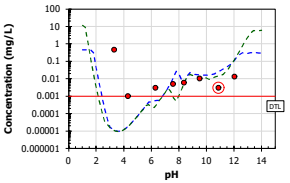

Sb Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
Total Dissolved
DHA-bound
SHA-bound
FeOxide
Clay
Antimocrandallite-exp
CaSb[OH]6[s]2
Exp2_Ca[OH]Sb[OH]6

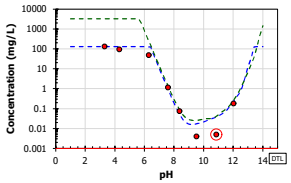

Se Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
Total Dissolved
SHA-bound
FeOxide
Clay
Exp2_Ca2[OH]2[SeO4]

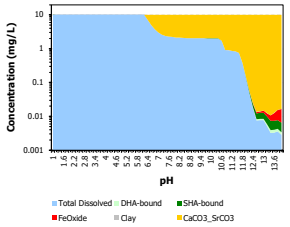

Sn Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
Total Dissolved
SHA-bound
FeOxide
Clay
Sn[OH]2[s]

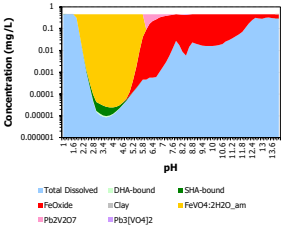

SO4 Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
Total Dissolved
DHA-bound
SHA-bound
FeOxide
Clay
Ba[SCr]O4[96%SO4]

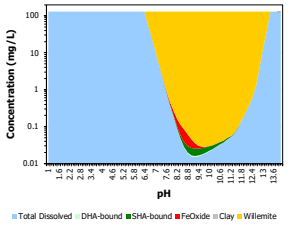

pH dependent concentration of Strontium
Concentration (mg/L)
pH
DTL


pH dependent concentration of Vanadium
Concentration (mg/L)
pH
DTL


pH dependent concentration of Zinc
Concentration (mg/L)
pH
DTL


Sr Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
Total Dissolved
DHA-bound
SHA-bound
FeOxide
Clay
CaCO3_SrCO3


V Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
Total Dissolved
DHA-bound
SHA-bound
FeOxide
Clay
FeVO4:2H2O_am
Pb2V2O7
Pb3[VO4]2


Zn Profile at L/S=10.1 L/kg
Concentration (mg/L)
pH
Total Dissolved
DHA-bound
SHA-bound
FeOxide
Clay
Willemite

Model Comparison: residuals - Concentration

Name **MSWI Bottom ash NL Reheated 500 C**

Legend

Total Average Deviation Square root of the sum of the squared values of residuals divided by the number of values, over the entire X range.
User Average Deviation Square root of the sum of the squared values of residuals divided by the number of values, over the user defined X range.
Fractional Average Devi Square root of the sum of the squared values of residuals divided by the number of values, over the fraction.
Note that the Total and User Average Deviation columns are averages as well.

Residual details, concentrations

Residuals as log(model/sample)

Fraction	*8*	*7*	*6*	*5*	*4*	*3*	*2*	*1*	*Total Avg*
pH	*3.30*	*4.31*	*6.30*	*7.59*	*8.37*	*9.52*	*10.9*	*12.0*	*Deviation*
Al	-0.01	-0.05	-0.70	-0.33	0.00	-0.11	-0.11	-0.04	0.10
As	-0.27	-0.26	-2.14	0.21	-0.05	-0.28	-0.12	0.00	0.28
Ba	-0.28	-0.50	-0.48	-0.64	-0.72	-0.80	-0.52	-0.08	0.19
Br	-	-	-	-	-	-	-	-	-
Ca	0.00	0.13	0.10	-0.34	-0.22	-0.14	0.30	0.24	0.08
Cd	0.01	0.18	0.51	1.77	1.70	1.78	-1.00	-1.10	0.50
Cl	-	-	-	-	-	-	-	-	-
Co	0.01	0.31	0.52	1.20	1.22	-0.53	-0.76	-0.92	0.28
CO32-	-	-	-	-	-	-	-	-	-
Cr	-0.01	0.75	0.55	0.10	-0.21	0.63	0.46	0.70	0.18
Cu	-0.22	0.39	1.58	0.38	0.19	0.55	0.87	1.40	0.30
Fe	-0.88	-1.67	0.38	0.48	0.39	0.23	1.05	1.53	0.34
B	-0.74	-0.43	-0.32	-0.20	-0.07	0.52	2.69	1.24	0.39
Si	-0.01	-0.50	-0.87	-0.81	-0.92	-0.40	0.33	1.40	0.27
K	0.01	0.24	0.34	0.39	0.44	0.45	0.48	0.48	0.14
Li	0.01	0.27	-0.25	-0.48	-0.42	-0.32	-0.14	-0.58	0.12
Mg	0.01	0.27	-0.70	-1.16	-1.06	-0.78	0.93	0.08	0.27
Mn	0.01	0.44	-1.45	-1.52	-0.66	-1.38	-2.68	-3.53	0.65
Mo	-1.96	-0.22	0.64	0.29	0.00	0.10	0.14	0.13	0.26
Na	0.01	0.16	0.21	0.24	0.26	0.28	0.32	-0.25	0.08
Ni	0.01	0.13	0.37	0.31	1.11	0.52	-0.12	0.27	0.17
Pb	-1.05	-0.62	1.17	-0.35	-0.23	-1.20	-1.43	-0.83	0.34
PO4	-	-	-	-	-	-	-	-	-
Sb	-0.36	-0.43	-0.88	-0.77	-0.80	-0.68	0.30	-0.07	0.21
Se	0.06	0.03	-0.06	0.12	0.13	0.13	-0.92	-1.62	0.23
Sn	-1.10	-1.23	-1.47	-1.16	-0.73	-0.10	0.55	1.75	0.40
SO4	-	-	-	-	-	-	-	-	-
Sr	0.01	0.17	0.19	-0.25	-0.17	-0.08	-0.03	-0.47	0.08
V	-4.60	-1.72	-0.73	0.35	0.01	0.21	0.95	0.96	0.65
Zn	0.01	0.14	0.43	-0.08	-0.16	0.64	0.89	0.12	0.15
Avg Deviati	0.22	0.13	0.17	0.13	0.13	0.15	0.21	0.23	0.27

Yellow = own pH All residuals within + 1 or - 1 are considered to represent a good fit.