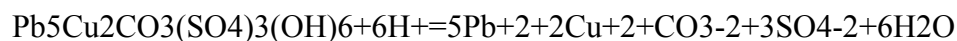


## Appendix B

### Model (I): Reaction path (i) and (ii) Figure 8

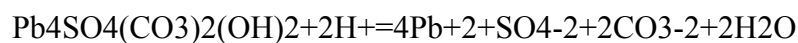
Phases

Caledonite # Abdul-Samad et al. 1982



log\_k -26.24

Leadhillite2 # Abdul-Samad et al. 1982



log\_k -26.3

#-----

Solution 1

units umol/l

pH 6.05

Temp 24.3 # water analysis from Negrel and Roy (1998)

Cl 31

S(6) 47.9

N(5) 41

Ca 78.8

Na 20

Mg 4.2

K 23.8

Al 1.56

Sr 0.0121

Alkalinity 160 as HCO<sub>3</sub><sup>-</sup>

#-----

SELECTED\_OUTPUT

-file X:\XX\XXXXXX.csv # Output folder

-reset false

-activities Pb+2 SO4-2

-pH

-saturation\_indices Caledonite Lanarkite Leadhillite2 Hydrocerussite massicot Litharge  
minium Anglesite Cerussite CO2(g)

-totals P S Pb

-equilibrium\_phases CO2(g)

Equilibrium\_phases

O2(g) -0.68 10

CO2(g) -2 10

#Galena 0 0.003 # (Only path ii)

Save Solution 1

End

#-----

Use Solution 1

Incremental\_reactions true.

REACTION 2

Minium 2

0.00015 in 100 steps

#-----

Equilibrium\_phases 2

O2(g) -0.68 10

#Caledonite 0 0

Cerussite 0 0

Hydrocerussite 0 0

Lanarkite 0 0

Litharge 0 0

Leadhillite2 0 0

Anglesite 0 0

Minium 0 0

Massicot 0 0

#Anorthite 0 10

#Quartz 0 10

#Galena 0 10

#Calcite 0 0

Save Solution 3

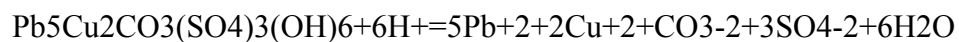
End

#-----

### **Model (II): Reaction path (iii) and (iv) Figure 8**

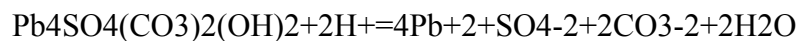
Phases

Caledonite # Abdul-Samad et al. 1982



log\_k -26.24

Leadhillite # Abdul-Samad et al. 1982



log\_k -26.3

#-----

Solution 1

units mg/l

pH 8.47      #(Path iii,iv) analysis from Bucher (2009)

Temp 15

Li 0.12

Na 29.82

K 18.65

Ca 74.60

Mg 12.36

Sr 1.02

F 2.77

Cl 11.07

Br 0.14

Alkalinity 128.10 as HCO<sub>3</sub><sup>-</sup>

Si 11.0

S 191

N(5) 5.38

Fe 0.405

SELECTED\_OUTPUT

-file X:\XX\XXXXXXX.csv

-reset false

#-activities Pb+2 SO<sub>4</sub><sup>-2</sup>

-pH

-saturation\_indices Caledonite Lanarkite Leadhillite Hydrocerussite massicot minium  
Litharge Anglesite Cerussite CO<sub>2</sub>(g)

#-equilibrium\_phases anglesite cerussite hydrocerussite Lanarkite leadhillite

#-----

Equilibrium\_phases

O<sub>2</sub>(g) -0.68 10

CO<sub>2</sub>(g) -3.44 10

Galena 0 0.0025 #(Path iii,iv)

Calcite 0 1 #(Only iv)

Save Solution 1

End

#-----

Use Solution 1

Incremental\_reactions true.

REACTION 2

Ca(OH)<sub>2</sub> 1

0.0009 in 100 steps

#-----

Equilibrium\_phases 2

O<sub>2</sub>(g) -0.68 10

#Caledonite 0 0

Cerussite 0 0

Hydrocerussite 0 0

Lanarkite 0 0

Litharge 0 0

Leadhillite 0 0

Anglesite 0 0

Minium 0 0

Massicot 0 0

Calcite 0 0

Save Solution 3

End

#-----