HLWYM HEmails

From: Paul Bertetti
Sent: Friday, July 07, 2006 3:50 PM
To: Xihua He; David Pickett; 'Vijay Jain'
Subject: RE: update on stainless steel immersion tests

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I believe there are a couple of contributors to the pH change in the test cells. Based on our analyses of the pore waters and chemical changes in the carbon steel test cells, it appears likely that calcite precipitates form solution as the solutions age. This is accompanied by an overall depletion of CO2 in the system. Even though the solutions are open to atmosphere, my calculations suggest that the partial pressure of CO2 is quite low (relative to atmosphere -- log fugacity -4.42 for the combined solution that had been opened and mixed for at least two hours -- so inside the test cells it may have been lower). The loss of CO2 and its incorporation into calcite is consistent with a pH increase. Moreover, the addition of fresh solution to replace samples continues to calcite precipitation process as more Ca is added. The small evaporation that does occur and the addition of original solution also tends to increase the pH. I might recommend addition of deionized water, diluted solution, or nothing to replace the water lost from sampling. Finally, the loss of SO4 and increase in S should be addressed. Based on analysis of the carbon steel solution samples, not all S is in the form of SO4 as one might predict from the redox (highly oxidizing for our sorption solutions at +500 mV Eh.

> -----Original Message-----
> **From:** Xihua He [mailto:xhe@cnwra.swri.edu]
> **Sent:** Friday, July 07, 2006 2:10 PM
> **To:** dpickett@cnwra.swri.edu; 'Vijay Jain'; 'Paul Bertetti'
> **Subject:** RE: update on stainless steel immersion tests
>
> The evaporation should be very little. We used a water-cooled condenser to minimize evaporation. Unfortunately I didn't do the same blank comparison for the carbon steel tests. But the simulated pore water has the same composition as we used for previous tests.
>
> Xihua
>
> > -----Original Message-----
> > **From:** David Pickett [mailto:dpickett@cnwra.swri.edu]
> > **Sent:** Friday, July 07, 2006 1:54 PM
> > **To:** xhe@cnwra.swri.edu; 'Vijay Jain'; 'Paul Bertetti'
> > **Subject:** RE: update on stainless steel immersion tests
> >
> > Xihua,
> >
> > Thanks for the update. I assume the pH change, then, is an evaporation effect? Did you do the same blank comparison for the carbon steel tests? What was the result?
> >
> > David
> >
> > -----Original Message-----
> > **From:** Xihua He [mailto:xhe@cnwra.swri.edu]
> > **Sent:** Friday, July 07, 2006 1:23 PM
> > **To:** David Pickett; Vijay Jain; Paul Bertetti
> > **Subject:** update on stainless steel immersion tests
> >
> > I immersed the stainless steel specimen in simulated sodium-pore water at 60°C as I did for carbon steel previously. In parallel there are three test cells, two with stainless steel and one with simulated pore water only as a blank cell. For these three test cells, the pH increased with time as I observed from the immersion of carbon steel. However, after I plot the pH difference against the blank cell. The pH

remained relatively constant. The file on this is attached. I also drew some solution for chemical analysis, but I didn't send to ICP lab yet due to budget issue.

The pH increase that we reported in the report may be due to solution chemical species changes. I believe we need to do chemical speciation simulation.

Thanks,
Xihua

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Subject: RE: update on stainless steel immersion tests
Sent Date: 7/7/2006 3:50:13 PM
Received Date: 7/7/2006 3:50:25 PM
From: Paul Bertetti

Created By: pbertetti@cnwra.swri.edu

Recipients:
"Xihua He" <xhe@cnwra.swri.edu>
Tracking Status: None
"David Pickett" <dpickett@cnwra.swri.edu>
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MESSAGE	3242	7/7/2006 3:50:25 PM

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