Figure 8-10 shows the distribution of iron species of week 14 leachates for the 5 rocks. Four of the five samples are in the stability field for the solid, poorly crystalline Iron Hydroxide, $FeOH)_3$(ppd). This is consistent with very low leachate iron concentrations, oxidizing conditions, generally low solubility of Fe (III) at circumneutral pH, and post leaching observations discussed in chapter 5. Soluble forms of iron are the preferred state for the acidic HCS-IN leachate. Cravotta (2008b) found that iron concentration in many mine waters is controlled by iron oxyhydroxides or hydroxysulfate minerals.

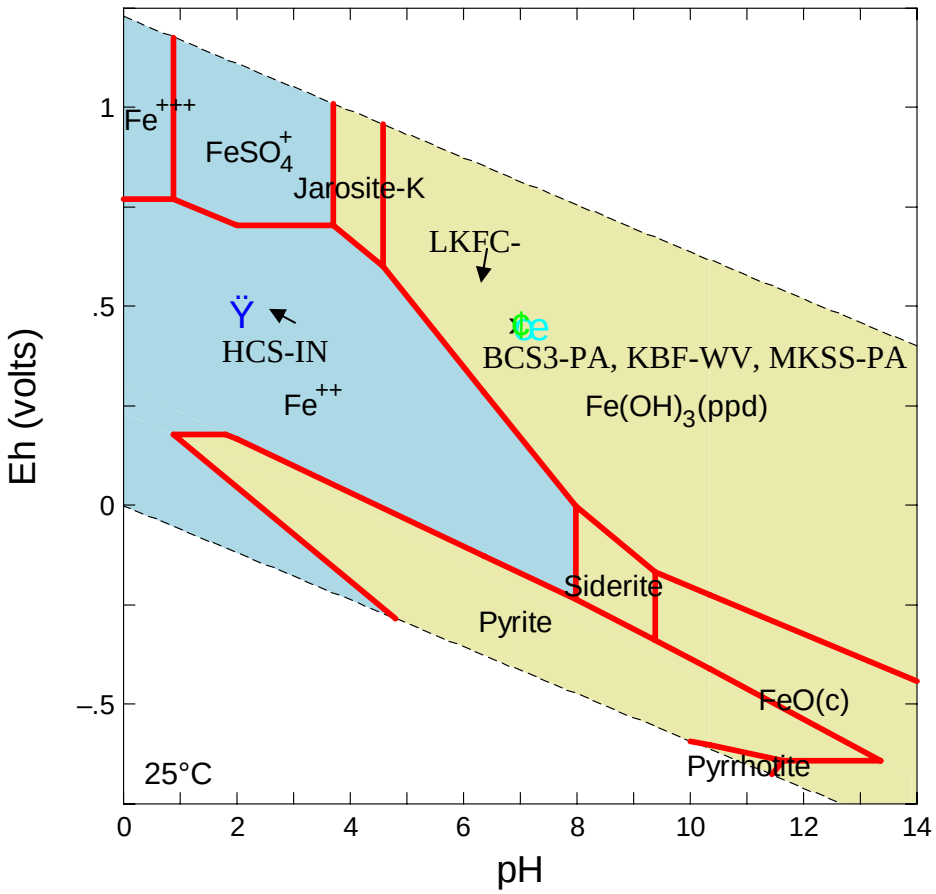


**Figure 8-10. Eh/pH Plot of Selected Iron Minerals and Week 14 Leachates.**

**<u>pH</u>**

pH is the principal solubility control for aluminum, and strongly influences the behavior of iron and other elements. Figure 8-11 shows aluminum solubility for leachates containing sulfate, potassium and silica at chemical activities representative of week 14 conditions. Aluminum solubility is at a minimum at about pH 6, and increases rapidly at pH conditions less than about 5. Aluminum solubility is controlled by alumino-silicates such as the clay mineral kaolinite, sulfate minerals such as alunite or others at low pH, and oxyhydroxides such as $Al(OH)_3$. Four of the five rocks produced leachates with pH between 6.1 and 7.2 and all contain kaolinite in the clay fraction. Aluminum concentrations were at or near detection for these rocks. The acidic conditions in HCS-IN leachate allow much higher concentration of soluble aluminum.