



Cesium Adsorption and Desorption in Clay Minerals: Effects of Natural Organic Matter and pH

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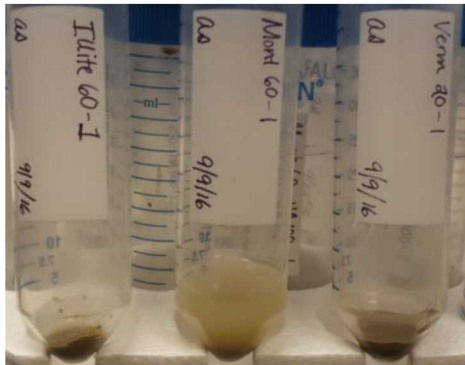
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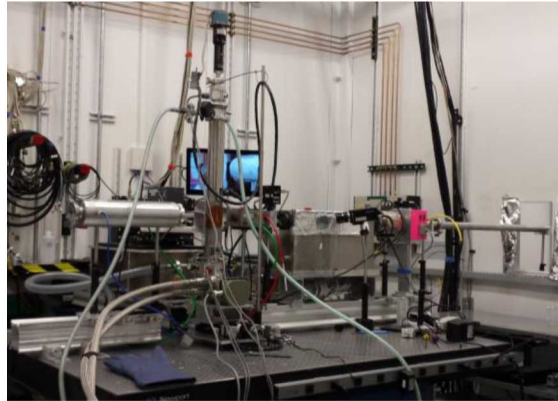


Methods

Batch Experiments

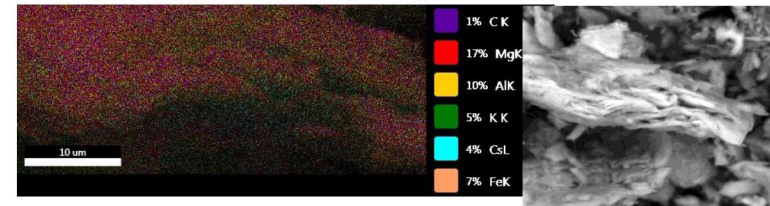


X-ray spectroscopy (XAFS)

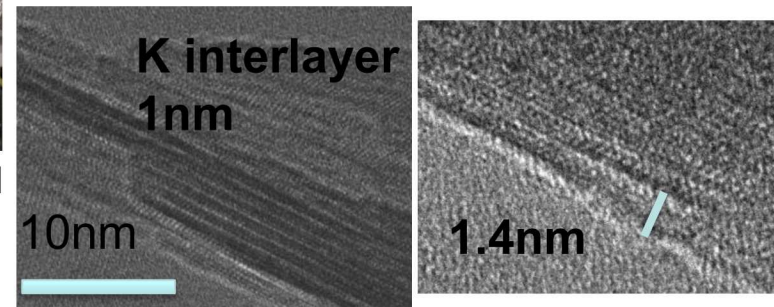


Cesium L_{III} -edge XAFS was collected in fluorescent mode using a solid state detector at sector 20 at Advanced Photon Source

SEM/TEM



Bright field TEM



(No Cs)

(Cs)

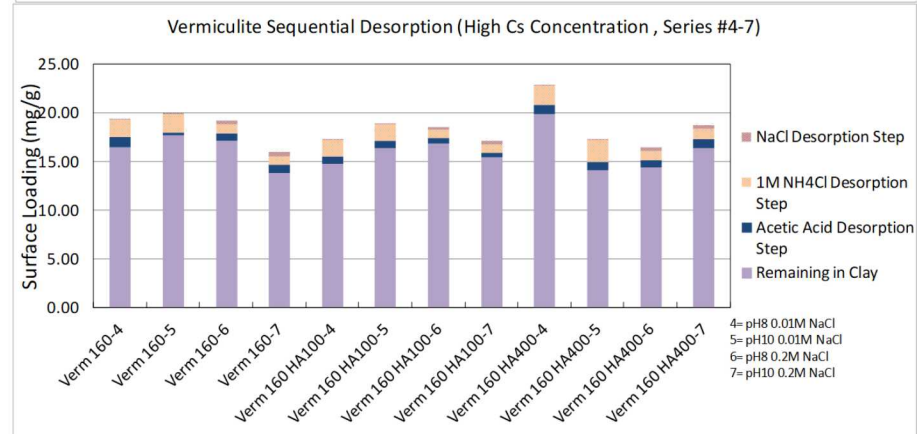
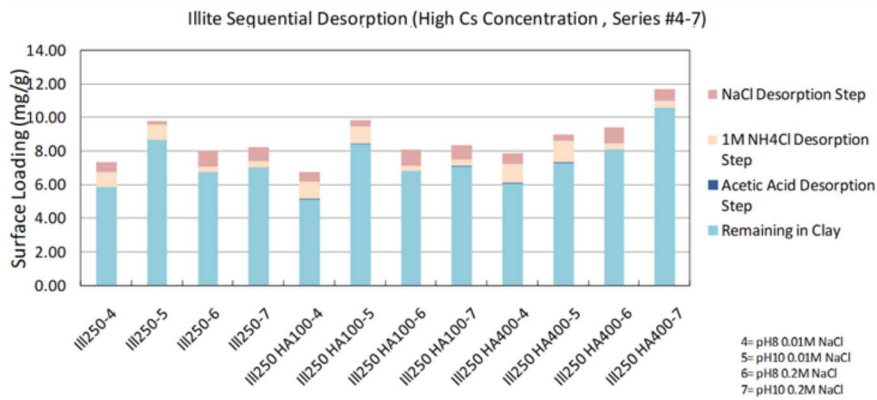
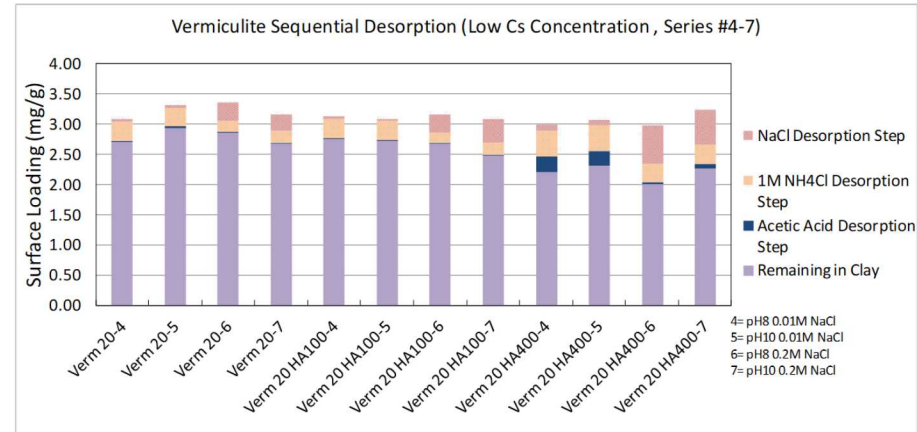
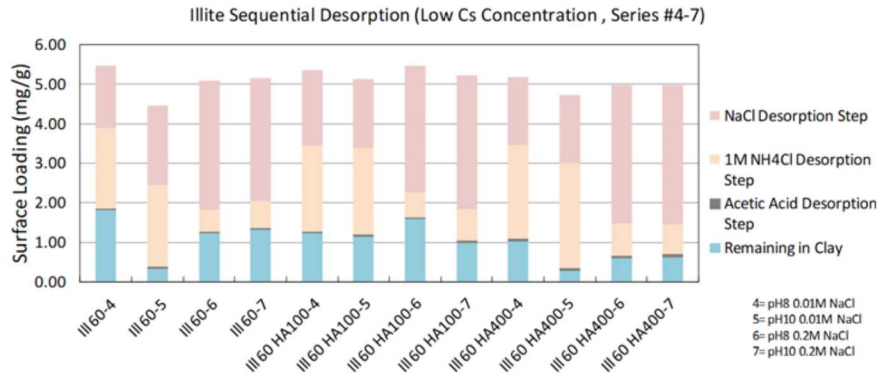
Cs adsorption conditions:

- ▶ Clay to solution ratio=0.5,2.5,5 g/L
- ▶ pH=6
- ▶ Ionic strength = 0.1M (NaCl base)
- ▶ Initial Cs conc = 1 to 250 ppm
- ▶ Humic Acid = 50 to 400 mg/L

Cs desorption conditions:

- ▶ Step1: NaCl (0.01 M and 0.2M) and pH=8 and 10
- ▶ Step2: NH_4Cl (1 M)
- ▶ Step3: CH_3COOH (0.11 M)

Results



- Cesium adsorption is affected by selective adsorption sites of clay minerals
- The presence of humic acid has different impacts on Cs adsorption for different clay minerals
- High Na⁺ concentration increases Cs desorption significantly and a total amount of desorbed Cs after a three step sequential extraction with sodium, ammonium acetate and acetic acid is similar
- For both adsorption and desorption (s)TEM and EXAFS analysis are being analyzed to account for Cs behavior in different clay minerals under different pH and HA amount

Acknowledgments

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