**Supplementary Information**

**Sorption of Eu(III) at feldspar/water interface: Effects of pH, organic matter, counter ions, and temperature**

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**1. Effect of contact time**



**Figure S1:** Effect of contact time on the sorption of Eu(III) to K-feldspar (a); The pseudo-second-order model of Eu(III) sorption to K-feldspar (b). *s/l* = 0.6 g/L, *I* = 0.01 mol/L NaCl, *T* = 25±1 0C, *C*(Eu(III))= 1.0×10-6 mol/L, *pH* = 6.50±0.05.

**2. Effect of ionic strength on HA sorption on K-feldspar**



**Figure S2:** Effect of ionic strength on HA sorption on K-feldspar. s/l = 0.6 g/L, C(Eu) = 1.0×10-6 mol/L, C(HA) = 15 mg/L; pH = 6.50 ± 0.05, T = 298 K.

**3. Zeta potentials of K-feldspar**



**Figure S3:** Zeta potentials of K-feldspar.

**4. XRD patterns of K-feldspar in the presence of F-**



**Figure S4:** XRD patterns of K-feldspar samples. (a) Raw K-feldspar; (b) K-feldspar + 1.0×10-6 mol/L Eu(III), C(NaF) = 1.0 mol/L, *pH* = 3.0; (c) K-feldspar + 0.01 mol/L Eu(III), C(NaF) = 1.0 mol/L, *pH* = 3.0. 1- K-feldspar sample; 2- Eu2O3; 3- Eu(OH)3; 4- EuF3.

**5. XRD patterns of Eu reference materials**



**Figure S5:** XRD patterns of Eu(NO3)3, Eu(OH)3 and EuF3.

**6. Eu(III) species in the presence of phosphate**



**Figure S6:** Eu(III) speciation distribution as a function of pH in presence of 0.01 mol/L NaH2PO4, C(Eu) = 1.0×10-6 mol/L. Simulated by View Minteq 3.0 code.

**Table S1** Reaction constants for Eu(III) and phosphate in aqueous solution

|  |  |
| --- | --- |
| **Reactions** | **logKint** |
| Eu3++Cl- ↔ EuCl2+ | 1.10 |
| Eu3++2Cl- ↔ EuCl2+ | 1.50 |
| Eu3++H2O ↔ Eu(OH)2++H+ | -7.64 |
| Eu3++2H2O ↔ Eu(OH)2++2H+ | -15.10 |
| Eu3++3H2O ↔ Eu(OH)(aq) + 3H+ | -23.70 |
| Eu3++4H2O ↔ Eu(OH)4-+4H+ | -36.20 |
| Eu3++ CO32- ↔ EuCO3+ | 7.48 |
| Eu3++ CO32- + H+ ↔ EuHCO32+ | 12.80 |
| Eu3++ 2CO32- ↔ Eu(CO3)2- | 12.63 |
| Eu3++ PO43- ↔ EuPO4 | 12.25 |
| Eu3++ 2PO43- ↔ Eu(PO4)23- | 8.39 |
| Eu3++ PO43- + H+ ↔ Eu(HPO4)+ | 18.08 |
| Eu3++ 2PO43- + 2H+ ↔ Eu(HPO4)2- | 21.98 |
| Eu3++ PO43- + 2H+ ↔ Eu(HPO4)2+ | 21.84 |
| PO43- + H+ ↔ HPO42- | 12.38 |
| PO43- + 2H+ ↔ H2PO4- | 19.57 |
| PO43- + 3H+ ↔ H3PO4 | 21.72 |

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