**Supplementary Information**

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

Ping Lia, Hanyu Wub, Jianjun Lianga, Zhuoxin Yinb, Duoqiang Panb, Qiaohui Fan\*b, Di Xu[[1]](#footnote-1)\*c, Wangsuo Wub

aKey Laboratory of Petroleum Resources, Gansu Province / CAS Key Laboratory of Petroleum Resources Research, Institute of Geology and Geophysics, Chinese Academy of Sciences, Lanzhou, 730000, China

bRadiochemistry Laboratory, School of Nuclear Science and Technology, Lanzhou University, Lanzhou, 730000 China

cState Key Laboratory of Lake Science and Environment, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, Nanjing, 210008, China

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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 |

1. \* Corresponding author. [fanqh@lzb.ac.cn](mailto:fanqh@lzb.ac.cn) (Fan Q.H.), [dxu@niglas.ac.cn](mailto:dxu@niglas.ac.cn) (Xu D.) Tel: 86-931-8960831. [↑](#footnote-ref-1)