

Cadmium adsorption with ferrihydrite nano-particles under various pH values

ZHANG WEI¹, HUANG YI*^{1,2}, ZHONG LICHUN¹,
NI SHIJUN^{1,2}, CHEN YING¹, LU HUILIN¹
AND LIU ZAIDONG¹

¹Department of Geochemistry, Chengdu University of Technology, Sichuan, PRC, huangyi@cdu.cn
(* presenting author)

²Applied Nuclear techniques in Geoscience Key Laboratory of Sichuan Province, PRC

Remediation of heavy metal contaminated soil includes physical, chemical and biological methods. Currently, a lot of research is focusing on adding certain sorbent to the soil to immobilize heavy metals. The sorbents could be divided into four groups: Fe oxides, organic matters, phosphates and silicates.

Fe exists in various natural minerals with the fourth abundance in the crust. Among the known sixteen Fe oxides, goethite, ferrihydrite, hematite and magnetite were found abundantly in sediments and soils. Fe oxides express strong absorption ability to heavy metals owing to their abundance, the surface variable charge, huge specific surface area and high surface activity. Among Fe oxides, ferrihydrite is the dominant one because the abundant distribution, smaller particle diameter and weak crystalizing.

In this paper, 2-line ferrihydrite was synthesized to study cadmium adsorption characteristics at normal temperature. The results show that, a. pH value plays a critical important role on effecting cadmium adsorption with ferrihydrite, b. under acidic condition, owing to the adsorption sites competing between cadmium and abundant in the H⁺ solution, the cadmium adsorption with ferrihydrite is not efficient. While the increasing of pH value leads to higher adsorption amount and adsorption rate. Under alkaline condition, the adsorption amount increases with Cd(OH)₂ forming, and c. the cadmium adsorption amount with ferrihydrite is comparing higher than those with Goethite, hematite and tannic acid.

Funded by Ministry of Science and Technology of the People's Republic of China (NO. 2013DFA21690) and National Natural Science Foundation of China (NO. 41273124)

[1] Peng Lu, Noel T. Nuhfer, Shelly Kelly, *et al* Lead coprecipitation with iron oxyhydroxide nano-particles, *Geochimica et Cosmochimica Acta* **75** (2011) 4547–4561.