Dissolution mechanism of schwertmannite in the presence of dissolved organic matter: implication for chromate dynamic behavior

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Schwertnannite is most often to precipitate in the acid mime drainage (AMD) sysytem with high sulfate and iron concentration, while it is thermodynamically unstable with respect to more crystalline minerals such as goethite. Some contaminants like heavy metals will adsorb and coprecipitate during the formation, but they will release and re-coprecipitate when minerals are trasformed [1]. And the transformation may be influenced by the dissolved organnic matter (DOM) or Fe(II) [2,3].

Batch experiments were conducted to study the behavior of chromate effected by the transformation of schwertmannite in the presence of DOM. Minerals and the products were analyzed by means of Fourier transform infrared spectroscopy, transmission electron microscopy, scanning electron microscope, X-ray diffraction and Mössbauer spectra. Results showed that adsorbed CrO_4^{2-} (0.3 wt% at pH 3.40 ± 0.20) released during the initial phase of the transformation of CrO_4^{2-}-containing schwertmannite which was rapidly readsorbed (0.1 wt%) to the new phase. And the soild mainly consist of schwertmannite and goethite, with minor amount of ferrihydrite and jarosite. Results obtained in the present study provide a framework for interpreting the transformation of schwertmannite and influence on behavior of chromate in geologic systems.

This study was supported by the National Natural Science Foundation of China (No.41330639).

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