# From Waste to Resource: The use of schwertmannite to remove oxoanions

S. PEIFFER[1], KLUG M.[1], B. MAROUANE[1], CHEN N.[2], OBST M.[3], JANNECK E[4]., REICHEL S[4]., BURGHARDT D.[5]

[1] Department of Hydrology, BayCEER, Univ. Bayreuth, Ger.
[2] Canadian Light Source, Saskatoon, Canada
[3] Experim. Biogeochemistry, BayCEER, Univ. Bayreuth, Ger.
[4] GEOS Company, Freiberg, Germany
[5] Groundwater Management, TU Dresden, Germany

Schwertmannite is a common secondary ferric hydroxosulfate mineral ($Fe_8O_8OH_x(SO_4)_y$, 8-x = y and $1.0 \leq y \leq 1.75$) found in acid mine-drainage affected environments and acid sulfate soils. In this contribution, I will discuss the potential of granulated schwertmannite biologically generated in an iron removal plant [1] to remove oxoanions (molybdate, vanadate, selenite, selenite, phosphate) from waste water streams. The reaction of schwertmannite with water is acidic (pH ~ 3, $Fe_8O_8OH_6SO_4 + 2\ H_2O \rightarrow 8\ FeOOH + SO_4^{2-} + 2\ H^+$), which favours adsorption of oxoanions to the ferric hydroxide surfaces. Retention of oxoanions in column experiments turned out to be extremely efficient with retention capacities of more than 10000 bed volumes. These observations suggest that not only adsorption is an important retention process but presumably also the formation of precipitates (e. g. ferrimolybdite) is being triggered by the low pH values. Preliminary experiments suggest that recovery of the sequestered oxoanions upon mild extraction (1 M NaOH) is generally possible.

[1] An adsorbent comprising schwertmannite, a method of preparing the adsorbent and the use of the adsorbent for purifying water or gas, European Patent 12 167 884.1 pending