Behaviour of Tc(VII) in aqueous solutions in the presence of iron oxides and microorganisms

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This study investigates the redox behaviour of Tc(VII) in a heterogeneous system containing hematite and magnetite with emphasis on transformation of oxidation state through microbial-mediated processes under oxic conditions. Results showed that after a short exposure period under alkalini conditions (pH 8-9) more then 75% of TcO_4^- were associated with Fe(II) oxide particles and removed from solution. The removal of Tc from solution may be controlled by reduction of Tc(VII) to Tc(IV) by biogenic Fe(II). Under these circumstances no pronounced effect of the sorption of technetium onto Fe(III) oxide was determined. Sorption of Tc onto hematite is achieved because of presence of specific microorganisms. Results of the combined effect of microorganisms and iron-bearing minerals on Tc (VII) sorption peculiarities have shown that bacteria *Arthrobacter globiformis* and *Cellulomonas cellulan*s did not have any influence on Tc sorption onto hematite, while micromicete *Fusarium oxysporum* altered sorption to approximately 85% compared to that in the system without microorganisms. Presence of microorganisms *Penicillium* sp., *Rhodococcus* sp and *Streptomyces* sp. in the tested system induced Tc sorption onto hematite up to 71-82%.

The research has received funding from the European Union's European Atomic Energy Community's (Euratom) Seventh Framework Programme FP7/2007-2011 under grant agreement n° 212287 (RECOSYproject) and from Lithuanian Agency for Science, Innovation and Technology (Grant No 31V-6)

Iron oxides of soils from Cenozoic basalts weathering in eastern China: Relationship with climate change

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The Cenozoic basalts are widely distributed from Heilongjiang to Hainan provinces in eastern China, which provide the unique climatic conditions to study basalts weathering. The five soil sequences developed from basalt bedrocks in eastern China were studied, along climate gradient ranging from 200 (Inner Mongolia) to 2,000 mm (Hainan) mean annual precipitation. Magnetic properties, chemical analyses and diffuse reflectance were measured to characterize the iron oxides in soils, since iron oxides are common weathering products and sensitive to response to climate change. Results show that content of free iron oxide, magnetic susceptibility, frequency dependence susceptibility and redness index of surface soil samples are all positively related to MAP, with lowest value in Inner Mongolia samples and highest in Hainan samples. Especially, the content of free iron oxide increases by almost 10 times ranging from 0.5 % to 5.5 % wt. According to similar chemical composition of basalt bedrocks, it can be concluded that climate took most effect on Cenozoic basalt weathering. Further studies are necessary to extract more credible and sensitive indicators like element ratios and mineral index.

This study is funded by the NSF of China (Grant No. 41021002) and China Geological Survey.