Mechanisms of arsenic scavenging by iron (hydr)oxides in anoxic environments

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Iron (oxyhydr)oxides widely occur in earth's surface environments, including soils, sediments and aquifers. Owing to their large specific area, these minerals can adsorb efficiently trace elements, as arsenic. Microorganisms are able to (trans)form iron minerals, directly by enzymatic oxidation or reduction and indirectly by complexation to organic compounds, and thus potentially play an important role in the cycling of iron and of associated trace elements. For example, bio-reduction of ferric (oxyhydr)oxides is known to be responsible for arsenic contamination of some important groundwaters resources throughout the world.

We will present recent investigations of model systems relevant of arsenic behavior in anoxic soils and sediments. X-ray Absorption Spectroscopy (XAS) and transmission electron microscopy, are used to elucidate the molecular scale mechanisms of arsenic immobilization upon reduction of arsenic bearing iron oxyhydroxides. The results suggest that, in the presence of a sufficient amount of iron in the system, adsorption and co-precipitation reactions of both As(III) and As(V) with Fe(II)/(III) minerals may delay arsenic release in anoxic environments. Other processes, including the progressive leaching of iron, may thus influence arsenic mobility in these environments.

Pb-Sr-Nd Isotopic Composition of I-Type and S-Type Granites in Eastern Segment of East Tianshan Belt

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This paper reports the Pb-Sr-Nd isotopic composition of I-type and S-type granites in eastern segment of east Tianshan Belt, China. Systematical research on Pb-Pb, Rb-Sr and Sm-Nd isotopes and the crustal growth age were made on six granitic intrusions in the eastern segment of middle east Tianshan belt. Pingdingshan augen-gneissic monzonitic granite, Back hill gneissic granodiorite and Tianhudong gneissic granodiorite, with $(^{206}Pb/^{204}Pb)_i$ of 18.356～18.426, $(^{207}Pb/^{204}Pb)_i$ of 15.697～15.867 and $(^{208}Pb/^{204}Pb)_i$ of 38.623～38.817 ε_{Nd} (t) of -3.7～-7.8, $(^{87}Sr/^{86}Sr)_i$ of 0.712632～0.718410;T^{Nd}(DM)=1.81～2.05Ga; Shalongdong monzonitie, with $(^{206}Pb/^{204}Pb)_i$ of 18.015～18.182, $(^{207}Pb/^{204}Pb)_i$ of 15.426～15.591 and $(^{208}Pb/^{204}Pb)_i$ of 37.67～37.824, ε_{Nd} (t) of +2.4～+2.7, $(^{87}Sr/^{86}Sr)_i$ of 0.703710～0.703853, T^{Nd}(DM)=0.82 Ga; Weiya manzonitic granite(center zone) and Weiya manzonitic granite (internal zone), with $(^{206}Pb/^{204}Pb)_i$ of 18.181～18.293, $(^{207}Pb/^{204}Pb)_i$ of 15.492～15.612 and $(^{208}Pb/^{204}Pb)_i$ of 37.804～37.973, ε_{Nd} (t) of -0.9～-1.0, $(^{87}Sr/^{86}Sr)_i$ of 0.704733～0.704831; T^{Nd}(DM)=0.3 79-0.380Ga. In combination with the geological evidence and other geochemical date, it is believed that the granites in eastern segment of middle east Tianshan belt are composed of granitoids of different ages, different genesis, and different source materials. Pingdingshan augen-gneissic monzonitic granite, Back hill gneissic granodiorite and Tianhudong gneissic granodiorite belong to S-type granites or a transformation type and are mainly autoch-parautochthonous Syntectonic granites characterized by gneissic structure. Shalongdong monzonitie belongs to I-type granites or syntactic type derived from a differentiated mantle magma assimilated and contaminated with crustal materials. Weiya manzonitic granites possibly belong to I/S-type granites or an intermediate type between I-type and S-type. The only difference in I-type and I/S-type is that the Weiya manzonitic granites have a higher crustal component to mantle component ratio than that of Shalongdong monzonitie.

Reference

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