

Speciation of iodine during biocycling in model sediment and mineral systems

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The impact of biogeochemical processes on redox-active iodine are poorly defined despite the significance of I-129 (half-life 16 million years) in radioactive waste destined for deep geological disposal and in radioactively contaminated land scenarios. Under oxic conditions, iodate (IO_3^-) dominates inorganic iodine speciation. Iodate is reactive with mineral surfaces leading to retention on sediments / minerals present in natural and engineered environments. These interactions potentially limiting the potential migration of iodate through the geosphere. In contrast, reduced iodide (I^-) has higher solubility in groundwater and, as a consequence, redox cycling has the potential to be a key control on iodine transport within the subsurface: Release of I^- formed during bioreducing conditions is significant in the context of radio-iodine contaminated land and waste management and significant scavenging of IO_3^- to solids is also possible during reoxidation of contaminated materials.

To gauge the environmental relevance of such processes, the fate and speciation of iodine has been studied in a range of sediment and mineral systems undergoing redox biocycling processes and at relatively low iodine concentrations in experiments. Analyses include geochemical, mineralogical and iodine aqueous speciation data using HPLC-ICPMS techniques. Data from these systems will be presented in the context of their influence on inorganic iodine speciation and solubility in sediment and key mineral systems.