# Interaction of Sr(II) and Mo(VI) with Synthetic Magnetite

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The chemical stability of high level nuclear waste repositories is defined by its resistance to radionuclide release to the biosphere. Among the factors that will influence the rate of spent nuclear fuel dissolution and radionuclide release, canister corrosion products have to be taken into account. Under repository conditions magnetite has been identified as a corrosion product of carbon steel canister, intended to be used as container or overpacking material in the final deep repository of high level nuclear waste (HLNW), (Smailos,1992). (Bruno,1999) studied the evolution concentration of the Sr and Mo present in the solution surrounding the fuel fragments measured at different time intervals. (Collins et al.,1998) studied $^{90}Sr$ adsorption to iron(oxyhydr)oxide minerals such as goethite. In this study, the magnetite retention capacity for Sr(II), Mo(VI) has been studied in terms of adsorption isotherms and equilibrium based on sorption models for synthetic magnetite.

## Experimental and Procedure

Experimental studies focused on radionuclide-magnetite interaction scarce for nuclear wastes. In this work we undertake the study of Sr(II) and Mo (VI) sorption onto magnetite at room temperature, oxic conditions and low ionic strength media. By Pourbaix diagrams we have observed only Mo species are sensitive to the implicit redox media. Synthetic magnetite (Aldrich) has been employed with a minor particle size of 5 microns and with a 98% of purity. All chemicals used in this work were of analytical grade. Sr $(NO_3)_2$ and $Na_2MoO_4$ concentration were $10^{-5}$ mol dm$^{-3}$. The ionic medium was prepared from sodium chloride stock solution in Millipore demonised triple distilled water (0.1 mol dm$^{-3}$ of NaCl). In order to ensure that the equilibrium was reached in experiments, sorption kinetics were studied. The time needed to reach equilibrium was found to be 6 hours for Sr (II) and less than 1 hour for Mo(VI).

Samples of appropriate weight of magnetite were shaken vigorously in Batch experiments with 20 cm$^3$ of metal aqueous phase for 6 hours. After phase separation, metal concentration in the aqueous phase were determined by ICP-OES (Inducted Coupled Plasma Emission). Equilibrium pH were measured by means of combined glass/reference electrode (Orion 250 A).

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