Effect of sulphides on the corrosion properties of pre-oxidized copper in oxic conditions

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Abstract

The copper containers that will be used to store spent nuclear fuel and highly radioactive waste will be exposed to atmospheric conditions before they are placed in deep geological repository (DGR). Under an atmospheric environment, the copper surface can undergo corrosion, and copper oxides can form on the surface. Copper oxides can influence further corrosion processes that will take place in DGR. Copper containers will first be exposed to an oxic environment, and there will also be an evolution of temperature from early 80 °C during first 200 years to 20 °C after several thousands of years. In the presence of sulfides, copper oxides can be converted to copper sulfide, leading to an increasing exposure of the underlying copper surface to sulfide. [1,2] In this study, we investigated formation of copper oxides and the effect of sulfide on the oxides in oxic conditions at different temperatures. We also investigated the effect of different sulfide concentrations on the conversion processes. After the experiments, the surface was characterized using various microscopic and spectroscopic techniques.

References:

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