

## **In situ investigations of short chain aliphatic carboxylic acids on U(VI) sorption on silica and rutile**

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In the pore water of the Callovo–Oxfordian formation, a potential host rock for the disposal of radioactive waste, short-chain carboxylic acids have been identified [1]. The migration of actinides could be affected by their presence through several mechanisms: (1) adsorption of organics on mineral surfaces may block surface sites or change surface charge, (2) formation of ternary surface complexes would modify the surface speciation or (3) complexation of actinides in solution can decrease affinity of surfaces and adsorption phenomena.

In this study, we have investigated sorption of uranyl ions on two model surfaces, TiO<sub>2</sub> and SiO<sub>2</sub>, and the effect of formate, acetate and propionate anions. In situ methods have been used to identify sorption mechanisms. On TiO<sub>2</sub>, zeta potential measurements have been interpreted as a surface precipitation. This result is consistent with supersaturated solutions and a low surface/volume ratio. Attenuated Total Reflection Infrared (ATR-IR) spectroscopy has been performed for both silica and rutile solids, and surface complexes of uranyl ions have been identified. The short equilibration time can explain the difference of speciation in comparison with zeta potential measurements. ATR-IR has allowed to show the presence of ternary complex in silica-U(VI)-acetate and silica-U(VI)-propionate systems only. On TiO<sub>2</sub>, formate and acetate prevents the surface precipitation.

[1] Courdouan et coll., Appl. Geochem. 22 (2007), 1537-1548