Investigation into the adsorption of aliphatic carbonic acids on clay minerals using vibrational spectroscopy

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Abstract:
Clay minerals are considered to be potential host rocks for the final disposal of nuclear waste because of their ability to strongly bind the radio nuclides via sorption. Since such minerals always contain small biogenic molecules which might form complexes with the nuclides and thus possibly enhance their mobility it is desired to learn about the molecule's adsorption behaviour on clay minerals. Raman spectroscopy and XRD measurements are already widely applied [1-4] but they only yield information about the bulk phase. To obtain further information about the surface region in this thesis additional VSF-spectroscopy was applied to kaolinite and its intercalation complexes with aliphatic acids as model systems for biogenic molecules. The data shows that both VSF and Raman spectroscopy yield mainly qualitative information with VSF spectra showing some additional surface specific peaks in the OH stretching region while the XRD measurements provide also quantitative information. Additionally it could be confirmed that the degree of intercalation depends on the clay's crystallinity and the intercalated molecule can be easily exchanged by another one as has already been observed [2;5].