
Effect of Negative Surface-Charge Densities of Smectite Clays on the Adsorption Isotherms of Racemic and Enantiomeric Tris(2,2'-Bipyridyl) Ruthenium(II) Chloride

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Abstract: The level of adsorption of enantiomeric tris(2,2'-bipyridyl)ruthenium(II) ($\text{Ru}(\text{bpy})_3^{2+}$) by seven different smectite samples was found to be controlled by the total surface area of the clay. The level corresponded to one monolayer. The adsorption of the racemic mixture was lower for all samples, being limited to saturation of the clay's cation-exchange capacity. The addition of NaCl increased the adsorption of the racemic $\text{Ru}(\text{bpy})_3^{2+}$ to the same level as the enantiomers. The dependence on the clay's surface charge density, expected on the basis of the limited face-to-face aggregation model, was not found. The sharp decrease in adsorption of the enantiomers by low charge-density clays and the corresponding sharp increase in adsorption of the racemate by high charge density clays were not observed. These results do not necessarily invalidate the model. The range of negative charges examined may not have been wide enough. Also, charge distribution in smectite is generally not uniform.

Key Words: Adsorption • Enantiomorphs • Racemic pairs • Smectite • Surface charge • Tris(2,2'-bipyridyl)ruthenium(II)

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