

Ph.D. defense

Institut de Chimie Séparative de Marcoule / CEA Marcoule
(UMR 5257, CEA, CNRS, Université Montpellier, ENSCM)

ARNAUD VILLARD

will present his Ph.D. dissertation

Mixture of electrolytes in solution: from modeling to application for the decontamination of the strontium by the sodium nonatitanate

The defense will take place on **Tuesday, October 27, 2015 at 10.00 am**
in the ICSM Auditorium

The objective of this thesis is to study the ionic decontamination of aqueous solutions by ionic oxide exchangers with a particular focus on the strontium adsorption by the sodium nonatitanate. The goal is to develop a predictive model which takes into account the physicochemical phenomena involved, and the deviations to the ideality into the solution but also in the material.

The activity coefficients of the ions in solution have been calculated from an approach based on the MSA theory (Mean Spherical Approximation), where the specific association phenomena have been taken into account. This allowed for calculating the ionic activity coefficients in the ternary mixtures. The validity of the mixture laws of Zdanovskii-Stokes-Robinson and McKay-Perring has been also specified. Two activity models, which represent the long- and the short-range interactions, have been used for the ionic study in the solid. The adsorption isotherms at various concentrations have been thus modeled.

A pH-metric study has also been performed on the sodium nonatitanate in order to determine the hydrolysis constant as well as the solid hydrolysis rate. A structural and morphologic study allowed for highlighting that for highly acidic solutions the sodium nonatitanate is dissolved and precipitated again under different crystallographic forms of the TiO_2 .

Keywords: activity coefficient; MSA; adsorption; solid-liquid

