Analysis of stability and sorption capability of γ-Al_2O_3 nanoparticles /clay mixtures

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Because of the increasing amount of nanoparticles (NPs) in the environment, it is interesting to analyse their stability in different chemical conditions to determine their mobility. It is also important to compare the stability of NP to that of more complex systems that could be found in the environment, such as NPs and clay minerals mixtures.

Nanoparticles and clay minerals can sorb contaminants in the environment. When a mixture is stable in suspension, colloidal mixture-contaminant complexes can be transported through water flows, increasing polluted areas.

Thus, as a possible vehicle of other contaminants, is very important to analyze the retention capability of NPs.

In this study, stability and sorption capability of γ-Al_2O_3 NP (single or mixed with NaBentonite clay) have been analysed, in a wide range of possible environmental conditions.

Stability has been studied by measuring particle size and ζ-potential. 100% γ-Al_2O_3 suspensions were prepared in a broad range of pH values and background electrolytes at different ionic strengths: $NaHCO_3$, $NaNO_3$, Na_2SO_4 and $NaClO_4$. γ-Al_2O_3-NaBentonite clay mixtures stability were measured in a wide range of pHs at different ionic strengths using $NaClO_4$ as background electrolyte.

Retention of aqueous pollutant species of different nature, Cd^{2+} (cationic) and SeO_3^{2-}, (anionic) onto γ-Al_2O_3-NaBentonite mixtures suspensions varying salinity conditions have been also evaluated with the aim of designing geochemical barriers to immobilize aqueous contaminants.

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