

Oral Presentations

Dispersion of Iron Nanoparticles on Clay Materials and its Application for the Sequestration of Aqueous Pollutants

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Abstract

During the last decade, iron nanomaterials have been investigated worldwide for the removal of various inorganic and organic aqueous pollutants. The efficiency of these materials was documented in lab scale experiments. Field studies (*in-situ* and *ex-situ*) were also conducted and the materials were reported to be successful in the treatment of polluted water and soil. However, one of the major constraints in field applications of iron nanoparticles stems from their strong aggregation tendency.

In order to reduce the aggregation behavior, the particles were synthesized in the presence of clay materials, employed as supporting and dispersing agents. Different types of clays and soil minerals were used; kaolinite, montmorillonite, alumina, and clinoptilolite. The resulting composite materials were utilized in the sequestration of aqueous heavy metal ions, ions of rare earth elements, in addition to cationic and anionic dyes, over wide ranges of experimental conditions. High removal percentages and fast kinetics were observed. The primary fixation/removal mechanisms involved redox and sorption reactions, depending on the reduction potential of the particular metal ion. The composite materials were repetitively used and showed high stability.