Application of Zeolite-Supported Nano Iron in the Removal of Phenol from Aqueous Solutions

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Abstract

Zeolite , a natural porous aluminosilicates material, was used as supporting material for iron nanoparticles produced by borohydride reduction method. The composite material (Z-Fe) was characterized using FTIR, XRD, SEM, TGA, BET-N2 techniques. The material was then applied in the removal of phenol from aqueous solutions under various experimental conditions. The batch-type experiments investigated the effects of initial phenol concentration, time of contact, and pH. Parallel experiments were also conducted using pure samples of zeolite and iron nanoparticles for the sake of comparison with Z-Fe. In addition, the composite material was also tested as a Fenton-like catalyst. The material demonstrated fast kinetic behavior, high removal capacity over a wide range of phenol concentrations (5.0-250.0 mg/L), and the removal capacity was quantitative over a wide pH range.