

Characterization of Polymer-Stabilized Nano Zero-valent Iron Particle by Ultrasonic Irradiation-assisted Method

Abstract

We present a study of the influence of pH and ultrasonic irradiation-assisted method on the dispersion of stabilized commercial nanoparticles in post-synthesis using two types of polymers. The great pH responsive and weak polyelectrolyte in aqueous medium solution, poly(acrylic acid) (PAA) and carboxymethyl cellulose (CMC) were employed in the study. We obtained TEM images, quantitative ATR FTIR and UV-Vis measurements to characterize the morphology, dispersion and size distribution of PAA and CMC absorb onto the commercial nanoparticle at both pH 2.2 and 8.6. PAA and CMC not only stabilized the colloid by promoting nucleation but also played a role as dispersing agent and FTIR exhibited that these surfactants chemically absorb on the surface of commercial nZVI through carboxylic group and monodentate interaction. Dispersion of stabilized-commercial nanoparticles could be controlled by adjusting the pH value of suspension and it revealed at higher alkaline medium numerous of small particles observed through TEM images. In addition, absorbance spectra provide more information and quantitatively confirmed significant differences for two colloidal suspensions with better dispersion for CnZVI at higher pH 8.6.

Keywords;

CMC; NZVI particle; PAA; Stabilizer