Adsorption behavior of poly(methacrylic acid)/iron-oxide-coated zeolite for the removal of Mn(II), Fe(II), and As(III) from aqueous solution

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Abstract
Polymer-modified zeolite has the potential to combine the advantages of polymers and zeolites while overcoming the drawbacks of both materials. In this study, a zeolite modified with poly(methacrylic acid) and iron-oxide (MA-zeolite) was successfully prepared using the graft polymerization method. The MA-zeolite was synthesized from clinoptilolite. The MA-zeolite was characterized and applied for the removal of Mn(II), Fe(II), and As(III) from aqueous solutions. Brunauer-Emmett-Teller surface areas, scanning electron microscopy, and Fourier transform infrared spectroscopy were used to study the surface properties of the MA-zeolite. The adsorption ability of the zeolite modified with poly(methacrylic acid) toward metals and metalloids such as Mn(II), Fe(II), and As(III) was studied and the results compared with those for raw zeolite and iron-oxide-coated zeolite. The MA-zeolite showed good adsorption ability, and the removal percentages decreased from Fe(II), Mn(II), to As(III).

Keywords: Grafting polymerization; Modification; Zeolite; Water treatment; Manganese; Iron; Arsenic

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