



Synthesis and characterization of polymer microspheres and its application for phenol adsorption

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ABSTRACT

This paper reports synthesis of the poly(ethylene glycol dimethacrylate-*n*-vinyl imidazole) (*[poly(EGDMA-VIM)]*) microspheres by suspension polymerization for the removal of phenol from an aqueous solution. The synthesized *[poly(EGDMA-VIM)]* microspheres were characterized by various analysis techniques. The *[poly(EGDMA-VIM)]* microspheres possessed a high specific surface area (304.4 m² g⁻¹). It was found that the pseudo-second-order kinetic and Freundlich isotherm models could well define the phenol adsorption process. The maximum capacity of the *[poly(EGDMA-VIM)]* microspheres was calculated to be 34.7441 mg g⁻¹ at 298 K and natural pH from Langmuir isotherm. The adsorption thermodynamics revealed that the adsorption of phenol was an exothermic and spontaneous process. The *[poly(EGDMA-VIM)]* microspheres were easily regenerated by using a 0.01 M NaOH solution, and were repeatedly used for at least 5 cycles without losing the adsorption capacity. The experimental results suggest that the *[poly(EGDMA-VIM)]* microspheres can be implemented as a promising adsorbent for phenol removal from wastewater.

Keywords: Adsorption; N-vinylimidazole; Ethylene glycol dimethacrylate; Polymer microspheres; Phenol

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