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Enhancing Emulsion Liquid Membrane System (ELM) Stability and Performance for the Extraction of Phenol from Wastewater using Various Nanoparticles

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ABSTRACT

Emulation liquid membrane (ELM) technology has recently garnered attention as an efficient alternative for separating pollutants, but it faces the problem of instability during the application, as well as emulsion breaking. With this in mind MgO, Al_2O_3, and three magnetic Fe_2O_3 nanoparticles (of different sizes) were utilized to fabricate a new Pickering ELM system (PELM). The extraction efficiency of phenol from aqueous solution by PELM was studied with different NPs types and with different phenol concentrations (1,000; 500; 100; and 50 ppm). It was found that the type of NPs and concentration of phenol in aqueous solution have a significant impact on the phenol extraction efficiency. By utilizing different NPs as the emulsifier, the extraction efficiency of phenol from a feed solution of 100 ppm phenol was between 91% and 97% after 12 min of contact with different PELM.

Keywords: Pickering emulsion liquid membrane; Emulsion stability; Phenol extraction; Nanoparticles; Wastewater treatment

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