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Adsorption and Desorption Mechanisms of Methylene Blue Removal with Iron-Oxide Coated Porous Ceramic Filter

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ABSTRACT

Adsorption and desorption mechanisms of methylene blue (MB) removal with iron-oxide coated porous ceramics filter (IOCPCF) were investigated in batch and column mode. The results revealed that MB removal mechanisms included physical adsorption and chemical adsorption, of which chemical adsorption by surface ligand complex reaction played a dominant role after infrared spectrum analysis. Recycling agents were selected from dilute nitric acid (pH=3), sodium hydroxide solution (pH=12) and distilled water. Among three agents, dilute metric acid (pH=3) was the best recycling agent. Regeneration rate of IOCPCF arrived at 82.56% at batch adsorption and regeneration was finished in 75min at column adsorption. Adsorp-tion-desorption cycles of IOCPCF after batch and column adsorption were four and three times, respectively. Further, compared with fresh IOCPCF, MB removal rate with these desorbed IOCPCF adsorption only slightly decreased, which suggested that IOCPCF should be used repeatedly.

KEYWORDS

Iron-Oxide Coated Porous Ceramics Filter, Adsorption, Desorption, Methylene Blue, Surface Complex Reaction, Reuse

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