Synthesis and characterization of Cu-based metal-organic framework MOF-199 as an efficient adsorbent for dyes removal

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Abstract:

In this research, we report the synthesis of $[Cu_3 (BTC)_2]$ (MOF-199) using solvothermal method under operational conditions and were used as adsorbents for degradation of dye pollutions of wastewater. Metal-organic frameworks (MOFs) are crystalline materials comprised of organic and inorganic components. The extension of synthesis time can increase the crystallinity of the samples which was caused by the reduction of BET surface area and the amount of Co-coordinative unsaturated sites. The surface area of MOF-199 was obtained as 1400 m^2/g. The adsorbent was characterized by Fourier-transform infrared spectroscopy (FT-IR), X-ray diffraction (XRD), scanning electron microscopy (SEM) and N_2 adsorption/desorption measurement. The selectivity test of dyes shows that $\pi-\pi$ interactions between organic linkers of MOF-199 and the aromatic ring of dyes are responsible for the adsorption dyes process. The practical feasibility of MOFs is possible owing to their abilities for high porosity, optimal loading capacity, ease of surface modification, among others. The used MOF-199 could be regenerated effectively and recycled without significant loss of adsorption capacity.

Keywords: MOF-199; Nano-sorbent; Removal dye; Characterization

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