



Original Research Article

Determination of optimum amounts of effective parameters in reactive dyes removal Using a zeolitic-imidazolate framework catalyst.

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ABSTRACT

An efficient and rapid fabrication procedure for ZIF-8 crystals through ultrasonic assisted strategy (30min) was reported. Additionally, the crystallinity, morphology, chemical bonding, and porosity of ZIF-8 were fully characterized by XRD, and FT-IR. The Response surface methodology approach was established to optimize a series of adsorption conditions: initial concentration (10–400 mg/L), dose (0.02–1 g/L), and time (20–60 min) for Red 141 and Violet-5r removals. Particularly, plausible adsorption mechanisms (electrostatic interactions and π - π stacking) were elucidated, and isotherm models were rigorously studied by three-parameter equations (Langmuir, Freundlich, Tempkin). The adsorption isotherm data showed the adsorption of reactive dyes by ZIF-8, was consistent with the Langmuir isotherm model. The kinetics parameters were in accord with the pseudo-second-order equation, which implied that the adsorption rate was mainly controlled by the chemisorption mechanism. Through advantageous effectiveness involving good reusability (4 cycles), and maximum adsorption capacities (250-200 mg/g), it is recommendable to utilize ZIF-8 as a good adsorbent for the dyes remediation.

Keywords: Zeolitic-imidazolate frameworks, dyes remediation, response surface methodology, electrostatic interactions.

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