

Fabrication of Zirconium Metal-Organic-framework/Poly Triazinephosphanimine Nanocomposite for Dye Adsorption from Contaminated Water: Isotherms and Kinetics Models

Vida Izadkhah,^{a*} Ramin Ghorbani-vaghei,^b and Sedigheh Alavini^b

^aDepartment of Chemistry, Hamedan Branch, Islamic Azad University

^bDepartment of Organic Chemistry, Faculty of Chemistry, Bu-Ali Sina University Hamedan, Hamedan,
Iran

The increase in water pollution has urged industries and academia to propose effective adsorbents to deal with this issue. The present research aimed to produce, characterize, and examine the adsorption capacity of a hybrid material composed of UiO-66-NH₂ and triazine-phosphanimine polymeric organic porous polymer (TPA-POP). In this respect, central composite design (CCD) was utilized to minimize the number of the reaction parameters (i.e., temperature, initial pH, and adsorbent concentration) on the removal of basic blue 41 (BB41). BB41 was adsorbed completely in 60 min with the UiO-66-NH₂/TPA-POP mesoporous nanostructure. The pseudo-secondorder model was the best equation to fit the kinetics data. Also, film adsorption and diffusion were identified as rate-limiting steps in removing the dyes. The equilibrium data were fitted by a Langmuir isotherm, and the maximum equilibrium adsorption was 260.7 mg/g. Moreover, the adsorbent was recycled for seven cycles for adsorption of BB41 dye without an obvious loss of activity.

Keywords: Metal-Organic Framework (MOF), Hybrid Material, MOF-Polymer Composite, Basic Blue 41, Central Composite Design

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