

عنوان مقاله:

Study on Efficiency of HKUST-1 Metal-organic Framework and Modified HKUST-1s for Removal of Meloxicam from Aqueous Solution

محل انتشار:

مجله تحقیقات شیمی تجزیه و تجزیه زیستی، دوره 11، شماره 1 (سال: 1403)

تعداد صفحات اصل مقاله: 14

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خلاصه مقاله:

In the present study, HKUST-1 (Hong Kong University of Science and Technology), HKUST-1@PVA, and Fe³O₄@HKUST-1, metal-organic framework, were synthesized by hydrothermal, post-synthetic modification and pre-synthetic modification methods, respectively. These sorbents were applied to remove the meloxicam drug as the model drug from aqueous solutions. The adsorption isotherm, kinetic, and thermodynamic experiments were done and confirmed that the adsorption behaviors of HKUST-1, Fe³O₄@HKUST-1, and HKUST-1@PVA are based on Langmuir isotherm (the values of q_{max} were obtained as ۸۸۳.۳۳, ۲.۵۰E+۰۳ mg/g for HKUST-1@PVA and Fe³O₄@HKUST-1, respectively) and Freundlich isotherm (the values of KF were obtained as ۳.۰۲E+۰۳ (n=۰.۷۴), ۷.۲۴E+۰۳ (n=۰.۹۹) and ۷.۹۹E+۰۴ (n=۱.۴۹) for HKUST-1, Fe³O₄@HKUST-1 and HKUST-1@PVA, respectively), with an endothermic mechanism and enthalpy-driven process. The kinetic results showed well-fitting with the pseudo-second-order kinetic model for all of them. The speed of the adsorption process, low cost, high efficiency, and high surface area are the main advantages of the proposed compounds as sorbents. The functionalization of HKUST-1 with magnetic nanoparticles decreased the adsorption time, and with PVA provides more functional group on the surface of HKUST-1 and increases its adsorption efficiency. Further, an easy separation with an external magnet in ۳۰ seconds is another advantage of magnetic functionalization. The aforementioned features make these adsorbents appropriate candidates for cost-effective water treatment.

کلمات کلیدی:

HKUST-1 Metal-organic Frameworks, HKUST-1@PVA, Fe³O₄@HKUST-1, Meloxicam, Removal, Nonlinear Langmuir isotherm

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