

Effect of thermolysis condition on characteristics and nonsteroidal anti-inflammatory drugs (NSAIDs) absorbability of Fe-MIL-88B-derived mesoporous carbons

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ABSTRACT

Discharge of nonsteroidal anti-inflammatory drugs (NSAIDs) from wastewater has been increasingly alarmed, led to the advent of the treatment techniques. Among these methods, adsorption is regarded as a tunable and green approach with the utilization of mesoporous carbon (MC) as an efficient and recyclable adsorbent. Herein, we described the strategy for the synthesis of novel MC from Fe-MIL-88B as a self-sacrificial template. Three thermolysis temperatures (550, 750, and 950 °C) were investigated to compare the structural characteristics and absorbability towards selected NSAIDs compounds including diclofenac sodium (DCF), aspirin (APR), and ibuprofen (IBU). Effect of contact time (0–480 min), concentration (10–40 mg/L), pH (2–10), and MC dosage (0.1–0.5 g/L) was systematically studied. Kinetic and isotherm models were also used to find out the adsorption mechanism and behavior of NSAIDs pharmaceutical over MC materials. Proposed mechanism and recyclability test were rigorously studied to gain more insight into how the NSAIDs molecules adsorb on the MC materials and their potential towards drug treatment.

KEYWORDS

Nonsteroidal anti-inflammatory drugs; Metal-organic frameworks; Mesoporous carbon; Pyrolysis; Fe-MIL-88B

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