

Mesoporous magnetic activated carbon: Effect of preparation route on texture and surface properties and on effect for Reactive Black 5 adsorption.

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In this study, the effect of preparation route of a mesoporous magnetic activated carbon on Reactive Black 5 (RB5) adsorption was investigated. The synthesis of the magnetic activated carbon was achieved both with (i) impregnation method (Bmi), and (ii) co-precipitation with two precipitation agents: NaOH (Bm) and NH₄OH (Bma). After synthesis, the full characterization with various techniques (SEM, FTIR, XRD, DTA, DTG, VSM) was achieved in order to testify the effect of the preparation route on its textural and surface properties. It was shown that after the precipitation method the prepared carbon presented a collapsed texture and small magnetic properties.

Effects of initial solution pH, effect of temperature, adsorption isotherms and kinetics were investigated in order to conclude about the aforementioned effect of the preparation method on dye adsorption performance of the magnetic carbons. The adsorption evaluation of the magnetic activated carbon presented higher adsorption capacity of Bmi carbon (350 mg/g) and lower of Bm (150 mg/g). Equilibrium experiments are also performed studying the effect of contact time (pseudo-first and -second order equations) and temperature (isotherms at 25, 45 and 65 °C fitted to Langmuir and Freundlich model). A full thermodynamic evaluation was carried out, calculating the parameters of enthalpy, free energy and entropy (ΔH , ΔG and ΔS). The characterization with various techniques revealed the possible interactions/forces of dye-composite system.