Synthesis and characterization of resorcinol formaldehyde carbon cryogel as efficient sorbent for imidacloprid removal

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Received 7 March 2013; Accepted 1 July 2013

ABSTRACT

Carbon cryogel (CC) has been prepared through sol gel polycondensation of resorcinol with formaldehyde in basic aqueous solution followed by freeze-drying and carbonization. Porous properties of CC analyzed by gravimetric McBain method confirmed the expected surface area and degree of mesoporosity. Obtained powdered material was used for the removal of pesticide imidacloprid from aqueous solutions under regular batch adsorption procedure. A set of several isotherm models including Langmuir, Freundlich, Temkin, Dubinin–Radushkevich, Brouers–Sotolongo, Redlich–Peterson, Sips, Toth, Jovanovic, Hurkins–Jura, Halsey and Radke–Prausnitz model was used for nonlinear fitting of equilibrium data. Several models fitted with quite high correlation coefficients. Bangham and Elovich model fitted suitably for kinetic study indicating that pesticide diffusion into carbons pores is important step which dictates the process rate. Suitability of kinetic models decreased with the increase in adsorbent dosage. Imidacloprid uptake was not influenced by the solution pH.

Keywords: Carbon cryogel; Imidacloprid; Modeling; Characterization