Activated Carbon Synthesized From Pithecellobium Dulce for Methylene Blue Removal

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Water pollution is a severe environmental problem that affects the world. The high concentrations of synthetic dyes disposed of by the textile industry, such as methylene blue, are a common cause of environmental and health problems. With the goal of removing wastewater dye, activated carbon-type adsorbents were prepared from epicarps (pod shells) and seeds of the Pithecellobium dulce (Roxb.) Benth., popularly known in Brazil as “hunger killer” or “buckthorn.” Samples collected from trees in Salvador, Bahia, Brazil, were submitted to washing, drying, grinding, and sieving steps before the chemical activation, using sulfuric acid or phosphoric acid as activating agents. Post activation, materials were washed, dried, and pyrolyzed in a muffle furnace. After being washed and dried, synthetic activated carbons were characterized by elemental analysis, scanning electron microscopy, energy dispersive X-ray spectroscopy, Fourier transforms infrared spectroscopy, and differential scanning calorimetry. The produced solids were also evaluated for methylene blue adsorption efficiency. Morphologies of the activated carbons obtained were very different, comparing the starting materials (epicarp and seed) as the activating agent used. The results showed that producing activated carbon from Pithecellobium dulce waste is possible, with the potential for textile effluents treatment. The best performance was obtained with carbon from epicarps (pod shells), activated with phosphoric acid, which showed a methylene blue removal efficiency of 97% (1.4mg dye/g activated carbon) under the employed conditions. This proposal is environmentally friendly because it uses plant wastes to produce a material (activated carbon) that treats water containing another waste (textile dye).

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