



Adsorptive and desorptive studies on toxic dye Amaranth onto de-oiled mustard from wastewater

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Received 24 April 2009; Accepted 6 February 2011

ABSTRACT

De-oiled mustard, an oil mill waste, was treated as an adsorbent for Amaranth, an azo dye currently used in paper and textile industries. The presence of Amaranth in these effluents causes obvious environmental and health problems. Kinetic studies of adsorption of Amaranth to de-oiled mustard were conducted in batch conditions at 30°C. The paper incorporates effect of pH, temperature, amount of adsorbent, contact time, concentration of adsorbate, particle size on adsorption. The adsorption process followed a pseudo-first order model. The equilibrium process showed to be well described by both Freundlich and Langmuir models, at 30°C, 40°C and 50°C. Thermodynamic parameters like free energy (ΔG), enthalpy (ΔH) and entropy (ΔS) of the systems, respectively, were calculated by using Langmuir constant. The estimated values for ΔG° were -8.027×10^3 and -1.5322×10^3 over activated carbon and activated de-oiled mustard at 303 K (30°C), indicate toward a spontaneous process. Desorption studies indicate that elution by dilute NaOH through the fixed bed of the adsorbents columns could be regenerated and a quantitative recovery of Amaranth can be achieved. A significant decrease in the COD values was observed, which clearly indicates that adsorption method offer a good potential to remove Amaranth from wastewater. Treated activated de-oiled mustard is an attractive candidate for removing organic dye Amaranth.

Keywords: Amaranth; Adsorption; Desorption; Kinetics; De-oiled mustard; COD

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