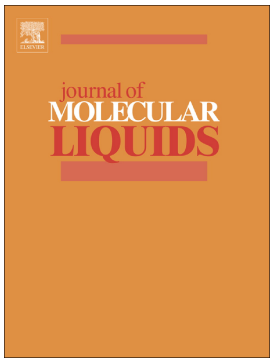

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Kinetic and Thermodynamic analysis for the redemption of effluents containing Solochrome Black T onto Powdered activated carbon: A validation of new Solid-Liquid phase equilibrium model

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Abstract

Degeneracy of synthetic dyes by activated carbon is necessary to save environment. The present study aimed at the impact of surface modification of activated carbon with the aid of ultra sound waves to instigate surface properties, exposure time to treat an azo dye, Solochrome Black T. Interference of ultra sound waves on the surface characteristics of activated carbon by SEM-EDX, FT-IR and physical, thermal characteristics by XRD and TGA were examined. Evaluation of batch adsorption was performed by investigating the factors affecting the adsorption process (initial adsorbate concentration, pH, contact time and temperature); adsorption isotherms and kinetics. The estimated adsorption capacity of 4.0 g L^{-1} was 106.7 (mg/g). Thermodynamic studies confessed the method of removal of dye was exothermic and spontaneous. The present adsorption system obeyed Pseudo second order kinetics (R^2>0.97). Experimental data was used to validate a new solid liquid phase equilibrium model, showing the average absolute relative deviation 6.682 %.

Key words: Dye; Ultrasonication; Adsorption; Solid-Liquid phase equilibrium model; Kinetics; Thermodynamics