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Thermodynamic study of some basic dyes adsorption from aqueous solutions on activated carbon and new correlations

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Abstract

The adsorption behaviour of safranin O and malachite green oxalate dyes on activated carbon as a function of temperature for a fixed initial concentration was investigated at $T = (303, 313 \text{ and } 323) \text{ K}$ and $p = 0.1 \text{ MPa}$ through adsorption isotherms and their thermodynamic parameters ($-\Delta G^{\circ}$, $-\Delta H^{\circ}$ and $-\Delta S^{\circ}$). The isotherms were correlated with a new model based on the principle of phase equilibrium. The new model equation comprising of 4 adjustable parameters correlates the isotherms as a function of temperature, sorbate melting temperature. The overall deviation between the experimental and the correlated results was less than 6.85% in averaged absolute relative deviation (AARD).

Key words: Basic dyes, Malachite green oxalate, New adsorption model, Safranin O, Sorbate melting temperature

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