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EQUILIBRIUM AND KINETIC STUDIES OF METHYL ORANGE ADSORPTION ONTO CHEMICALLY TREATED OIL PALM TRUNK POWDER

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Abstract

In present work, acid treated natural oil palm trunk powder (OPTP) has been utilized as novel adsorbents for the removal of methyl orange (MO) from aqueous solution. The batch method was employed to study the adsorption behavior of MO which was subsequently determined by UV/Visible spectrophotometer. The adsorption characteristics and operational parameters were determined by monitoring different parameters such as pH, contact time, dye concentration and temperature. The acid treated OPTP and MO saturated OPTP adsorbent were characterized based on Fourier transform infrared spectroscopy (FT-IR) and scanning electron microscopy (SEM). The maximum adsorption of MO was observed at pH 6 and contact time 120 min was sufficient to attain the equilibrium. The adsorption of MO onto treated OPTP best fit to Langmuir model and followed the pseudo second order kinetic model. Different thermodynamic parameters such as free energy, enthalpy, and entropy have been calculated and it was concluded that with increase in temperature adsorption increases, which indicates adsorption of MO onto OPTP was endothermic in nature and favourable with positive value of ΔH° . The method can be applied to the removal of MO dyes in waste waters.

Keywords: adsorption isotherm, equilibrium, kinetic parameter, methyl orange dye, oil palm trunk powder

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