

Effect of ultrasound pre-treatment on adsorbent in dye adsorption compared with ultrasound simultaneous adsorption

ABSTRACT

Ultrasound was applied simultaneously with adsorption process in most of the previous studies. However, this method is not practical to treat huge amounts of coloured wastewater effluent. In this study, the efficiency of ultrasound pre-treated peanut husk powder at different power levels (1.5–3.5 W) in dye adsorption with several conditions of initial dye concentration (20–100 mg/L), contact time (0.5–5 h), solution pH (2–8), and dosage (0.1–0.3 g) was studied and compared with ultrasound simultaneous adsorption process and the control. Adsorption efficiency of indirect ultrasound pre-treated peanut husk powder has increased 25.78%, 13.64% and 1.5% compared with the control, ultrasound simultaneous adsorption and direct ultrasound pre-treated sample respectively at 60 mg/L of initial dye concentration. Indirect ultrasound pre-treated sample at 3.5 W has achieved the highest adsorption efficiency of 89.96% at solution pH 8 and 94.83% at 0.3 g dose for 3 h. The surface feature and textural properties of samples were characterized by using scanning electron microscopy and surface characterization analyser. The result indicated that more porous structure was created on the ultrasound pre-treated sample at increasing power levels.

Keyword: Ultrasound; Adsorption; Peanut husk powder; Dye