Utilization of mustard and linseed oil cakes: novel biosorbents for removal of acid dyes

Yusra Safa

Lahore College for Women University, Lahore, Pakistan, email: yusra_safa@yahoo.com

Received 12 May 2014; Accepted 27 December 2014

ABSTRACT

In this research study, the biosorption of Synolon red 3HF and Synolon black HWF-FS dyes onto novel biomasses mustard oil cake and linseed oil cake, respectively, was investigated in the batch mode using different process parameters like pH, particle size, biosorbent dose, initial dye concentration, contact time, and temperature. Maximum biosorption capacity was observed at pH 1 for Synolon red 3HF onto mustard oil cake and pH 2 for Synolon black HWF-FS onto linseed oil cake. The biosorption capacity was efficient at the smallest particle size of biosorbent. The amount of dye sorbed (mg/g) decreased with the decrease in biosorbent dose and increased with increase in initial dye concentration and temperature. The Freundlich isotherm model was best fitted to experimental data. The biosorption followed the pseudo-second-order kinetic model suggesting a chemisorption mechanism. An increase of biosorption capacity with temperature shows an endothermic nature of the process. In this research, the influence of electrolytes, heavy metals, and surfactants on the removal of dyes was also examined.

Keywords: Biosorption; Mustard oil cake; Linseed oil cake; Acid dyes; Modeling