

Parametric and Adsorption Kinetic Studies of Reactive Black 5 Removal from Textile Simulated Wastewater Using Oil Palm (*Elais guineensis*) Empty Fruit Bunch

Abstract

The potential of using Empty Fruit Bunch (EFB), an agrowaste material, as a low-cost biosorbent for the removal of Reactive Black 5 (RB5) from aqueous solution was investigated in this study. The influences of solution pH, contact time, initial concentration and biosorbent dosage were studied in batch experiments at room temperature. Adsorption equilibrium was achieved after 30 min of agitation. The maximum adsorption uptake of RB5 dye occurred at pH 2, resulting in a rapid adsorption (more than 50% RB5 uptake) for the first 5 min of contact. Lower solution pH values showed better adsorption because the dye molecules tend to adsorb on positively charged adsorbent sites. Furthermore, higher biosorbent dosages increased the dye uptake by up to 90% due to the availability of more active adsorption sites. Both the pseudo-second-order kinetic model and the Langmuir model indicated that monolayer coverage on the adsorbent was dominant and that chemisorption was the rate-determining step