

## Effect of ultrasound on biosorption kinetics of Acid blue 25 from aqueous media by using cycads palm bark as novel biosorbent

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### ABSTRACT

In this work, the cycads palm bark (CPB) was tested as a novel biosorbent for the removal of acid blue 25 (AB25) from aqueous media in the absence and presence of ultrasonic irradiation. Batch biosorption studies were conducted to study the effects of different parameters such as initial pH solution, biosorbent dose, initial dye concentration, and ultrasonic power on AB25 dye biosorption in order to explain the influence of ultrasonic irradiation on biosorption kinetics. Ultrasonic irradiation and initial pH solution played a key role in the removal of acid dye. The amount of AB25 biosorption is markedly increased in the presence of the ultrasonic field and reduces of equilibrium time for biosorption. The biosorption kinetic data were found to be well-represented by the pseudo-second-order rate equation, both in the absence and presence of ultrasound. The activation energy ( $E_a$ ) of biosorption has also been evaluated with the pseudo-second-order rate constants. The values of  $E_a$  for AB25 on CPB in the presence and in absence of ultrasound, respectively, are 20.14 and 25.80 kJ/mol, which confirm that the process is physical nature ( $E_a < 40$  kJ/mol) both with and without the assistance of ultrasound. This was further confirmed by the values of  $\Delta H^\circ$  obtained. Additionally, the biosorbent surface was characterized by surface-specific area, isoelectric potential ( $pH_{ZPC}$ ), surface functional groups, and scanning electron microscopy.

**Keywords:** Ultrasonic irradiation; Biosorption; Cycads palm bark; Acid blue 25; Kinetics; Characterization

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