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Adsorption of Malachite Green Dye onto Industrial Waste Materials: Full Factorial Design

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Abstract : Dyes are widely used in industries such as textiles, paper, paints, leather, rubber, plastics, cosmetics, food, and drug etc, to color their products. Due to their chemical structures, dyes are resistant to fading on exposure to light, water and many chemicals and, therefore, are difficult to be decolorized once released into the aquatic environment. Many of the organic dyes are hazardous and may affect aquatic life and even the food chain. This study deals with the adsorption of malachite green dye onto fly ash and red mud. The effects of experimental factors (adsorbent dosage, initial concentration, pH and temperature) on the adsorption process were examined by using 24 full factorial design. The results were statistically analyzed by using the student's t-test, analysis of variance (ANOVA) and an F-test to define important experimental factors and their levels. A regression model that considers the significant main and interaction effects was suggested. The results showed that initial dye concentration an pH is the most significant factor that affects the removal of malachite green.

Keywords : malachite green, adsorption, red mud, fly ash, full factorial design
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