

Área: ANA

## Use of Ceramic Brick Waste in the Removal of Methylene Blue from Aqueous Solutions: An Adsorption Study

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### Highlights

- Particle sizes and concentrations were the most important variables.
- The best conditions of removal of MB were particle sizes of 205  $\mu\text{m}$ , concentration of 83  $\text{mg L}^{-1}$ , and pH of 5.8.
- Maximum MB removal was 100.0%.

### Abstract

Adsorption is a well-established and effective physicochemical process for the removal of pollutants from industrial effluents, using adsorbents of different origins that retain molecular substances on their surface. Currently, there is a constant search for adsorbent materials that provide a better cost-benefit ratio, both financially and ecologically. In Brazil, ceramic masonry is widely used in civil construction, and this process generates a large volume of red ceramic waste (RCW), which often lacks proper disposal. In this work, RCW was studied for the removal of the methylene blue dye (MB). Parameters such as pH (5.0, 8.0, and 11.0), adsorbent particle size (150, 300, and 450  $\mu\text{m}$ ), and dye concentration (50.0, 100.0, and 150.0  $\text{mg L}^{-1}$ ) were evaluated using the Box-Behnken experimental design. MB removal was assessed by the reduction of absorbance at 665 nm using UV-Vis spectrophotometry. From the chemometric analysis, the Pareto Chart (Figure 1A) and the response surface of the two most significant variables (Figure 1B) were plotted.

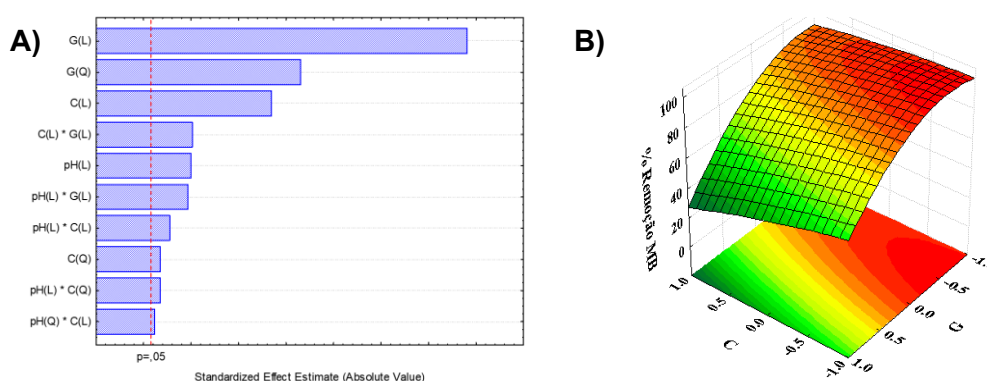


Figure 1: Adsorption of MB by RCW. A) Pareto Chart and B) Response Surface.

Particle sizes of RCW and MB concentrations exert the greatest influence on the adsorption of MB. Based on this significance, the response surface revealed a maximum removal of 100.0% of MB (particle sizes of 205  $\mu\text{m}$ , concentration of 83  $\text{mg L}^{-1}$ , and pH of 5.8). Therefore, red ceramic waste proved to be an efficient adsorbent material for the treatment of industrial effluents.

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