TITLE:
PARAMETRIC STUDY ON MAGNETIC TEA WASTE AND IRON TEA WASTE ADSORBENT FOR MALACHITE GREEN REMOVAL (IMPACT OF DOSAGE)

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ABSTRACT

Synthetic dyes, particularly the synthetic dye malachite green (MG) in wastewater, pose severe risks to the bioenvironment and human health because these chemicals are highly toxic and difficult to degrade. This study investigated the feasibility of tea waste-based adsorbents, especially iron-modified tea waste (Fe-TW), in terms of MG removal from aqueous systems. The relationship of adsorbent dosage and its effect on dye removal efficiency was evaluated through parametric studies. Fe-TW adsorbent was synthesized through chemical modification and characterized by Fourier Transform Infrared Spectroscopy (FTIR) and subjected to batch adsorption experiments. The results showed that increasing the Fe-TW dosage increased the MG removal efficiency. According to the study, Fe-TW is a low-cost, environmentally friendly alternative to wastewater treatment towards achieving Sustainable Development Goals (SDGs) 6, 11, 12, and 14. Future work will consider several additional parameters such as pH, temperature, and regeneration potential to optimize adsorption efficiency and industrial applicability.

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