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## FACILE PREPARATION OF GRAPHENE OXIDE SHEETS FOR THE REMOVAL OF MIXED TEXTILE DORACRYL BLUE MD DYE FROM WASTEWATER

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### Abstract

2D Graphene oxide (GO) sheets were synthesized from inexpensive graphite powder and characterized by means of FTIR, XRD and SEM analysis. Presence of different functional groups was studied using FTIR. SEM image revealed the layered structure of GO sheets and a rough surface. XRD was used to verify the increase of interlayer spacing due to oxidation. Specific surface area, total pore volume, skeletal density, porosity based on skeletal density and average pore diameter were measured using BET analysis. Synthesized GO was used to remove textile dye Doracryl Blue MD (DBMD) from the aqueous system. Highest adsorption capacity was found at 848.81 mg/gm. Graphene oxide and the dye mostly interact through a strong electrostatic attraction. A number of experimental variables such as effect of pH, dosage, commencing concentration of dye solution and duration of contact was studied in detail. Distribution of adsorbate dye molecules over the adsorbent surface was analyzed using Langmuir and Freundlich adsorption isotherms. Pseudo-first-order and pseudo-second-order reaction kinetics were both tested for the adsorption process. Adsorption data fitted the Langmuir model best and followed pseudo-second-order reaction kinetics. Theoretical maximum adsorption capacity was 714.29 mg/gm, which was determined using the Langmuir model. A small loss in adsorption capacity was observed after regenerating the used adsorbents by repeatedly washing them with 2% HCl solution. Based on its increased adsorption capacity and recyclability, GO was found to be a promising adsorbent for treating wastewater contaminated with organic dyes.

*Keywords:* adsorption, dye, graphite, graphene oxide, wastewater

*Received: September, 2022; Revised final: December, 2022; Accepted: March, 2022; Published in final edited form: April, 2022*

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