



"Gheorghe Asachi" Technical University of Iasi, Romania



REMOVAL OF MALACHITE GREEN AND CONGO RED FROM AQUEOUS MEDIA USING GRAPHITE CARBON NITRIDE (G-C₃N₄): A REVIEW

**Sulieman Ibraheem Shelash Al-Hawary¹, Hijran Sanaan Jabbar^{2*}, Salema K. Hadrawi³,
 Taif Alawsi⁴, Furqan M. Abdulelah⁵, Usama S. Altimari⁶, Saja Hameed Kareem⁷,
 Ahmed Hussien Radie Alawady^{3,8,9}, Ali Hashiem Alsaalamy¹⁰, Yasser Fakri Mustafa¹¹**

¹*Department of Chemistry, Al al-Bayt University, P.O.BOX 130040, Mafrq 25113, Jordan*

²*Department of Chemistry, College of Science, Salahaddin University-Erbil, Kurdistan Region, Iraq*

³*Department of Chemical Engineering, College of Technical Engineering, the Islamic University, Najaf, Iraq*

⁴*Scientific Research Center, Al-Ayen University, Thi-Qar, Iraq*

⁵*Department of Chemical Engineering, Al-Bayan University, Baghdad, Iraq*

⁶*Department of Chemistry, AL-Nisour University College/ Baghdad/ Iraq*

⁷*Department of Chemistry, National University of Science and Technology, Dhi Qar, Iraq*

⁸*College of technical engineering, the Islamic University of Al Diwaniyah, Iraq*

⁹*College of technical engineering, the Islamic University of Babylon, Iraq*

¹⁰*College of technical engineering, Imam Ja'afar Al-Sadiq University, Al-Muthanna 66002, Iraq*

¹¹*Department of Pharmaceutical Chemistry, College of Pharmacy, University of Mosul, Mosul-41001, Iraq*

Abstract

As industries continue to release pollutants into the environment, the preservation of the environment has become a crucial concern. Among these pollutants, dye pollutants are particularly dangerous because they degrade slowly and pose a threat to aquatic life. In this paper, the removal and degradation of two dangerous dye contaminants, Malachite Green (MG) and Congo red (CR), by g-C₃N₄ and its composites and derivatives, were investigated. The results have shown that these composites have effectively removed both CR and MG dye contaminants from aqueous media in almost all studies, with a high degradation rate of over 90%. Also, in all studies, composites and derivatives of g-C₃N₄ have been found to destroy these two dye pollutants more effectively than g-C₃N₄ alone. Finally, as a general outcome, g-C₃N₄ and its composites can be utilized on a large scale in the textile industry to eliminate dye contaminants and aid in preserving the environment for future generations.

Key words: congo red (CR), environment, g-C₃N₄, malachite green (MG), pollutants

Received: August, 2023; Revised final: March, 2024; Accepted: April, 2024

* Author to whom all correspondence should be addressed: e-mail: hsanaanjabbar@gmail.com; Phone: +9647516610918