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Photochemical Modification of Graphene Oxide for Enhanced Removal of Heavy Metal Ions from Industrial Effluents

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Abstract: *This research paper delves into the efficacy of photochemically modified graphene oxide (GO) for the enhanced removal of heavy metal ions, specifically lead (Pb), cadmium (Cd), and chromium (Cr), from synthetic industrial effluents. The objective was to investigate whether photochemical modifications could augment the adsorptive properties of GO, making it a more effective and selective adsorbent for heavy metals prevalent in industrial wastewater. A series of batch adsorption experiments were designed and conducted, simulating industrial effluents with varying concentrations of the target heavy metals. The adsorption data were analyzed using the Langmuir isotherm model to quantify the adsorption capacity and understand the nature of the adsorption process.*

The key findings revealed a significant improvement in the adsorption capacities of photochemically modified GO, with maximum adsorption capacities reaching 225 mg/g for Pb, 85 mg/g for Cd, and 115 mg/g for Cr. These results underscore the enhanced efficacy and selectivity of modified GO towards specific heavy metals, attributed to the introduction of functional groups during the photochemical modification process. The study fills a critical gap in the literature by demonstrating the potential of photochemical modifications to tailor GO for specific environmental remediation applications.

The implications of this research are far-reaching, offering a novel approach to the development of more efficient and selective adsorbents for the treatment of heavy metal-laden industrial effluents, thereby contributing to the advancement of sustainable water purification technologies.

Keywords: Photochemical Modification, Graphene Oxide, Heavy Metal Removal, Industrial Effluents, Adsorption Capacity, Environmental Remediation