

Enhanced Photocatalytic Degradation of Naphthacene-based Antibiotic over Hierarchical CdWO₄-decorated Reduced Graphene Oxide: Optimization of operational parameters

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The search for high-efficient photocatalyst for decontamination of organic pollutants from wastewater or natural water remains a great challenge. In this study, a new photocatalyst consisting of reduced graphene oxide/CdWO₄ composite was synthesized by a facile wet chemical process and utilized for the degradation of a naphthacene-based antibiotic (tetracycline (TC)) under solar-light exposure. The Box-Behnken four-level experimental design was employed to find the maximum yield of photocatalytic degradation and optimize the process variables. The synthesized hierarchical structure showed a narrow band gap of 2.46 eV, indicating their availability as a robust visible-light-driven photocatalyst for degradation of conjugated aromatic compounds. The optimal conditions for the complete TC degradation are found to be: irradiation time: 60 min, catalyst dosage of 0.216 g L⁻¹, [TC]₀ of 13.54 mg L⁻¹, and pH 5.8. Moreover, the kinetic analysis confirmed that the degradation of TC follows the Langmuir-Hinshelwood kinetic model.