“Fabrication of TiO_2/ZnS/GO with Enhanced Photocatalytic Activity for the Degradation of Methylene Blue”

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TiO_2-based ternary composites have been regarded as excellent photocatalysts for environmental applications. This study aimed to synthesize, characterize and investigate the photocatalytic performance of TiO_2/ZnS/GO composites for the removal of individual and mixed dyes (methylene blue, methyl orange, and Rhodamine B). Characterizations analyses using Fourier transform infrared spectroscopy (FTIR), Raman spectroscopy, Scanning electron microscopy (SEM), Energy dispersive X-ray spectroscopy (EDX), X-ray diffraction (XRD), and Brunauer-Emmett-Teller (BET) surface analyser confirmed the fabrication of TiO_2/ZnS/GO composites. The TiO_2/ZnS/GO (1:1:1) composite was highly efficient in removing 20 ppm of methylene blue (98.4%), methyl orange (83.6%) and Rhodamine b (95.7%), individually via adsorption and photocatalytic effects. When methylene blue, methyl orange and rhodamine b co-exist in solution, TiO_2/ZnS/GO removed 81.8%, 54.3% and 9.7%, respectively. In comparison to TiO_2/ZnS/GO powder, the beads appeared to be superior for assisting in the recovery of photocatalysts from the reaction medium. The efficacy of the fabricated TiO_2/ZnS/GO composite provides a great insight into its potential application in wastewater treatment consisting of multiple dyes in powder as well as immobilized forms.

Keywords:
Photocatalysis, graphene oxide, sodium alginate, beads, wastewater, titanium dioxide

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