Photodegradation of Methylene Blue Dye Using BiVOÃ¢Â‚„/g-CÃ¢Â‚ƒNÃ¢Â‚„ Composites under Visible Light Irradiation

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Abstract	This study evaluates the degradation of methylene blue through photocatalysis using BiVO4/g-C3N4 material with the help of visible light. Material characterization was conducted using X-ray diffraction, scanning electron microscopy, and UV-Vis diffuse reflectance spectroscopy data. The characterization results show that the crystal structure of BiVO4/g-C3N4 is a heterojunction between monoclinic BiVO4 and hexagonal g-C3N4, with a crystal size of about 10.16 nm and a band gap energy value of about 2.16 eV. The morphology formed is a combination of sheet and rod-like. This study optimized the photocatalytic activity of the composite by analyzing the variation of g-C3N4 concentration, degradation time, and methylene blue pH. The results show that the BiVO4/g-C3N4 sample has optimal photocatalytic and adsorption properties in sample B (1:3) with pH 7 and a degradation time of 150 minutes. Under these conditions, the BiVO4/g-C3N4 composite successfully degraded methylene blue by 94.14%. The rate kinetics of the photocatalytic reaction followed first order, with *OH species playing the most role in the degradation mechanism. These findings highlight the potential of BiVO4/g-C3N4 as an effective photocatalyst material for organic pollutant degradation applications, offering a sustainable solution for wastewater treatment.
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