Persulfate Promoted ZnIn₂S₄ Visible Light Photocatalytic Dye Decomposition

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In this work, a synergistic way for promoting the ZnIn₂S₄ nanoparticle photocatalysis coupled with persulfate (PS) under LED visible light was proposed. The ZnIn₂S₄ nanoparticle was prepared through a hydrothermal procedure and studied by diversified characterizations. When 1 mmol/L PS was added, 86% of methyl orange (MO) with the beginning amount of 15 mg/L was decolorized at the ZnIn₂S₄ dosage of 0.2 g/L and pH of 6 after 120 min treatment. The ZnIn₂S₄/PS process presented a good stability during five cyclic utilizations. Besides, the scavenger addition tests proved the sulfate radical and superoxide radical were the main species for the MO elimination. The chemical oxygen demand and total organic carbon results indicated that the synergistic system could improve the degradation and mineralization effects for the MO. In summary, the coupling ZnIn₂S₄/PS system presented a favorable synergistic photocatalytic performance, which not only could improve the separation of electron and hole and then activate PS, but also promote the decomposition of MO.

Keywords: ZnIn₂S₄; Photocatalysis; Visible light irradiation; Persulfate; dye removal

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