Enhanced photocatalytic performance of BiVO$_4$ for degradation of methylene blue under LED visible light irradiation assisted by peroxymonosulfate

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The enhancement of BiVO$_4$ photocatalytic degradation of methylene blue (MB) through peroxymonosulfate (PMS) introduction was studied under LED light irradiation. The BiVO$_4$ catalyst was prepared by the hydrothermal method, and its physicochemical properties were characterized through various surface means. The influencing factors on the MB decolorization, such as the PMS concentration, BiVO$_4$ amount, initial solution pH value, and catalyst stability were determined. The results presented that the photocatalytic performance of BiVO$_4$ for MB removal was effectively improved after adding the PMS in the photocatalysis system. Increasing BiVO$_4$ and PMS dosages promoted the MB elimination, and the synergy process showed satisfactory MB decolorization effect from pH 4 to 10. Besides, the coupling system exhibited a good stability after the four recycles. Moreover, the reactive species were identified by radicals scavenging experiments, and the results displayed that the sulfate and hydroxyl radicals were in charge of the MB decomposition during this collaborative process.

**Keywords:** BiVO$_4$; Photocatalysis; LED visible light; Peroxymonosulfate; Methylene blue degradation