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Photocatalytic degradation of methyl blue by tourmaline-coated TiO_2 nanoparticles

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ABSTRACT

Complex photocatalysts were prepared by coating TiO_2 nanoparticles with tourmaline and used in the photocatalytic degradation of simulated methyl blue wastewater. The photocatalytic activities and crystalline form were affected by the synthetic conditions, with the optimum catalyst preparation of using 1% in weight, of HCl treated tourmaline passed by the 3,000 mesh sieve, and finally calcination at 450°C for 5 h. The addition of SO_4^{2-} or lowering of solution pH decelerated photocatalytic degradation, while cations like Ca^{2+}, Zn^{2+}, and Mg^{2+} accelerated the reaction. Results of our study indicate that tourmaline due to its broadening utilization potential is a helpful carrier to enhance the effect of the TiO_2 photocatalytic method in the processing of dye wastewater.

Keywords: Tourmaline; TiO_2; Coat; Photocatalysis; Hydroxyl radical

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