Short Communication

Fabrication of N-doped TiO₂ Nanorods and Its Visible-Light Photocatalytic Activity for Resorcinol Degradation in Wastewater

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This work was focused on the synthesis of N-doped TiO₂ nanorods as photocatalyst and its visible-light photocatalytic activity to degrade resorcinol as phenolic pollutants in wastewater. Pure TiO₂ and N-doped TiO₂ NRs were synthesized using a solvothermal process. The analyses of morphology and structure of prepared photocatalysts by TEM and XRD showed that well-defined mesoporous nanorods in anatase phase were synthesized. The result of optical characterization showed that the band gap values of TiO₂ and N-doped TiO₂ NRs were obtained 3.04 and 2.31 eV, respectively, indicating the band gap of N-doped TiO₂ NRs was greatly narrower than the pure TiO₂ NRs. The results of EIS analysis showed lower resistance of carrier transfer for the doped sample. The Results of the photocatalytic study showed that the complete treatments of 100 mg/l resorcinol were obtained at 120 and 95 minutes under UV irradiation for pure TiO₂ and N-doped TiO₂ NRs, respectively, and complete removal was obtained at 130 and 85 minutes under visible light irradiation for pure TiO₂ and N-doped TiO₂ NRs, respectively. Therefore, the higher degradation rate of resorcinol on N-doped TiO₂ NRs under visible light irradiation was observed which can be attributed to the narrowing band gap of doped sample and formation of an impurity energy level, avoiding the recombination between e⁻ and h⁺.

Keywords: Degradation of phenolic pollutants; Wastewater; Photocatalyst; N-doped TiO₂ nanorods

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