Comparative study on the photocatalytic degradation of dye pollutants over the TiO2 photocatalyst doped with different s

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ABSTRACT

The objectives of this work are to prepare N-doped, S-doped and Fe-doped TiO2 photocatalysts, respectively, using the sol-gel method, and to investigate the photo-degradation behaviors of different dyes including AR27, MG, MO, and AR4 in aqueous solutions under visible light irradiation. The preparation conditions, including the type and amount of dopants and photocatalyst concentration were studied and the degradation of dye molecules were analyzed. The physical-chemical characteristics of the prepared photocatalysts were analyzed by BET, SEM, EDX, XRD, and UV-Vis. Results showed that the specific surface area of the photocatalysts is about 26.86~38.25 m2/g. XRD patterns indicated that the major crystalline type of the prepared TiO2 is anatase. UV-Vis diffuse reflectance spectra showed that absorption of Fe-doped TiO2 in the visible light region was strengthened and the phenomena of red-shift was apparent. As for the photocatalytic degradation of AR27,MG, MO and AR4, the pseudo-first-order rate equation can be used to describe the reaction kinetics. The degradation behaviors varied with the photocatalyst concentration and the type of dopants for the prepared photocatalysts. It also revealed that the reaction rate constants for the prepared photocatalysts are greater than those for commercial TiO2. Further, the prepared photocatalysts could react with AR27, MG, MO and AR4 more effectively under visible light irradiation, especially for the N-doped and S-doped TiO2.

Keywords : photocatalysts、visible light、Fe、S、N、TiO2、AR27、AR4、MO、MG

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