Degradation of dye pollutants by the modified Tio2 photocatalysts under visible light irradiation :

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ABSTRACT

The objectives of this work are to prepare Fe-doped, N-doped and S-doped TiO2 photocatalysts, respectively, using the sol-gel method, and to investigate the photo-degradation behaviors of different dyes including, MG, AR13 and AR27 in aqueous solutions under visible light irradiation. The preparation conditions, including type and amount of dopants were studied and degradation of dye molecules was analyzed. The physical-chemical characteristics of the prepared photocatalysts were analyzed by ICP-AES, SEM, EDX, XRD, and UV-Vis. Results of the XRD analysis indicated that the major crystalline type of the prepared TiO2 is anatase. UV-Vis spectra showed that absorption in the visible light region was strengthened and the phenomena of red-shift was apparent. As for the photocatalytic degradation of MG, AR13 and AR27, the pseudo-first-order rate equation can be used to describe the reaction kinetics. Further, the prepared photocatalysts could react with MG, AR13 and AR27 more effectively under visible light irradiation. As for the Fe-doped, N-doped and S-doped TiO2 photocaralysts, iron nitrate, urea, thiourea were found to be the best dopants, respectively. Among these photocatalysts, the N-doped photocatalysts using urea as the dopant possessed the best reactivity under visible light irradiation.

Keywords : TiO2、visible light、N、S、Fe、dye

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