

Synthesis, Characterization and Photocatalytic Performance of TiO₂ Co-doped with Bismuth and Zinc

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Abstract : The objective of this study is based on the synthesis of a new photocatalyst based on TiO₂ and its application in the photo-degradation of an acid dye under the visible light. The material obtained was characterized by different techniques like diffuse reflectance UV-Vis spectroscopy (DRS), X-ray diffraction (XRD) and scanning electron microscopy (SEM). The photocatalytic efficiency of the Bi, Zn co-doped TiO₂ treated at 670°C for 2 h was tested on the Indigo Carmine under the irradiation of visible light and compared with that of the commercial titanium oxide TiO₂-P25 (Degussa). The XRD characterization of the material Bi-Zn-TiO₂ (670°C) revealed the presence of the anatase phase and the absence of the rutile phase in comparison of the TiO₂ P25 diffractogram. Characterization by UV- visible diffuse reflection (DRS) material showed that the Bi-Zn-TiO₂ exhibits redshift (move visible) relative to commercial titanium oxide TiO₂-P25, this property promises a photocatalytic activity of Bi-Zn-TiO₂ under visible light. Indeed, the efficiency of photocatalytic Bi-Zn-TiO₂ as a visible light is shown by a complete discoloration of indigo carmine solution of 16 mg/L after 70 minutes, whereas with the P25-TiO₂ discoloration is achieved after 120 minutes.

Keywords : POA, heterogeneous photocatalysis, TiO₂, co-doping

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