World Academy of Science, Engineering and Technology
International Journal of Chemical and Materials Engineering
Vol:9, No:01, 2015

Photocatalytic Degradation of Organic Polluant Reacting with Tungstates: Role of Microstructure and Size Effect on Oxidation Kinetics

Authors : A. Taoufyq, B. Bakiz, A. Benlhachemi, L. Patout, D. V. Chokouadeua, F. Guinneton, G. Nolibe, A. Lyoussi, J-R. Gavarri

Abstract : Currently, the photo catalytic reactions occurring under solar illumination have attracted worldwide attentions due to a tremendous set of environmental problems. Taking the sunlight into account, it is indispensable to develop highly effective visible-light-driver photo catalysts. Nano structured materials such as MxM'1-xWO6 system are widely studied due to its interesting piezoelectric, dielectric and catalytic properties. These materials can be used in photo catalysis technique for environmental applications, such as waste water treatments. The aim of this study was to investigate the photo catalytic activity of polycrystalline phases of bismuth tungstate of formula Bi2WO6. Polycrystalline samples were elaborated using a coprecipitation technique followed by a calcination process at different temperatures (300, 400, 600 and 900°C). The obtained polycrystalline phases have been characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM), and transmission electron microscopy (TEM). Crystal cell parameters and cell volume depend on elaboration temperature. High-resolution electron microscopy images and image simulations, associated with X-ray diffraction data, allowed confirming the lattices and space groups Pca21. The photo catalytic activity of the as-prepared samples was studied by irradiating aqueous solutions of Rhodamine B, associated with Bi2WO6 additives having variable crystallite sizes. The photo catalytic activity of such bismuth tungstates increased as the crystallite sizes decreased. The high specific area of the photo catalytic particles obtained at 300°C seems to condition the degradation kinetics of RhB.

Keywords : Bismuth tungstate, crystallite sizes, electron microscopy, photocatalytic activity, X-ray diffraction.
Conference Title : ICCIS 2015 : International Conference on Chemical Industry and Science
Conference Location : Jeddah, Saudi Arabia
Conference Dates : January 26-27, 2015