

Characterization of Iron Doped Titanium Dioxide Nanoparticles and Its Photocatalytic Degradation Ability for Congo Red Dye

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Abstract : This study reports the preparation of iron metal-doped nanoparticles of Titanium dioxide by the sol-gel process and the photocatalytic degradation of dye. Nano-particles were characterized by SEM, EDX, and UV-Vis spectroscopy. The detailed study confirmed that nanoparticles have grown in high density and have good optical properties. The photocatalytic batch experiment was performed in an aqueous solution where congo red dye was used as a dye pollutant under the irradiation of ultraviolet rays created by using a mercury lamp source. Total degradation efficiency achieved was approximately 85% to 93% in the duration of 100-120 minutes of irradiation under an ultraviolet light source. The decolorization ability of this process was measured by absorbance at a maximum wavelength of 498nm. The results indicated that the iron-doped Titanium dioxide nanoparticles showed an excellent photocatalytic response to the degradation of dye under the ultraviolet light source within a very short period of time.

Keywords : titanium dioxide, nano-particles iron dope, photocatalytic degradation, Congo red dye, sol-gel process

Conference Title : ICNNN 2020 : International Conference on Nanomaterials, Nanodevices and Nanoparticles

Conference Location : Auckland, New Zealand

Conference Dates : December 01-02, 2020