

Photocatalytic Degradation of Methylene Blue Dye Using Pure and Ag-Doped SnO₂ Nanoparticles as Catalyst

Authors : M. S. Abd El-Sadek, Mahmoud A. Omar, Gharib M. Taha

Abstract : Photodegradation of methylene blue in the presence of tin dioxide (SnO₂) nanoparticles under solar light irradiation are known to be an effective photocatalytic process. In this study, pure and silver (Ag) doped tin dioxide (SnO₂) nanoparticles were prepared at calcination temperature (800°C) by a modified sol-gel method and studied for their photocatalytic activity with methylene blue as a test contaminant. The characterization of undoped and doped SnO₂ photocatalyst was studied by X-rays diffraction patterns (XRD), transmission electron microscopy (TEM), Fourier Transform Infrared Spectroscopy (FT-IR) and Energy Dispersive X-ray Microanalysis (EDX). The catalytic degradation of methylene blue in aqueous media was studied using UV-Vis spectrophotometer to monitor the degradation process by measuring its absorption spectra. The main absorption peak of methylene blue is observed at $\lambda = 664$ nm. The change in the percent of silver in the catalyst affects the photoactivity of SnO₂ on the degradation of methylene blue. The photoactivity of pure SnO₂ was found to be a maximum at dose 0.2 gm of the catalyst with 100 ml of 5 ppm methylene blue in the water. Within 210 min of photodegradation (under sunlight) after leaving the reaction for 90 minutes in the dark to avoid the effect of adsorption, the pure SnO₂ at calcination temperature 800°C exhibited the best photocatalytic degradation with removal percentage of 93.66% on methylene blue degradation under solar light.

Keywords : SnO₂ nanoparticles, methylene blue degradation, photocatalysis, silver doped-SnO₂

Conference Title : ICNFA 2019 : International Conference on Nanotechnology: Fundamentals and Applications

Conference Location : Prague, Czechia

Conference Dates : July 09-10, 2019