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Photocatalytic Degradation of Methylene Blue Dye Using Pure and Ag-Doped SnO_2 Nanoparticles as Catalyst

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Abstract : Photodegradation of methylene blue in the presence of tin dioxide (SnO_2) nanoparticles under solar light irradiation are known to be an effective photocatalytic process. In this study, pure and silver (Ag) doped tin dioxide (SnO_2) nanoparticles were prepared at calcination temperature (800ºC) 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 SnO_2 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 λ= 664 nm. The change in the percent of silver in the catalyst affects the photoactivity of SnO_2 on the degradation of methylene blue. The photoactivity of pure SnO_2 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 SnO_2 at calcination temperature 800ºC exhibited the best photocatalytic degradation with removal percentage of 93.66% on methylene blue degradation under solar light.

Keywords : SnO_2 nanoparticles, methylene blue degradation, photocatalysis, silver doped-SnO_2
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