



Photocatalytic degradation of Eriochrome Black-T by the Ni:TiO₂ nanocomposites

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ABSTRACT

Conventional chemical, biological and adsorption treatments have been applied for the removal of dyes from textile wastewater, but these processes are insufficient in removing dye contaminants. Photocatalysis is greener approach for the degradation of harmful dye pollutant compounds completely. In the present study, TiO₂ and Ni:TiO₂ nanoparticles were prepared and their photocatalytic activity was measured against Eriochrome Black-T (EBT). The photodegradation of EBT was investigated in the different conditions of concentration and pH in the presence of TiO₂ and Ni:TiO₂. The photocatalysts were characterized by X-ray diffraction (XRD), scanning electron microscope (SEM), energy-dispersive X-ray spectroscopy, UV-Vis and Brunauer -Emmett -Teller. The XRD confirmed the presence of anatase and rutile phase in the prepared photocatalysts. The Scherrer's calculations are used to determine the average particle size. The average particle size was found as 72 and 16 nm for TiO₂ and Ni:TiO₂, respectively. The SEM and transmission electron microscopy images also confirmed the formation of nanoparticles in the range of ~100 nm. The band gap energy of TiO₂ and Ni:TiO₂ was calculated by talc plot and obtained as 3.2 and 3.0 eV, respectively. The photocatalyst activity was measured by varying pH and concentration of dye solution. Kinetics study was also performed in this investigation.

Keywords: Photocatalyst; Nanocomposites; Eriochrome Black-T; Photodegradation

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