Photodegradation study of congo red, methyl orange, methyl red and methylene blue under simulated solar irradiation catalyzed by ZnS/CdS nanocomposite

H.R. Pouretedal\textsuperscript{a,*}, S. Sabzevari\textsuperscript{b}

\textsuperscript{a}Faculty of Science, Malek-Ashtar University of Technology, Shahin-Shahr, Iran
\textsuperscript{b}Department of Chemistry, Islamic Azad University, Shahreza Branch, Iran

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ABSTRACT

The nanocomposites of $\text{Zn}_x\text{Cd}_{1-x}\text{S}$ were synthesized via controlled co-precipitation. The X-ray diffraction pattern, transmission electron microscopy image and BET method were used to characterize the synthesized nanocomposites. The cubic structure of nanocomposites were confirmed using X-ray diffraction pattern. The photodegradation of congo red, methyl orange, methyl red and methylene blue catalyzed by prepared nanocomposites was studied under simulated solar irradiation. The $\text{Zn}_{0.4}\text{Cd}_{0.6}\text{S}$ show the highest photoactivity among nanocomposites. The effect of samples pH and $\text{Zn}_{0.4}\text{Cd}_{0.6}\text{S}$ dosage were adjusted to optimize the photodegradation process of dyes. The degradation efficiency of 95% were obtained within 20 min for congo red and 60 min for other dyes with initial concentration of 10 mg/l. The $\text{Zn}_{0.4}\text{Cd}_{0.6}\text{S}$ indicate the stability in samples with pH of 3–11. The mineralization of dyes was confirmed using determination of chemical oxygen demand of solutions after photodegradation process.

Keywords: Dye; Degradation; ZnS; CdS; Composite; Photocatalyst

\textsuperscript{*}Corresponding author.