

## Photo-Degradation Black 19 Dye with Synthesized Nano-Sized ZnS

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**Abstract :** Textile industries produce large volumes of colored dye effluents which are toxic and non-biodegradable. Earlier studies have shown that a wide range of organic substrates can be completely photo mineralized in the presence of photocatalysts and oxidant agents. ZnO and TiO<sub>2</sub> are important photocatalysts with high catalytic activity that have attracted much research attention. Zinc sulfide is one of the semiconductor nanomaterials that can be used for the production of optical sensitizers, photocatalysts, electroluminescent materials, optical sensors and for solar energy conversion. The synthesis of ZnS nanoparticles has been tried by various methods and sulfide sources. Elementary sulfur powder, H<sub>2</sub>S or Na<sub>2</sub>S are used as sulfide sources for synthesis of ZnS nano particles. Recently, solar energy is has been successfully used for photocatalytic degradation of dye pollutant. Studies have shown that the use of metal oxides or sulfides with ZnO or TiO<sub>2</sub> can significantly enhance the photocatalytic activity of them. In this research, Nano-sized zinc sulfide was synthesized successfully by a simple method using thioacetamide as sulfide source in the presence of polyethylene glycol (PEG 2000). X-ray diffraction (XRD) spectroscopy scanning electron microscope (SEM) was used to characterize the structure and morphology synthesized powder. The effect of photocatalytic activity of prepared ZnS and ZnS/ZnO, on degradation of direct Black19 under UV and sunlight irradiation was investigated. The effects of various parameters such as amount of photocatalyst, pH, initial dye concentration and irradiation time on decolorization rate were systematically investigated. Results show that more than 80% of 500 mgL<sup>-1</sup> of dye decolorized in 60-min reaction time under UV and solar irradiation in the presence of ZnS nanoparticles. Whereas, mixed ZnS/ZnO (50%) can decolorize more than 80% of dye in the same conditions.

**Keywords :** zinc sulfide, nano articles, photodegradation, solar light

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