METHYLENE BLUE PHOTODEGRADATION USING CdS NANOCRYSTALS AS CATALYTIC AGENT

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Photocatalytic process show great capabilities towards degradation of organic contaminants. Semiconductors are common photocatalyst due to their narrow band gaps which absorb light over a wide spectral range. Development of nanostructured photoactive materials could result in the creation of powerful catalyst, allowing full control of their properties when using bottom-up synthesis techniques. The size-tunable luminescence shown in semiconductor nanocrystals, particularly CdS quantum dots, makes them ideal candidates for their use as catalysts in light dependent reactions, such as photodegradation process¹. The exposition of CdS quantum dots to light creates electron-hole pairs which favors the oxidation/reduction process of the surrounding molecules, especially in an aqueous medium, resulting in the degradation of the present organic compounds².

Herein, we report the hydrothermal synthesis of CdS nanocrystals with diameters between 2-5 nm and their use in the methylene blue degradation. The nanoparticles were characterized by UV Visible and Fluorescence spectroscopy, Transmission Electron Microscopy and Z Potential. Significantly, methylene blue was degraded up to 90% under visible light irradiation for 60 min at room temperature in air. The influence of pH and nanoparticle size were studied, changing pH values from 5 to 8. Degradation kinetics for methylene blue solutions are described, using CdS nanocrystals of 2.05, 3.16, 3.51, 3.92, 4.30 and 4.49 nm as a photocatalytic agents.

Keywords: Nanocrystals, Photodegradation, Semiconductors

References:


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