

Synthesis of ZnO Nanoparticles by Altering Capping Agents and their Effects on Dyes: A Photocatalytic Study †

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Abstract: Metal oxide nanoparticles are largely used as a photocatalytic agent due to their small size and larger surface area. It was noted that the catalytic activity of the nanomaterials enhances in the presence of UV-Vis light. In this work, we have synthesized zinc oxide (ZnO) nanoparticles by co-precipitation method by altering capping agents. We have chosen Polyethylene Glycol (PEG) as a capping agent with various molecular weights, namely, PEG 600, PEG1000, PEG 6000, and PEG 10000, respectively. The catalytic activities of the ZnO nanomaterials in the presence of various dyes, mainly Rhodamine 6G (R6G), Rhodamine B (RhB), Malachite Green (MG), and Brilliant Green (BG) were performed by absorption spectroscopic technique. We observed that the dye degradation capabilities of ZnO nanoparticles strongly depend on the sizes of the ZnO nanoparticles, which arise due to the effect of capping agents. The sizes of the ZnO nanoparticles synthesized by using PEG 10000 are smaller compared to the other PEG, which has been confirmed by XRD and SEM data. These studies also supported that the capping agents have a major role in modulating the sizes of the nanoparticles, alternatively the catalytic activities of nanoparticles.

Keywords: ZnO nanoparticles; photocatalysts; XRD (List three to ten pertinent keywords specific to the article; yet reasonably common within the subject discipline.)

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Conflicts of Interest

The authors declare no conflict of interest.