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OPTIMIZATION OF PHOTOCATALYTIC ACTIVITY OF Mg/ZnO NANOPARTICLES IN THE REMOVAL OF A MODEL CONTAMINANT USING RESPONSE SURFACE METHODOLOGY

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Abstract

In this study, Mg-doped ZnO nanoparticles with 2% Mg content were synthesized by sol-gel method. The structure and morphology of the nanoparticles were characterized by TEM, BET and UV-Vis absorbance techniques. From TEM image, it was found out that the nanoparticles had uniform size and uniform distribution. BET analysis revealed that in comparison with pure ZnO, Mg 2%/ZnO nanoparticles had a higher specific surface area. Based on UV-Vis absorbance analysis, Mg 2%/ZnO nanoparticles shifted to a lower wavelength (blue-shift), showing a high photocatalytic activity under UV light irradiation. The central composite design under the response surface methodology (RSM) was used for optimization of the photocatalytic removal of Rhodamine B (RhB) with Mg 2%/ZnO nanoparticles. The results showed that there was a good agreement between the predicted data from RSM and the experimental data with a correlation coefficient of 0.9354. The determined optimum values for removal of RhB were as follows: Mg 2%/ZnO nanoparticles dosage of 500 mg L^{-1}, initial RhB concentration of 6 mg L^{-1}, the irradiation time of 6 min, and pH = 8. In order to get more information about photocatalytic activity of the prepared Mg 2%/ZnO nanoparticles, a comparison was made between the photocatalytic activity in this study and that reported by other researchers. The results revealed the synthesized Mg 2%/ZnO nanoparticles had considerable photocatalytic activity.

Keywords: Mg/ZnO, photocatalytic activity, *Rhodamine B*, response surface methodology

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