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Degradation of phenol through solar-photocatalytic treatment by zinc oxide in aqueous solution

Abstract

Phenol-containing wastewater is only allowed in a very small amount either in sewage or industrial effluent due to the hazardous effect towards the environment. The objective of this study was to investigate the photocatalytic degradation of phenol with zinc oxide as photocatalyst under solar light irradiation. The operating parameters such as initial phenol concentration, catalyst loading, pH, effect of aeration, H2O2 dosage and effect of solar light irradiation were investigated. The results obtained were fitted well with the Langmuir–Hinshelwood kinetic model. The percentage of phenol removal increased with the increase of irradiation time, catalyst loading, under weakly acidic condition, with the aid of aeration and addition of 0.1 M of H2O2. Analysis of UV–vis and chemical oxygen demand attested the complete degradation of phenol concentration and possibility for mineralization.

Keywords

Kinetics study; Phenol; Photocatalytic degradation; Zinc oxide