

Photocatalytic activity of zinc oxide (ZnO) synthesized through different methods

Abstract

Derivatives of phenol are considered as part of the persistent organic pollutants with endocrine effects persist in the environment and resist to bio-degradation which is difficult to be degraded. The objective of this study was to investigate the solar-photocatalytic degradation of phenol with synthesized ZnO through precipitation (ZnO-P) and hydrothermal (ZnO-H) method as photocatalysts. ZnO-P is capable to achieve total degradation of phenol up to 30 mg/l of initial phenol concentration and 20 mg/l for ZnO-H within 6 h of reaction time. The degradation of ZnO-P and ZnO-H is favored in acidic condition (pH 3) and followed by natural condition (pH 6). The results obtained fitted well with Langmuir–Hinshelwood kinetic model. The apparent rate constant is proportional to the efficiency of the photocatalysts. Chemical oxygen demand results attested the complete degradation of phenol concentration and possibility for mineralization.

Keywords

Hydrothermal; Phenol; Photodegradation; Precipitation; Zinc oxide