

Phenol Degradation via Photocatalytic Oxidation Using Fe Doped TiO₂

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Abstract : Degradation of phenol-contaminated wastewater using Photocatalytic oxidation process was investigated in batch experiments using Fe doped TiO₂. Moreover, the effect of oxygen aeration on the performance of photocatalytic oxidation process by iron (Fe⁺²) doped titanium dioxide (TiO₂) was assessed. Photocatalytic oxidation using Fe doped TiO₂ effectively reduce the phenol concentration in wastewater with optimum condition of light intensity, pH, catalyst-dosing and initial concentration of phenol were 50 W/m², 5.3, 600 mg/l and 10 mg/l respectively. The results obtained that removal efficiency of phenol was 88% after 180 min in case of N₂ addition. However, aeration by oxygen resulted in a 99% removal efficiency in 120 min. The results of photo-catalysis oxidation experiments fitted the pseudo-first-order kinetic equation with high correlation. Costs estimation of 30 m³/d full-scale photo-catalysis oxidation plant was assessed.

Keywords : phenol degradation, Fe-doped TiO₂, AOPs, cost analysis

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