

Effect of a modified photo-fenton procedure on the oxidative degradation of 1-naphthol in aqueous solution

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ABSTRACT/RESUME

Abstract: The photocatalytic degradation of 1-naphthol (1-NP) using natural iron oxide (NIO) as a heterogeneous catalyst in the presence of oxalic acid was investigated under UV irradiation. The characterization of this catalyst revealed that NIO has a mixed elemental composition and consists mainly of iron oxide (α -Fe₂O₃). This powder contains hematite as iron source and its dissolution provides Fe³⁺ cations for the photo-Fenton-like reaction in solution. The degradation rate was strongly influenced by oxygen, initial concentration of oxalic acid (C_{ox}) and 1-NP. The optimal C_{ox} was 1mM. The first-order kinetic constant for the degradation of 1-NP decreased with the increase in the initial concentration of 1-NP. Furthermore, the variation of pH and the concentration of Fe²⁺ during the photoreaction were also strongly dependent on the C_{ox}. The use of 1% of tertibutanol as a scavenger confirmed the intervention of hydroxyl radicals in the photodegradation of 1-NP. Since both oxalic acid and iron oxides are common constituents of natural waters, this investigation will give a new insight to understanding the 1-NP photodegradation in natural environment.