

Removal of chloridazon pesticide from waters by Fenton and photo-Fenton processes

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ABSTRACT

Chloridazon (CLZ), also named as Pyrazon and classified as organochlorine pesticides, is widely used during sugar beets cultivation. CLZ being a pesticide with high solubility in water is likely to end up in surface and groundwater bodies because of its high mobility in soil. Due to its toxic properties, it may cause serious problems in human health and ecological cycle. In the present study, the removal of CLZ pesticide by Fenton and photo-Fenton processes was investigated. The effects of parameters such as H₂O₂, Fe(II), initial CLZ concentration, pH, and temperature were studied. It was observed that CLZ completely disappeared within 1 h and 20 min by the Fenton and photo-Fenton process, respectively, under optimal conditions. The optimal conditions for each processes were attained as 7.5 mg/L Fe(II), 50 mg/L H₂O₂, 40 mg/L initial CLZ, pH 3 and 20°C for Fenton process, and 5 mg/L Fe²⁺, 50 mg/L H₂O₂, 60 mg/L initial CLZ, pH 3 and 20°C for photo-Fenton process. The reaction kinetics of CLZ followed Behnajady–Modirdhahla–Ghanbery kinetic model. Desphenyl CLZ, pyridazine-3,4,5-trione, oxaluric acid, and 5-hydroxyhydantion were identified as CLZ degradation by-products. Accordingly, the degradation pathway was proposed.

Keywords: Chloridazon removal; Fenton; Photo-Fenton; Kinetics; By-products

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