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Oxidative Degradation of Chlorophenolic Compounds with Modified-Fenton Process Using Pyrite as the Catalyst

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Oxidative dehalogenation has been shown to be a viable and cost effective process for dealing with a particularly persistent class of contaminants (e.g., chlorophenolic compounds (CP)) often found in contaminated soil and ground water. Here, the degradation of various chlorophenolic compounds (e.g., 2-CP, 4-CP, 2,3-di CP, 2,4-di CP, 2,4,6-tri CP, 2,3,4,6-Tetra CP) was investigated by modified Fenton process using pyrite as source of Fe2+ (catalyst) . The effects of different parameters such as chlorophenol type, pH and chlorophenol, pyrite and H_2O_2 concentrations on the degradation kinetics of chlorophenols were studied in batch reactors. Our results show that while the rate of chloropehenol degradation increased with decreasing solution pH, no direct correlation was observed between H_2O_2 concentration and chlorophenol degradation, indicating a complex mechanism involved in CP degradation by modified Fenton process. The batch results also show that the CP degradation was highly dependent on CP type, the number and location of chloride ions in the structure. Overall, the results of this study suggest that pyrite can be effectively used in reactive treatment barriers for in-situ treatment of subsurface systems contaminated with chlorophenols.