

DEGRADATION OF CHLORINATED HYDROCARBONS BY SODIUM PERSULFATE ACTIVATED BY DIRECT ELECTRIC CURRENT

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Abstract

In recent years intensively investigated remediation technologies based on *in situ* chemical oxidation focus on utilizing oxidation characteristics of sodium peroxodisulfate (PDS).

Applicable use of this oxidizing agent, which comparing to the other routinely applied practices based on use of on hydrogen peroxide, has higher stability in bedrock and less non-target reactions, presents a possible solution for problematic distribution of active agent in low permeable contaminated matrix.

By effective activation of persulfate (thermal effect, base activation, activation by heavy metals or ultimately, by direct electric current) free radicals are generated. These particles have higher oxidizing-reductive potential than persulfate ions, which might increase the effectiveness of remediation.

In this paper level of the persulfate activation by direct electric current was evaluated. Evaluation was done according to results of kinetic tests of trichloroethylene (TCE) degradation. Analysis of TCE was done by GC-ECD method. Determination of persulfate concentration was done by iodometric titration. Additionally, values of pH, oxidation-reduction potential and temperature were measured.

Measured first-order kinetic rates for TCE destruction have higher values in runs, where electric current was applied comparing to runs without application of electric current. Identically, rate of persulfate destruction increased as well.

Results have proven positive effect on persulfate activation, which opens a possibility of applying this method in practice. System has been continuously tested in terms of possible by-products and influence of naturally occurring compounds.

Key words:

Sodium persulfate, chlorinated hydrocarbons, electroremediation, innovative remediation, *in situ* chemical oxidation, sulfate free radical