

Safety Benefits of Temperature Controlled Stabilized Hydrogen Peroxide

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Presented at Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, CA, May 20, 2014

Background. Catalyzed hydrogen peroxide (CHP) has been used for many years for the rapid in-situ destruction of organic contaminants. CHP (also known as Fenton's reaction) is a very aggressive and rapid exothermic reaction, resulting in the complete consumption of peroxide within 24 hours. Subsurface temperatures as high as 150 to 200 degrees Fahrenheit have been recorded during injection of catalyzed peroxide. The catalyzation of peroxide also results in a rapid release of oxygen gas, resulting in rapidly increasing subsurface pressures of 50 to 80 psi. The combined effect of increasing high temperature and high pressure in the subsurface commonly results in chemical daylighting, a process wherein peroxide and groundwater is forced upward to the ground surface.

Innovative Solution. A new innovative (patent-pending) process called Temperature Stabilized Hydrogen Peroxide (Custom SHP) has been developed that involves the addition of a carboxylate stabilizer, such as sodium citrate, that slows the normal rapid decomposition of hydrogen peroxide and extends the life of the peroxide from one day to up to 10-14 days. Use of stabilized hydrogen peroxide has been shown to significantly dampen the rapid decomposition of peroxide which normally occurs during a catalyzed Fenton's reaction. One of the primary benefits of stabilized hydrogen peroxide (SHP) is a significantly lower temperature increase compared to the highly exothermic catalyzed hydrogen peroxide reaction. Groundwater temperatures monitored during Custom SHP injections can reduce subsurface temperatures to an optimal range of 105 to 120 degrees Fahrenheit and limit the subsurface pressure to an optimal range of 20 to 30 psi. The custom stabilization involves increasing the dose of sodium citrate in the field to help fine-tune the temperature and pressure increase which may vary according to iron levels encountered in differing soil types. By controlling the stabilization and the corresponding temperature and pressure increases, the use of Custom SHP has been shown to minimize the occurrence and severity of chemical daylighting.