Use of Stabilized Hydrogen Peroxide to Control the Adverse Side Effects of the Catalyzed Fenton's Reaction

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Use of a hydrogen peroxide stabilizing agent has been shown to significantly slow down the rapid decomposition of peroxide which normally occurs during a catalyzed Fenton's reaction. One of the benefits of stabilized hydrogen peroxide (SHP) is a significantly lower temperature increase than normally associated with the exothermic catalyzed hydrogen peroxide (CHP) reaction. Groundwater temperatures monitored during peroxide injections have demonstrated that SHP can reduce the temperatures by 20 to 40 degrees Fahrenheit compared to CHP reactions.

Recently at a site in Michigan., thermocouples and dataloggers were utilized to measure downhole temperatures during peroxide injections. The temperatures monitored during a CHP reaction increased rapidly from an initial water temperature of 60 degree Fahrenheit (F) to temperatures as high as 140 degrees F within one hour. When a stabilizer was added to the peroxide, the temperature increase was much slower and the maximum temperature increase was approximately 115 degrees F. In addition, much lower back pressure was generated at the well head during injection of SHP, with pressures approximately 10 to 15 psi lower compared to CHP injections. At another site in Washington state, the use of SHP reduced the maximum temperature to 97 degrees F.

Our studies have shown that the life of the peroxide can be extended from less than 24 hours to 10-14 days by the use of a peroxide stabilizer. By controlling the temperature increase and the pressure increase (due to rapid oxygen release), use of SHP can minimize the occurrence and severity of chemical daylighting. The use of SHP has also been shown to provide excellent VOC destruction efficiency. Contaminant destruction of 89% to 99% of TCE, benzene, MTBE, TBA, and TPH as gasoline levels have been measure in laboratory testing.

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