



Bacterial Control in Oil Wells and Petroleum Systems

Application Description

Chlorine dioxide is effective in the remediation of bacterial and sulfide contamination commonly found in oilfield production, injection and disposal fluids. Sulfides (S^{2-}) are formed by the metabolism of anaerobic *sulfate reducing bacteria* found in oil well water handling systems. These sulfides react with iron to form insoluble iron sulfide, which together with the bacterial biofilm act as plugging agents. The sulfides can also result in sour crude oil which is of lower quality and more expensive to refine.

Chlorine dioxide is used for two purposes in this application. First, as a chemical oxidant to oxidize the sulfides to sulfates, thus preventing the formation of colloidal sulfur or iron sulfide which can plug the well, and, second, as a biocide to kill the bacteria which produce the sulfides.

The performance of chlorine dioxide is unaffected by pH or by the presence of other organic materials.

Feed Requirements

The required dosages will vary with process conditions. Sodium chlorite may be applied either continuously or intermittently through a chlorine dioxide generating system to oil well production water as it is separated from the oil, and before it is re-injected into the well.

For continuous feeds, chlorine dioxide may be applied at dosages slightly higher than sulfide's oxidative demand as determined by a demand study. For intermittent treatment, chlorine dioxide should be applied at a shock dosage of 200 - 3000 ppm.

Method of Feed

Sodium chlorite is applied through a chlorine dioxide generator. Chlorine dioxide solutions should be fed where adequate mixing and uniform distribution can be accomplished. Multiple treatment points may be required in some cases. The feed point should be below the water level to prevent volatilization of the chlorine dioxide.

Chlorine Dioxide Analysis

Residual chlorine dioxide concentrations must be determined by substantiated methods which are specific for chlorine dioxide. Two suitable methods are published in *Standard Methods for the Examination of Water and Wastewater*:

4500-ClO₂ B Iodometric Method
4500-ClO₂ E Amperometric Method II

Further Information

More detailed information on sodium chlorite is available on request through the OxyChem Technical Service Department. Call or write:

Technical Service Department
OxyChem
Post Office Box 12283
Wichita, Kansas 67277-2283
800-733-1165 option #1
www.oxy.com

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