Sodium Chlorite Use in the Oil & Gas Industry for Bacteria Control in Hydraulic Fracturing

Sodium chlorite ($NaClO_2$) is a widely used oxidizing agent in oil and gas water treatment programs, primarily because it generates chlorine dioxide (ClO_2)—a powerful, selective biocide effective at controlling microbial contamination throughout the hydraulic fracturing water cycle. Microbial management is essential to protect downhole equipment, maintain well productivity, reduce chemical costs, and prevent formation damage.

In hydraulic fracturing operations, sodium chlorite is activated on-site using acid or chlorine to produce chlorine dioxide. This oxidant provides rapid, broad-spectrum control of sulfate-reducing bacteria (SRB), iron-reducing bacteria (IRB), and slime-forming microbes present in produced water, flowback, and stored freshwater. Uncontrolled bacterial growth can lead to corrosion of tubulars, generation of hydrogen sulfide (H_2S), deterioration of frac fluids, and increased maintenance and operating costs.

Chlorine dioxide generated from sodium chlorite offers advantages over conventional biocides. It remains effective across wide pH ranges, high total dissolved solids (TDS), and variable water chemistries typical of recycled produced water. Unlike chlorine bleach, it does not create harmful chlorinated byproducts and reacts selectively with target organisms instead of organics, reducing required dosages and preserving friction reducer performance—critical in high-recycle frac programs.

Operational uses include pre-treatment of source and recycled water, continuous dosing during frac operations, cleaning pipelines and storage vessels, and suppressing biofilm growth in water recycling facilities. Its rapid kill rate supports higher water-reuse percentages, enabling midstream water providers and operators to efficiently supply consistent, bacteria-free volumes for large multi-well frac campaigns.

Overall, sodium chlorite is a core component of modern frac-water management. When safely handled and properly generated, it delivers reliable microbial control, mitigates corrosion and souring, supports high water recycling strategies, and contributes to more efficient, lower-cost operations across the entire hydraulic fracturing water lifecycle.