

# Petro-FLO™

## Stabilized Chlorine Dioxide

Petro-FLO™ is an EPA approved broad spectrum, fast acting microbiocide that is effective in controlling sulfate reducing, acid producing and biofilm forming bacteria that contaminate water supplies.

Petro-FLO not only eliminates individual sessile and planktonic organisms, but is extremely effective at penetrating and breaking down biofilms that accumulate in the wellbore, surface pipes, and storage tanks. It breaks down to simple table salt, making it more environmentally friendly than other biocides.

Unlike sodium hypochlorite and chlorine, Petro-FLO does not combine with organics to form chlorinated carcinogenic byproducts like THMs or chloroform. Since the active ingredient in Petro-FLO is also widely used in the sanitation process for foods, beverages, drinking water, and common consumer products such as eye drops and mouthwash, operators are more comfortable with its use.

Petro-FLO is an oxychloro compound that is easy to store and handle. To get the most effectiveness during water treatment operations, an activator is needed to generate an extended release of chlorine dioxide. The process requires minimal equipment and brings all the power and benefits of chlorine dioxide in a simple to use solution.

### APPLICATIONS

In fracturing treatments, activated Petro-FLO is typically added on-the-fly at the frac tanks or into the blender. Onsite water testing is performed to determine the optimal dosage required to treat the particular source water being used.

As an alternative the source water may be batch treated in frac tanks or pits. To insure complete dispersal throughout the well system all water used including pump down and drill-out water should be treated with Petro-FLO.

### CONCENTRATE PROPERTIES

Concentration: 5.0 – 5.2% available chlorine dioxide

Appearance: Clear Colorless liquid

Odor: Very faint chlorinous odor

Boiling point: 221 °F (105 °C)

Melting point: N/A

Freezing point: 25.2 °F (-3.78 °C)

Very low acute toxicity (EPA Cat. III)

Solubility: Complete (in water or brine)



### KEY - FEATURES

- Rapid, sustained, low-dose efficacy against SRB, APB, GAB
- Penetrates and destroys biofilm
- Oxychloro residual acts as bacteriostat and inhibits biofilm formation
- Residual efficacy can be custom engineered for the application
- Recommended for on-the-fly, tank side, or storage pit treatment
- Compatible with friction reducers and guar gels
- Selective oxidation of H<sub>2</sub>S and FeS
- Improves the condition of produced and flowback water for re-use
- Effective over a broad pH range (1-10)
- Stable formula with long shelf life
- Environmentally friendly, ultimately breaks down to table salt



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Bio-Cide International is ISO 9001:2008 certified

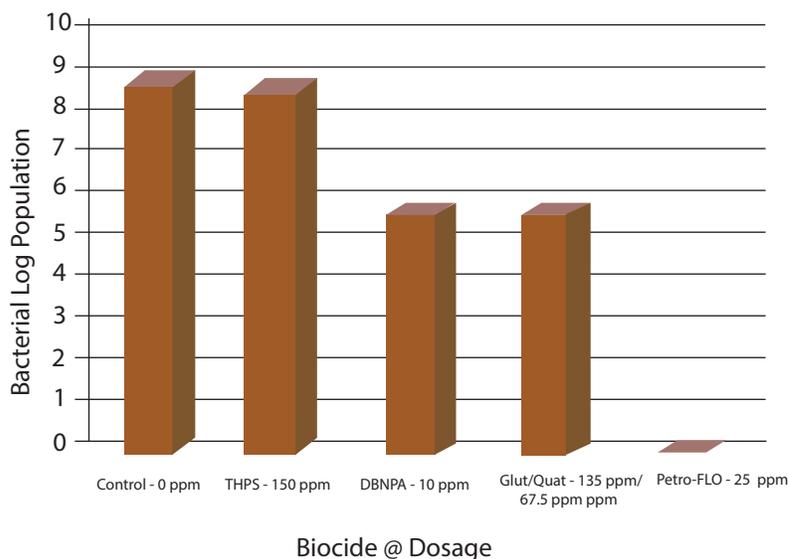
## Petro-FLO™ is Uniquely Effective Against Biofilm

Biofilm is found everywhere in oilfield systems. Frac water transfer lines, tanks, pits, pumps and fracturing equipment can all be heavily contaminated with large colonies of biofilm. While individual bacteria cells found in most water supplies are relatively easy to control with most biocides, the bacteria in large masses of biofilm that are dislodged during fracturing operations are much more difficult to treat because they are contained within the biofilm's protective polysaccharide material. Therefore, many common biocides are nearly ineffective against bacteria contained in biofilms at the low doses used during fracturing. Inadequate biofilm control may be the leading cause of well contamination incidents where wells have been treated with insufficient doses of common biocides.

Petro-FLO is uniquely effective at penetrating and breaking down biofilm's protective polysaccharide barrier. The biofilm structure is oxidized and dissolved and the exposed bacteria are then much easier to control. After the biofilm and bacteria have been eliminated, Petro-FLO provides a level of residual activity that helps to protect against the re-growth of biofilm. This unique feature is why Bio-Cide International's stabilized chlorine dioxide products are so widely used in brewing, beverage and water treatment applications and is the preferred sanitizer for food processing plants.

The following biofilm efficacy test, conducted in accordance with NACE standards shows how Petro-FLO provided an exceptional level of bacterial control in biofilms while THPS, DBNPA and a Glut/Quat mixture used at recommended doses were mostly ineffective.

Biofilm Efficacy Test



## ENVIRONMENTALLY FRIENDLY

Petro-FLO has a low EPA CAT III toxicity rating, making it safer for the environment than most oilfield biocides. It doesn't combine with organics to form carcinogens and other harmful byproducts. Its ultimate environmental fate is that it breaks down to table salt, making flowback water safer and more suitable for re-use.

## COMPATIBILITY

While some biocides can react with friction reducers and gels, Petro-FLO has been proven in the lab and in the field in thousands of stages to be compatible with fracturing additives.

## SAFE TO HANDLE

### NFPA Classification

Sanitizer	Health	Flammability	Reactivity
<b>Petro-Flo</b>	<b>1</b>	<b>0</b>	<b>1</b>
Sodium Hypochlorite (bleach)	3	0	1
Glutaraldehyde	3	0	0
Glutaraldehyde + Quaternary Ammonium compounds	2	2	0
Tetrahydro-3, 5-Dimethyl, 2H-1, 3, 5-Thiadiazine-2-Thione (DAZOMET)	3	1	0
2,2-Dibromo-3 Nitrilopropionamide (DBNPA)	3	1	1

When compared to other common sanitizers, Petro-Flo has the lowest hazard classification designated by the National Fire Protection Association.

## SHIPPING FACTS

Shipped via 55 Gallon drums, 330 gallon totes, or in bulk tank truck loads.

Available in customized concentrations for high volume applications.

PetroFLO has 5% of available chlorine dioxide.