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What's New?



**DioxiWhite™ Tooth Whitener**

**\$10.00**



## The DioxiCare® System

When hearing the words chlorine dioxide you probably think of chlorine, a harsh chemical used in the backyard pool. The two are oxidizing agents but have little else in common. Chlorine dioxide is a friendly compound used to disinfect meat, seafood, fruit and surfaces, whiten teeth, eliminate odors, and experimentally to treat wounds and infections. Numerous studies have shown that chlorine dioxide, at appropriate concentrations, has no adverse health effects, either by skin contact or ingestion. It does not irritate or leave toxic residues, as does chlorine bleach, nor inhibit wound healing, as do many strong disinfectants.

Interestingly, chlorine dioxide is a gas, and not easily incorporated into a product. Frontier Pharmaceutical has developed and patented a method of generating the gas and then utilizing its properties on an as-needed basis. This system is called DioxiCare®. By combining two component parts of the System, at the time of use, chlorine dioxide is released into a solution or a gel at a controlled concentration. The generation of chlorine dioxide is immediate, and the resulting product is highly suited for topical applications. The DioxiCare® System separates Frontier's products from other chlorine dioxide preparations. Based on this technology, Frontier possesses a comprehensive line of human and veterinary products for oral care, skin care, wound care, and surface disinfection and decontamination.

### Features of the DioxiCare® System

1. The DioxiCare® System is a fast-acting, complete spectrum disinfectant. It kills BACTERIA, VIRUSES, FUNGUS, YEAST and SPORES, and the speed of kill is typically within one minute, in vitro (in the laboratory).

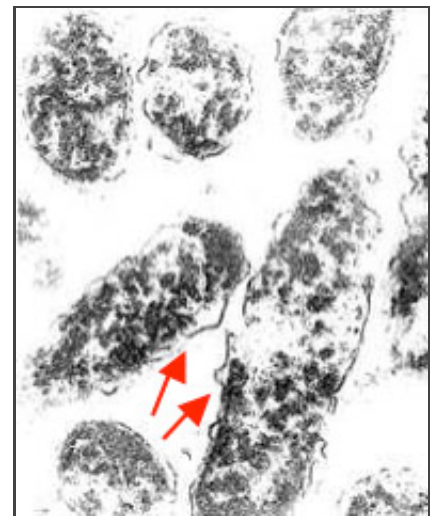
Chlorine dioxide, above a certain concentration, deactivates microorganisms by breaking the bacterial cell wall, or, in the case of viruses, by loosening the viral envelope. This disinfecting action occurs immediately upon exposure.

Pseudomonas bacteria magnified 108,000x



#### **Untreated**

Notice intact (smooth) cell walls



#### **Treated with chlorine dioxide**

Notice curling of cell walls and coagulating nucleic material.

Because animal cells do not have cell "walls", as do microorganisms, human tissue is not affected by the same action. For this reason, chlorine dioxide is safe for use in drinking water as well as for application to the skin. In addition, chlorine dioxide does not break down into irritating and carcinogenic by-products, as does chlorine bleach. The safety of chlorine dioxide is confirmed by extensive testing, including many studies performed by the Environmental Protection Agency (EPA).

Of importance as well, the use of chlorine dioxide does not result in the creation of resistant strains of microorganisms, such as occur with other disinfectants like Triclosan.

**To Frontier's knowledge, there are no other disinfectants available that quickly kill all forms of microorganisms, do not inhibit wound healing, and are safe for use on the body.**

2. The DioxiCare® System is an excellent odor remover. Chlorine dioxide eliminates or neutralizes odor by a process known as oxidation. It is not a masking agent. The same oxidizing properties result in a bleaching or whitening action, and the DioxiCare System is now formulated in a tooth whitening gel. As a matter of comparison, the concentration of chlorine dioxide needed to effectively whiten teeth is significantly lower than the peroxide concentration utilized in peroxide-based tooth whitening formulas currently on the market. These peroxide products often cause irritation and sensitivity to the teeth and gums.
3. The DioxiCare System is non-toxic and non-irritating, making the compound suitable for use on the body. Studies show that DioxiCare is an outstanding promoter of wound healing, and has successfully treated many skin diseases. In addition to antimicrobial properties, the DioxiCare System likely oxidizes and neutralizes free radicals and cytokines, irritating compounds released by the body in response to injury or disease.

Frontier Pharmaceutical has performed many efficacy and toxicity studies on its various products and formulations. EPA and FDA approval have not yet been obtained for any disinfection or medical claims.

Frontier's DioxiCare® products are supplied in convenient dual containers that dispense the two parts simultaneously, and in some cases mix the product at the same time. The two parts are stored in separate compartments until time of use. Frontier products have a shelf-life of at least two years.

### **Active vs. Stabilized Chlorine Dioxide**

Active and Stabilized chlorine dioxide are not the same. The term, "Stabilized Chlorine Dioxide", is misleading. There is little or no chlorine dioxide (ClO<sub>2</sub>) in the stabilized chlorine dioxide compound.

Stabilized chlorine dioxide products are prepared by buffering sodium chlorite with carbonate or phosphate and hydrogen peroxide. This stabilizes the chlorite, not chlorine dioxide. Stabilized chlorite is not the same as chlorine dioxide, and does not have the same oxidizing properties. The oxidizing action of chlorite is much lower, and is far less useful. Another main difference between the two compounds is that chlorine dioxide is a gas, and sodium chlorite is a salt.

To make active chlorine dioxide, an acid is mixed with chlorite, which slowly releases the gas. The gas is then captured in a solution or gel. This reaction normally requires high acidity (low pH). Frontier, however, has patented a method of speeding the release of chlorine dioxide at mild acidity (closer to neutral pH). The resulting product is then optimized for use on the body.

The manufacturers of stabilized chlorine dioxide appropriate the term "stabilized" to capitalize on the beneficial properties of chlorine dioxide. The misleading stabilized chlorine dioxide phrase has become popular by effective marketing. Many people refer to it without knowing the difference, and research papers incorporate it incorrectly. The stabilized manufacturers "justify" the misnomer by stating that the term has been in use for some time.

