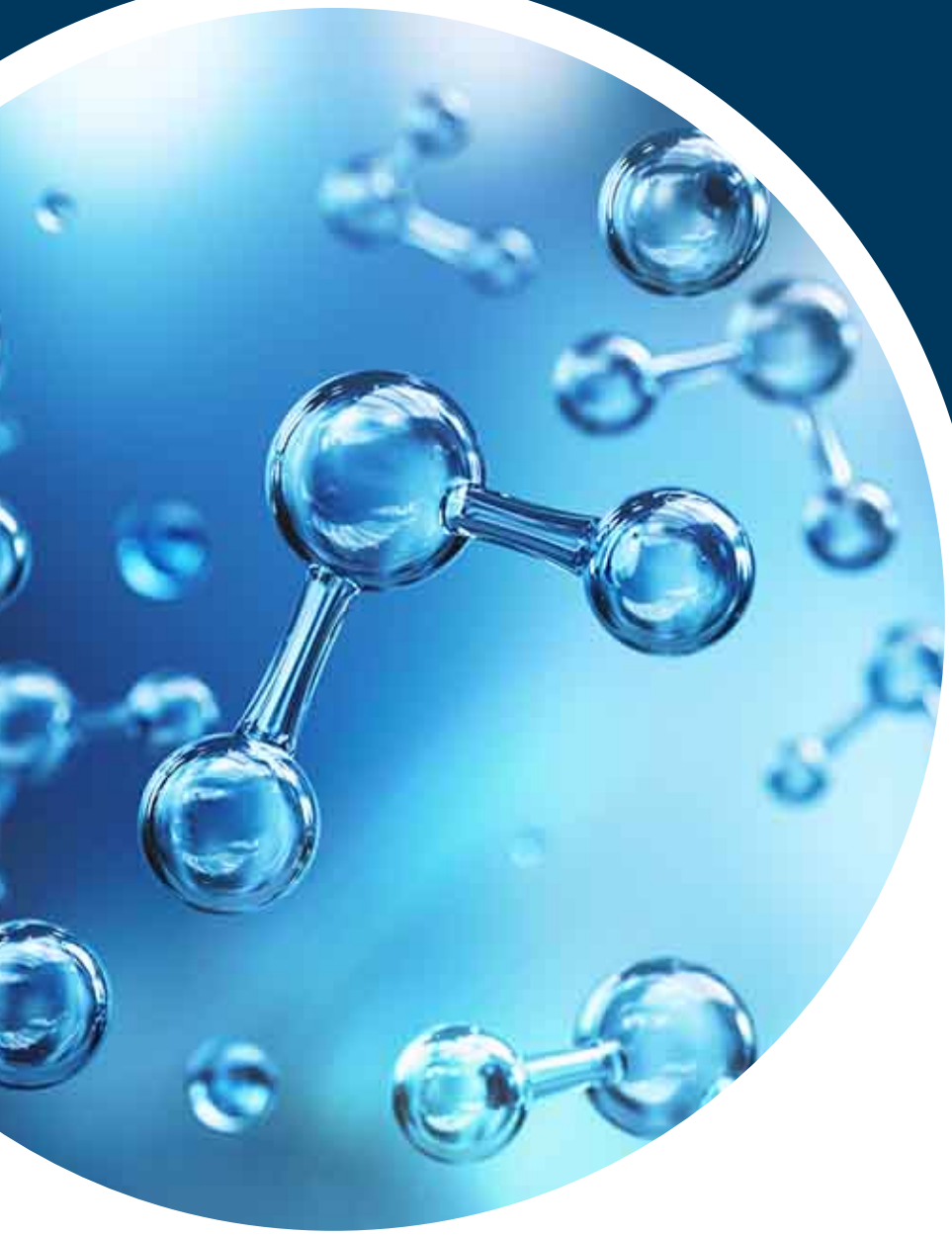
NOT ALL CHLORINE DIOXIDES ARE CREATED EQUAL



Eco-friendly for people and the planet

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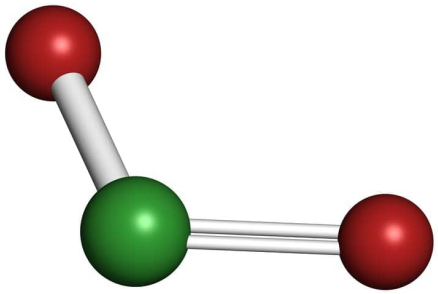


Chlorine dioxide Chlorine dioxide is a chemical compound made up of the element chlorine (Cl) and the oxygen molecule (O2). It is a gas at room temperature that becomes liquid under 11° Celsius (51.8 Fahrenheit), and is not found in nature. In other words, it must be manufactured. As opposed to sodium chloride (ClNa) commonly known as "salt,"the chemical bond of chlorine and oxygen, which becomes chlorine dioxide, is rather weak, so once it finds itself in nature, it tends to break up readily leaving no residues since the chlorine atom will bind to some other gas or mineral (like hydrogen in the atmosphere, or some other mineral in the soil or water). Also, the chlorine dioxide molecule is very small—smaller than a virus—which means it will readily pass through plastics and other organic fabrics and reach places other sterilizers or disinfectants can't access, making it a very versatile product for this purpose.

It's important to note that not all chlorine dioxides are the same. There are three main types of chlorine dioxide from a manufacturing perspective:

However, not all chlorine dioxides are created equal.

1. **Chlorine dioxide gas that is generated on-site**
2. **Chlorine dioxide that is either concentrated or ready to use**
3. **Chlorine dioxide sachets or liquids that can be mixed on-site**

Chlorine Dioxide Generators

Chlorine dioxide generators are utilized to produce the gas on-site since chlorine dioxide is a gas at room temperature and cannot be compressed or stored without becoming unstable and potentially causing an explosion if it reaches over 1.4% or 14,000 ppm.

However, chlorine dioxide gas generators can be costly, and the gas produced must be applied immediately as it is continuously produced. Although the gas is typically pure, there may be exceptions.

Chlorine Dioxide Solutions

There are different methods for producing chlorine dioxide solutions, also called aqueous chlorine dioxide, which involves dissolving chlorine dioxide gas in water. However, not all formulations result in a high-grade product. While they may technically be considered aqueous chlorine dioxide, the chemicals used and their activation rate during the production process can lead to various qualities of chlorine dioxide solutions. Therefore, the quality of the chlorine dioxide solutions can differ depending on the production method used.

Typically, most formulations for chlorine dioxide solutions involve using two chemicals: sodium chlorite and an acid. The percentages of these chemicals used during production will determine the amount of chlorine dioxide generated in water, the concentration of the solution (measured in parts per million, or ppm), and the purity of the chlorine dioxide produced.

It's important to note that although a chlorine dioxide solution may contain ClO2 gas as the active ingredient, if the sodium chlorite was not fully activated during production, the resulting solution may also contain dissolved sodium chlorite and unreacted acids. This can result in the solution containing not only chlorine dioxide but also other chemicals that can lead to unwanted outcomes.

Many chlorine dioxide solutions contain acids that can damage surfaces, equipment, and organic life that require disinfection or sterilization. These solutions may also leave residues that can accumulate over time, leading to unwanted side effects that may not be immediately noticeable. Although chlorine dioxide in the solution can effectively do the job, it may have unplanned short, medium, or long-term side effects.

Some chlorine dioxide solutions add other chemicals to prolong their shelf life, resulting in non-pure ClO2 solutions that can interact in undesired ways, which may not be apparent after the first few applications. It's essential to be aware of these differences, which can affect product purity and concentration (measured in ppm). These factors are crucial to consider when analyzing cost-benefits and dilution rates. For instance, a 2000 ppm chlorine dioxide solution will do half the work of a 4000 ppm solution, essentially doubling the cost.

Chlorine Dioxide Sachets or Liquids

These are chemical products that are pre-packaged and, when mixed with water, create chlorine dioxide solutions at the appropriate ppm concentration for a particular task. Some of them come in the form of solid chemical sachets (which will depend on the type of acid used to activate sodium chlorite), while others come as liquids with a 1:1 mixing ratio of dissolved sodium chlorite and an acid, usually hydrochloric acid (HCl), which is highly corrosive and hazardous.

As with aqueous chlorine dioxide products, these formulations usually do not produce high-purity chlorine dioxide solutions, as not all of the sodium chlorite (NaClO2) is fully activated, resulting in the presence of free acid molecules. Additionally, they often have a very low (and corrosive) pH, ranging from pH 1.7 to pH 2, which can cause harm to surfaces, equipment, plants, and soil.

It is crucial to be cautious and well-informed when selecting various types of chlorine dioxide for different applications because the damages may not be immediately visible after the first or second application. Residues may accumulate and interact with other chemicals or the environment, resulting in undesired side effects.

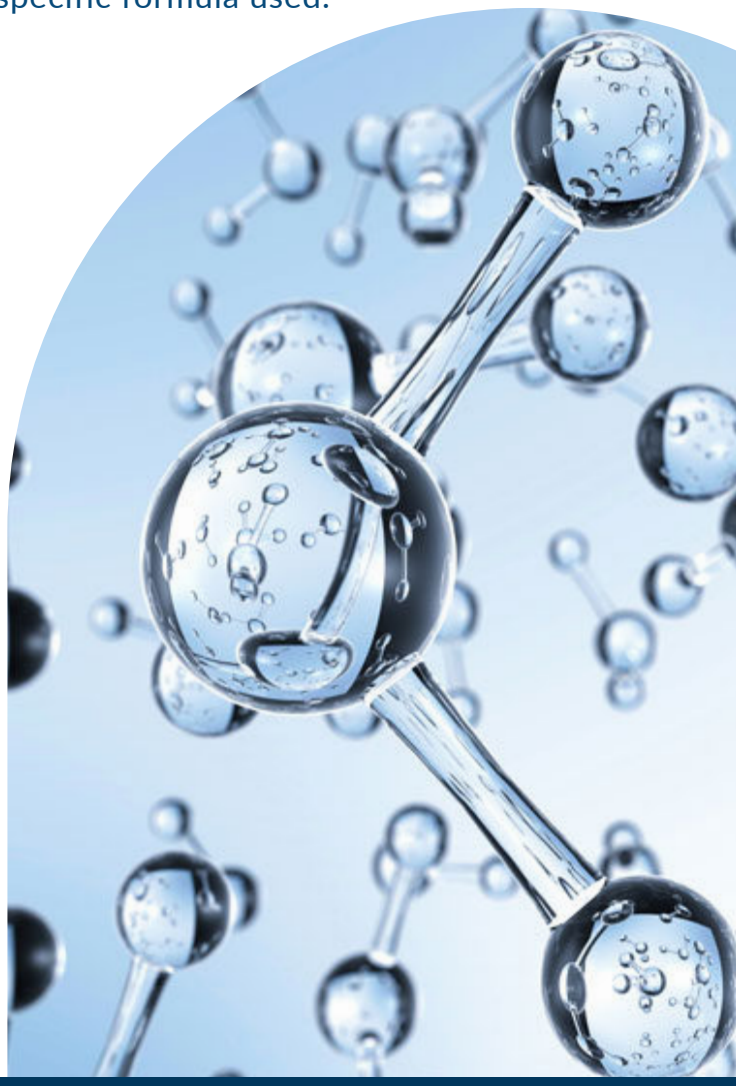
Don’t confuse Chlorine Dioxide with Non-Chlorine Dioxide products

To avoid confusion, it is important to differentiate between chlorine dioxide and non-chlorine dioxide products. Many people are not familiar with what chlorine dioxide is, so they may mistakenly consider non-chlorine dioxide solutions as equivalent. One such non-chlorine dioxide solution is commonly referred to as "stabilized chlorine dioxide.”

Stabilized chlorine dioxide

To clarify, a true chlorine dioxide solution is created through a chemical activation process that involves sodium chlorite and acids. The resulting solution contains activated chlorine dioxide gas, the amount of which depends on the specific formula used.

On the other hand, stabilized chlorine dioxide is a different compound altogether. It is a mixture of sodium chlorite and hydrogen peroxide that does not contain chlorine dioxide gas. Despite this, it is often referred to as "stabilized chlorine dioxide" due to the presence of sodium chlorite, which is used to make the solution. However, it is important to note that stabilized chlorine dioxide and chlorine dioxide are chemically distinct and react differently.



Hypochlorous acid

There is often confusion between chlorine dioxide (ClO2) and hypochlorous acid (HClO) because both are generated by machines and sold in liquid form. However, these two molecules are completely different and have different ways of killing pathogens. Hypochlorous acid kills through toxicity, similar to other chlorinated compounds, which is different from how chlorine dioxide kills through ReDox by oxidizing pathogenic cell membranes, their DNA, and/or RNA.

BioCentric Solutions

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The BioCentric Solutions Ethos

BioDox™ was developed by BioCentric Solutions, a company that believes in creating the most effective solutions to dangerous pathogens without harming people or our planet. Our mission is to create safe and effective solutions that improve the health of the world around us.