

PURE CHLORINE DIOXIDE & STABILIZED CHLORINE DIOXIDE COMPARISON

Category	Pure Chlorine Dioxide (Oxygen Based)	Stabilized Chlorine Dioxide
Definition	- When reacting with salt and acid, only the chlorine dioxide gas that occurs is gathered and dissolved in the water. – - Only chlorine dioxide gas and water are present - Chlorine dioxide gas must be dissolved in water with chlorine dioxide gas of more than 90% purity through a separate generator	- Made by mixing sodium chloric acid with inorganic acids(sulfuric acid, hydrochloric acid) - Only trace amounts exist with 3% - 8% of ingredients of chlorine dioxide - No need for chlorine dioxide generators, long-term storage using acids – It's called 'fake chlorine dioxide'
Name	Chlorine dioxide (or) CLO ₂	Stabilized Chlorine dioxide
Main ingredients	CLO ₂ (Chlorine Dioxide)	CLO ₂ -(Chlorite Acetic acid Ions) CLO ₃ -(Chlorine acid ions)
Accurate concepts	"Pure/Active chlorine dioxide"	"Stabilized Chlorite" OR "Sodium Chlorite"
Usability	1)Gas: Currently in the United States, Europe...etc. in the world. in-site production from various areas to sterilize & Used as a deodorant 2)Liquid: sterilization/deodorant	Livestock, crops, fisheries, human body not applicable 1)Gas: Impossible 2)Liquid: sterilized/deodorized
Sterilizing power	Strong	Minor
Eco-friendly	1)Used for drinking water integers from around the world 2) Allow residue in U.S. Organic StandardsSection 205 601 specified as material	1)CLO ₂ -, CLO ₃ -는 Cyanosis-induced when over absorbed 2)Producing various harmful byproducts during sterilization
Safety	Non-toxic to the human body, non-occurring carcinogens that are incidental in the chlorine system as an eco-friendly substance	Cyanosis

◆ *What is Pure chlorine dioxide & stabilized chlorine dioxide?*

Chlorine dioxide is the gas, and stabilized chlorine dioxide is the liquid with chlorine dioxide dissolved. Stabilized chlorine dioxide is bound to be utilized only in a liquid state by nature. Chlorine dioxide is mainly sterilized and deodorized in a gaseous state, and stabilized chlorine dioxide is not as powerful as chlorine dioxide, but functions as a liquid state. Chlorine dioxide is also used as a liquid because it dissolves well in water, but it cannot be stored for long periods of time, such as stabilized chlorine dioxide.

Because of the strong oxidation action, the properties change by reacting easily with water.

The efficacy of stabilized chlorine dioxide in water is known as about 1/10 - 1/100 of chlorine dioxide.

On the other hand, the reason that the characteristics of chlorine dioxide is unstable (unstable) is because of the inherent properties of the gas, it is not easy to store and storage because of the nature of the desired easily fusion with air and water.

In order to use chlorine dioxide as a gaseous state, the technology for storing it is the only thing that has been tried worldwide so far, But it was commercialized as the first in the world by KIST(Korea Institute of Science and Technology).

◆ *Certified status in countries related to pure chlorine dioxide*

- US EPA: ph announces antiseptic power at water quality higher than 8
- US FDA: Approved as a food disinfectant and food additive
- 1. US Agricultural Trade Center: Approved for U.S. Organic Products (Us Organio Standards) residues
- 1. Korea Ministry of Environment: To be able to use up to 1pp apply to drinking water (No.1999-173)
 - Korea FDA: Approved as a food additive and food use disinfectant
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◆ *Definition of stabilized Chlorine Dioxide*

Stabilized chlorine dioxide is a widely used term, but unfortunately it is a wrong name. "Stabilized chlorine dioxide" only has a very small amount of chlorine dioxide (CLO₂). The correct expression

of this is stabilized chlorite (Stabilized chlorite) or sodium chlorite (Sodium chlorite). Chlorite is stabilized with peroxide and buffer at around pH7 and is another oxidizing agent, but not as powerful as chlorine dioxide.

Chlorine dioxide (ClO₂) is the gas that produced on the air only by mixing the two separated raw materials, unlike chlorine phosphate.

Therefore, the case that the intermediate substance called stabilized chlorine dioxide is made of distribution, storage, and when the user is using the stabilized chlorine dioxide must be mixed with an acidic substance to be properly sterilized, deodorized.

◆ *Use case of stabilized chlorine dioxide - Domestic*

Ildong Pharmaceutical's Ildong crina, Bon*, two**, eco** (kemo**), k*, new*, poo***, yes*, * having***, this***, lai*, baidu*, otu****, oh*, sun*, me* **... etc. 3%, 5%, 8% of the products circulating in all products are stabilized chlorine dioxide products. (It is "fake" product of pure chlorine dioxide.)

To be precise, they are "fake" pure chlorine dioxide products that contain a variety of harmful chemicals or omit the reaction process with acidic substances.

The process of manufacturing a stabilized chlorine dioxide = sodium chlorine dioxide and toxic substances inorganic acids (**hydrochloric acid, sulfuric acid**) and sodium chlorine acid (**lax**), toxic caustic sodium hydroxide (**sodium hydroxide**), emulsifiers, etc. are dissolved water made by stirring by the addition of water. It is a kind of **industrial poison** that contains all organic acids, inorganic acids in the actual dissolved water. **(The actual Food and Drug Administration agency has been reported that the product with more than 90% of the purity chlorine dioxide gas generated through the chlorine dioxide manufacturing apparatus is dissolved in water as pure oxygen-based chlorine dioxide water.)**

◆ *Case of use of stabilized chlorine dioxide - overseas*

Home of chlorine dioxide, In the United States, pure chlorine dioxide and stabilized chlorine dioxide are strictly used separately.

Pure chlorine dioxide products are mainly generator-related equipment products, or to be mixed separately packaged Sodium chlorite and Acid dissolved in water when used, stabilized chlorine

dioxide products are MUST indicated as "Stabilized" the phrase in the products.

◆*Derivation of stabilized chlorine dioxide*

In July 1990, the metropolitan water supply, Paldang Lake, Korea was severely contaminated, causing water quality to be deteriorated by 2-3 classes, along with the problem of difficulty eating clear tap water as a water purification facility at the time. In addition, the THMs scandals of the water purification station was the opportunity to begin to pay attention to chlorine dioxide as a substitute with the problem recognition of chlorine disinfection. When the hazards caused by water source pollution and chlorine disinfection became a social issue, 'Zearin Asia' introduced chlorine dioxide from Germany, and began selling it under the brand 'DUOZON' in a domestic water purification company.

However, chlorine dioxide was a product that is difficult to say that the so-called stabilized chlorine dioxide, the actual chlorine dioxide containing trace amounts of chlorine dioxide in a strict sense. At the time, however, even journalists could not even distinguish between stabilized chlorine dioxide and chlorine dioxide.

In 1992, not long after the Nakdong River phenolic pollution incident occurred at the time, heavy metals and bacteria, carcinogens, etc. were also detected again in the water purification plant disinfection problem was re-injured, with increased distrust of the tap water of the people to provide a cause to start to drinking water or have a water purifier at home.

According to "Stabilized Chlorine Dioxide Component Analysis" data from Professor Shin, Gongju University, commissioned and analyzed by the Korea Institute of Environmental Water Resources in 1999. "Stabilized chlorine dioxide contains a very small amount of chlorine dioxide content of 0.01 to 0.09%, the rest is composed of chlorite or chlorate" was announced.

◆*Status of stabilized chlorine dioxide*

After the closing of Zearin Asia, stabilized chlorine dioxide 'doo zone' was expelled, but after some time, the same product is again taken in and sold under the brand 'Doo Zone' by various companies in Korea. In addition, the ironic reality that "stabilized chlorine dioxide", sold under the "Doo Zone" and other brands, accounts for the majority of the chlorine dioxide market.

Most of the products that currently sell chlorine dioxide under 'DUOZON' and other brands are sold by labeling the chlorine dioxide content in containers as "stabilized chlorine dioxide" by 3-8%, which is false and is actually a **fake chlorine dioxide** containing only extremely **small amounts of chlorine dioxide**.

Chlorine dioxide is a water-soluble gas because it has the property of exploding when the concentration of more than 10% in a certain space will explode immediately in the sealed container if the content indicated in the stabilized chlorine dioxide container. Therefore, it is indicated in stabilized chlorine dioxide. 3-8% (30,000 ~ 80,000 ppm) is reasonable to see as ppm of Sodium Chlorite (sodium sodium hydrochlorite), not the content of chlorine dioxide, it is indicated by the chlorine dioxide content is to be urgently corrected in the wrong notation.

"It is not chlorine dioxide that is stabilized chlorine dioxide is actually a substance called chlorine dioxide (sodium chlorite, sodium chlorite) and it is described that the material can not be expected to disinfect the effect. This fake chlorine dioxide is known as a substance that "should not be used as a disinfectant for water purification," according to a court ruling in Germany." - Monthly Environmental Movement, October 96 –

According to the october 1996 issue of the Monthly Environmental Movement (currently the monthly way of living together) published by the Environmental Movement Association, "stabilized chlorine dioxide" is a fake chlorine dioxide, a substance that is not licensed as a disinfectant by the EPA, and the disinfection effect cannot be expected, and a German court has ruled that the water purification plant should not be used. In addition, there is a content called "hydroxytes that cause chlorine dioxide, which causes less hydrosis" of the article of September 28, 1999, this is a "stabilized chlorine dioxide" as well as the actual chlorine dioxide is a water purification effect is very good, as well as does not cause cyanosis material is a substance that is completely different from chlorine dioxide as a substance called Sodium Chlorite (sodium sodium hydroxlorite).

With this misinformation and the effect of away, 'stabilized chlorine dioxide' is to cause negative perception of real chlorine dioxide and act as a barrier to entry into the market, and to develop situations such as breaking the market order by dumping.

Judging criteria for chlorine dioxide products that are mostly sold as liquids, the generation and acceptance of chlorine dioxide (水溶) method and the actual content of chlorine dioxide is determined to be confirmed by the world-authorized titration measurement method Titration accurately and properly chlorine dioxide can be selected. In addition, the researchers' ability and experience with chlorine dioxide will have to be considered together.

