GREEN Q

Your Partner for Purity

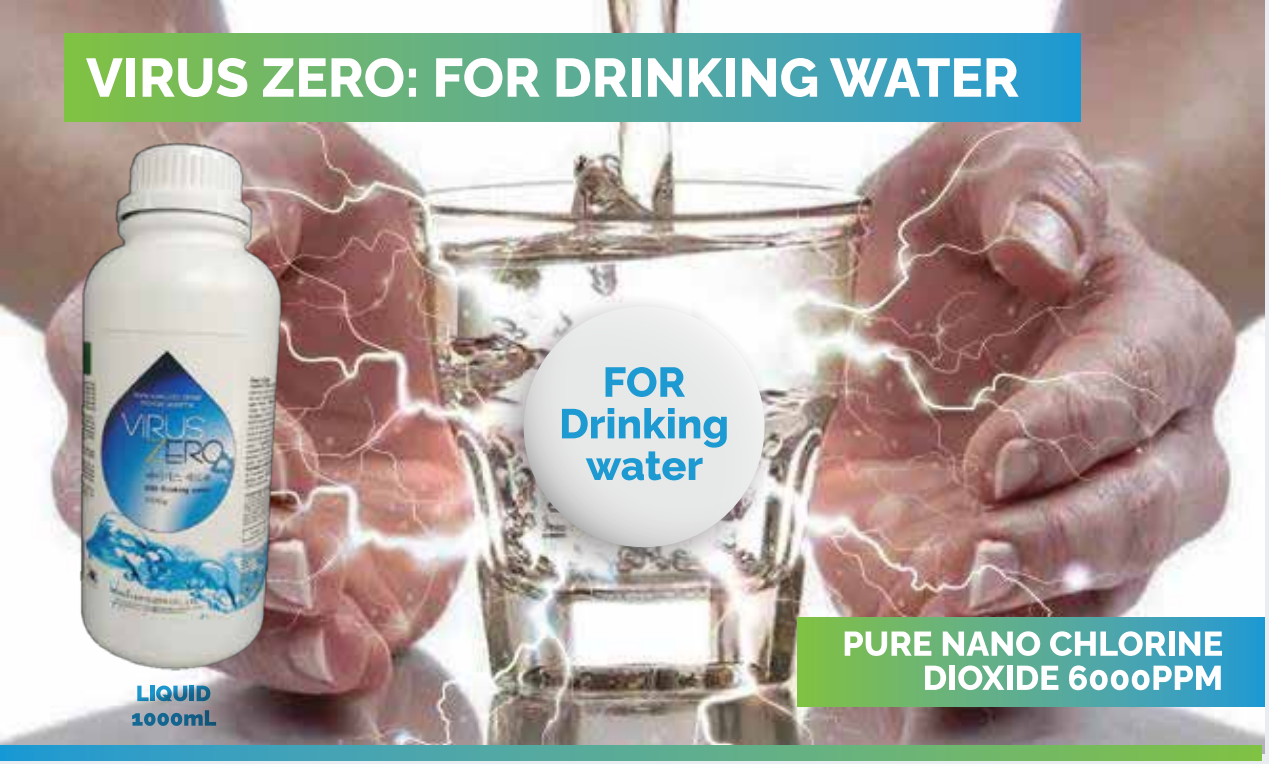
Water treatment

Drinking and waste water treatment, disinfection

PURE NANO CHLORINE DIOXIDE TECHNOLOGY FOR COMPLETE REMOVEAL BACTERIA & VIRUSES.

WHAT IS CHLORINE DIOXIDE?

VIRUS ZERO: FOR DRINKING WATER



● **Dilution Ratio Calculation Method** (In case of 6000PPM VIRUS ZERO)

○ Formula: 6000 ÷ PPM = Dilution Ratio.

Ex1) The indication to use 1PPM is ▷6000÷1PPM=6000times EX2) The indication to use 5PPM is ▷ 6000÷5PPM=1200times

○ The amount of input varies depending on the amount of water.

Ex1) if water is 1 liter and mix 1PPM, ▷ 1liter(1000mL) water ÷ 6000 times = 0.16mL input.

Ex2) if water is 20 liters and mix 10PPM, ▷ 20 liters water (20,000 mL) ÷ 600 times = 33.33mL input

Ex3) if water is 1ton(1000L) and mix 5PPM ▷1000L(1ton) of water ÷ 1200 times = 0.83L.

Ingredient	Chlorine dioxide 0.6%, purified water 99.4%

Chlorine dioxide is an oxygen-based fungicide. It is not a chlorine

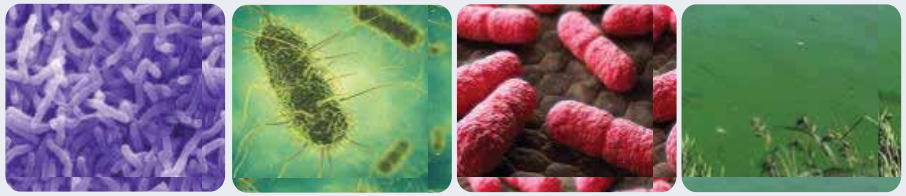
• US EPA approved as disinfectant • US EPA approved as disinfectant and disinfectant for drinking water • US FDA registered as a food additive (21 CFR 173.300) • EU recommends to Member States as a disinfectant for drinking water • US FDA permits use of red meat-related products by immersion or spraying (FCN No. 45) • US EPA, Detailed Uses and Method Regulations (EPA 738-R-06-007) • Permitted to use in US FDA, red meat processing, canned food, seafood, ice, restaurant tools (FCN No. 668) • Ministry of Environment notification 1999-173, sanctioned as food sanitizing disinfectant. • Ministry of Environment, sewage treatment, chlorine dioxide disinfection facility can work in the best economic evaluation guidelines disinfection • Designated to be used as sanitizing and disinfecting agent of the Korea Food and Drug Administration Notice 2005-33. • Notified by Korea Food & Drug Administration Notification No. 2007-74, for the purpose of disinfecting foods such as fruits and vegetables • Ministry of Agriculture, Forestry and Fisheries, Food Industry Promotion Act No. 9759, Designation and use as a processing aid for organic agricultural products • Ministry of Agriculture, Forestry and Fisheries, Article 20 of Enforcement Regulation of Livestock Epidemic Prevention Act • Approved by Korea Food and Drug Administration Notification No. 2009-66, sanitary management material for aquarium • National Veterinary Research and Quarantine Service, Livestock Specification -1600, Licensed for use in meat processing surface treatment

FDA No 3017180767 EU No N-92265, / 2015/830 KFDA No 20160513307
ISO9001 No Q328220 MINISTER OF ENVIRONMENT GB20-21-0368

Eco-sterile disinfectants
Preservative-free
Alcohol free

How to Use

● **General Drinking water** •0.5 ~1PPM(12,000~6000:1) •A metering pump is installed at the area where water enters the tank. Automatic adjustment according to the amount of water flowing ● **Water tank cleaning** •100PPM (50~60:1) •Clean once every 6 months ① Remove the water completely, ② Dilute to 100PPM and spray it sufficiently inside the water tank using a low-pressure sprayer. ③ Leave it for 30 minutes. Bacteria attached to the surface will flow down by themselves. ④ Wash with a highpressure sprayer, remove the contaminated water completely, and fill it with water. ● **Cooking tools** •50PPM(120 : 1) •1time a day •Stainless steel, plastic, rubber and wood are no problem. However, in the case of ordinary steel materials, clean with sterile water after sterilization (corrosion protection) ● **Sterilization of vegetables**, fish, etc. •5PPM (1,200 : 1) •Dip for 3 seconds, then take out and wash with normal sterile drinking water. ● **Drinking water** of Pet Dilute VIRUSZERO 1PPM in clean water.



Livestock manure, feed residues, detergent or fertilizer, domestic sewage, factory wastewater, etc. flow into the water source of human drinking water to expand the distribution of nutrients such as ammonia, nitrite, phosphate, and silicate in the water, resulting in excessive growth of phytoplankton and water It reduces the oxygen in the water, deteriorates the water quality, and eventually generates reducing gases such as methane, ammonia, and hydrogen sulfide, causing the water to smell of rot.

In addition, most of the toxic bacteria and viruses that cause disease, such as E. coli and cholera, are waterborne. Disinfection with chlorine for many years in the past is not suitable anymore because not only does it not completely remove bacteria and viruses in the water, but also chlorine generates trihalomethane carcinogens. Pure chlorine dioxide decomposes heavy metals, completely removes viruses, and does not create any residual harmful substances.

ClO2(Chlorine dioxide) is already recognized as a fully functional disinfectant added for medical use, food from all the international organizations such as **WHO, EPA, FDA, JECFA, HACCP, KFDA.**

Chlorine dioxide, however, because the volatility of the radical type, and can not be stored and carried. However, now it can be stored in long-distance transport by KFC technicians. Chlorine dioxide is a complete environmentfriendly disinfectant that does not generate any harmful substance without destroying the amino acid of the living body.

In particular, high-risk viruses such as SARS, Ebola, Norovirus, Anthrax, Escherichia coli, Staphylococcus bacterium, Bacillus subtilis, yeast fungi, pestilence, Sclerotinia rot, black blotch, gray mold, wilt, tap rot, mosaic virus.

VIRUS ZERO : FOR SWIMMING POOL

CAN'T YOU MAKE DRINKABLE POOL WATER?

Specialized product for general sterilization and deodorization for people and the pool

Preservative-free · Synthetic fragrance-free · Alcohol-free

VIRUSZERO is Oxygen-Based sterilizer

FOR SWIMMING POOL
6000ppm 1000ml

FDA, EU, KFDA, MOE registered product.

FDA No 3017180767 EU No N-92265, / 2015/830
KFDA No 20160513307 ISO9001 No Q328220
MINISTER OF ENVIRONMENT GB20-21-0368

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Ingredient	Chlorine dioxide 0.6%, purified water 99.4%

Do you still disinfect the water in your swimming pool with conventional substances?

In swimming pools used by many people, chlorine is combined with substances such as people's urine, cosmetics, sweat and shampoo to generate toxic gas and THMs(trihalomethane), a first-class carcinogen. In indoor pools, children sometimes have vomiting, eye pain, cough, and even collapse.
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Swimming pool	EPA 59055-1	Use Metering pump	1~5ppm (1200~6000:1) Water 1ton + 160~830cc

If you do not have a metering pump, you can calculate the total amount of water and pour VIRUS ZERO directly into the pool water.

●Report number: GB20-21-0368 ●Item: Disinfectant ●Date of manufacture: separately ●Product Name: Virus Zero ●Shelf life: 1 year from the date of manufa ture ●Capacity: 1000mL ● Manufacturer: Korea Fertilizer Co., Ltd. T.+8218337786 Main substances used: purified water, pure chlorine dioxide ●How to use ●Use according to the instruction manual ●Precautions for use ①Store in a cool, dark place indoors and keep out of direct sunlight. ②Keep out of reach of children and do not drink. If the undiluted solution comes into contact with your skin, wash it under running water. ②If you drink the undiluted solution, induce vomiting and follow your doctor's instructions.

VIRUS ZERO can be added to food, washed fruits to remove sterilization and pesticides, sterilize incubator equipment, and sterilize general bottled water. It is the strongest, but most environmentally friendly material.

LIQUID 1000ml

LIQUID 5000ml

Chlorine dioxide Generator to replace chlorine

20000PPM Chlorine Dioxide Generator Removal of all viruses, germs and protozoa, Generator that will produce 20000 PPM of chlorine dioxide to be used instead of chlorine in the water purification process.

MODEL	KFC CLO-C1
PRODUCT NAME	Pure Chlorine Dioxide Production Equipment
SIZE	2500*600*1500Cm (Length X width X height)
MATERIAL	Stainless and reinforced plastic
WEIGHT	300 kg
ELECTRIC	220V, Three phase electric, 60Hz
Electricity consumption	MAX 5KW
PRODUCTION PPM	20000PPM
INPUT MATERIAL	Sodium chlorite, hydrochloric acid, SiO4 Nano water
First discharge time	12,000L/h (12T/Per H) It may increase depending on the size of the chemical dosing pump.
Volume of product discharged once	12,000L/h 288,000L/24h
Additional device required	•Requires storage of large concrete. •No Need for packing equipment •Special equipment in tank required
Main use	Large-scale drinking waterworks, sewage treatment plants, waste disposal plants, etc.
Expiration date	•3 hour validity time
Note	KFC's generators are manufactured by special methods. Therefore, disassembly by unauthorized persons will immediately stop the digital instrument panel. Including connecting lines and parts
Notes	

Difference between Chlorine Dioxide and Stabilized Chlorine Dioxide

Stabilized chlorine dioxide is a widely used term, but unfortunately it is a misnomer. "Stabilized chlorine dioxide" contains only a very small amount of chlorine dioxide, also called sodium chlorite. Chlorite is stabilized with peroxides and buffers at pH7 and is another oxidant but not as powerful as chlorine dioxide.

Unlike chlorine dioxide, chlorine dioxide is a gas produced immediately by mixing two separate raw materials (two or three raw materials of KFC). Therefore, the situation is being distributed and stored as an intermediate substance called stabilized chlorine dioxide, and when used by the user, the stabilized chlorine dioxide must be mixed with an acidic substance to be properly sterilized and deodorized.

In the United States, chlorine dioxide and stabilized chlorine dioxide are strictly distinguished. Pure chlorine dioxide products are mainly generator-related equipment products, or when sodium chlorite and acid are packaged separately, mixed and dissolved in water. Stabilized chlorine dioxide products are required to be marked with 'stabilized' on the product. However, vendors are trying to remove these marks as much as possible.

Division	Chlorine Dioxide	Stabilized Chlorine Dioxide
English name	ClO2(Chlorine Dioxide)	Stabilized Chlorine Dioxide
Main ingredient	ClO2	ClO2- (chlorite ion) ClO3- (Chlorate ion)
Exact concept	Pure active chlorine dioxide	Stabilized Chlorite or Sodium Chlorite
Usability	1) Gas: Currently, developed countries such as the US, Korea, and Europe are newly used in the field and used as various sterilizers and deodorants. 2) Liquid: Sterilization and Deodorant	1) Gas: Impossible 2) Liquid: Sterilization / Deodorization
Bactericidal power	Strong	Weak (the state dissolved in water)
Eco-friendliness	1) Used for drinking water purification in countries around the world. 2) Based on organic products, such as the United States and Korea-specified as residual allowable substances	1) ClO2-, ClO3- may cause cyanosis upon excessive absorption. 2) Generates various harmful byproducts during sterilization.
Characteristic	Key to widespread use of storage and storage technology after creation.	1) Reacts with acid to generate pure chlorine dioxide 2) Because of its convenience in distribution and use, it is distributed in Korea as a "fake chlorine dioxide" product that omits the reaction with acid.

Difference between Chlorine Dioxide and Stabilized Chlorine Dioxide

Sodium hypochlorite

The most common and economical disinfectant that has been used conventionally, but generates many harmful substances such as THMs.

Ozone

It is spotlighted as a non-chlorine disinfection means, but it is very harmful due to excessive device price and byproducts such as bromate, a carcinogen.

Chlorine Dioxide

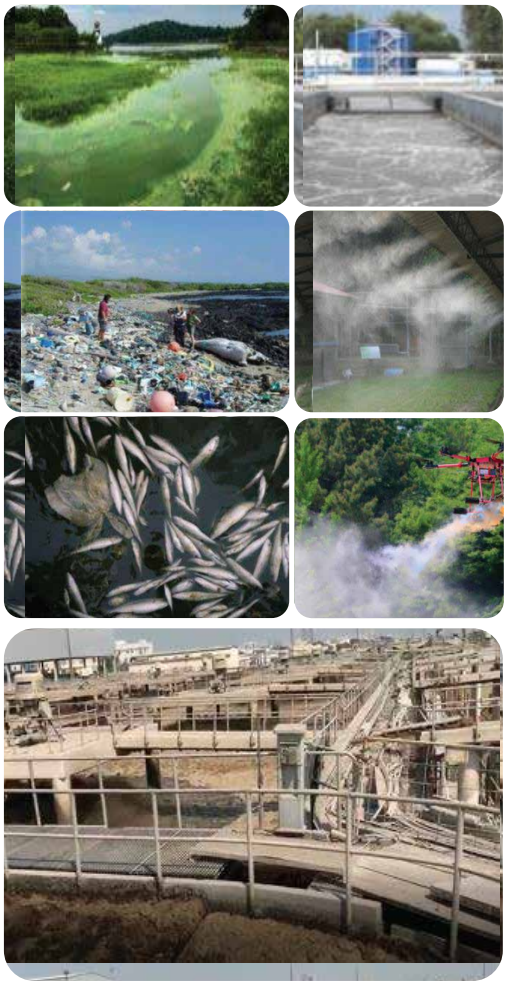
Excellent sterilization power, and does not generate secondary harmful substances, rapidly expanding its utilization as a substitute for chlorine disinfectant

Division	Sodium hypochrlorine (NaOCl)	Ozone (O3)	VIRUS ZERO (ClO2)
Storage effect (retention time during sterilization)	few hours	few minutes	Few seconds
Produce raw material	Cl2gas,HClO	Air or oxidation, electric energy	NaClO2,HCl ETC
Bactericidal power	Good	Instant sterilization is good	Wide range of applications and 2.5-5 times more effective than chlorine
Protozoa Removal Ability	Low (odor-causing)	no effect	High
Odor elimination ability	Almost none	None	Very WELL
Iron, manganese, phenol removal ability	None	None	Very WELL
pH range	6.5~7.5	6.5~7.5	2~10
Color removal ability	lowness	has exist	has exist Keep the original color. Only contaminated chromaticity is removed.
Causticity	causticity	Very strong corrosive	Some
Ammonia Water Removal Capacity	Removal ability	None	No removal ability. But ammonia gas is completely removed
Dioxin Reduction Capacity	None	None	Reduction Capability
Disadvantages	Carcinogen generation	Price cheaper	Low concentration (low dilution rate)

Water Treatment Application

Chlorine dioxide water treatment application

- Water and sewage purification and wastewater treatment.
- Elimination of green algae and red algae.
- Ship, cooling tower cooling water treatment.
- Various water tank sterilization, disinfection, etc.



Water purification & Odor removal program

Permit status by major countries of chlorine dioxide

- KOREA : Ministry of Environment: Recognized as a disinfectant by the Drinking Water Management Act.
- KOREA : Ministry of Environment: Designation and use of organic processing aids.
- USA EPA: Disinfectant disinfectant, drinking water, factory drainage, environmental cleanup
- USA Department of Agriculture: Permits to disinfect food and meat
- EU : Recommendations for Member States as Drinking Water Disinfectants
- WHO : A1 grade, recognized as the most stable grade of food additives
- WHO : Food and Agriculture Organization of the United Nations: Class A1, ADI
- JAPAN : Welfare: Permit to add food and sterilize utensils.
- JAPAN : Ministry of Health and Welfare: Licensed as a purified water disinfectant

Plan

1

- Check field conditions
- Lab or Pilot Test

Design

2

- Select Treatment Method
- Design Process

Construction

3

- Machine Production
- Plant Construction

Commissioning Test

4

- Manage Commissioning Test

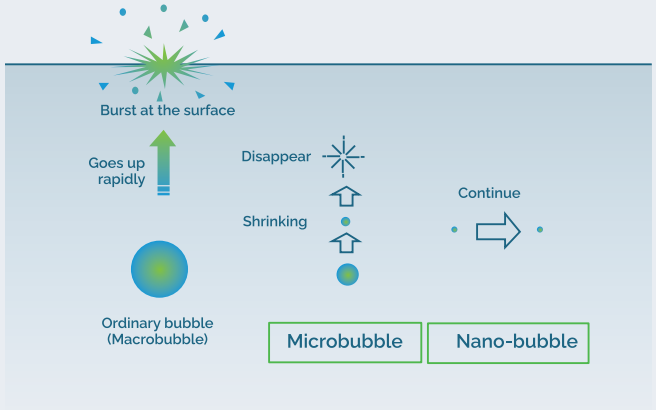
Maintenance

5

- Continuous management of Treatment System & Water Quality

NANO ClO2 + BUBBLE SYSTEM

- Solution of odors and wastes from feedlots such as cattle, sheep, goats, chickens, pigs, and ducks • Waste treatment plant • Slaughterhouse
- Hospital waste • Water treatment plant • Compost factory • Food factory • Lake • Other places odor removal is required



- The latest nano bubble system removes waste and odors accumulated on the floor. • It is restored to a clean lake by spraying products (ODORZERO, VIRUSZERO) that remove odor and sterilize using a drone or long-distance spray device.
- The photos show a scene using a stream nanobubble device, a longdistance spray device, and a drone

Ballast Water

The International Maritime Organization (IMO) reported that more than 3 to 5 billion tons of seawater moves around the world every year in ballast water, and that more than 7000 species of aquatic life are moving with ballast water (Latarche). 2014).Although there is a low probability that organisms moved to ballast water will settle and survive in a new environment, if they succeed, they may threaten the survival of indigenous organisms and cause ecosystem disturbance. Accordingly, the IMO proposed the 'ballast water treatment standard' in 2004, and since 2017, all ships, including Korea, have been obliged to install the ballast water treatment system.

Conclusion: In an experiment using artificial seaw ter simulating ballast water, chlorine dioxide has a greater effect on killing microorganisms than chl rine with the same amount of effective chlorine and produces less harmful byproducts of disinfection. In general, although the production cost of chlorine dioxide is higher than that of chlorine, it is judged that ballast water treatment using chlorine dioxide is reasonable in terms of low input requirements and less adverse effects on the marine ecosystem.

GENERATION & APPLICATION OPTIONS FOR CHLORINE DIOXIDE AND ITS VARIOUS APPLICATIONS IN OILFIELD OPERATIONS

Chlorine dioxide has a wide variety of applications in the oilfield, including fracturing, water flood, salt water disposal wells and producing well stimulation. It is uniquely suited to deal with the core problems of microbiological fouling, H_2S, iron sulfide and oil/water emulsions. The unique attributes of this oxidizing chemical mean that it will not react with hydrocarbons and most amines (unlike other oxidizers), and thus is effectively targeted on the problems most commonly encountered. Virtually all oilfield systems contain and/or utilize water. This may be in the form of fresh water used for fracturing operations or produced water used for anything from fracturing to water flood or disposal. Any aqueous oilfield environment inevitably results in several ubiquitous problems.

- Bacteria will be present, both aerobic and anaerobic varieties. These bacteria result in:
  - Formation of biomass that will
    - Form rag layers in gathering tanks,
    - Foul piping, well bores and formations
  - Cause differential cell corrosion on metal surfaces o Form emulsions with hydrocarbons
  - Anaerobic sulfate reducing species will produce H_2S, which is both
    - Highly toxic, and - Corrosive
- H_2S corrosion of piping systems and formation iron results in large amounts of iron sulfide (FeS) in both the water and hydrocarbon phase
- FeS stabilizes oil/water emulsions, producing additional fouling

The total effect of bacterial growth on oilfield systems is generally substantially underestimated by producers. However, if it is controlled and the downstream effects (H_2S and FeS formation) prevented, most production limiting issues can be largely eliminated. While efforts have been made to address individual issues in recent years (various nonoxidi ing biocides for bacterial control; H_2S scavengers, etc.), none have been completely successful. Over the last five to seven years, however, chlorine dioxide (ClO_2) chemistry has proven to be extremely effective at targeting all these issues. As an oxidizing chemistry, it will rapidly provide bacterial kill (unlike nonoxidizing biocides) when fed to obtain a small residual.1 It also destroys H_2S, which vastly improves personnel safety and resolves most corrosion issues. In addition, by eliminating FeS, it rapidly resolves most emulsions, which are typically stabilized by the presence of the FeS. Finally, being a relatively weak oxidizer, it will not react with most hydrocarbons — resulting in much lower dosages than other oxidizing chemistries and none of the objectionable reaction byproducts those others form with hydrocarbons. Chlorine dioxide is, thus, an almost perfectly targeted chemistry for resolving a great many vexing oilfield problems.

GREEN Q

Your Partner for Purity

KHC **Exclusive agency in Qatar for Korea fertilizer Company**

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