



RSVP CHLOROTECH

(Enriching Engineering)

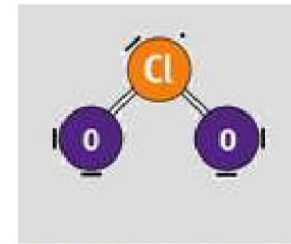
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CLO2 GENERATOR / SYSTEM

Introduction:

Chlorine dioxide is one of the fastest growing Chlorine alternatives in water treatment solutions. This technology offers the benefits of effectiveness at high pH, being unaffected by ammonia, and demonstrating significant advantages over Chlorine in systems susceptible to high levels of organic contaminants. Because Chlorine dioxide is a selective oxidizer, its ability to control microorganisms in water at very low dosages makes it an especially cost effective solution.

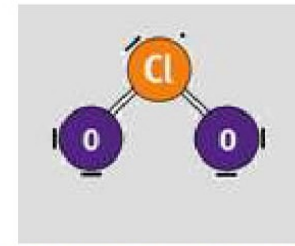
Solubility:

Chlorine Dioxide is approximately 5 times more soluble than chlorine and 50 times more soluble than ozone. Even though Chlorine Dioxide is soluble, it is still a gas and the solubility of the gas is governed by Henry's Law. In closed pipelines, virtually no loss out of water into the gas phase can be expected. In open tanks, Chlorine Dioxide in solution will slowly decrease until equilibrium is established between $\text{ClO}_2(\text{g})$ and $\text{ClO}_2(\text{aq})$. According to Le Chatelier's Principle, if Chlorine Dioxide is continually removed from the gas phase above an open tank, the concentration in solution will continue to decrease until it reaches zero.

Advantages of Chlorine Dioxide usage:

- ✦ Chlorine dioxide is effective over a broad pH range.
- ✦ Chlorine dioxide has 2.5 times the oxidizing capability of Chlorine.
- ✦ Required contact time for Chlorine dioxide is lower compared to Chlorine.
- ✦ Chlorine dioxide has the ability to penetrate and remove bio film formed and kill bacteria, spores and viruses.
- ✦ Chlorine dioxide is less corrosive than chlorine and does not hydrolyze to form acid.
- ✦ Chlorine dioxide does not form chloramines.
- ✦ Chlorine dioxide does not form trihalomethanes upon reaction with organic matter.





ClO₂ GENERATOR / SYSTEM

Types of Chlorine Dioxide generators:

We can provide the following types of chlorine dioxide generation:

- ✦ 2-chemical acid-chlorite generation systems
- ✦ 3-chemical generation (acid-chlorite-hypochlorite)



2-chemical acid-chlorite generation systems

In the generator unit, Chlorine dioxide is generated by a chemical reaction that occurs when a controlled volume of precursor chemical (NaClO₂) is combined with a water stream containing Hydrochloric Acid.

Following is the reaction for generation of ClO₂ by HCl method

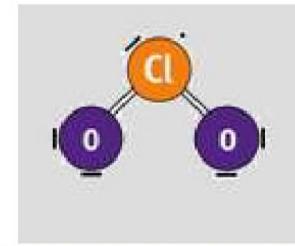


3-chemical generation (acid-chlorite-hypochlorite)

In the generator unit, Chlorine dioxide is generated by a chemical reaction that occurs when a controlled volume of precursor chemical (NaClO₂) is combined with a water stream containing sodium hypochlorite and a Hydrochloric Acid.

Following is the reaction for generation of ClO₂





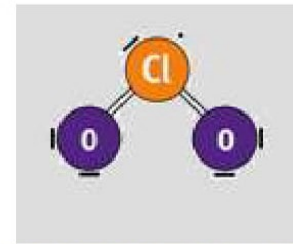
CLO2 GENERATOR / SYSTEM

Available Integration Scheme with Chlorine Dioxide Generator:

- ◆ Design, Supply Manufacturer, Erection & Commissioning / Operation and Maintenance.
- ◆ 2 Nos. (1W + 1S) of In Situ chlorine – dioxide generators auto mode.
- ◆ 2 Nos. (1W + 1S) of Hydrochloric acid (30-33%) unloading pumps with necessary accessories.
- ◆ 2 Nos. Hydrochloric acid bulk storage tank with nozzles, vents, fume absorber, neutralization system, drains, overflow etc.
- ◆ 2 Nos. (1W + 1S) HCl dosing system comprising of dosing pumps of PP construction, PRV, PG, auto & manual valves etc.
- ◆ 2 nos. (1W + 1S) Sodium chlorite unloading pumps of PP construction with necessary accessories.
- ◆ 2 nos. NaClO₂ bulk storage tanks with nozzles, vents, level control units etc.
- ◆ 2 nos. (1W + 1S) NaClO₂ dosing system comprising of dosing pumps of PP constructions, PRV, PG, auto & manual valves etc. as per system requirement
- ◆ 2 Nos. (1W + 1S) water dilution dosing horizontal pumps with necessary accessories.
- ◆ PLC or controller based system as per customer requirement shall be designed appropriately (Redundant & Non Redundant type)
- ◆ Online pH analyzer/ Residual Chlorine dioxide analyzer.
- ◆ Online gas leak detector
- ◆ Flow meters on all chemical feed lines, dilution water lines, and chlorine dioxide solution lines
- ◆ Supply of Chemicals

Safety:

- ◆ Chlorine Dioxide gas can explode if the concentration in air exceeds the explosive threshold of 10% v/v. 2-chemical acid-chlorite generators are designed so that vacuum cannot be present where high concentration Chlorine Dioxide is stored.



CLO2 GENERATOR / SYSTEM

Reaction by Products:

- ◆ Pure chlorine dioxide will react with NOM (Naturally Occurring Organic Matter) such as humic and Fulvic acids to form a number of oxidised organic compounds such as carboxylic acids and aldehydes in the ppb concentration range. No formation of chlorinated organic by-products will occur unless chlorine is present in the reaction mixture. THM's will only be formed with the chlorine-chlorite process.
- ◆ Chlorite is the major inorganic by-product of the reaction of chlorine dioxide in water. Usually, the amount of chlorite formed will be 40-60% of the amount of chlorine dioxide which has reacted. For example, if 1.00 ppm of chlorine dioxide is added to water and 10 minutes later, 0.60 ppm remains as a residual, 0.40 ppm has therefore reacted. We can expect the chlorite to be 0.16 – 0.24 ppm.

On Going Site:

