SUPPLEMENTAL LABELING

CHLORINE DIOXIDE PRECURSOR

TECHNICAL SODIUM CHLORITE SOLUTION 31.25

ACCEPTED
1258-1055
SEP 15 1983

Active Ingredients:
Sodium Chlorite..................25%
Inert Ingredient................. 75%
Available Chlorine...............39%
EPA Reg. No. 1258-1055

For use in the mechanical generation of chlorine dioxide as a disinfectant, sanitizer, or for microorganism control and as a chemical oxidant in aquatic systems.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

FEED REQUIREMENTS
Feed rates of Sodium Chlorite will depend on the severity of contamination and the degree of control desired. The exact dosage will depend on the size of the system and residual necessary for effective control. Approximately one pound of chlorine dioxide is generated from 6.8 pounds of 25% active Sodium Chlorite solution and an aqueous solution of chlorine.

Some examples of industrial applications of chlorine dioxide include:
- Potable water disinfection and removal of sulfide.
- Control of bacterial slime and algae in industrial recirculating and one-pass cooling systems.
- Biocontrol in food processing flumes, water-using equipment, cooling water, and recycled waters.
- Disinfection of sewage and plant wastes.
- Destruction of phenolics, simple cyanides and sulfides by chemical oxidation.
- Bacterial slime control in white water paper mill systems.
- Bacterial control in oil well and petroleum systems.

Your Olin representative can guide you in the application techniques.

METHOD OF FEED
Large amounts of chlorine dioxide can be generated by two common methods: 1.) the chlorine method which utilizes a Sodium Chlorite solution and chlorine gas, or 2.) the hypochlorite method which utilizes a Sodium Chlorite solution, a hypochlorite solution and an acid. Your Olin representative can guide you in the selection, installation and operation of feed systems.

Consult product bulletin and also the instructions on the chlorine dioxide generation system before using Sodium Technical Chlorite solution 31.25.

User is responsible for compliance with applicable Federal, State and local laws regarding proper use and disposal of the chlorine dioxide generated.

KEEP OUT OF REACH OF CHILDREN

DANGER

See Principal Label For Complete Precautionary Information and Storage and Handling Instructions

OLIN CHEMICALS
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PRODUCT BULLETIN

Olin Sodium Chlorite Products
for Chlorine Dioxide Generators

Olin technical sodium chlorite dry and solution products are offered as precursors of chlorine dioxide. Commonly, solutions of 25% active sodium chlorite or less are used to charge chlorine dioxide generators.

Generation of Chlorine Dioxide

Chlorine dioxide can be generated by activating technical sodium chlorite ($NaClO_2$) with an oxidizing agent or an acid source. The most commonly available oxidant is chlorine. It may be reacted in solution or in its gaseous form with sodium chlorite. The principal reaction of sodium chlorite with chlorine is:

$$2NaClO_2 + Cl_2 \longrightarrow 2ClO_2 + 2NaCl \quad [1]$$

Stoichiometrically, 1.68 lbs of technical sodium chlorite reacts with 0.5 lbs of chlorine to produce 1.0 lb of chlorine dioxide. In most cases, the reaction is carried out by dissolving the chlorine in a chlorinator and then contacting a solution of $NaClO_2$ in a reaction column. A slight excess of chlorine can be used to insure that the reaction solution has a pH of 2-4, and will produce chlorine dioxide with high efficiency.

If chlorine is not readily available, chlorine dioxide can also be prepared by mixing sodium hypochlorite bleaching solution with sodium chlorite and acid, as shown in Equation [2].

$$2NaClO_2 + NaOCl + H_2SO_4 \longrightarrow$$

$$2ClO_2 + NaCl + Na_2SO_4 + H_2O \quad [2]$$

While sulfuric is shown as the acid, other inorganic acids may be used. Numerous other acids, oxidizers, and available chlorine compounds are potential activators for chlorine dioxide generation from sodium chlorite. Again, a slight excess of acid is employed so that the pH is adjusted to 2-4. Hydrochloric acid is reported to produce the most efficient generation of chlorine dioxide.

Chlorine dioxide can also be generated by simply acidifying a solution of sodium chlorite in modified generators where efficiency is not critical.

$$5NaClO_2 + 4H^+ \longrightarrow 4ClO_2 + 2H_2O + 5NaCl \quad [3]$$

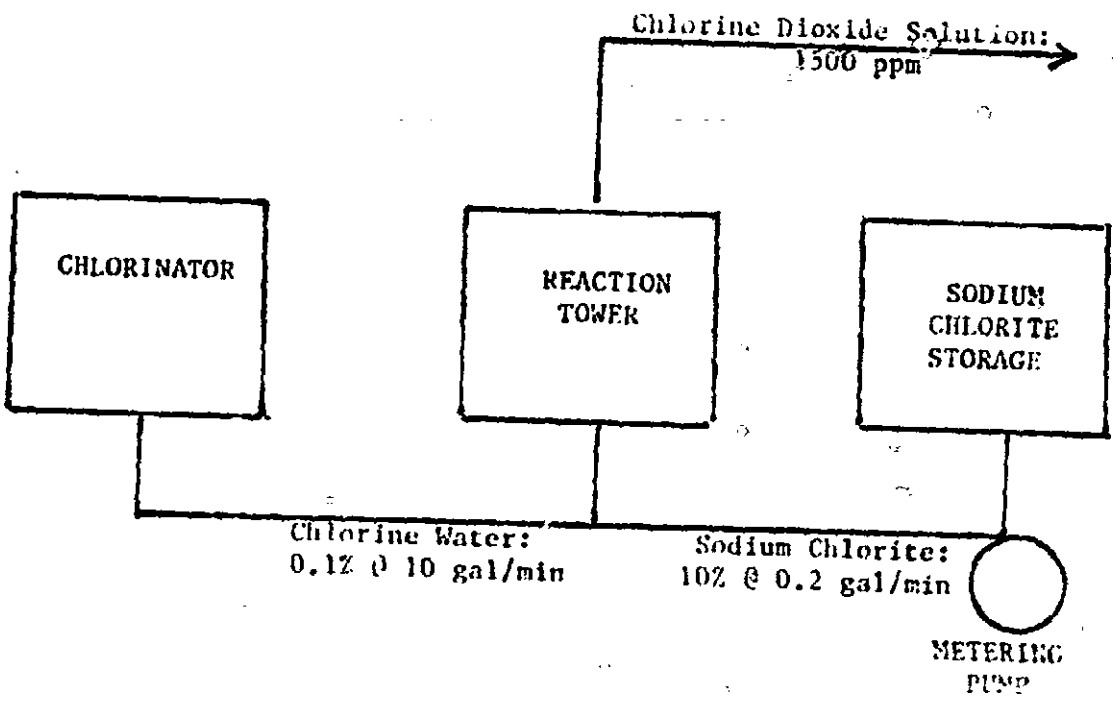
This reaction represents the easiest method for generating chlorine dioxide. However, concentrated acid should never be mixed with concentrated sodium chlorite solutions.

Commercial generators are available based upon the above chemistry. The ease of generation of chlorine dioxide in a closed system is illustrated in Figure 1, using activated chlorine as an example.

A 0.1% Cl_2 solution is fed from the chlorinator at 10 gal/min and mixed with a 10% $NaClO_2$ solution pumped at 0.2 gal/min in a reaction tower filled with Raschig rings. The resulting product contains about 1500 ppm of chlorine dioxide which can be introduced into the system for water treatment.

Figure 1

Chlorine Dioxide Generator



PRODUCTS

Technical sodium chlorite used to generate chlorine dioxide is available in both solution and dry forms. Typical chemical and physical properties are given for both forms in Tables 1, 2, and 3.

Table 1

Typical Properties of
Technical Sodium Chlorite

Sodium Chlorite, min (%)	79
Sodium Chloride, max (%)	12
Inert Ingredients, mixture of Sodium Salts and water	Balance
Appearance	White Flakes
Bulk Density (lbs/ft)	
Loose	53
Packed	69

Table 2

Typical Properties of
Technical Sodium Chlorite Solution 50

Sodium Chlorite, min (%)	37
Sodium Chloride, (%)	1.5-7.5
Inert Ingredients, mixture of other Sodium Salts (%)	3-4
Water	Balance
Appearance	White, slightly cloudy
Density @ 3° °C (lbs/gal)	11.7
Crystallization Point (°C)	25

Table 3

Technical Sodium Chlorite Solution 31.25

Sodium Chlorite, min (%)	25%
Sodium Chloride, max (%)	4.5
Inert Ingredients, mixture of other Sodium Salts ( )	3-4
Water, max	71
Appearance	Clear, Slightly yellow solution
Density (lbs./gal)	10.4
Crystallization Point (°C)	-7

CHLORINE DIOXIDE APPLICATIONS

Stripping Dyestuffs from Textiles. Chlorine dioxide, generated from sodium chlorite under acidic conditions removes dyestuffs from textiles with a minimum of fiber degradation. However, its effectiveness depends upon the dyestuff and the type of fabric. This method also provides a good bottom for redyeing.

Pulp Bleaching. Sodium chlorite is used to generate chlorine dioxide for bleaching pulp. It is most frequently used in situations where the chlorine dioxide requirements are small and capital and operating costs are restrictive.

Upgrading of Fats and Oils. Chlorine dioxide generated from sodium chlorite is effective in bleaching fats. The process is simple, low cost, and since it eliminates the need for a filter medium, produces a higher yield than other methods. (About 30% of the weight of the filter residue, which is generally discarded, is tallow.) Problems such as storage and handling of the filter medium and disposal of filter residues are eliminated as well.

Bleaching of Natural Foliage. Chlorine dioxide, generated from sodium chlorite, is used for removing color from natural foliage. The foliage can then be used in the white state or it can be dyed. Degradation of cellulosic structure is minimal.

Treatment of Potable Water. Sodium chlorite is a simple way to generate chlorine dioxide, which has long been used to remove tastes and odors in potable water. Chlorine dioxide is also used in the disinfection of water, particularly where THM's are concerned. And it oxidizes soluble manganese and iron compounds, eliminating a major cause of stained sinks and fixtures. Complete information can be found in Olin Bulletin 743-022. Chlorine dioxide has also found application in disinfection of sewage and plant wastes, and destruction of phenolics, simple cyanides and sulfides by chemical oxidation.

Bacterial Control in Oil Wells and Petroleum Systems.

Bacterial Slime Control in Paper Mills. Some of the major operational problems in paper and paperboard production are caused by proliferation of microbiological organisms in white water and stock systems. Chlorine dioxide as generated from sodium chlorite has excellent microbiological control properties. Chlorine dioxide, an oxidizing biocide, can control microbiological growths which cause paper malodors and discoloration, deterioration of felts, equipment corrosion, fouling of pipes and showers, and paper quality problems such as spots, specks and holes.

Food Processing. Chlorine dioxide, simple to generate and control from sodium chlorite, is highly effective for microbiological control in organically contaminated flume waters. Control of microbiological growths is necessary to insure food product safety and quality. Chlorine dioxide has also found application in sherry bleaching.

Algae Control in Cooling Towers. Chlorine dioxide as generated from sodium chlorite is an efficient and economical product to control microbiolical growths under conditions unfavorable to chlorine in industrial cooling waters. Chlorine dioxide is the primary microbiological control agent in high pH, ammonia-nitrogen contamination, or persistent slime problem situations.

STORAGE AND HANDLING

Do not contaminate sodium chlorite with foreign material such as dirt, organic matter, chemicals, soap products, solvents, acids or paint products. Contamination may start a chemical reaction with generation of heat and emission of chlorine dioxide (a poisonous, explosive gas). A fire or explosion may result. Flush all spills with large amounts of water.

Dry Sodium Chlorite. Do not expose to moisture. Store sodium chlorite in a cool, dry place in the original container. Always replace cover tightly. Mix only into water using a clean, dry metal scoop reserved for this product alone.

Keep away from flame or any burning material (such as lighted cigarette). If fire occurs, extinguish with plenty of water. Cool any unopened drums near the fire by spraying water on them.

Rinse empty containers thoroughly with water and dispose of in a chemically safe manner.

Sodium chlorite should always be diluted in water, i.e. to a 10-25% active $NaClO_2$ aqueous solution prior to generation of chlorine dioxide.

Sodium Chlorite Solution. Flush all spills with large amounts of water. If sodium chlorite solution is allowed to dry, the precautions described for dry sodium chlorite apply.

Specifically designed dispensing equipment should be used in accordance with manufacturers instructions and according to state regulatory agency recommendations for dosages or residual chlorine dioxide levels which should be maintained for each specific site of application.

TOXICOLOGICAL PROPERTIES

Do not get in eyes, on skin or on clothing. Sodium chlorite is highly corrosive and may cause skin or eye damage. It may be harmful or fatal if swallowed.

PERSONNEL PROTECTION

When handling sodium chlorite, goggles, neoprene gloves, coveralls and boots should be worn. Local exhaust is required where exposure to dust or mist might occur. If sodium chlorite is spilled on clothing, remove and wash contaminated clothing at once to avoid the potential of fire.

FIRST AID

Contact with skin: Brush off excess chemical and flush skin with cool water for at least 15 minutes. Call a physician.

Contact with eyes: Flush eyes with cool water for at least 15 minutes. Call a physician.

SPILL AND LEAK PROCEDURES

Remove all sources of ignition. Wear NIOSH/MSHA approved self contained breathing apparatus. Follow OSHA regulations for respirator use. (See Title 29, Section 1910.34, Code of Federal Regulations.) Wear goggles, coveralls and neoprene gloves and boots. Clean up in a manner to avoid contamination with organic material. Do not return material to original container. Place in a fresh container and isolate outside or in a well ventilated area. Do not seal the container. Flush any residual material with large quantities of water.

DISPOSAL

Dispose of unused product in a manner approved for this material. Consult the appropriate federal, state and local agencies to ascertain proper disposal procedures.

TECHNICAL SERVICE

Technical assistance is available to facilitate further investigation or use of sodium chlorite and sodium chlorite solutions. If you have a specific question, desire a sample or need more information, please write or call your nearest Olin Sales Office.

AVAILABILITY

Technical sodium chlorite is available in 100-lb drums. Technical Sodium Chlorite Solution 50 is available in tank truck quantities, and Technical Sodium Chlorite Solution 31.2% and Olin 300% are both available in both tank truck and drum quantities.

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