Process & Packaging, Inc.

Oxine & Purogene Sanitizers

An element in IDD's "PurePass" system for beer, juice, soft drink and water aseptic process & packaging, Oxine and Purogene are safe and powerful sanitizers in potable water at 5 ppm (as approved by the FDA).

What is Oxine & Purogene?

- "Stabilized" chlorine dioxide (ClO2)- It is a proprietary process available in a concentrated and stable form with very low toxicity.
- As a powerful oxidant, it is virtually unaffected by organic load and hard water.
- It is a highly refined, two percent modified chlorite ion containing liquid product and is 7 times more effective than chlorine. It is NOT a simple solution of tech grade sodium chlorite.
- Chlorine Dioxide gas (ClO2) was discovered in 1811 by Sir Humphrey Davey, three years after he discovered chlorine.
- It wasn't until the 1970's that aqueous phase generators were developed to allow the dry chlorine gas to be produced in water based solutions of precursor compounds, normally sodium chlorite and a mineral acid.
- Hypochlorite solutions were later added to further drive the reaction as completely as possible to chlorine dioxide.
- Technical advances have resulted in the FDA (reference CFR P-1, 3-D and G-5) and the majority of international authorities approving Oxine and Purogene ('stabilized' ClO2) as a 'direct' contact sanitizer for numerous applications within the brewery, winery, soft drink, juice, dairy and food (meat, fish, fruit and vegetable) processing plants.
- Oxine has more regulatory approvals as a direct food contact sanitizer than any other product on the market.

OXINE AND PUROGENE...THE SANITIZERS FOR ALL REASONS. For years it has been known that chlorine dioxide gas is a powerful anti-microbial agent. However, this gas is toxic and unstable in an aqueous solution. Modern technology has overcome these problems with Oxine (North American name) and Purogene (European name). Today, stabilized chlorine dioxide (ClO2) is available in a concentrated stable form with very low toxicity. As a powerful oxidant, stabilized ClO2 is virtually unaffected by organic load and hard water. These technical advances have resulted in the FDA (reference CFR 178-1010), EPA (registered for food and beverage contact surfaces), USDA (D-2, P-1, 3-D and G-5) and the majority of international authorities approving stabilized ClO2 as an acceptable sanitizer for numerous applications within the brewery, winery, soft drink, dairy and food (meat, fish, fruit and vegetable) processing plants. Properties which make stabilized ClO2 most attractive to the brewer, maltster and other beverage plant operators are:

LOW ODOR - Unlike typical sanitizers such a hypochlorites, quaternary ammonium, or even peroxy-acetic acid, stabilized ClO2 has an almost undetectable odor while surpassing the bacteriocidal efficacy of these other compounds. Hypochlorites can form chlorophenols (a medicinal flavor compound) when combined with organic material in beer: Quaternary ammonia compounds have well known negative effects on flavor; the end product of the reduction of peroxy-acetic acid is acetic acid, with its typically "vinegar-like" character. Even small amounts remaining in a tank and having the opportunity of coming in contact with beer, can have a deleterious effect on beer flavor.

LOW CORROSIVITY - Stabilized ClO2 is not harmful to vessels or piping systems when used at the recommended dosages. Typically, brewers like the effectiveness of hypochlorites but a major drawback is hypochlorites role in causing "stress corrosion fatigue" in stainless steel, particularly at weld joints. Stabilized ClO2 while actually being 4 to 7 times more effective as a sanitizer than hypochlorite, does not enhance or contribute to "stress corrosion fatigue" in the metal. Stabilized ClO2 is only slightly more corrosive than tap water and much of this is due to the acid used in the activation of the product. When it is used as a final rinse in vessels, or piping systems, it is perfectly safe to leave a 5 to 10 ppm solution un-rinsed in a tank, pipe network or piece of process equipment, (i.e. bottle fillers, keg racking machines, sheet or pressure leaf filters, etc.).

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EASE OF HANDLING - While idophors, peroxy-acetic acid and hypochlorites are popular sanitizers for tanks, fillers and other equipment, they have some handling drawbacks. Iodophors are really only effective at low pH, thus they are typically carried as a concentrate in a solution of phosphoric or nitric acid. This makes them hazardous to handle. Iodophors also have a tendency to stain equipment (and people). Pereoxy-acetic acid is actually quite volatile at moderately elevated temperatures (120ºF/50ºC) and can cause spontaneous explosions. It is also corrosive in its concentrated form. Hypochlorites as chlorine gas have a short-term exposure limit slightly higher than that of stabilized ClO2 (1.0 ppm versus 0.3 ppm respectively). However, since stabilized ClO2 is 4 to 7 times more effective than hypochlorites at normal use levels, it is less hazardous.

NO ENVIRONMENTAL IMPACT - Stabilized ClO2 does not form the highly carcinogenic trihalomethanes as do hypochlorites in the presence of organic materials. Oxine is environmentally and user friendly and has been accepted by the EPA has having no environmental impact upon disposal. It is not corrosive nor is it volatile in its concentrated (2%) stable form.

EFFICACY - Stabilized ClO2 does not act by chlorination but by oxidation and has proven effective against all common brewery, winery and beverage plant micro-organisms. It is an effective bacteriostat at use rates as low as 5 to 20 ppm against such common pests as Lactobacillus and Pediococcus sp. and at 50 ppm against Wild Yeasts and Mold strains.

As with all gaseous products such as stabilized ClO2, Oxine can be monitored by using a standard gas monitoring system such as those supplied by LAB SAFETY SUPPLIES COMPANY. Toll free telephone number 800-356-0722. It is necessary to take extra care with good ventilation during the "activation" process of Oxine. If it is considered necessary to monitor gas levels at this time for your safety records, we recommend that the chlorine "low range" (0.05 to 16ppm) tube be used to monitor gas levels. These tubes readily detect and measure all types of inorganic chlorine.

ACTIVATION OF ClO2 CONCENTRATE: Since the ClO2 is in a stabilized form in concentrate, it must be "activated" before using. To manually activate Oxine add a food grade acid such as citric or phosphoric to lower the pH in a well-ventilated area to below 4 pH. A Litmus paper test at 4 pH is a simple method to be sure of activating correctly. Activation can also be verified by a corresponding color change of the concentrate from clear to yellow/green. Keep stirred at let stand for 5 minutes before using. Any number of acids will activate the stabilized ClO2, however, food grade Citric or Phosphoric acid is recommended for this application.

Following are the details for replacement chemicals for your Oxine Test Kits.

10% Potassium Iodide - 100 g diluted to 1,000 ml with distilled water.

0.2N Hydrochloric Acid - Add 16.6 ml Concentrated HCL (39%) to 800 ml water. Bring to 1,000 ml with water.

0.00564N PAO (Phenylarsine Oxide).

CALCULATIONS FOR DOSING RATES:

C1 x V1 = C2 x V2 Where:

C1 = The initial Oxine concentration (20,000ppm activated)
V1 = The initial Oxine volume (How much Oxine you need)
C2 = The final Oxine concentration (Application strength)
V2 = The final volume of Oxine (The water volume required)

Knowing any three of these variables the fourth can be found by simple algebraic techniques.

AVAILABILITY: Oxine is available from IDD in 5, 30, 55 gallon and tote containers. Oxystix, Test kits and replacement test kit materials can also be purchased from IDD.

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STORAGE: Concentrated ClO2 can be stored in a dry, cool area away from acids for up to 3 years under standard conditions.

Activated Oxine (20,000 ppm) has a half-life of approximately 48 hours under standard conditions.

Activated Oxine can be added to cold water at 4,000 ppm. (5:1 ratio - water: activated Oxine) Under such conditions a half-life of up to 2 weeks is possible under standard conditions.

Brewery & Beverage Plant Uses

MALTHOUSE: Stabilized ClO2 is an effective wash down sanitizer for walls and floors, germination areas and steep tanks. At 100 to 500 ppm it will kill and bleach out mold and mildew common to these high-humidity areas. Oxine is successfully used in barley steep waters to inhibit microbial growth of all types. Typically at 10 to 50 ppm depending on the microbial load, one can assure a safe re-cycling of the steep water into subsequent batches. Oxine's strong oxidizing capability actually reduces B.O.D. loads for disposal.

BREWHOUSE: Safe for all vessels and piping systems, whether copper or stainless steel, Oxine can ensure a microbially free environment in coppers/kettles, mash filters or lauter tuns, swirl tanks, settlers and wort cooling systems when used at 50 to 100 ppm. The related piping systems for wort transfer to fermentation areas can be sanitized at 100 ppm. A 50 ppm solution is also safe to leave in the pipelines during periods of non-use, to keep them sanitized.

FERMENTATION/STORAGE AREAS: A 50 ppm solution is adequate to sanitize tank walls and related piping systems. Since low levels of contact with finished product do not effect final beer flavor, one can safely use Oxine in a final rinse and be able to obtain some residual bacteriostatic value. It is recommended that boots, gloves, yeast-handling tools and the like be sanitized at 100 ppm. Stabilized ClO2 at 100 ppm is ideal for foot baths at or near tank entry areas.

FILTRATION: Oxine is particularly useful for stabilizing and sanitizing filter systems. It can be used to shock sanitize activated carbon and sand/gravel filters in the water treatment facility. Typically, a 50 to 100 ppm solution is run slowly through these type filters. Oxine will not be absorbed significantly by the active carbon. Once the bed is sanitized it is then possible to dose Oxine into the water stream prior to the filter bed at a concentration of 1 to 5 ppm in order to prevent future contamination.

Plate-and-frame filters can be sanitized with a 10 to 50 ppm solution without the typical water flush/rinse required by acid-sanitizers and the like. A standing solution of up to 10 ppm can be left in a filter during periods of non-use with no harm to the filter frame or the sheets.

It is recommended that this procedure be carried out after any normal production run to inhibit the growth of yeasts, molds and bacteria, since residual product on the sheets makes for an ideal growth media. A solution of the same strength sprayed over the outer exposed edges of the filter sheets will prevent mold growth when standing.

PACKAGING: Stabilized ClO2 provides a safe sanitization and soaking solution for keg washer rackers, bottle and can fillers. Sanitize at 50 to 150 ppm and soak or stand filler bowls in cold water at 10 ppm.

Aseptic keg, bottle and can rinsing immediately prior to filling with beer, juice, soft drink or water is enhanced when 50 to 150 ppm of stabilized ClO2 is used as a final cold rinse.

The use of stabilized ClO2 as an aseptic "fog" spray around aseptic bottle and can fillers is highly effective as a sanitizer and microbial preventative at 10 to 50 ppm.

The non-corrosive nature of stabilized ClO2 makes it an ideal growth inhibitor in tunnel pasteurizers. Stabilized ClO2 is most effective in the moderate temperature zones (warm-up and cool-down fresh water zones) of the pasteurizer. A 20 to 30 ppm solution is normally adequate and quite safe to the equipment.

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TANK-TRUCK WASHING: As in the typical use for tank washing and sanitizing, stabilized ClO2 can be used for the sanitization and cleanup of bulk tankers and their related piping and hoses. Wash down tank internals, pumps and hoses at 100 ppm, externals at 250 to 500 ppm. This will prevent transfer of micro-organisms to or from the connecting systems.

MOLD AND MILDEW CLEANUP AND CONTROL: Clean off walls and floors as well as air handling units and machinery using a 200 to 500 ppm solution of stabilized ClO2. This effectively kills mold and mildew spores while still retaining some bleaching ability to remove tough black stains. This is good procedure prior to painting, or prior to the application of a mold and slime growth inhibitor such as Alltech's Mold-Zap.

PROCESS WATER TREATMENT: The FDA has approved stabilized ClO2 for process water sanitization at between 100 to 200 ppm available ClO2. Potable water treatment is approved for human consumption at 4 ppm available ClO2 and is commonly used in potable water tanks on aircraft and boats.

ACTIVE CARBON BED (ACB): Infected ACB's can be back flushed and soaked in a 100 ppm solution of ClO2 for 15 to 60 minutes, after which time a forward flush-out of 15 to 30 minutes with the process water can take place. It is then advisable to inject 1 to 3 ppm of activated ClO2 into the process water stream thereafter prior to the ACB to prevent future infections.

GLASS WASHING/RINSING: Even at the final stage of the brewer's trade, where bars and pubs have a need for an effective and safe drinking-glass sanitizer, stabilized ClO2 can fill the need. Since stabilized ClO2 can be safely consumed at 4 ppm, it makes an ideal glass rinse. Unlike typical quaternary ammonium rinses, it will not have any deleterious effect on beer flavor, nor on beer foam quality. Use at 20 to 50 ppm in final rinse water.

WASHING OF YEAST SLURRY WITH OXINE: Stabilized ClO2 (Oxine) will effectively kill unwanted bacteria in yeast at 20 to 40 ppm, while leaving the culture yeast unharmed. Because of stabilized ClO2's unique action, it does not have the drawbacks of phosphoric acid. It does not form chlorophenols (which contribute to a much feared medicinal character in products) in the presence of organic materials.

YEAST WASHING METHOD: Normally, an initial washing at 20 to 40 ppm (20 ppm for homogenous yeast, 40 ppm for "clumpy" or highly flocculant strains) is effective against most Lactobacilli and Pediococci species. This "wash" is done by adding stabilized ClO2 directly to yeast slurry on a volume/ppm basis. It does not need to be activated as the pH of the yeast slurry is low enough to convert to ClO2.

Stabilized ClO2 is supplied at a concentration of 20,000 ppm or 2% Chlorine Dioxide when activated. Therefore, on a volume basis, one could essentially make up with one gallon of stabilized ClO2 concentrate, one thousand gallons of solution at 20 ppm. By this method, we can also assume with one gallon of concentrate to make up one thousand gallons of yeast slurry at 20 ppm. It is impractical to measure the concentration of ClO2 in the presence of yeast, so the dilution must be made based on the strength of the concentrate (20,000 ppm).

Yeast slurry should be thin enough to allow for homogeneous mixing, usually 20 to 40% solids. The killing action of stabilized ClO2 is very fast compared to the traditional phosphoric acid wash. Only 15 to 30 minutes need be allowed for effective bactericidal effect of stabilized ClO2, with no resultant stress on yeast cells.

YEAST WASHING DOSING RATE: For regular washing of homogenous recycled brewer’s yeast, a 20 to 40 ppm wash for a minimum 30 minutes to 5 hours prior to pitching. Mix 1 to 2 ml of stabilized ClO2 concentrate with each liter of yeast slurry. Agitate thoroughly during the process.

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AUTOMATIC ACTIVATION SYSTEMS: The IDD low cost, hands free, automated activation, dosing and distribution systems are available to provide a continuous volume of activated ClO2 into a storage reservoir as needed. These systems eliminate the need for manual mixing, measuring and dispensing.

DISCLAIMER: The aforementioned information is offered as suggested uses of Oxine and Purogene and is not intended to be definitive or accurate for all applications.

IDD Process & Packaging, Inc. do not accept any liability for the use or application of Oxine or Purogene.

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