



Chlorine Dioxide - within the Food & Beverage Industry

Because of its chemistry and physical properties, Chlorine Dioxide is the most powerful and environmentally safe biocide in common use.

Increasing demands for Food Safety have paved the way for effective biocidal control in all aspects of Food and Beverage preparation and packaging. A review, published by the World Health Organisation in 1998, examining "Surface Decontamination of Fruits and Vegetables Eaten Raw" states:-

*"Vigorously washing fruits and vegetables with **safe water** reduces the number of micro-organisms by 10-100 fold and is often as effective as treatment with 200 ppm chlorine..... Prevention of contamination at all points of the food chain from primary production to the final consumer is preferred over the application of disinfectant after contamination occurs. Prevention can be achieved through application of the principles of food hygiene and the Hazard Analysis and Critical Control Point System (HACCP)".*

These same principles are inherent throughout all aspects of Food and Beverage production, ensuring that contamination and infection prevention is applied at all stages within the food chain.

In May, 2001, following rulings from within the European Union, the UK Foods Standards Agency ruled that *"all water used in poultry processing must be of potable quality"*. Traditionally, this industry relied on high levels of chlorine to control microbial contamination of water systems and help reduce microbial loadings on the carcass. Permitted levels of chlorine are inadequate to control microbial growth in water and associated distribution systems. Chlorine Dioxide is extremely effective against biofilms and pathogens at a concentration approved for potable water (0.5 ppm).

Research carried out by BSRIA (Building Services Research and Information Association) on Chlorine Dioxide treatment of domestic water systems concluded that at a concentration as low as 0.1 ppm biofilm was eradicated.

Catalytic Chlorine Dioxide production and delivery systems offer an "ultra-pure" level of chlorine dioxide¹ that is cost effective, safe and easy to apply at various stages throughout the food chain, offering a superior alternative to chlorine, bromine and traditional chlorine dioxide generator technologies.

Laboratory comparisons show that Chlorine Dioxide has the best performance, at the lowest concentration of all the disinfectants/sanitiser tested. This is maintained against a wide spectrum of pathogens found throughout the food and beverage industry.

¹ = Catalytic Chlorine Dioxide production offers the most effective conversion to chlorine dioxide (>98.5%) with minimal chlorate, and zero chlorite residuals. (Verified by independent analysis)

Water . Air - Water . Air - Water . Air - Water . Air

Applications for Chlorine Dioxide within the Food & Beverage Industry

Vegetable Processing, Growing and Horticulture

- ◆ Disinfection of Food Contact Surface
- ◆ Bacteria, Mould and Odour Control throughout all aspects of plant
- ◆ Flume Water Treatment
- ◆ Fresh Produce Packaging and Processing Aid
- ◆ Treatment of fertigated hydroponic water for plant and human pathogen control.

Processed Foods, Frozen Foods and Ready Meals

- ◆ Disinfection of Food Contact Surfaces
- ◆ Bacteria, Mould and Odour control
- ◆ C.I.P. (in process and transport)
- ◆ Disinfection of Cold Rooms / Freezers / Transportation and Process Areas.
- ◆ Treatment of total site water to enhance overall hygiene programme

Poultry Processing

- ◆ Disinfection of Processing Equipment
- ◆ Disinfection of Water Lines
- ◆ Carcass and Evisceration Sprays
- ◆ Treatment of Chilled and Process Water
- ◆ Hatchery Water Quality Control
- ◆ Fumigation

Fresh Fish Transport and Processing

- ◆ Pathogen control for Ice packing
- ◆ Process Water Treatment
- ◆ Listeria Control
- ◆ Pathogen Control throughout the Plant
- ◆ Odour Control

Soft Drinks, Bottling, Brewery and Dairy Plants

- ◆ C.I.P. throughout all aspects of Process
- ◆ Lube biocide for Conveyors
- ◆ Bottle Disinfection
- ◆ Transportation Disinfection
- ◆ Total Water Treatment
- ◆ Pasteurisers, Bottle warmers and Coolers

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Dairies, Brewing, Soft Drinks, Cheese

Chlorine dioxide offers numerous applications.

Typically: -

- ◆ No rinse disinfection of food processing equipment
- ◆ Disinfection of air chillers and chiller vanes for mould control. (including cold rooms)
- ◆ C.I.P. disinfection of pipes and vessels
- ◆ Disinfection and odour control (e.g. waste / effluent)
- ◆ Disinfection of drains and drain channels (e.g. Listeria)
- ◆ Especially effective for disinfection of Chilled Water



Fresh Fish Transport and Processing

- ◆ Chlorine Dioxide does not deposit significant amounts of residual sodium on the produce being processed.
- ◆ Used for pathogen control in the production of ice for packing fresh fish

Vegetable Washing

Chlorine dioxide is an excellent product for washing vegetables. It has the ability to kill spores, fungi and viruses at low concentrations.

Chlorine dioxide is a proven product that can be used to solve many food related problems. It does not affect taste, odour or appearance. It is safe to use and complies with Food Regulations.



Typical Applications:-

- ◆ *Apples*: control of E-coli and Listeria
- ◆ *Potatoes*: protection against "late blight" and "silver scurf"
- ◆ *Lettuce, Celeries and Onions*: compared to hypochlorite the vitamin C content resulted higher and the Potassium content lower.
- ◆ *Citrus Fruits*: protection against "green mould" and "sour rot" proved to be successful at variable pH values, low concentrations and limited contact time.



- ◆ Effective at eradicating biofilm
- ◆ Broad spectrum of pathogen eradication, at lower concentrations than traditional disinfectants
 - ☞ Salmonella typhimurium
 - ☞ Pseudomonas aeruginosa
 - ☞ Candida albicans
 - ☞ Listeria monocytogenes
 - ☞ Streptococcus faecalis
 - ☞ E-coli
 - ☞ Faecal coliforms
 - ☞ Aspergillus fumigatus spores
 - ☞ Giardia
 - ☞ Proteus mirabilis
 - ☞ Rotavirus
 - ☞ Campylobacter
 - ☞ etc.
- ◆ Holds a USDA D-2 approval as a terminal sanitising rinse, not requiring a water flush
- ◆ Flow related chlorine dioxide dosing ensures continuous protection without having to shut down process or production
- ◆ Reduced corrosion - the corrosive effects of chlorine dioxide are minimal compared to the corrosive effects of tap water
 - ◆ Simple to maintain, demand related and effective
 - ◆ Rapid microbial killing action
- ◆ Maintains biocidal activity at up to pH 11
- ◆ Does not react with organics to form ecotoxic and bioaccumulative by-products
- ◆ Better tolerance to organics than chlorine or bromine
- ◆ Environmentally safe Surface disinfection
- ◆ Eradication of bacteria in rubbers hoses and associated pipework can assist with Hygiene Audits
 - ◆ Non foaming
- ◆ Can be used as an effective fogging and fumigation material
- ◆ Effective in controlling micro-flora found on stainless steel food processing equipment.

Clearwater

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