TwinOxide International B.V.
Industrial Water Solutions

TwinOxide®
Superior Water Disinfection Power

Application information

Application of TwinOxide® in the fruit & vegetable industry

Citrus Fruits
Lettuce
Potatoes
Raw Shrimps
Tomatoes

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Disinfection with TwinOxide®

The most widespread used disinfectant is chlorine. The use of chlorine implies numerous general acknowledged disadvantages and hazards. The hazards of chlorine involve both safety and health related risks and effects that can only be avoided by ending the use of chlorine and applying a disinfectant with completely different characteristics.

TwinOxide® is a superior disinfection concept that has been acknowledged in numerous countries and that re-defines the minimum characteristics of a 21st century disinfectant.

The industry has been looking for alternatives to replace the use of chlorine for a long time. Many chemical and mechanical concepts have been tested and evaluated but with only limited results or new problems to be tackled.

TwinOxide®, an advanced delivery system to generate 99.9x% pure chlorine dioxide in an aqueous 0.3% solution allows a full replacement of chlorine with sublime disinfection results satisfying the requirements and needs.

When TwinOxide® is applied many of the undesired limitations of classical disinfectants are absent, e.g.:

- TwinOxide® provides more microbiological security as the full spectrum disinfection capacity of TwinOxide® kills all in water common micro-organisms, viruses and pathogens (including Legionella control);
- TwinOxide® removes the biofilm and inhibits the reformation of this dangerous biofilm;
- TwinOxide® does not cause allergic reactions (no skin irritation or ruptures, no activation of the mucous glances, no eye irritation) and does not generate smell or taste;
- TwinOxide® does not generate TriHaloMethanes (THM's) or other carcinogenic by-products;
- TwinOxide® is not corrosive and erroneous dosing (overdosing) does not cause an immediate risk;
- TwinOxide® enables you to disinfect without the use of chlorine and does not generate chlorite, chlorate or free chlorine;
- TwinOxide® is not explosive and a chemical substance with only a limited hazard class;
- TwinOxide is applied with standard equipment commonly used in the swimming pool industry;
- TwinOxide® provides its superior disinfection power in a broad pH-level bandwidth (pH-level 4 to 10);
- Less chemical use to optimize microbiological control;
- Only limited use of pH-level adjustment chemicals;
- TwinOxide® is easy to transport and store;
- Simple application by standard dosing equipment available in the market;
- TwinOxide® does not load the environment;
- No use of chlorine!

Application of TwinOxide® on Citrus Fruits:

After harvesting the citrus fruits may contain micro-organisms, spores and mould. To optimize food safety and quality these pathogens need to be removed by a washing procedure.

Reduction aim by using TwinOxide®

Common pathogens on citrus fruits are e.g. Geotrichum Candidum (Sour Rot Spores), Penicillum Digitatum (blue mold) and Green mold, that can be removed by immersing the citrus fruits in water containing TwinOxide® 0.3% solution to optimize micro biological control during the washing stage.

The process

The wash water is re-circulated water with an average temperature of 20° Celsius. The wash water is also used in the shower bin and can be marked as very dirty. The wash water requires a permanent residual of TwinOxide® 0.3% solution of 0.35ppm.

Dosing TwinOxide® into the wash water

To ensure the residual of 0.35ppm the use of a redox meter is strongly advised in combination with dosing equipment (dosage pump, contact water meter, two PE-HD black storage tanks and an injection point).
Contact time is key during the washing process.

Some specific advantages and benefits:

- The use of TwinOxide® 0.3% solution in the wash water will contribute to an increased production yield by better optimized micro biological control;
- No more use of chlorine or bromine (Nylate) in the disinfection process;
- No taste or odour problems with the citrus fruits;
- Increased shelf life of the citrus fruits (up to 3 times);
- TwinOxide® is effective against fungi; a separate fungicide may no longer be required.

Note!

The immerse tank of the washing process may cause the formation of airborne spores. Therefore safety precaution measures may be required by using an exhaust system.

Dosage rates mentioned above may deviate.

Application of TwinOxide® on Lettuce

Super markets, fast food chains, restaurants etc., very often use pre-packed lettuce. Hygiene codes and quality control (HACCP) contribute to optimized food safety and the interest of the customer.

The quality requirements for lettuce are stringent, e.g. zero tolerance on Salmonella, Listeria and E-coli. Further the appearance must be good, the lettuce must pass high standard test criteria (no chlorine taste) and the micro biological surface contamination is subject to stringent rules. In addition to this the customer may prescribe a shelf life when the lettuce arrives.

The old process of lettuce disinfection with washing water

- High levels of chlorine (100-300ppm) are used in the washing water causing a terrible chlorine smell in the factory and affecting employees (eye & skin irritation, high employee illness rate) and the environment;
- The high level of chlorine disturbs the pH-level control of the washing water;
- To maintain chlorine residual high cost for chilling and extra ice are required as a lot of water is dumped;
- The level of Salmonella, Listeria and E-coli is not always zero;
- Permanent concern for Listeria contamination as Listeria is not affected by chorine at lower water temperatures;
- The micro biological surface contamination is from the start inconsistent.

Lettuce disinfection with washing water containing TwinOxide®

- Add TwinOxide® 0.3% solution in the first stage wash at a minimum residual of 0.1ppm (this water is on average at 8-10° Celsius);
- Add TwinOxide® 0.3% solution in the second stage wash at minimum residual 0.4ppm (this water is on average at 2-3° Celsius);
- Ensure sufficient contact time with the wash water containing TwinOxide®.

Dosing TwinOxide® into the wash water

To ensure the residual of TwinOxide® in the wash water the use of a redox meter is strongly advised in combination with dosing equipment (dosage pump, contact water meter, two PE-HD black storage tanks and an injection point).
Contact time is key during the washing process.

Some specific advantages and benefits:

- The use of TwinOxide® 0.3% solution in the wash water will contribute to an increased production yield by better optimized micro biological control;
- No more use of chlorine in the disinfection process;
- No taste or odour problems with lettuce;
- Increased shelf life of the lettuce;
- TwinOxide® is effective against fungi; a separate fungicide may no longer be required.

Dosage rates mentioned above may deviate.

Application of TwinOxide® on Potatoes

After harvesting the potatoes they are placed into heaps. These potatoes contain sand, mold and pathogens, e.g. Aspergilus Niger. The potatoes are then washed, peeled and cut into shapes prior to freezing. To optimize food safety and quality pathogens need to be removed by a washing procedure. Water used for processing is in general from municipal supply.

Potato disinfection with washing water containing TwinOxide®

- Add TwinOxide® 0.3% solution to obtain a minimum residual of 0.2-05ppm (the contact time will influence the dosage rate) for the wash water used during the peeling and cutting process;
- Ensure sufficient contact time with the wash water containing TwinOxide®.

Dosing TwinOxide® into the wash water

To ensure the residual of TwinOxide® in the wash water the use of a redox meter or chlorine dioxide sensor is strongly advised in combination with dosing equipment (dosage pump, contact water meter, two PE-HD black storage tanks and an injection point).
Contact time is key during the washing process.

Some specific advantages and benefits:

- The use of TwinOxide® 0.3% solution in the wash water will contribute to an increased production yield by better optimized micro biological control;
- Unusual taints on processed potatoes are removed;
- No more use of chlorine in the disinfection process; no chlorinated organic by-products;
- TwinOxide® 0.3% solution delivers superior broad spectrum micro-biological control;
- No taste or odour problems with potatoes;
- TwinOxide® is effective against fungi; a separate fungicide may no longer be required.

Note!

The volume of water used may be considerable in a potato processing plant. A by-pass of on the main water supply pipeline may simplify the dosing that is feed back to the main flow.

Dosage rates mentioned above may deviate.

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Application of TwinOxide® on Raw Shrimps

Raw shrimps are supplied to the factory from farms (natural sea or river). During the processing (washing, sizing, peeling, washing) of the raw shrimps safe water plays a key role. To optimize food safety and quality pathogens need to be removed by a washing procedure. Water used for processing is in general from municipal supply.

As contact time with washing water during processing is limited the dosage rate of TwinOxide® 0.3% solution needs to be appropriate to optimize disinfection capacity from the water.

Potato disinfection with washing water containing TwinOxide®

- Add TwinOxide® 0.3% solution in the first stage wash at a minimum residual of 1.0ppm;
- Add TwinOxide® 0.3% solution to water used during sizing and peeling with a minimal residual of 0.5ppm;
- Add TwinOxide® 0.3% solution to the second stage wash (rinsing) with a minimal residual of 0.2ppm;
- The second stage(rinsing) wash water can be used during the freezing process;
- Ensure sufficient contact time with the wash water containing TwinOxide®.

Dosing TwinOxide® into the wash water

To ensure the residual of TwinOxide® in the wash water the use of a redox meter or chlorine dioxide sensor is strongly advised in combination with dosing equipment (dosage pump, contact water meter, two PE-HD black storage tanks and an injection point).
Contact time is key during the washing process.

Some specific advantages and benefits:

- The use of TwinOxide® 0.3% solution in the process water will contribute to an increased production quality by better optimized micro biological control;
- No influence of pH-Level of the water on the TwinOxide® disinfection power;
- No more use of chlorine in the disinfection process; no chlorinated organic by-products;
- TwinOxide® 0.3% solution delivers superior broad spectrum micro-biological control;
- No taste or odour problems after final rinse water;
- Improvement of the micro biological surface contamination level by using TwinOxide®.

Dosage rates mentioned above may deviate.

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Application of TwinOxide® on Tomatoes

After harvesting Tomatoes contain moulds. These moulds are a risk for the tomatoes and need to be removed during processing. The tomatoes arrive at the production plant and are dumped onto a conveyor. The tomatoes are coarsely rinsed with municipal water sprays to remove dirt, stems and leaves.

The tomatoes fall into sorting table (flume) containing water and then unacceptable product is removed from the sorting conveyor and are collected in one tank. Then they are pumped to a chopping system and then further processed to tomato paste, etc.

Tomato disinfection with washing water containing TwinOxide®

- Add TwinOxide® 0.3% solution to the flume water with a minimum residual of 0.2-0.4ppm;
- Add TwinOxide® 0.3% solution to the make-up condensate water from the tomato paste process with a minimum residual of 0.1-0.2ppm;
- These minimal residuals should be adjusted based on the presence of mould in the production process. Mould is a serious problem when it rains during harvest and affects the total production process negatively;
- Permanently monitor and control against moulds and keep surfaces clean (by cleaning and then wet disinfecting with TwinOxide ® 0.3% solution with a minimum residual of 5ppm (ensure contact time).

Dosing TwinOxide® into the flume and condensate water

To ensure the residual of TwinOxide® in the flume and condensate water the use of a redox sensor is strongly advised in combination with dosing equipment (dosage pump, contact water meter, two PE-HD black storage tanks and an injection point).
Contact time is key during the process.

Some specific advantages and benefits:

- The use of TwinOxide® 0.3% solution in the process water will contribute to an increased production quality by better optimized micro biological control;
- No influence of pH-Level of the water on the TwinOxide® disinfection power;
- No more use of chlorine in the disinfection process; no chlorine smell for operators;
- No chlorinated organic by-products;
- Effective destruction of moulds on tomatoes and the flume equipment;
- TwinOxide® 0.3% solution delivers superior broad spectrum micro-biological control;
- Improvement of the micro biological surface contamination level by using TwinOxide®.

Note!

Operators preferably wear suitable gloves when touching the fume water (e.g. during sorting). In many countries this is mandatory as part of HACCP regulations.

Application Document End