TAP FACT SHEET

Aqueous Ozone Sanitation Technology

Food and beverage manufacturers routinely use sanitizers to clean product contact surfaces. Their use is critical to ensure that foods are free of microorganisms that can cause foodborne illnesses. Many food and beverage manufacturers use chemical sanitizers in their operations. Aqueous ozone is a non-toxic, water-based alternative.

Ozone is an FDA, USDA, USDA Organic, FSIS, OSHA and EPA approved antimicrobial food additive. Ozone infused water (aqueous ozone) can sanitize food contact and non-contact surfaces, break down bacterial biofilms, molds, mildews and other microorganisms and reduce levels of fats, oils and greases (FOG).

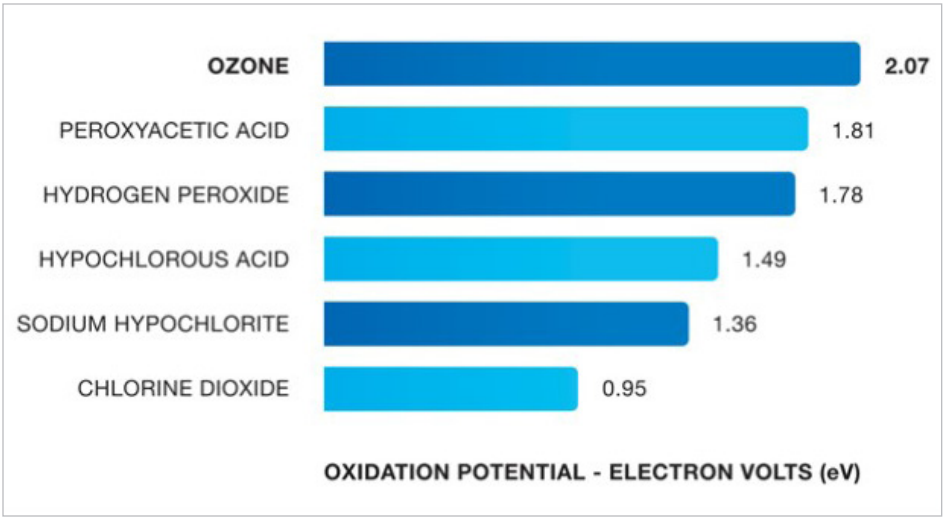
Ozone is a viable replacement for traditional antimicrobials such as acid and chlorine based solutions and quaternary ammonium compounds. Its use reduces the cost of chemical purchase, water consumption, heating, and sanitation labor.

SANITIZING POWER

- Ozone's disinfecting potential is 10 to 4,000 times the concentration of free available chlorine, depending on pH, temperature, and the specific microorganism(s) to be destroyed.
- Chlorine-tolerant microorganisms like *Cryptosporidium parvum* are destroyed by ozone.
- Bacteria and viruses can't develop a tolerance to ozone because disinfection occurs by the high oxidation power of ozone attacking the cell walls and membranes of bacteria and the DNA chain of viruses.
- Aqueous ozone effectively breaks down and removes various types of biofilms.

OZONE SAFETY

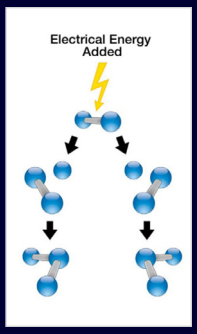
The by-products of ozone are oxygen and water. It does not have an odor or taste and does not leave a residue.



Oxidation strength comparison of common sanitizers.

WHAT IS OZONE?

Ozone is a gas produced at the point of use in a device called an ozone generator, which uses oxygen-enriched feed gas and electricity to split oxygen molecules (O_2) into two oxygen atoms (O_1). Oxygen atoms unite with other oxygen molecules to produce ozone (O_3).



OZONE PROPERTIES

- **Ozone is an unstable molecule, which makes it a strong oxidizer, disinfectant, and sanitizer.**
- **It has a short half-life of seconds to minutes depending on pH and temperature, after which it reverts to oxygen.**
- **Ozone can be used as a gas or dissolved in water for targeted operation. When used for surface sanitation, it is dissolved in water.**
- **When ozone comes into contact with bacteria, the most weakly bonded oxygen atom separates and oxidizes the cell membrane, causing the cell to burst and be destroyed.**
- **The weak bond splits, leaving water as the by-product.**

COMMON COMMERCIAL USES

Ozone is commonly used in the following commercial applications:

- Drinking water, bottled water, and wastewater disinfection
- Marine aquaria, aquaculture, laundries, pharmaceutical, ultrapure water preparation for electronics manufacturing, and water reuse
- Pulp and paper and kaolin bleaching
- Agriculture irrigation water and ground water remediation
- Food manufacturing and food service
  - Clean in place/Sanitize in place (CIP/SIP), surface sanitation, biofilm removal, process/product water, and direct food contact.

OZONE APPLICATION AND MATERIAL COMPATIBILITY

Ozone is typically applied as an aqueous product. It is hard plumbed into existing sanitation lines as a centralized system. It can be used with either hand-held or fixed sprayers and as a flood or cascade. It is sprayed at low pressure (20 psi or less) in cold water (<70°F). Low pressure use is designed to gently flood surfaces without causing pressurized over-spray that can spread microorganisms to other areas of a facility.

Ozone is compatible with:

- Stainless Steel (304, 316 and foil)
- Aluminum (all grades)
- Concrete, Painted Surfaces, Wood
- Painted Concrete
- Plastics - ECTFE, PTFE, PVC, PVDF, HDPE (Polyethylene)
- Gaskets - FPM (Viton), EPDM
- Rubber Modified Vinyl
- Glass
- Galvanized Steel

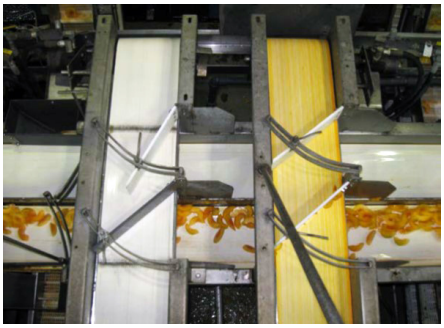
If used on mild steel, surface rusting similar to exposure to plain water may occur. It is not suitable for use with natural latex.

SANITIZING USES

Ozone-enriched cold water (aqueous ozone) can sanitize both food contact and non- contact surfaces, as well as other wettable surfaces, including tables, conveyor belts, prep surfaces, ceilings, floors and walls, carts, tanks, totes, basins, and drains.

Ozone reduces the levels of microorganism and biofilm build-up on all surfaces and may reduce FOG. Regular use throughout the plant will help to eliminate greasy film on facility floors.

Ozone can be safely used on wettable ceilings and walls to reduce and remove biofilms and molds (especially in areas of high sugar products). Ozone sanitation sprays keep conveyor belts clean and free of build-up. Build-up may consist of food debris, sugar, fat, grease, etc. It can also harbor biofilm that may consist of any number of human pathogens, as well as fungi.



Ozone vs. Chlorine – 11 days without sanitation.

Equipment surface sanitation.

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