

FOOD SAFETY • POST-HARVEST

DZ 9966 ROS: Advanced Oxidation for Food Safety & Shelf Life

A mineral oxychloride (sodium oxychloride) reactive-oxygen sanitizer that works like liquid ozone — delivering a rapid, high-log kill of foodborne pathogens across the value chain, from post-harvest wash to bacteria-free ice, with no change to the taste or appearance of the food.



Fresh seafood on ice — one of many points where DZ 9966 ROS protects product quality and safety.

6-log

PATHOGEN REDUCTION — UP TO A 5-6 LOG (99.9999%) KILL

<10 s

CONTACT TIME TO A 6-LOG KILL OF *SALMONELLA* & *LISTERIA*

>+700 mV

OPERATING ORP — THE HIGHER THE POTENTIAL, THE FASTER PATHOGENS DIE

Foodborne pathogens and spoilage organisms can be introduced at every stage of the supply chain — production, processing, transport, storage, in-store handling and display. DZ 9966 ROS gives grocers, growers and processors a single oxidation chemistry that intervenes at each of these points to cut contamination, control cross-contamination, and extend saleable shelf life.

THE CORE BENEFIT

Faster, broader pathogen kill than conventional sanitizers — at a lower cost than ozone — while leaving the color, texture and flavor of fresh produce, seafood and meat unchanged.



— The food-safety challenge

Contamination and quality degradation are not one-time events — they accumulate along the value chain. A single contaminated item, a biofilm-coated surface, or poorly managed ice can seed pathogens that spread from product to product and from water to product during washing. The result is recalls, liability exposure, and produce that spoils before it can be sold.

Among the sixteen most common foodborne pathogens, three drive most of the industry's cross-contamination risk: *Escherichia coli*, *Listeria monocytogenes* and *Salmonella*. Controlling these — on produce, in wash water, on carts and trays, and in ice — is the central objective of a DZ 9966 ROS program.

— How DZ 9966 works

DZ 9966 is a strong oxidizing sanitizer that **transfers electrons to a microorganism's cell wall almost instantly**, oxidizing the outer cell membrane using available electrons. The higher the oxidation potential (measured as ORP), the faster the microorganisms die.

Because the mechanism is physical oxidation rather than a biochemical pathway, **pathogens do not develop resistance** to DZ 9966 — unlike many conventional antimicrobials. It achieves up to a 5–6 log reduction of bacteria, viruses and other pathogens with **no change in the characteristics of the food**.

Functionally it behaves like **liquid ozone**: it delivers ozone-class oxidation power in a stable, applied solution, without an on-site ozone generator — and at lower cost. As the side table shows, its oxidation potential sits well above ozone and the chlorine-based sanitizers it replaces.

OXIDATION POTENTIAL OF COMMON OXIDANTS

REAGENT	FORMULA	VOLTS
Fluorine	F ₂	3.06
Mineral Oxychloride	M _x O _y Cl _t	2.8–2.9
Hydroxyl Radical	OH•	2.80
Oxygen Ion	O ⁻	2.42
Ozone	O ₃	2.07
Hydrogen Peroxide	H ₂ O ₂	1.78
Perhydroxyl Radical	HO ₂	1.70
Chlorine Dioxide	ClO ₂	1.57
Hypochlorous Acid	HOCl	1.49
Chlorine Gas	Cl ₂	1.36
Oxygen (Molecule)	O ₂	1.23
Hypochlorite Ion	OCl ⁻	0.94
Sodium Hypochlorite	NaOCl	0.94
Hydroperoxide Anion	HO ₂ ⁻	-0.88
Superoxide Radical	O ₂ ⁻	-2.40

— Proven results: cross-contamination control

In a study by a university post-harvest research program, DZ 9966 achieved a **6-log removal of *Salmonella* and *Listeria monocytogenes* in less than 10 seconds of contact time** when operated at **+670 mV or higher**. That speed is what allows a wash line to break the fruit-to-water and fruit-to-fruit transfer that lets one contaminated item compromise an entire lot.

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— Study conducted by a university post-harvest research program

— Shelf-life extension — no change in taste

Fresh raspberries from a grocery store were rinsed with DZ 9966 and held alongside an untreated control. By **day 12**, the untreated berries began showing mold; the DZ 9966-treated berries remained fresh and marketable. The treated fruit did not show its first mold until **day 18**.

For reference, the **average in-store shelf life is about 6 days** — so DZ 9966 roughly tripled the usable life of the fruit, with no reduction in taste to the consumer.



DAY 18: DZ 9966-TREATED RASPBERRIES (LEFT) STILL MARKETABLE; UNTREATED CONTROL (RIGHT) HEAVILY MOLDED.

DAYS AFTER PURCHASE	DZ 9966 TREATED	UNTREATED CONTROL
~6 (avg. store life)	Fresh, marketable	Fresh
12	Fresh, marketable	Mold appears
18	First mold appears	Heavily molded

Grocery-store raspberries, single-rinse DZ 9966 vs. untreated control (demonstration).

WHY SHELF LIFE IMPROVES

Biofilm is a leading cause of short shelf life. DZ 9966 oxidizes the extra-polymeric substance that shields microbial colonies, removing both planktonic and sessile organisms — an ORP above +450 mV is effective on any wet or dry surface.



— Intervention opportunities across the value chain

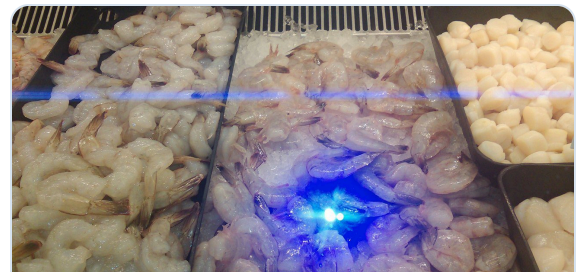
INTERVENTION POINT	WHAT DZ 9966 ROS DOES
Post-harvest wash	Rapid pathogen kill and cross-contamination control on incoming produce
Bacteria-free ice	Dosed source water at +700 mV destroys pathogens; ice keeps disinfecting power as it melts
Extended shelf life	Biofilm and spoilage-organism removal on produce, seafood and meat — no taste change
In-packaging & surfaces	Lower bacteria counts on carts, trays and any wet/dry surface

— Applications

- Control of biofilm on any wet or dry surface.
- Supplier application extends the shipping life of produce and increases product safety while reducing liability exposure.
- Improve the shelf life of produce, seafood and meat products — in-store application adds shelf life with no reduction in taste.
- Improve the safety of ice-making systems, where *Listeria* is common in poorly managed units.
- Lower bacteria counts on carts and trays.



POST-HARVEST SPRAY WASH — A PRIMARY DZ 9966 INTERVENTION POINT.



FRESH SEAFOOD DISPLAY — EXTENDED SHELF LIFE AND LOWER PATHOGEN LOADING.

— Regulatory status

EPA-Registered

USDA Organic

NSF

THE BOTTOM LINE

A DZ 9966 ROS food-safety and preservation program strengthens your food-safety profile, reduces recall and liability exposure, and extends shelf life across the value chain — delivering ozone-class oxidation at a lower cost than ozone.

Based on work by a food quality and safety research consortium and a university post-harvest research program. To discuss a program for your operation, contact D&Z Worldwide at deepak@dz-worldwide.com.