



## ECO-SHIELD CHEMICAL FREE WATER SANITATION

Eco-Shield is our new concept for building a fortress of safety around your products, your plant and staff; and our innovative chemical free water sanitation systems are a foundation of this.

Key Diagnostics believes that protecting the health and safety of everyone, including our planet, is paramount.

Our desire isn't just to provide substitutes but to find solutions that are greener and safer whilst providing scalable improvements.

## Share our World Where Food Safety is Powerful, Yet Pure.

### Sounds great, but what is it?

Over the last 25 years many distinct groups from a wide variety of global locations have examined Electrolysed Water as a disinfectant. Slightly Acidic Electrolyzed Water (SAEW) and Neutral Electrolyzed Water (NEW) are excellent options as alternative disinfectants. Given the safety profile of SAEW, its non-corrosive characteristics and lack of harmful by-products, the development of a commercially available product like BIOIONIX Activated Water and Envirolyte are logical for use in food safe disinfection to replace sanitisers.



## The Technology

Slightly acidic electrolyzed water (SAEW) technology uses a specialised electrolysis process to produce a mild yet highly effective disinfectant solution, 100 times more effective than bleach. By feeding a dilute electrolyte solution consisting of salt and weak acid, into an electrolysing cell, free chlorine species such as hypochlorous acid (HOCl) are generated in water with a pH range of roughly 5.0 to 6.5. This should not be confused with hypochlorite which is problematic and corrosive, and should be avoided.

This slightly acidic environment maximises HOCl's antimicrobial efficacy, enabling broad-spectrum disinfection of bacteria, viruses, and fungi while minimizing chemical residues and odors. SAEW offers numerous advantages, including:

- On-site generation
- Low toxicity
- Environmental friendliness
- Non corrosive
- Low odours

Making it an increasingly popular choice for food safety, healthcare sanitation and general surface disinfection.



### Natural Protection

Hypochlorous acid (HOCl) is produced by our bodies white cells to fight infection. It penetrates cell walls and works from within, just like nature.



### Approved for Contact With Food

Currently approved by EPA, FSANZ, USDA, FDA, APVMA, Halal and Organic processing.



### Removes Chemical Hazard

Low carbon alternative to costly chemicals, without the dangerous hazards and disposal problems.



### Safe and Eco-Friendly

Allows the recycling of contaminated water and brine, safely reducing costs, water usage and extending production cycles.

## Benefits

By eliminating the use of toxic chemicals and replacing with BIOIONIX Activated Water for food safe disinfection, the benefits include:

- **Disinfection:**
  - >7 log reduction in 30 seconds
  - Bacteria , Viruses and Spores
- **Cleaning Power:**
  - Effectiveness of nanobubbles
  - Attacks and controls biofilm
- **Non-Corrosive:**
  - Extends life of equipment
- **Non-Toxic:**
  - Chemical free
  - Safer for staff and environment
- **Water & Brine Reuse:**
  - Reduces water usage
  - Reduces turbidity
  - Reduces down time and cleaning
- **Shorten CIP Duration:**
  - Improve throughput
  - Saves water - no rinsing
  - Reduces downtime
- **Improve Product Quality:**
  - Tasteless
  - Odourless
  - Extends shelf life
- **Lowers Carbon Footprint:**
  - No transport costs
  - No disposal costs
  - Low power usage
  - Recycles water

## Non Corrosive

Activated water is non-corrosive compared to other common sanitisers, extending the life of membranes, stainless equipment, drains and more.



## Frequently Asked Questions

### What is Hypochlorous Acid?

Hypochlorous Acid (HOCl) is the predominant component of Slightly Acidic Electrolysed Water (SAEW). HOCl has 100 times the antimicrobial activity of hypochlorite (bleach). HOCl is completely non-toxic and all natural. This should not be confused with hypochlorite which is produced at a higher pH and comes with many hazards. Hypochlorite is corrosive, produces dangerous byproducts such as trihalomethanes and chloramines; and are strong irritants to the eyes, skin and respiratory tract of workers. In contrast, Hypochlorous Acid is low odour and much safer for food, the environment and staff.

### Why haven't I heard about SAEW or Hypochlorous Acid?

Slightly Acidic Electrolyzed Water (SAEW) and Hypochlorous Acid (HClO) have been extensively studied by scientists around the world for the past 25+ years. SAEW / HOCl are very difficult to produce with consistency and even harder to produce to industrial scale. Our suppliers are unique as they are the only industrial scale capabilities .

Also, chemical manufacturers make money selling drums of sanitisers, so a system that makes sanitiser from salt and water threatens their livelihood. It is in their best interests to keep this technology from being accepted.

### What is Eco-Shield?

Eco-Shield creating a fortress of safety around your plant, your products and your staff that is both economical but is eco-friendly for the planet. It is built on four pillars;

- 1. Monitoring Tools** - this is what our company was built on, providing innovative HACCP monitoring tools for food safety
- 2. Real Time Biofilm Detection** - our Bactiscan range utilising revolutionary UV detection
- 3. Air Sanitiation** - converts the moisture in the air into an high performance sanitiser that is safe to run during production so that it can kill airborne bacteria, spores and viruses in seconds.
- 4. Water Sanitation** - as detailed in this white paper.

### What are Nanobubbles?

- Nanobubbles are extremely small gas bubbles, 100 nanometers or less in diameter.
- Their negative charge allows them to remain suspended in liquids for extended periods of time.
- Nanobubble charged surfaces promote electrostatic interactions with hydrophobic contaminants, such as fats, oils and grease, allowing for the removal of these substances from surfaces.
- As the bubbles burst, they produce jets of extremely high pressure and temperature, cleaning contact surfaces of organic matter, biofilms and solids.
- The suspended solids are then lifted out of the solution by the bubbles, enabling easy removal.
- During their collapse, the bubbles also release hydroxyl radicals, resulting in powerful localised disinfection.



### How is SAEW Eco-Friendly?

- Created from just salt and water and breaks back down into water, oxygen and a small amount of chloride ions.
- No persistent or toxic chemical residues remain.
- Biodegradable and safe for disposal, poses no problems for wastewater treatment systems.
- It is slightly acidic and therefore is gentler on surfaces compared the strongly acidic and alkaline chemicals
- Lower Energy Footprint
  - No transport costs - created on demand
  - Low power usage
  - Can replace hot water applications
- Reduce water usage
  - Recycling of water and brines
  - Cuts out a rinse step in CIP
  - Doesn't require a rinse for product use
- Safer work environment
  - Reduces hazardous / costly chemicals
  - Risk free mid process sanitation

# Validation Study

Partnering with **USDA/FDA**, accredited 3rd party labs and the industry, BIOIONIX performed a validation study to demonstrate the effectiveness of using BIOIONIX to generate activated water in the form of 99% hypochlorous acid (HOCl) to disinfect various surfaces for the elimination of bacteria and pathogens commonly found.

## Testing Elements

Bacteria and pathogens tested include:

- Salmonella spp.
- Listeria monocytogenes
- E. coli O157:H7
- Bacillus cereus

Surfaces sanitised include:

- 316 Stainless Steel
- Epoxy Floor Tile
- Plastic

## Testing Design

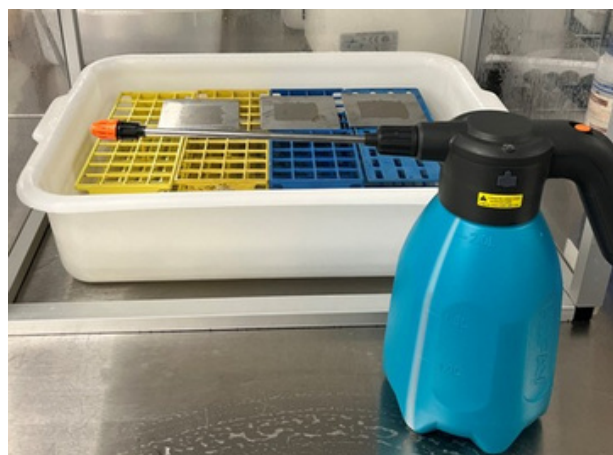
A small recirculating BIOIONIX system was used in pair with an acidifier, salt, and water to generate activated water comprised of **99% HOCl** at a **pH = 5.5**, **FAC = 150ppm**, and temperature of 67°F. This solution was then transferred to an automatic sprayer at 65 PSI (10mL/s) and used to treat each coupon for 30 seconds at a distance of 15-20cm. After treatment, the activated water was then allowed to gravity run-off and the samples rested in open air for 20min prior to being plated.

After treated coupons finished culturing, the coupons were then tested to determine microbial reductions.

## Preparation

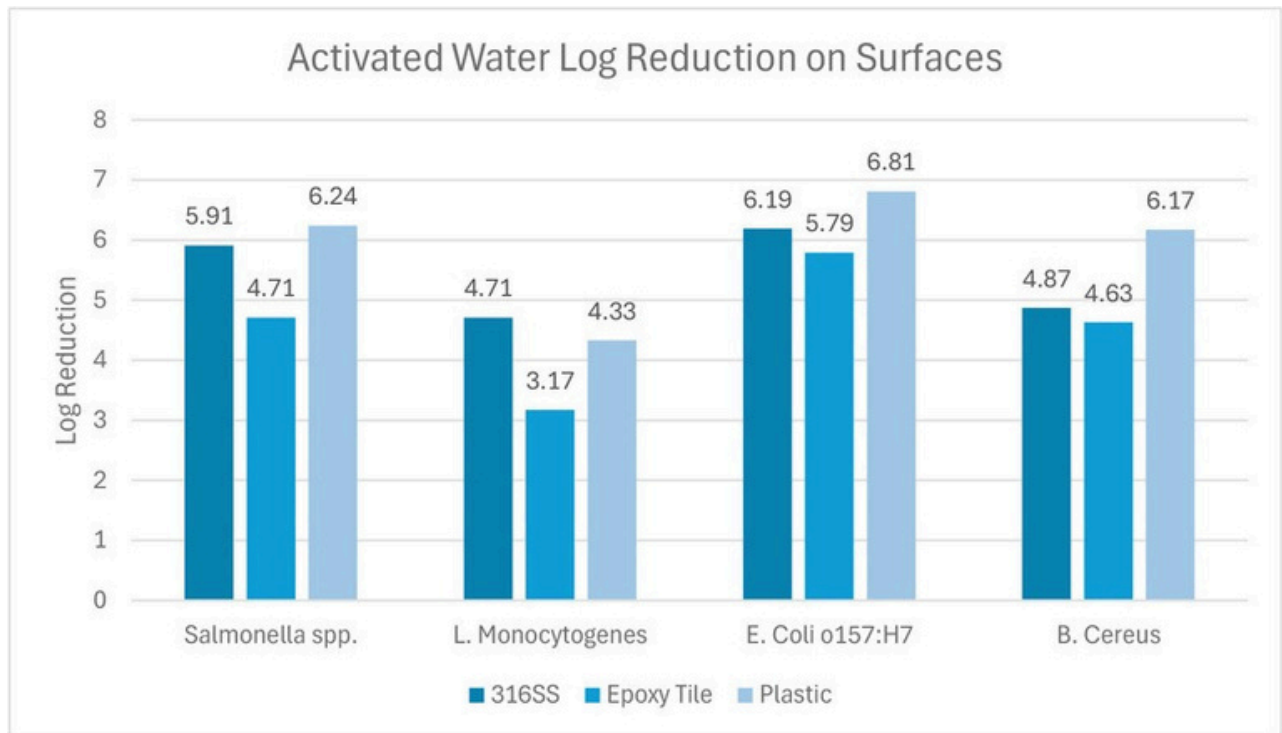
In preparation for the validation, three (3) of each stainless steel, epoxy tile, and plastic coupons were inoculated with 7-8 log<sub>10</sub> CFU/coupon of subject bacteria/pathogens above. These coupons were then placed in a 30°F cooler for 18hrs at 30%RH to dry and stabilise. Within this validation a 24-sample matrix consisting variable material type and contaminant was configured and repeated for three (3) trials to ensure an adequate representation of the results.

Activated Water & Treatment Characteristics	
Distance from Coupons	15-20cm
Treatment Time	30s
Flow rate	10mL/s
Temperature	67 degF
Water Pressure	65psi
pH	5.5 (+/-) 5%
FAC	150ppm (+/-) 10%



# Conclusion

## Average Results



## Testimonials

"Using the BIOIONIX system we were able to eliminate \$80k of chemicals per year while improving quality and reducing downtime."



Plant Manager

"Before BIOIONIX, we were having daily quality events and tried all other available disinfection products on the market with no success. Since installing the BIOIONIX we have had 0 product quality events for 4 years."



Plant Manager

"BIOIONIX equipment and service give me peace of mind when I'm not in the plant because I know that Bioionix has the quality covered."



QA Manager

## What happens when you eliminate toxic chemicals from your plant?

- You improve taste and food quality
- You increase consumer perception
- You create a safer environment for your employees
- You save water and help the planet
- You have a green message for you customers
- And...you save money

## Eco-Shield - The Future is Greener and Safer