Beyond Eradication

Can We Accept Effective Forms of Sanitization that Go Beyond the Killer Chemical Paradigm?

| BY DR. JOELLEN FEIRTAG

In 1774 Swedish pharmacist Carl Wilhelm Scheele unwittingly discovered chlorine, but it wasn't used as a sanitizer until 73 years later, in 1847, to prevent the spread of "child bed fever" in the maternity ward at Vienna General Hospital.

Today, it remains as the most widely used, yet most commonly misunderstood sanitizer in the food services industry. Even though chemistry has progressed, and many new and effective sanitizers have emerged, it seems that the food services industry has maintained the same paradigm. That is, if you want to sanitize, use a chemical.

The ideal disinfectant would offer maximum antimicrobial efficacy without harming other forms of life. Unfortunately, chemical disinfectants cannot satisfy this ideal. Virtually all chemical disinfectants, by their very nature, are potentially harmful, and in most cases, toxic. Political correctness has eliminated the skull and cross bones, but if you go back just a few years, that symbol appeared on virtually every sanitizer used in the food industry.

Let's take a look at some of the sanitizers that are most common to our industry, and let's take another look at one or more advanced alternatives that could signal a paradigm shift to a green, more effective and safer sanitizing solution.

Chlorine Bleach

Exactly how chlorine in the form of sodium hypochlorite kills microorganisms is still something of a mystery. What we do know is that its effectiveness varies widely based on a number of human factors. These factors are concentration, length of contact time, temperature, type and concentration of organism and perhaps most important, pH. For example, bleach concentrate out of the bottle has a pH of about 12.4. When diluted in water at a pH of around 7.0 its pH can remain as high as 10.4.

"At alkaline pH values of about 8.5 or higher, 90 percent of the bleach is in the form of the hypochlorite ion (OCL-), which is relatively ineffective antimicrobally," says Dr. Norman Miner at MicroChem Labs (Newton Mass.). "At acidic pH values of about 6.8 or lower, more than 80 percent of the bleach is in the form of hypochlorous acid (HOCL). HOCL is about 80 to 200 times more antimicrobial than OCL-.

Both Dr. Miner and the EPA have recommended adding vinegar to bleach to drop the pH and raise its antimicrobial efficacy.

Quaternary Ammonia

There are a variety of quat compounds that vary in effectiveness against a variety of pathogens. Quat compounds generally leave residues that can be a mixed blessing.

The good news about quat residue is that generally the residue continues to provide an antimicrobial effect. The bad news is that the residue needs to be removed from food preparation surfaces and food storage surfaces as contact with food could contaminate foods. In Florida, for example, grapefruit stored in bins with residue from quat compounds have been damaged and discolored by the residue.

Although fairly effective, quat compounds can be toxic if inhaled, ingested or if it comes into contact with skin. Concentrated solutions can be corrosive and can cause burns to dermal tissue. Other effects depend on length of exposure and concentrations include nausea, vomiting and convulsion. Death may occur within one to three hours after ingestion.

Peracetic Acid

Peracetic acid, in a diluted form, is safe enough to apply directly to food without rinsing. It is an extremely effective sanitizer composed of varying quantities of acetic acid and hydrogen peroxide in an aqueous reaction medium containing a sulfuric acid catalyst.

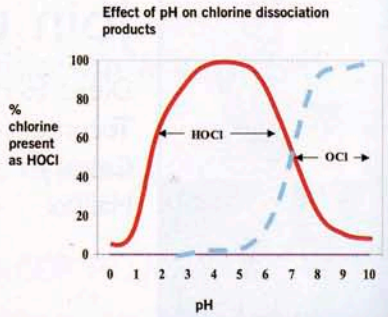
The fact that a highly diluted concentration can be applied to food to effectively sanitize is where the good news ends.

Hypochlorous Acid (HOCl) vs. Hypochlorite (OCl)

The effectiveness of chlorine as a sanitizer in a larger part is determined by the pH of the water.

"Available chlorine" exists primarily as HOCl between pH 2.5 to 6.5.

Since HOCl is undissociated and charged, it is 50 to 80 times more effective against pathogens than OCl (hypochlorite).



At 110° F, a temperature of a truck cargo area on a hot summer day, it can explode. This is why many trucking companies and overnight delivery services will not ship it. In concentrated form it may react violently with organic materials. It is known to be toxic to inhale ingest or absorb through the skin. Most food

PRELIMINARY COST SAVINGS

ANALYSIS FOR USING THE ALKALINE WATER FROM THE ELECTROLYZER MACHINE IN LIEU OF CHEMICALS

EXISTING USAGE	USAGE PER MO.	COST PER CASE	MONTHLY SAVINGS	YEARLY SAVINGS
ENERGIZE MACH. SOAP	3 CASES -12 UNITS	$66.00	$198	$2,376
BREAKER BREAKER	1 CASE - 4 GALL	$26.00	$26.00	$312
BLEACH	1 CASE - 4 GALL	$7.26	$7.26	$87
FOAMING SOAP	3 EACH 2000ML	$67.50	$67.50	$810
SPARKLE PRESOAK	5 GALLON	$42.25	5 EA GAL	$507
SPIC & SPAN CONC. FLOOR CLEANER	3 EACH GALLON	$16.83	$50.49	$605.88

YEARLY OPTIMUM SAVINGS TOTAL: $4,698

EXISTING USAGE	USAGE PER MO.	COST PER CASE	MONTHLY SAVINGS		YEARLY SAVINGS
ENERGIZE MACH. SOAP	3 CASES -12 UNITS	$66.00	$198.00	75% DECREASE	$1,782
BREAKER BREAKER	1 CASE - 4 GALL	$26.00	$26.00	100% DECREASE	$312
BLEACH	1 CASE - 4 GALL	$7.26	$7.26	100% DECREASE	$87
FOAMING SOAP	3 EACH 2000 ML	$67.50	$67.50	50% DECREASE	$405
SPARKLE PRESOAK	5 EACH GAL	$8.45	$42.25	100% DECREASE	$507
SPIC & SPAN CONC. FLOOR CLEANER	3 EACH GAL	$16.83	$50.49	50% DECREASE	$303

YEARLY CONS SAVINGS TOTAL: $3,396

service operators who choose to use this substance require a precise mixing device to mix exactly the correct dilution. However, if the mixing device ever malfunctions the consequences could be unthinkable.

Chlorine Dioxide

Chlorine dioxide is also a very effective sanitizer. However, according to the New Jersey Department of Health, it is explosive at concentrations greater than 10 percent and can be ignited by sunlight, heat or sparks. This chemical can cause nose and throat irritation, and can irritate lung tissue. U.S. DOT regulations forbid its transport in non-hydrated form.

Although our approach to chemical sanitization has become more efficient and sophisticated one thing has remained constant. Chemicals are potentially dangerous, and if the increasing number of *E-Coli*, *Salmonella* and *Norovirus* outbreaks is an indicator, they are easily misused, or are less effective than we would like them to be.

All of the substances that are covered here fall into a single simple category, poison.

Until recently, there have been few if any alternatives to these useful, effective but often dangerous substances. Today, finally there is a technology that combines three simple elements, water, salt and electricity to create a sanitizer that has proven to be more effective at 50 parts per million than chlorine bleach is at 200 parts per million.

It is known as electrolyzed water. It is effective, safe easy to generate and costs a half cent per gallon. Although prolonged eye exposure or ingestion is not recommended, if it gets into the eyes, limited exposure will not harm them. If it is ingested, there are few, if any, harmful effects beyond killing "good bacteria" in the throat.

This water can be generated in any environment. The process is elegant in its simplicity. Tap water is passed into two chambers, one with a positive electrode, and the other with a negative electrode.

Between the two chambers are a set of ion transfer membranes. A saturated saline solution is passed between the membranes allowing the transport of saline ions into the two chambers. Chloride ions which are negatively charged are attracted to the positive electrical charge and electrochemically converted from Cl to HOCL or hypochlorous acid at a fairly low pH.

The sodium ions are positively charged and are attracted to the negative electrode chamber where water is electrolyzed to form NaOH or a sodium hydroxide solution at a fairly high pH. The solutions exit the respective chambers in separate streams, and can be used for a wide variety of purposes. The hypochlorous acid is a powerful sanitizer which dries, residue free.

The sodium hydroxide is an effective cleaner that can be used to remove dirt and grease from any device or surface in a food service operation. A number of users have documented significant savings in chemical costs, but even greater savings on the cost of soaps and detergents.

This approach, based on advanced electrochemical technology by Electrolyzer Corp. (Woburn, Mass.), is catching on in food service operations throughout the U.S. and the world.

Electrolyzed water is safe for people and the environment; it is as effective as many chemicals and more effective than others. Both streams of electrolyzed water are nontoxic, useful and can save an operation thousands of dollars per year. One chain of pub restaurants has documented an anticipated savings of close to $5,000 per year per operation on the alkaline stream alone to replace or augment their chemical detergents for washing floors, food preparation surfaces and even dishes. As the United Culinary Chef's Association stated in their newsletter, "Green is coming to our industry, and it is the color of water." ■

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