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Know Your Sanitizer

by Melissa Vaccaro, MS, CHO

All foodservice facilities have sanitizers around. Sometimes we forget that they are actually chemicals, and overlook that they can be dangerous. The regulatory concerns involving chemical sanitizers focus on antimicrobial effectiveness, safety of residues on food and food contact surfaces, and environmental and personal safety.

Chemical safety rules for foodservice facilities include the following:

- Sanitizers are chemicals. Use them as instructed.
- Store chemicals properly, according to the manufacturer label.
- Store chemicals away from food, food contact surfaces, linens, utensils, equipment, and single-service items.

- Read the product labels. Follow instructions that apply for each chemical usage situation. Failure to read the label and use the product correctly could lead to severe injury or death.
- Properly label all containers, buckets, spray bottles, or other secondary containers of sanitizer.
- When using chemicals, take care not to contaminate other areas of the facility or yourself.
- Never mix chemicals together.

REGULATION OF SANITIZERS

The registration of chemical sanitizers and antimicrobial agents for use on food and food product contact surfaces and on non-product contact surfaces is through the **U.S. Environmental Protection Agency (EPA)**. Prior to approval and registration, the EPA reviews efficacy and safety data, and product labeling information.

The **U.S. Food and Drug Administration (FDA)** is primarily involved in evaluating residues from sanitizer use that may enter the food supply. Thus, any antimicrobial agent and its maximum usage level for direct use on food or food contact surfaces must be approved by the FDA. Approved no-rinse food contact sanitizers and non-food contact sanitizers, their formulations, and usage levels are listed in the *Code of Federal Regulations* (21 CFR 178.1010).

The **U.S. Department of Agriculture (USDA)** also has lists of antimicrobial compounds *(USDA List of Proprietary Substances and Nonfood Product Contact Compounds),* which are primarily used in the regulation of meats, poultry, and related products by the USDA's Food Safety and Inspection Service (FSIS).

Although most states follow the lead of the Federal agencies, your individual state may have other food and food contact surface sanitizer regulations. Always check with your state food regulatory agency for further information on any state requirements or restrictions.

Sanitizing and disinfecting are very similar, but are not exactly the same. The EPA lists more specific and technical details regarding the guidelines for sanitizers and disinfectants, but they go into far more detail than most foodservice workers need. Generally, according to the EPA, the following are the standard definitions of clean, sanitize, and disinfect.

Clean

The process that physically removes debris from the surface or area by scrubbing, washing, and rinsing. It may be accomplished with soap or detergent and water.

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Sanitize

A product that kills 99.9 percent of germs identified on its label. Sanitizers are used to reduce, but not necessarily eliminate, microorganisms from the inanimate environment levels considered safe as determined by public health codes or regulations. In the foodservice industry, sanitizing is the level of destruction we are going for on food and food contact surfaces.

Disinfect

A product that kills nearly 100 percent of germs identified on its label. Disinfectants are used on hard inanimate surfaces and objects to destroy or irreversibly inactivate infectious fungi and bacteria, but not necessarily their spores. There are two major types of disinfectants: hospital and general use. Hospital disinfectants are the most critical to infection control, while general disinfectants are typically used in households, swimming pools, and water purifiers.

ANY CHLORINE BLEACH used must be a "food grade" substance. Some commercially available household chlorine bleaches contain fragrances, thickeners, and/or other additives not approved for food use.

USE OF CHEMICAL TEST STRIPS

Parts per million (PPM) basically means out of a million. One ppm is equivalent to 1 milligram of something per liter of water. For those who like numbers: 1ppm = 1/100000 = 0.000001 = 1x10 -6

So, without all of the math, it is the concentration of the solution. In this case how much sanitizer (chemical) is in the water? This is very important when using chemicals because too much is toxic, and too little will not ensure sanitation.

How do we tell if we have the correct ppm? One way is to measure. For example, 1 teaspoon of chlorine bleach (5.25 percent) in 1 gallon of water is approximately 65ppm, and 1 tablespoon in 1 gallon of water is 200ppm. The other—more accurate—way to measure sanitizer concentration is to use a sanitizer test strip kit. This is a color indicator paper strip that when dipped into the final mixture will give you a color indication of the ppm. Liquid titration test kits can also be used, but they are much more costly and time consuming to use. Test strips are specific to each chemical sanitizer being used. Make sure you are using the proper test strips and that they are not expired.

TYPES OF SANITIZERS USED IN FOOD SERVICE

Chlorine Compounds (Chlorine, HOCl)

Chlorine, in its various forms, is the most commonly used sanitizer in food processing and foodservice facilities. Chlorine has a broad range of effects and is active against most bacteria, viruses, yeasts, molds, fungi, and protozoans. Chlorine-based sanitizers form hypochlorous acid (HOCl, the most active form) in liquid form. For hypochlorites, an exposure time of 1 minute at a *minimum* concentration of 50ppm and a temperature of 75°F are suggested. The *maximum* acceptable level for no-rinse use is 200ppm available chlorine, but recommended usage levels vary, so read your product labels.

The benefit of using chlorine is that it has activity at low temperature, is relatively cheap and easy to find, and leaves minimal residue or film on surfaces. Unfortunately, the activity of chlorine is radically affected by such factors as pH, temperature, and soil load. Chlorine is less affected by water hardness when compared to other sanitizers. Elevated temperatures will evaporate off the chlorine, and excessive soil loads will cause chlorine to be less effective.

The main shortcoming to using a chlorine compound is corrosiveness to many metal surfaces, especially at higher temperatures (and of course it can bleach out your uniform if you spill it on yourself). Health and safety concerns can occur because of skin irritation and mucous membrane damage in confined areas.

Any chlorine bleach being used must be a "food grade" substance. Some commercially available household chlorine bleaches contain fragrances, thickeners, and/or other additives not approved for food use. These products

are not suitable for use in foodservice facilities to sanitize food and food contact surfaces.

Quaternary Ammonium Compounds (Quats)

Quats are active and stable over a broad temperature range, which is a benefit to the foodservice industry. Quats are effective against bacteria, yeasts, mold, and viruses. The concentration of quats to use on food and food contact surfaces varies by the specific chemical formulation being used by the chemical producer. Concentration ranges typically from 150-400ppm at a minimum temperature of 75°F. You must read the label on quats to determine the specific concentration.

Quats possess some cleaning ability; therefore, they are less affected by light soil than are other sanitizers. That being said, heavy soil will decrease its effectiveness. Quats generally have better effects in alkaline (more basic) pH water. Lack of tolerance to hard water is often listed as a major disadvantage of quats, but with today's science some quats are fairly tolerant of hard water. An advantage of quaternary ammonia compounds in some applications is that they leave a residual antimicrobial film. Though an advantage to most foodservice facilities, this would not be advantageous in operations producing such items as cultured dairy products, cheese, beer, etc., where microbial starter cultures are used.

Quats are not very compatible with certain detergents or chlorine-containing compounds, therefore thorough rinsing following the cleaning step is absolutely necessary to avoid inhalation of any dangerous gasses.

Iodine

Iodophors, like chlorine compounds, have a very broad range and are active against bacteria, viruses, yeasts, molds, fungi, and protozoans. Iodine is highly temperature-dependent and evaporates at 120°F. Thus, it is limited to lower temperature uses. Iodophors are generally less affected by organic matter and water hardness than chlorine. However, loss of activity is prominent at higher, more basic water pH levels. In the foodservice industry, iodine must be used between 12.5-25 ppm at a minimum temperature of 68°F.

Iodine has a long history of use in the medical world; however, like many chemicals and sanitizers, ingestion of iodine gas poses a toxicity risk in closed environments. The primary disadvantage is that iodine can cause staining on some surfaces (especially plastics) due to its yellow/brown color.

It is not necessary that employees understand all of the science behind sanitizers, but every employee should know

- What sanitizer is being used.
- How to mix the sanitizer properly.
- How to test the concentration of the sanitizer and at what temperature.

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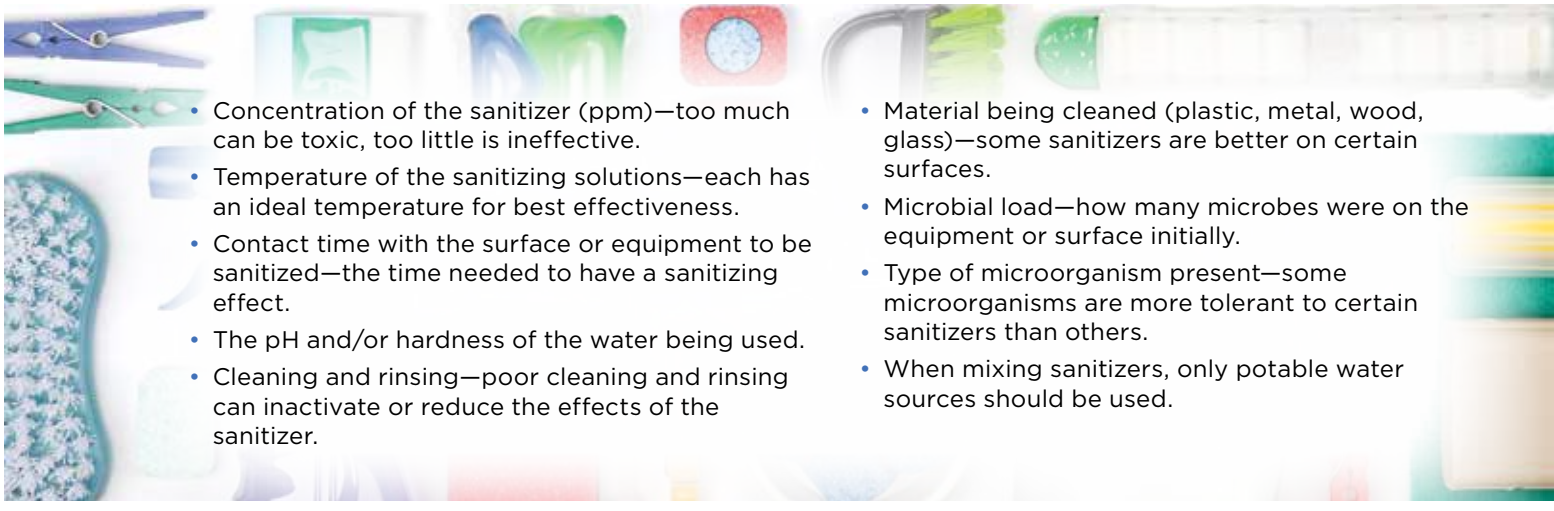
FACTORS THAT AFFECT SANITIZERS



- Concentration of the sanitizer (ppm)—too much can be toxic, too little is ineffective.
- Temperature of the sanitizing solutions—each has an ideal temperature for best effectiveness.
- Contact time with the surface or equipment to be sanitized—the time needed to have a sanitizing effect.
- The pH and/or hardness of the water being used.
- Cleaning and rinsing—poor cleaning and rinsing can inactivate or reduce the effects of the sanitizer.
- Material being cleaned (plastic, metal, wood, glass)—some sanitizers are better on certain surfaces.
- Microbial load—how many microbes were on the equipment or surface initially.
- Type of microorganism present—some microorganisms are more tolerant to certain sanitizers than others.
- When mixing sanitizers, only potable water sources should be used.

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- How to properly use or dispense the sanitizer.
- How to properly store the sanitizer when in use or not in use.
- How to handle any emergency situations with relation to the sanitizer (chemical safety).

Don't underestimate the purpose and importance of sanitizers in your foodservice facility. Use them as directed for best results and optimal safety.

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SOURCES:

- Food Code 2013. U.S. Public Health Service, Food and Drug Administration, Washington, DC.
- McGlynn, William. "Guidelines for the Use of Chlorine Bleach as a Sanitizer in Food Processing Operations" Food Technology Fact Sheet, FAPC-116. Oklahoma Cooperative Extension Service.
- Schmidt, Ronald H. "Basic Elements of Equipment Cleaning and Sanitizing in Food Processing and Handling Operations," FA14. Food Science and Human Nutrition Department, University of Florida, Institute of Food and Agricultural Sciences Extension.

Review Questions

FOOD PROTECTION CONNECTION

Reading *Know Your Sanitizer* and successfully completing these questions online has been approved for 1 hour of sanitation CE for CDM, CFPPs. CE credit is available ONLINE ONLY. To earn 1 San CE hour, access the online CE quiz in the ANFP Marketplace. Visit **www.ANFPonline.org/market**, select "**Publication**," then select "**CE article**" at left, then search the title *"Know Your Sanitizer"* and purchase the article.

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1. Which sanitizer has an acceptable concentration of 50-200ppm?
   A. Iodine
   B. Chlorine
   C. Quat
2. Which sanitizer can leave stains on equipment, especially plastics?
   A. Iodine
   B. Chlorine
   C. Quat
3. Which sanitizer is best used at 150-400ppm at 75˚F?
   A. Iodine
   B. Chlorine
   C. Quat
4. What is used to test the concentration of a chemical sanitizer in a food facility?
   A. Sanitizer test strips
   B. A swimming pool chlorine test kit
   C. A thermometer
5. Antimicrobial agents and their maximum usage level for direct use on food or food contact surfaces must be approved by:
   A. EPA
   B. FDA
   C. USDA
6. For a chemical sanitizer you must always:
   A. Buy the most expensive product
   B. Store product outside of the facility
   C. Read the product label
7. Food employees should know:
   A. The science behind all chemicals they use
   B. What sanitizers work best for metals vs. plastics
   C. How to mix, measure concentration, and properly use their sanitizer