

**Hypochlorite** (The Practical Application of Disinfectant and Sterilization in Health Care Facilities, Chapter 5, pp 41-45, Cokendolpher and Haukos. AHA 1996).

Is a very good general disinfectant available to many facilities are household bleach (5.25% sodium hypochlorite).

However, bleach is not a miracle disinfectant. Bleach has a long proven history, having been used as an antiseptic and disinfectant since 1846 (Ware, 1989). However, the use of household bleach has some negative aspects. Bleach is inactivated by the presence of organic matter such as dirt, blood, and excrement. Bleach should not be exposed to ammonia-containing compounds like those found in many household cleaners and detergents. The combination of chlorine and ammonia liberates chloramines gas, which is very hazardous to humans. Chloramine gas then breaks down to hypochlorous acid, which is very corrosive when contacting water in the mucous of the mouth and lungs. Bleach also has the potential of bleaching or discoloring fabrics and synthetic materials such as carpet and upholstery. Concentrations of bleach that are stronger than the dilution recommended for nonporous surfaces (1:100 bleach/water) are corrosive to most metals.

Bleach is effective against the following:

- A broad spectrum of bacteria
- Lipid and nonlipid virus
- Fungi
- Slime-forming algae
- Protozoa
- Nematodes

Because OSHA recognizes household bleach as an effective tuberculocidal disinfectant, many professionals wishing to comply with the Bloodborne Pathogen Standard have used bleach solutions for disinfections of sites contaminated with blood or other body fluids. However, most household bleach products are not specifically labeled for use as tuberculocidal disinfectants. This creates conflict because it is stated in the OSHA standard that one must use an appropriate disinfectant, which is registered with the EPA. Bleach is an appropriate disinfectant, but most household bleach products are not registered with the EPA as tuberculocides. Therefore, directions for tuberculocidal effectiveness are not found on the labels of most bleach products. Clorox bleach is the only household bleach solution that is currently registered with the EPA as an effective agent against *M. tuberculosis* (see **Antimicrobial Chemical/Registration Number Indexes** <http://www.epa.gov/oppad001/chemregindex.htm>)

Many household bleach solutions are registered with the EPA as sanitizers. In order to carry a sanitizer label claim, the product must contain at least 200 ppm available chlorine. It must reduce the number of but not necessarily eliminate, microorganisms from inanimate environments to levels considered safe as determined by public health codes or regulations. Sanitizers for food contact surfaces must be effective against either *Salmonella typhi* or *Staphylococcus aureus* bacteria; whereas nonfood contact surface sanitizers must be effective against *Staphylococcus aureus* and either *Klebsiella pneumoniae* or *Enterobacter aerogenes* bacteria.

## **Guide for Use**

### **As a Tuberculocide**

Some guidelines for the use of household bleach (5.25% sodium hypochlorite) as tuberculocidal disinfectant have been developed by infection control experts:

1. A 1:10 (1 part bleach in 10 parts water, or about 1/2 cups of bleach in 1 gallon of water) dilution (=5,000 ppm available chlorine) is appropriate for porous surfaces (wood, cloth, concrete, etc.) that cannot effectively be pre-cleaned of organic matter. The 1:10 dilution is typically considered too corrosive for many surfaces.
2. A 1:100 (1 part bleach to 100 parts water, or approximately 1/4 cup of bleach in 1 gallon of water) dilution supplies 500 ppm available chlorine and can be used on smooth pre-cleaned surfaces (glass, plastic, metal, etc.) The object to be disinfected should be thoroughly moistened with the solution (spray or sponged) and left to air dry.
3. When using diluted bleach for disinfections of a surface with a blood spill, one suggested protocol follows these directions:
  - Remove blood and other organic matter with a disposable material (paper towel would be acceptable), because organic matter (blood, body secretions, etc.) inactivates sodium hypochlorite.
  - Place dirty towel in an impervious container (appropriately labeled or color coded as biohazardous) to eliminate possible transmission of bloodborne pathogens by accidental contact with the cleaning materials.

- Spray the spill site with the diluted bleach solution. Spray enough of the dilution on the site to make the surface “glisten;” this means to neither flood the site nor just spray a couple of drops.

The above information relates to bleach solutions of products not registered with the EPA as effective against Mycobacterium. For Clorox bleach, which is registered as effective by the EPA, you should follow the label directions: “To disinfectant hard nonporous surfaces, clean surface by removing gross filth (loose dirt, debris, food material, etc.). Prepare a dilution of 1 part Clorox to 10 parts water (13 oz/gallon). (5,000 ppm available chlorine). Thoroughly wet surfaces with the solution and allow it to remain in contact with the surface for 10 minutes. Rinse with clean water and dry.” Be aware that the Clorox label instructs the users to use a bleach dilution on a nonporous surface that is much higher than that recommended by infection control experts. One could expect to experience metal corrosion with the use of 5,000 ppm, available chlorine.

In a laboratory setting, where cultured pathogens are concentrated, cleanup procedures for spills or contamination are specific and more stringent than those mentioned above. The recommended guidelines are as follows:

- Immobilize the spill with an absorbent material
- Add concentrated germicide to the spill
- Allow the germicide to sit for 15 to 20 minutes
- Clean up visible organic matter
- Then follow the steps above the use of a bleach dilution (1:100 or an appropriate proprietary product).

### **As a Sanitizer**

Bleach is also frequently used as a sanitizer; as a rinse on food-service and surfaces such as dishes and cooking utensils, and on equipment and utensils found in dairies, food-processing plants, and eating and drinking establishments. Sanitizers also include laundry additives and toilets bowl sanitizers (U.S. EPA, 1991b). The chemical must be able to reduce contamination in the inanimate environment to levels considered as safe as determined by Public Health Ordinance, or reduce the bacterial population by significant numbers when public health requirements have not been established. When bleach is used as a sanitizer, it must have at least 200 ppm of available chlorine, this equates to a bleach and water mixture of 1 tablespoon of bleach to 1 gallon of water.

**List B: EPA Registered Tuberculocide Products Effective Against *Mycobacterium tuberculosis*:**

Amuchina (65787-1), Austin A-1 (1672-65), Borchlor 10 (41504-20002), Clorox Bleach (5813-1), CPPC Bleach (67619-1), CPPC Storm (67619-13), CPPC Tsumani (67619-12), CPPC Ultra Bleach (67619-7), CPPC Ultra Bleach 2 (67619-8), Current Technologies Disinfecting Spray with Bleach (70590-2), Clatech Dispatch Hospital Cleaner Disinfectant (56392-7), Lass-o Bleach (70271-3), Pure Bright (70271-10), Pure Bright Disinfectant Bleach (70271-3), Pure Bright Gemicidal Ultra Bleach (70271-13), Super-Chlor (69687-1), Syscco Reliance Ultra Disinfectant Bleach (29055-3), and Ultra Clorox Bleach Formula (5813-71), Ultra-Clorox Brand 6.15% Bleach (5813-52), Ultra Clorox Brand Regular Bleach (5813-50), and Vertex Gemicidal Ultra Bleach (9616-13),

**Shelf-life:**

Hypochlorite solutions in tapwater at a pH>8 stored at room temperature (23°C) in closed, opaque plastic containers may lose up to 40-50% of their free available chlorine level over a period of one month. Thus, if a user wished to have a solution containing 500 ppm of available chlorine at day 30, a solution containing 1000 ppm of chlorine should be prepared at time 0. There is no decomposition of sodium hypochlorite solution after 30 days when stored in a closed brown bottle.

**Reference:**

Rutala WA, Cole EC, Thomann CA, Weber DJ. Stability and bactericidal activity of chlorine solutions. *Infect. Control Hosp. Epidemiol.* 1998;19:323-7.  
57.

## **Bloodborne Pathogen Standard:**

[2001 - 11/27/2001 - CPL 02-02-069 \[CPL 2-2.69\] - Enforcement Procedures for the Occupational Exposure to Bloodborne Pathogens](#)

Under paragraph (d)(4)(ii)(A), cleaning of contaminated work surfaces after completion of procedures is required to ensure that employees are not unwittingly exposed to blood or OPIM remaining on a surface from previous procedures. This paragraph requires contaminated work surfaces to be cleaned with an "appropriate disinfectant." Appropriate disinfectants include a diluted bleach solution and EPA-registered tuberculocides (List B), sterilants registered by EPA (List A), products registered against HIV/HBV(List D) or Sterilants/ High Level Disinfectants cleared by the FDA. The lists of the EPA Registered Products are available from the National Antimicrobial Information Network on its web site at <http://nain.orst.edu/> or at (800) 447-6349. The sterilants and high level disinfectants cleared by FDA can be found at <http://www.fda.gov/cdrh/ode/germlab.html>. Any of the above products are considered effective when used according to the manufacturer's instructions, provided the surfaces have not become contaminated with agents or volumes of or concentrations of agents for which higher level disinfection is recommended.

NOTE: The EPA lists contain the primary registrants' products only. The same formulation is frequently repackaged and renamed and distributed by other companies. These renamed products will not appear on the list, but their EPA Registration number must appear on the label. Products cleared solely by the FDA will not have an EPA number.

INSPECTION GUIDELINES. Compliance Officers should check the product label for EPA registration and/or consult the Environmental Protection Agency (EPA) lists of registered sterilants (representing the highest level of antimicrobial activity that destroys all viruses), tuberculocidal disinfectants (effective against tuberculosis bacteria and the specific viruses named on the product label as well as the hepatitis B virus), and antimicrobials with HIV/HBV efficacy claims for verification that the disinfectant used is appropriate. The employer must follow the label instructions regarding the amount of disinfectant and the length of time it must remain wet on the surface. Since the effectiveness of a disinfectant is governed by strict adherence to the instructions on the label, Compliance Officers should also interview employees to ensure that the disinfectants are being used according to the manufacturer's instructions. If employees have not been trained in the proper use of the disinfectant, a violation of the appropriate paragraph in (g)(2)(vii) should be cited.

NOTE: Fresh solutions of diluted household bleach made up daily (every 24 hours) are also considered appropriate for disinfection of environmental surfaces and for decontamination of sites following initial cleanup (i.e., wiping up) of spills of blood or other potentially infectious materials. Contact time for bleach is

generally considered to be the time it takes the product to air dry. Solutions of bleach should not be stored in glass containers, but in material such as the plastic in which the bleach, the consumer product, is packaged in. Household bleach (5.25% sodium hypochlorite) diluted to the appropriate strength for the clean up job at hand is also an effective disinfectant, although bleach may cause damage to some medical instruments and therefore cannot be used in all cases. In addition, gross contamination must be cleaned up first with a soap and water solution, to ensure the disinfectant is completely effective.