Chapter 5: Safe Use Practices

Chapter 5.A. Introduction

Safe work practices need to be developed for each product that is being used because each product has specific hazards, precautions, and directions for maximum effectiveness. The information in this chapter is provided to ensure that all necessary factors are taken into account when developing cleaning protocols, with the goals of protecting employees and building occupants and using the products most effectively.

Although the National Cleaning for Healthier Schools and Infection Control Workgroup does not advocate the use of bleach and other hazardous disinfection products, the Cleaning for Healthier Schools – Infection Control Handbook provides guidelines on using them to ensure the safety of workers and building occupants should these products be deemed necessary for specific situations.

Consider that there is a corresponding relationship between the toxicity and hazard level of the products used and the number of health and safety measures required. The less toxic the product, the fewer the safety measures needed.
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Chapter 5.B. Using Bleach (Sodium Hypochlorite): Hazard Overview

Introduction

Bleach is known by several names, including chlorine bleach, household bleach, and sodium hypochlorite. In this document, bleach refers to products registered by the Environmental Protection Agency (EPA), 5.25% or 6.00% solution, unless otherwise stated.

Bleach has been used for generations as a disinfectant, and the general opinion during this time has been that it is a safe chemical for this purpose. Recent research, however, has identified adverse health effects for users and the environment. Because of this research, many purchasers are looking for a safer alternative with a better human-health and environmental profile. Manufacturers are also developing safer disinfectants to augment their “green” cleaning lines of products. See Chapter 4.B. Comparing Disinfectants: Comparison Chart for Hard-Surface Disinfectants Registered by the Environmental Protection Agency for details on alternative products.

Bleach is used extensively in childcare centers and other settings due to a number of perceived conveniences such as low up-front cost, ease of purchase, and its ability to be used at different strengths for different purposes. Because many users are not implementing the required safety measures to address a number of the hazards associated with using bleach (as illustrated below), the perceived level of convenience and cost is inaccurate.

What Are the Problems with Using Bleach as a Disinfectant?

- **Health problems**
  
  o Bleach is suspected of causing asthma, and is known to exacerbate asthma episodes. A recent study found that asthma symptoms in domestic cleaning women were associated with exposure to bleach.\(^1\) Another study showed that bleach and organic chemicals (e.g., surfactants and fragrances) contained in several household cleaning products can react to form chlorinated volatile organic compounds (VOCs) when used during cleaning operations.\(^2\) Some chlorinated VOCs are toxic and probable human carcinogens.
  
  o Household chlorine bleach in a 5.25% to 6.00% concentration is considered an irritant to the skin, eyes, and respiratory tract. It is identified as corrosive in concentrations as low as 6.00%. “Inhalation of gases released from hypochlorite solutions may cause eye and nasal irritation, sore throat, and coughing at low concentrations. Inhalation of higher concentrations can lead to respiratory distress with airway constriction and accumulation of fluid in the lungs (pulmonary edema).”\(^3\)
  
  o Mixing bleach with ammonia, quaternary ammonium compounds, vinegar, or other acids can create toxic gases. **Never mix bleach with another cleaning solution.**
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- **Child health and safety**
  - The Agency for Toxic Substances & Disease Registry Medical Management Guidelines provides specific information on the effects of bleach on children:³ “Children exposed to the same levels of gases as adults may receive a larger dose because they have greater lung surface area to body weight ratios and higher minute volumes to weight ratios. Children may be more vulnerable to corrosive agents than adults because of the smaller diameter of their airways. In addition, they may be exposed to higher levels than adults in the same location because of their short stature and the higher levels of chlorine found nearer to the ground. Children may also be more vulnerable to gas exposure because of increased minute ventilation (respiration) per kg and failure to evacuate an area promptly when exposed.”
  - Children have accidentally ingested bleach. The American Association of Poison Control Centers recorded over 50,000 calls regarding chlorine bleach poisoning events in 2007, making it one of the most common household substances reported to the poison control center. One third of these calls concerned children accidentally ingesting chlorine bleach.⁴

- **Employee health and safety**
  - Bleach in a concentrated form can cause irreversible eye damage and skin burns, and requires the use of an eyewash station to flush eyes for 15 to 20 minutes. It can irritate mucous membranes and the respiratory system if inhaled, and can trigger respiratory conditions such as chemical irritant–induced asthma if there is prolonged exposure.³
  - Recommended staff handling of bleach for daily preparation requires training, a ventilated dispensing area, tools that help measure the correct amount of bleach, such as dispensing pumps, a funnel, and the proper use of personal protective equipment (PPE), including nitrile or rubber gloves and chemical splash goggles. See Chapter 5.C. Protocol for Safe Use of Bleach.

- **In a school setting**
  - Bleach degrades metal and other incompatible surfaces.
  - It may damage fabrics and floor finishes.
  - Bleach is unstable in storage, so it should be purchased monthly.
  - A bleach solution must be mixed daily because the germicidal effectiveness of bleach in solution degrades after 24 hours.

**Summary Note:** Chlorine bleach should be used only when proper precautions are followed and when safer alternatives are unavailable or regulations require its use.
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Chapter 5.C. Protocol for Safe Use of Bleach

Introduction
The Workgroup does not recommend the use of bleach for disinfecting and sanitizing due to its corrosiveness and health hazards, but bleach is used in some schools and childcare centers. The Workgroup developed the following guidelines to prevent overexposure and misuse for those who choose to use it.

Purchasing Bleach Products and Supplies
1. Obtain bleach that is a 5.25% or 6.00% concentration of sodium hypochlorite, fragrance-free, and registered by the EPA for use as a disinfectant and or sanitizer.
2. Select a container/dispenser. A common spray-bottle size for staff use is a quart (32 oz., 946 mL). Product dispensers that provide portion control and eliminate mixing are also available.

Preparing a Fresh Bleach Dilution Daily
Solutions lose their strength after 24 hours. Anytime the odor of bleach is not present, discard the solution.
1. Put on PPE, including safety glasses and rubber, nitrile, or other nonlatex gloves as required on the label for pouring and mixing bleach.
2. Determine the dilution rate. Proper dilution is extremely important to ensure adequate disinfection and to reduce health hazards. Identify the product’s concentration rate (5.25% or 6.00%) to determine the proper dilution rate. Always check the product label for dilution rates and contact time for each specific product.
3. Prepare the container.
   • For a 1:10 solution, select a container that can hold a total of 10 measures.
   • Mark the container where the measurements for “9 of the 10 parts” and “1 of the 10 parts” are located (see Figures 1 and 2).

Figure 1. Containers marked for identifying portions
Figure 2. Sequence to prepare a solution
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4. Prepare the solution. Avoid contact with eyes, skin, and clothing.
   - Fill the marked container with cool water up to the watermark.
   - Pour the bleach into the container up to the top mark.
   - Add the bleach to the water (not the water to the bleach) to reduce the release of vapors.

5. Label the dispenser bottle. Figure 3 shows the information that should be included on the dispenser bottle. The label template should be revised with each preparation date:

   | Name of Product: | Bleach (sodium hypochlorite) |
   | Health Hazards, Including Target Organs: | Concentrate may cause severe irritation or damage to eyes and skin. Vapor or mist may irritate respiratory system. Harmful if swallowed. |
   | Physical Hazards: | Corrosive |
   | Date Prepared: |
   | Concentration: |

   Figure 3. Label Template for a dispenser bottle

Cleaning Up
1. Wash measuring device (if used).
2. Remove and dispose of gloves.
3. Wash hands after any direct contact with bleach.

Using the Prepared Bleach Solution
1. Protect yourself and building occupants.
   - Use when children are not present.
   - Wear PPE.
   - Ventilate the room well (using a fan to the outside if possible) while applying bleach.
2. Disinfect surface or item.
   - Clean the surface or item first with detergent and rinse.
   - Apply the bleach dilution after cleaning the surface.
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- Allow for a dwell/contact time as specified above, or air dry. If the surface will be touched by skin, rinse after contact time is up.
- Allow the surfaces to completely dry before allowing children back into the area.

NOTE: Never mix bleach with any product, especially ammonia or products containing ammonia because it creates toxic gas.

Storing Bleach and Bleach Solution

1. Store the diluted product and the concentrated product in a secure area inaccessible to children, where they will not spill, and below eye level to prevent them from spilling into the eye when being moved.

2. Store away from incompatible products, including flammable products (such as solvent-based cleaning and degreasing products) and corrosives (which include acids such as an acid toilet bowl cleaner and bases such as ammonia-based or quaternary compound–based products).

Disposing of Bleach

1. Dispose of unused solution daily.

2. Diluted bleach solutions can be disposed of down the drain, but concentrated bleach must be disposed of as hazardous waste. Contact the town’s Department of Public Works for hazardous waste guidance.

Sources


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Chapter 5.D. Using Disinfectants

Introduction

This section provides guidelines on using disinfectants when developing a customized protocol. For specific information on how to perform the following work-practice recommendations, consult the label of each product being used. Educate school staff on the finalized disinfection protocols, and post these in accessible locations. Remember to change the protocols when products change.

Work-Practice Recommendations

- **Protect workers**: Spray or squirt the product on cloths and mops whenever possible versus spraying them into the air. When the disinfectant is sprayed onto a hard surface, the mist can bounce back directly into the face and be inhaled. Always use disinfectants with the recommended PPE and adequate ventilation. Make sure the facility’s heating, ventilating, and air conditioning system is operating while disinfecting tasks are being performed.

- **Protect building occupants**: Consider how to minimize exposure (of product vapors or residue) to building occupants when selecting the application process and performing the disinfecting. Although some activities need to be conducted while school is in session, tasks that only need to be done once a day should be scheduled after the students, teachers, and other personnel leave.

- **Reduce quantity**: When applying the disinfectant, use the smallest possible amount of disinfectant as recommended by the manufacturer to obtain the desired level of microbe control. More is not necessarily better—it may be more hazardous and it creates waste.

- **Allow enough time for disinfectants to react with the microbes to kill them**: Contact or kill times vary from product to product. Follow label directions to determine the time required for the disinfectant to be wet on the surface and in contact with microbes.

- **Rinse**: Rinse all high-touch areas if the product label requires this step. Although product labels specify whether rinsing is required, there are general requirements for the following types of products and situations:
  - Food-contact sanitizers (sanitizing rinses) are considered a final rinse when used on surfaces that come in contact with food. No water rinse following application is allowed.
  - Disinfectants with claims for use on food-contact surfaces must be rinsed when used in this capacity.

- **Dry**: Wipe or dry surfaces only if the product label requires this step.