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# Practical Disinfection Guidance for the Clinical Laboratory

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# Course Learning Objectives

- At the end of this webinar, each participant will be able to:
  - ✓ Describe the difference between cleaning, sanitization and disinfection
  - ✓ Find the list of EPA approved disinfectants available on the web
  - ✓ Choose and appropriate disinfectant for use with human samples and infectious agents
  - ✓ Describe an appropriate plan for disinfecting/cleaning of surfaces and equipment in the laboratory

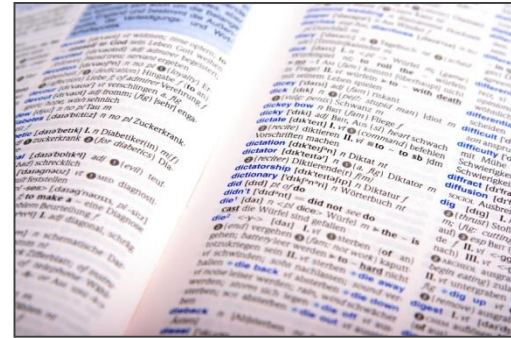


Alcohol,  
bleach,  
Fabuloso,  
Pine Oil?



# Definition of Disinfection

- A process that eliminates many or all pathogenic microorganisms on inanimate objects, with the exception of bacterial spores.



# Why Use Disinfectants?

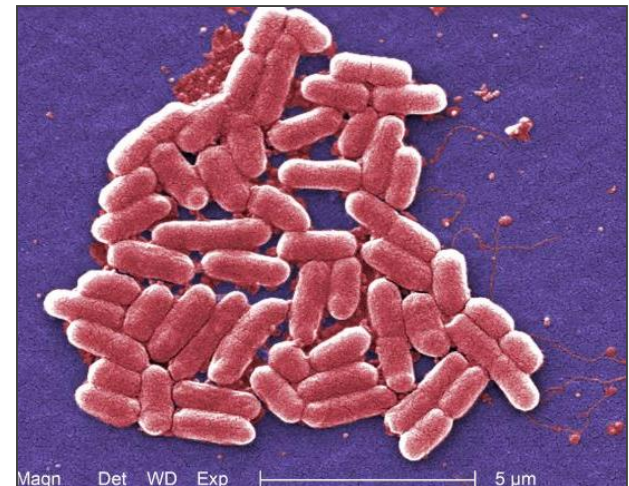
- To get rid of unwanted microorganisms, which **MAY** be pathogenic...
  - To eliminate exposure risk
    - Medical waste treatment
    - Spill cleanup
    - Minimization of nosocomial infections
    - Routine surface decontamination
  - OR:



# Why use disinfectants?

- To eliminate contamination risk
  - Preparation of microbiological media & supplies
  - Cross contamination of samples and tissue culture
  - Preparation of work area for cleanliness-critical tasks

*E. coli* O157:H7  
CDC/Janice Haney Carr



# Disinfection

- Decontamination - disinfection or sterilization of contaminated articles to make them suitable for use
  - Does not imply that all organisms are inactivated, only that the numbers have been reduced to make the material safe to handle
- Sanitizer - an agent that reduces the numbers of vegetative bacteria only





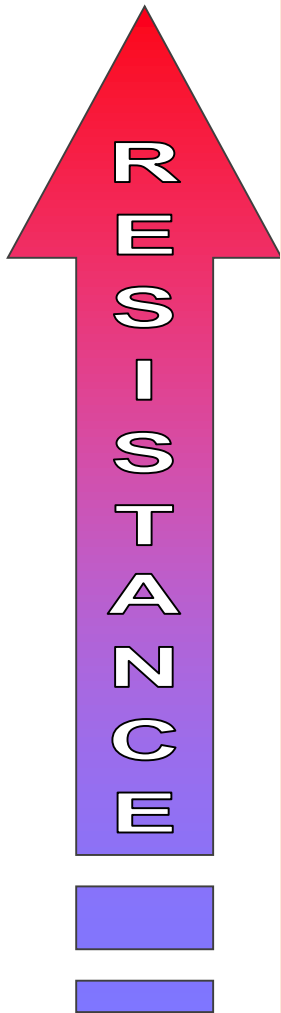
# Other Terms

- Sterilization - the act or process, physical or chemical, that destroys or eliminates all forms of life, including bacterial spores



- Cleaning – the removal of visible soil (organic and inorganic) from objects and surfaces
  - Manual or mechanical
  - Using water with detergents or enzymatic products

# Hierarchy of Resistance to Disinfection



- Prions
- Bacterial spores
- Protozoal oocysts (*Cryptosporidium*)
- Helminth eggs (*Ascaris*)
- *Mycobacterium tuberculosis*
- Small nonlipid (nonenveloped) viruses (parvovirus)
- Protozoal cysts (*Giardia*)
- Fungal conidia (spores)
- Rickettsiae, Chlamydiae
- Gram negative bacteria
- Vegetative fungi & algae
- Vegetative helminths and protozoa
- Large nonlipid (nonenveloped) viruses (Adenovirus)
- Gram positive bacteria
- Lipid-containing (enveloped) viruses (HIV)

# Disinfection in Laboratories

- Chlorine (bleach, Clorox Healthcare® Bleach Germicidal Cleaners)
- Iodine (Wescodyne Plus, Betadine)
- Alcohol (Ethyl, Isopropyl)
- Phenolics (Lysol, Cavicide)
- Quaternary Ammonium Compounds (Quats: Clorox® Broad Spectrum Quaternary Disinfectant Cleaner, Super Sani-cloth)



# Label Claims

- Limited efficacy
  - Activity vs. one specific group of organisms
    - Gram + claim = *Staph aureus*
    - Gram – claim = *Salmonella enterica* (formerly *cholerasuis*)
- General Purpose or Broad Spectrum
  - Activity against both organisms above
- Hospital or medical environment claim
  - Activity against both above + *Pseudomonas aeruginosa*



# How to Choose a Disinfectant

- Human samples, OPIM, tissue culture
  - Included under OSHA Bloodborne Pathogen Law
  - Therefore, must either:
    - Be EPA/FDA registered sterilant
    - Be EPA registered tuberculocide, or
    - Be effective against HBV/HIV
- Federal Law
  - Disinfectants must be prepared and used according to label claims
    - E.g., pre-cleaned surface, soak, remain wet



**Note: these disinfectants will also be effective for most infectious agents found at BSL-2**

# The “EPA Lists”

<https://www.epa.gov/pesticide-registration/selected-epa-registered-disinfectants>

## Currently 12 lists:

- ➔ • [List A: EPA’s Registered Antimicrobial Products as Sterilizers](#)
- ➔ • [List B: EPA Registered Tuberculocide Products Effective Against \*Mycobacterium tuberculosis\*](#)
  - [List C: EPA’s Registered Antimicrobial Products Effective Against Human HIV-1 Virus](#)
- ➔ • [List D: EPA’s Registered Antimicrobial Products Effective Against Human HIV-1 and Hepatitis B Virus](#)
- ➔ • [List E: EPA’s Registered Antimicrobial Products Effective Against \*Mycobacterium tuberculosis\* Human HIV-1 and Hepatitis B Virus](#)
  - [List F: EPA’s Registered Antimicrobial Products Effective Against Hepatitis C Virus](#)
  - [List G: EPA’s Registered Antimicrobial Products Effective Against \*Norovirus\*](#)
  - [List H: EPA’s Registered Antimicrobial Products Effective Against Methicillin Resistant \*Staphylococcus aureus\* \(MRSA\) and Vancomycin Resistant \*Enterococcus faecalis\* or \*faecium\* \(VRE\)](#)
  - [List J: EPA’s Registered Antimicrobial Products for Medical Waste Treatment](#)
  - [List K: EPA’s Registered Antimicrobial Products Effective Against \*Clostridium difficile\* Spores\(PDF\)](#)
  - [List L: EPA's Registered Antimicrobial Products that Meet the CDC Criteria for Use Against the Ebola Virus](#)
  - [List M: Registered Antimicrobial Products with Label Claims for Avian \(Bird\) Flu Disinfectants](#)



# Example of Old Tuberculocidal List

- Note Lysol products with different ingredients!

Unfortunately, the EPA lists no longer give the active ingredients!

**Product:** LPH MASTER PRODUCT  
**EPA Reg#:** 1043-91  
**Registrant:** STERIS CORPORATION  
**Approval Date:** 06/17/1987  
**Active Ingredients:** Amylphenol 7.600% ; Phenylphenol 7.7%

**Product:** LPH-SE  
**EPA Reg#:** 1043-92  
**Registrant:** STERIS CORPORATION  
**Approval Date:** 06/17/1987  
**Active Ingredients:** Amylphenol 7.6% ; Phenylphenol 7.7%

**Product:** LYSOL BRAND DISINFECTANT TOILET BOWL CLEANER  
**EPA Reg#:** 777-81  
**Registrant:** RECKITT BENCKISER INC.  
**Approval Date:** 06/27/1994  
**Active Ingredients:** Hydrogen chloride (=hydrochloric acid, anhydrous) 9.5%

**Product:** LYSOL BRAND FOAMING DISINFECTANT BASIN TUB&TILE CLEANER II  
**EPA Reg#:** 777-71  
**Registrant:** RECKITT BENCKISER INC.  
**Approval Date:** 11/16/1989  
**Active Ingredients:** Didecyl dimethyl ammonium chloride 0.025%  
Octyl decyl dimethyl ammonium chloride 0.05%  
Dioctyl dimethyl ammonium chloride 0.025%

**Product:** LYSOL® BRAND DISINFECTANT S.A. CLEANER  
**EPA Reg#:** 675-55  
**Registrant:** RECKITT BENCKISER INC.  
**Approval Date:** 12/21/1998  
**Active Ingredients:** Citric acid 2.5%

**Product:** LYSOL BRAND DISINFECTANT TRIGGER SPRAY  
**EPA Reg#:** 777-73  
**Registrant:** RECKIT BENCKISR INC.  
**Approval Date:** 03/16/1990  
**Active Ingredients:** Hydrogen chloride (=hydrochloric acid, anhydrous) 90.5%



# Tuberculocidal List

Listing only in numerical order now, so you must search by registration #


<b>List B: EPA's Registered Tuberculocide Products</b>		
<b>Effective Against Mycobacterium tuberculosis</b>		
Registration #	Product Brand Name	Company
211-32	PHENO-CEN SPRAY DISINFECTANT/DEODO RANT	CENTRAL SOLUTIONS, INC.
211-36	TRI-CEN	CENTRAL SOLUTIONS, INC.
211-62	LOW PH PHENOLIC 256	CENTRAL SOLUTIONS, INC.
303-223	BEAUCOUP GERMICIDAL DETERGENT	HUNTINGTON PROFESSIONAL PRODUCTS
498-134	SRAYPAK SPRAY CLEANSE	CHASE PRODUCTS CO
498-194	SPRAYPAK SPRAY DISINFECTANT/LUBRIC ANT	CHASE PRODUCTS CO
498-197	SPRAY DISINFECTANT	CHASE PRODUCTS CO
675-1	VANI-SOL BOWL CLEANSE	RECKITT BENCKISER LLC
777-71	LYSOL BRAND FOAMING DISINFECTANT BASIN TUB & TILE CLEANER II	RECKITT BENCKISER LLC.
777-81	LYSOL BRAND DISINFECTANT TOILET BOWL CLEANER	RECKITT BENCKISER LLC.
777-99	BRACE	RECKITT BENCKISER LLC.
777-105	LYSOL BRAND IV I.C. DISINFECTANT	RECKITT BENCKISER LLC.
954-10	CLIPPERCIDE SPRAY	KING RESEARCH, INC.
954-13	SPACIDE	KING RESEARCH, INC.
1043-19	STAPHENE DISINFECTANT SPRAY AND DEODORIZER	STERIS CORPORATION
1043-26	1-STROKE ENVIRON	STERIS CORPORATION



# Where is the EPA Registration #?

Manufacturer ID #

Product ID #



**SPOR-KLENZ® Ready To Use**  
Cold Sterilant

**PRECAUTIONARY STATEMENT**  
Hazard to Humans and Domestic Animals

**DANGER – PELIGRO. Corrosive. Causes irreversible eye damage.** Do not get in eyes, on skin, or on clothing. Avoid contact with drinking water, chewing gum, using tobacco or using the toilet. Remove contaminated clothing and shoes before reuse. Caution should be used when applying indoors.

**Personal Protective Equipment (PPE):** Handlers must wear: (1) long-sleeved shirt and long pants; (2) rubber gloves.

**Environmental Hazards:** This pesticide is toxic to birds, fish and aquatic invertebrates. Do not discharge effluent containing this product into lakes, streams, rivers, or other bodies of water unless this product is specifically identified and addressed on the label. Do not discharge effluent containing this product into sewer systems without proper authority. For guidance, contact your State Water Board or Regional Water Pollution Control Agency.

**Physical and Chemical Hazards:** This product contains an oxidizing liquid. **\*\*KILLS HIV-1 ON PRE-CLEANED ENVIRONMENTAL SURFACES SOILED WITH BLOOD/BODILY FLUIDS** in health care settings. Do not use on surfaces with an expected likelihood of soiling inanimate surfaces/objects with blood or body fluids likely to be soiled with blood or body fluids capable of transmitting HIV-1 (Human Immunodeficiency Virus Type 1) or other infectious agents.

**SPECIAL INSTRUCTIONS FOR CLEANING AND DECONTAMINATION OF SURFACES/OBJECTS SOILED WITH BLOOD/BODY FLUIDS:** Specific barrier protection items to be used on surfaces/objects soiled with blood or body fluids are disposable latex gloves, gowns, and coverings. **CLEANING PROCEDURE:** Blood and other body fluids must be cleaned from surfaces and objects before the application of this product. **OF INFECTIOUS MATERIALS:** Blood and other body fluids must be cleaned from surfaces and objects before the application of this product. **CONTACT TIME:** Leave surfaces completely immersed in SPOR-KLENZ Ready To Use for a minimum of 10 minutes.

Reorder Number: 6525-01

Net Contents: 3.2 Liters (3.38 qts.)

EPA Reg. No. 1043-119

**For Use in Pharmaceutical, Medical Device, Biotech and Cosmetic Manufacturing Facilities.**

**Sterilant/Sporicidal, Bactericidal, Tuberculocidal, Fungicidal, \*Virucidal, Non-food Contact Sanitizer**

**Uses:** Primarily intended for sterilization or disinfection of: stainless steel, plastic items and surfaces, hard surfaces e.g. countertops, floors, walls, bathroom fixtures, glass, formica, vinyl.

**Active Ingredients:**  
Hydrogen Peroxide ..... 1.00%  
Peroxyacetic Acid ..... 0.08%  
**Inert Ingredients..... 98.92%**  
**TOTAL..... 100.00%**

**KEEP OUT OF REACH OF CHILDREN**  
**DANGER - PELIGRO**  
See side panel for precautionary statements.  
EPA Est. No. 52252-MN-01

Manufactured for:  
STERIS Corporation  
7501 Page Avenue ■ St. Louis, MO 63133 ■ USA  
K 800-548-4873 ■ www.steris.com


FIRST AID	
If inhaled	<ul style="list-style-type: none"> <li>Move person to fresh air.</li> <li>If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible.</li> <li>Call a poison control center or doctor for further treatment advice.</li> </ul>
If on skin or on clothing	<ul style="list-style-type: none"> <li>Take off contaminated clothing.</li> <li>Rinse skin immediately with plenty of water for 15-20 minutes.</li> <li>Call a poison control center or doctor for treatment.</li> </ul>
If in eyes	<ul style="list-style-type: none"> <li>Hold eye open and rinse slowly and gently with water for 15-20 minutes.</li> <li>Remove contact lenses, if present, after the first 5 minutes, then continue rinsing the eye.</li> <li>Call a poison control center or doctor for treatment advice.</li> </ul>
If swallowed	<ul style="list-style-type: none"> <li>Call poison control center or doctor immediately for treatment advice.</li> <li>Have person sip a glass of water if able to swallow.</li> <li>Do not induce vomiting unless told to do so by the poison control center or doctor.</li> <li>Do not give anything by mouth to an unconscious person.</li> </ul>
HOT LINE NUMBER	
For chemical emergency, spill, leak, fire, exposure and accident, call Chemtrec, day or night 800-424-9300, 703-527-3887.	
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact Chemtrec at 800-424-9300 for emergency medical treatment information.	
NOTE TO PHYSICIAN	
Probable mucosal damage may contraindicate the use of gastric lavage.	

**DIRECTIONS FOR USE**  
It is a violation of Federal law to use this product in a manner inconsistent with its labeling.  
**DO NOT USE AFTER EXPIRATION DATE.** Do not allow SPC to mix with alkaline substances such as bleach (Sodium Hypochlorite) or oxidizing agents. Use purified water (e.g. deionized) for making and rinsing. Some materials may be incompatible with SPC. Test material prior to use. SPOR-KLENZ Ready To Use is compatible with Polyvinyl chloride, polypropylene, polyurethane, polycarbonate, polysulfone, polystyrene, stainless steel.  
Reuse of diluted SPOR-KLENZ Ready To Use is not recommended. (Directions for use continue on reverse side of label.)

# Example of Name/Company Shift

## EPA List B (tuberculocides)

2013



**2013**

Reorder Number: **Net Contents:**  
**NJ138 3.78 Liters (1 Gal.)**

**CONCENTRATED BROAD SPECTRUM IODOPHOR ONE-STEP CLEANER-DISINFECTANT AND NO-RINSE SANITIZER**

**VIRUCIDE • BACTERICIDE • FUNGICIDE**

Meets OSHA's Bloodborne Pathogens requirements.

EPA Reg. No. 4959-16-1043 EPA Est. No. 4821-1M0-1

**Active Ingredient:** 1.75%


**Inert Ingredients:** 98.25%

**Total:** 100.00%

\*\*From alpha-(2-hydroxyphenyl)-omega-hydroxypropyl (oxyethyl)amine-iodine complex

For industrial and institutional use only.

**KEEP OUT OF REACH OF CHILDREN DANGER**



(01)00724995 010119

See side panel for additional precautionary statements.

**FIRST AID**

**If in eyes:**

- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first 5 minutes. Then continue rinsing.
- Call a poison control center or doctor for treatment advice.

**If swallowed:**

- Call a poison control center or doctor immediately for treatment advice.
- Have person sip a glass of water if able to swallow.
- Do not induce vomiting unless told to do so by the poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

**If on skin or clothing:**

- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

**If inhaled:**

- Move person to fresh air.
- If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible.
- Call a poison control center or doctor for further treatment advice.

**HOT LINE NUMBER**

Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact 1-800-424-9300 for emergency treatment.

**NOTE TO PHYSICIAN:**

Probable mucosal damage may contraindicate the use of gastric lavage.

**Product:** VIRAHOL HOSPITAL SURFACE DISINFECTANT TOWELETTE  
**EPA Reg#:** 60142-3  
**Registrant:** VERIDINE CORP  
**Approval Date:** 01/29/1997  
**Active Ingredients:** Isopropanol 70.0%

**Product:** WAVICIDE-06 PLUS  
**EPA Reg#:** 15136-9  
**Registrant:** MEDICAL CHEMICAL CORP.  
**Approval Date:** 06/22/1999  
**Active Ingredients:** Ethyl alcohol 50.0% and Glutaraldehyde 0.25%

**Product:** WEX-CIDE CONCENTRATED GERMICIDAL DETERGENT  
**EPA Reg#:** 34810-8  
**Registrant:** WEXFORD LABS, INC.  
**Approval Date:** 09/09/1975  
**Active Ingredients:** Benzyl-4-chlorophenol 5.760%; Phenylphenol 06.73%

**Product:** WEX-CIDE-128  
**EPA Reg#:** 34810-31  
**Registrant:** WEXFORD LABS, INC.  
**Approval Date:** 06/26/2007  
**Active Ingredients:** Benzyl-4-chlorophenol 3.03%; Phenylphenol 3.4%

**Product:** YYY DISINFECTANT  
**EPA Reg#:** 4959-34  
**Registrant:** WEST AGRO INC  
**Approval Date:** 05/27/3003  
**Active Ingredients:** Nonylphenoxypolyethoxyethanol - iodine complex 0.35%

**Product:** ZZZ DISINFECTANT  
**EPA Reg#:** 4959-16  
**Registrant:** WEST AGRO INC  
**Approval Date:** 01/26/2007  
**Active Ingredients:** Nonylphenoxypolyethoxyethanol - iodine complex 1.75%

**ZZZ™ DISINFECTANT IS A CONCENTRATED BROAD SPECTRUM IODOPHOR FOR USE AS A ONE-STEP CLEANER-DISINFECTANT AND NO-RINSE SANITIZER:**

Hospitals and Clinics • Food Processing Plants • Dental Offices • Glove Hand Sanitizers • Schools and Institutions • Nursing Homes • Kitchens and Lunch Rooms • Restrooms

Meets OSHA's Bloodborne Pathogens Act requirements.

**DANGER PELIGRO**

**KEEP OUT OF REACH OF CHILDREN MANTENER FUERA DEL ALCANCE DE LOS NIÑOS**

**PRECAUTIONARY STATEMENT:**

**HAZARD TO HUMANS BY INHALATION-IRRITANT:**  
**DANGER:** Corrosive. Causes irreversible eye damage. Wear goggles or face shield when handling this product. Harmful if swallowed. Do not get in eyes or on clothing. Avoid contact with skin. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using toilet. Remove contaminated clothing and wash before reuse.

**ENVIRONMENTAL HAZARDS:** This product is toxic to fish and aquatic organisms. Do not contaminate water by cleaning of equipment or disposal of wastes. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other water unless in accordance with the requirements of a National Pollution Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewer treatment district to prevent contact with your State Water Board or Regional Office of the EPA.

**STORAGE AND DISPOSAL:**

**PROHIBITIONS:** Do not contaminate water, food or feed by storage or disposal. Open dumping is prohibited. **PESTICIDE DISPOSAL:** Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide spray mixture or material is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Distribution Act representative at the nearest EPA Regional Office for guidance.

**CONTAINER DISPOSAL:** Nonhazardous container: Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying.

**3 gallon or less containers:** Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. Then after recycling or reconditioning if available, if not, puncture and dispose of in a sanitary landfill, or incineration, if allowed by State and local authorities, by burning, if burned, stay out of smoke.

**5 gallon or more containers:** Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. Then after recycling or reconditioning if available, if not, puncture and dispose of in a sanitary landfill, or incineration, if allowed by State and local authorities, by burning, if burned, stay out of smoke.

**DIRECTIONS FOR USE:**

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. This product is not to be used as a disinfectant/sterilant/pesticide on any surface or instrument that (1) is introduced into the body, either into or in contact with the bloodstream or normally sterile areas of the body or (2) contacts intact mucous membranes but which does not ordinarily reach the blood stream or otherwise enter normally sterile areas of the body. This product may be used for pre-clean or decontaminate critical or semicritical medical devices prior to disinfection or sterilization.

**FOR INDUSTRIAL, INSTITUTIONAL AND AGRICULTURAL USE**

**ZZZ™ Disinfectant**

**AUTHORIZED BY USDA FOR USE IN FEDERALLY INSPECTED MEAT, POULTRY AND EGG PROCESSING PLANTS**

**ACTIVE INGREDIENT:** 1.75%

**INERT INGREDIENTS:** 98.25%

**Total:** 100.00%

\*Nonylphenoxypolyethoxyethanol - iodine complex and Polyethoxypolyoxyethylalcohol-iodine complex

EPA Reg. No. 4959-16 EPA Est. No. 4821-1M0-1

See left panel for additional precautions

**FIRST AID**

**IF IN EYES:**

Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes. Then continue rinsing.

Call a Poison Control Center or doctor for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person.

**IF SWALLOWED:**

Call a Poison Control Center or doctor for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person.

**IF ON SKIN OR CLOTHING:**

Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a Poison Control Center or doctor for treatment advice.

**IF INHALED:**

Move person to fresh air. If person is not breathing, call 911 or ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. Call a Poison Control Center or doctor for treatment advice.

Have product container or label with you when calling a Poison Control Center or doctor or going in for treatment. You may also contact 1-800-424-9300 for emergency treatment information.

**NOTE TO PHYSICIAN:** Probable mucosal damage may contraindicate the use of gastric lavage.

**ONE-STEP CLEANING AND DISINFECTING:**

This product may be used to clean and disinfect operating areas, patient rooms, floors, walls, countertops, restrooms, shower areas, refuse containers, food frames, morgues, laboratories, canteens, commercial kitchens, animal rooms, cages and other hard nonporous surfaces. Before applying disinfecting solution, food products and packaging materials must be removed from the room or surface protected. Remove heavy soil deposits before applying the disinfecting solution. Using a solution of 3 ounces ZZZ™ Disinfectant per 5 gallons of warm water (80°F, 20°C or warmer), immerse objects in disinfecting solution, or apply solution to walls, floors, or other hard non-porous surfaces. Use mechanical scrubbing to produce a clean surface. Allow a 10 minute contact time with disinfecting solution. All food contact surfaces must be rinsed with potable water before reuse. Floors, walls and all other non-food contact do not require rinsing before reuse.

**NOTE:** When using ZZZ™ Disinfectant against the following viruses, bacteria and pathogenic fungi: Polio 1, Herpes Simplex Type 1, and Influenza A2/Japan 56S, Salmonella enterica, Clostridium botulinum, Pseudomonas aeruginosa, E. Coli, Trichophyton mentagrophytes, in a solution of cold water (as low as 41°F; 5°C), increase dilution to 6 gallons of water.

**KILLS HIV ON PRE-CLEANED ENVIRONMENTAL SURFACES/OBJECTS PREVIOUSLY SOILED WITH BLOOD/FLUIDS IN HEALTH CARE SETTINGS OR OTHER SETTINGS IN WHICH THERE IS AN EXPECTED RISK OF SOILING IMMEDIATE SURFACES/OBJECTS WITH BLOOD OR BODY FLUIDS, AND IN WHICH THE SURFACES/OBJECTS MUST BE SOILED WITH BLOOD OR BODY FLUIDS THAT ARE ASSOCIATED WITH THE POTENTIAL FOR TRANSMISSION OF HUMAN IMMUNODEFICIENCY VIRUS TYPE 1 (HIV-1) (Associated with AIDS).**

**SPECIAL INSTRUCTIONS FOR CLEANING AND DECONTAMINATION AGAINST HIV-1 ON SURFACES AND OBJECTS PREVIOUSLY SOILED WITH BLOOD OR OTHER BODY FLUIDS:**

**PERSONAL PROTECTION:** Clean up should always be done wearing protective latex gloves, gowns, masks and eye protection. Specific barrier protection items to be used when handling items soiled with blood or body fluids are protective gloves, gowns, masks, or eye coverings.

**CLEANING PROCEDURE:** Blood and other body fluids containing HIV-1 must be thoroughly cleaned from surfaces and objects before application of this product. Thoroughly wet food surfaces with a solution of 3 ounces ZZZ™ Disinfectant per 5 gallons of water. Completely immerse objects in the disinfecting solution; immediate evaporation of air bubbles. Allow at least 10 minutes contact time.

**CONTACT TIME:** This contact time will not control other common types of viruses and bacteria listed on this label. To be effective against Hepatitis B virus, a 10 minute contact time is required.

**TO CLEAN AND DISINFECT TOILET BOWLS AND URINALS:** Flush toilet. Add 1 ounce of ZZZ™ Disinfectant directly to toilet bowl. Brush for 30 seconds. Allow to stand for 10 minutes. Flush toilet. Repeat procedure for urinals. Allow to stand for at least 10 minutes. Flush toilet. Rinse metal parts with water after disinfecting to prevent corrosion.

**SANITIZING PREVIOUSLY CLEANED FOOD CONTACT SURFACES:** Sanitize previously cleaned and rinsed food contact surfaces such as glass, metal, plastic, and porcelain with a solution containing 1 and 1/2 ounces of ZZZ™ Disinfectant per 5 gallons of water. Rinse with potable water. Allow to stand for 10 minutes. Allow a 1 minute contact time. Drain solution from equipment; do not rinse. ZZZ™ Disinfectant used at 1 ounce per 5 gallons of water contains 100 ppm available iodine and does not require a final rinse with potable water in accordance with Federal Food and Drug Administration Regulation 178.1010.

**SANITIZING GLASSES, DISHWARE, POTS, PANS, AND UTENSILS IN FOOD SERVICE OPERATIONS:**

1. Pre-rinse or pre-scrape equipment and utensils. If needed, pre-wash to remove gross food particles and soil.
2. Wash equipment and utensils in hot/leaves water that contains an adequate amount of a good detergent or cleaner. Keep this water clean by frequent changing.
3. Rinse equipment and utensils with water prior to sanitization.
4. Sanitize equipment and utensils by immersion them in a solution of 1 ounce ZZZ™ Disinfectant per 5 gallons of water. Rinse with potable water. Do not use equipment until the solution is changed or replaced (as required by local sanitation codes). Fresh solution should be prepared daily or more often if the solution becomes diluted or soiled. Use an approved color test kit to check for proper concentration.
5. After required contact time of one minute or more, allow equipment and utensils to adequately drain. Do not rinse.

**GLOVE SANITIZING DIRECTIONS:** To prevent cross contamination gloves must be sanitized prior to entering or re-entering those areas. Rinse glove cross contamination from gloves before sanitizing. Dip gloved hand in a use-dilution of 1 ounce of ZZZ™ Disinfectant per 5 gallons of water so that there is enough sanitizing solution to cover the entire glove. Allow gloves hands to remain wet for at least 60 seconds. No potable water rinses is required. Change the solution in the bath at least daily or more often if the solution appears visibly diluted or soiled.

**FOR ADDITIONAL INFORMATION CONSULT YOUR WEST AGRO, INC. REPRESENTATIVE OR SAFETY DATA SHEET.**

**DOT DESCRIPTION**  
**UN3264**  
 Corrosive liquid, acidic, inorganic, N.O.S.  
 (contains Phosphoric Acid), 8, PG II

2018

18

# Label Information

- You must use a commercial disinfectant as specified on the label:
  - Type of surface
  - Pre-cleaning
  - Contact time
  - Dilution
  - Temperature
  - Type of water

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**DIRECTIONS FOR STERILIZATION**  
SPOR-KLENZ Ready To Use is not to be used as a terminal sterilant on any critical/semi-critical medical device. Remove any obvious debris or organic material from the surface to be sterilized. This can often be accomplished by rinsing with water or by detergent cleaning followed by a water rinse. Immerse the item to be sterilized in a sufficient volume of undiluted SPOR-KLENZ Ready To Use to cover the item and fill all passages requiring sterilization. Hold in the sterilizing solution for a minimum of 5-1/2 hours at 20°C temperature (68°F). Remove items after 5-1/2 hours and rinse with sterile water until rinse water shows levels of 10 ppm or less. The solution may be used and reused for up to 14 days in a manual system with 5-1/2 hours immersion.

**DIRECTIONS FOR BROAD SPECTRUM DISINFECTION/TUBERCULOCIDE/VIRUCIDE\* (HIV-1, Mouse hepatitis virus and Murine parainfluenza virus type 1 (Sendai), Mouse parvovirus and Murine novovirus/ Mycoplasma gallisepticum/ Aspergillus niger):** Use only on hard, non-porous surfaces. This product is not to be used as a terminal high level disinfectant on any critical/semi-critical medical device. Remove any obvious debris or organic material from the surface to be disinfected. This can often be accomplished by rinsing with purified water (e.g. deionized), mechanical action, or by detergent cleaning followed by a water rinse. Apply product to hard, non-porous surfaces, thoroughly wetting surfaces with a cloth, mop, sponge, sprayer, or by immersion. Treated surfaces must remain wet for 10 minutes (For Aspergillus niger, contact time is 5 minutes) (For mouse parvovirus, keep surfaces completely immersed for 25 minutes). Wipe dry with a cloth, sponge or mop or allow to air dry. For sprayer applications, use a coarse spray device. Spray 6 – 8 inches from the surface, rub with a brush, sponge or cloth. Do not breathe spray.

**FOGGING AS AN ADJUNCT TO REGULAR CLEANING AND DISINFECTING:** This product may be used in fogging as an adjunct either preceding or following regular cleaning and disinfecting procedures for hard room surfaces. Prior to fogging, remove or carefully protect all food products and packaging materials. Ensure room is properly ventilated. Vacate all personnel from the room during fogging and for a minimum of 2 hours after fogging or until the hydrogen peroxide air concentration is below 0.5 ppm. Fog areas using one quart (946 mL) per 1,000 cu. ft. (28.3 m3) of room volume with undiluted SPOR-KLENZ Ready To Use solution. Allow surfaces to dry thoroughly before operations are resumed. Note: In all applications, always prepare a new solution daily to ensure effectiveness. Do not reuse solutions. Dispose of any unused solution.

**DIRECTIONS FOR USE AS A GERMICIDAL DISINFECTANT SPRAY:** Use only on hard, non-porous surfaces. Spray SPOR-KLENZ Ready To Use undiluted onto cleaned surfaces using a plastic spray bottle. Allow to remain on surface for 30 seconds. Let air dry or rinse with purified water, drain off excess water if possible and allow to dry.

**DIRECTIONS FOR USE AS A CLEANER/SANITIZER (Non-food contact surfaces):** Using water or mechanical action, remove heavy soil or gross filth from hard surfaces such as formica, stainless steel or vinyl surfaces. Apply by cloth, mop or sponge so as to wet all surfaces thoroughly, a freshly made 50X dilution (1 part product to 49 part water) of SPOR-KLENZ Ready To Use, made using purified water, to the pre-cleaned surface or immerse pre-cleaned items to be sanitized in the solution. Allow 5 minutes of contact time. Let air dry or rinse with purified water, drain excess if possible and allow to dry. May not be reused as a cleaner/sanitizer.

**DIRECTIONS FOR USE AS A SPORICIDE:** Use only on hard, non-porous surfaces. Remove any obvious debris or organic material from the surface to be sterilized. This can often be accomplished by rinsing with water or by detergent cleaning followed by a water rinse. Immerse hard, non-porous surfaces in a sufficient volume of undiluted SPOR-KLENZ Ready To Use. Treated surfaces must remain completely immersed for 30 minutes. Wipe dry or allow to air dry.

6525-061(310) 61168 67199-403/A Product Made In U.S.A.

(01)00724995 014384

# Where to find labels

<https://iaspub.epa.gov/apex/pesticides/f?p=PPLS:1>

Often, it is easier to search for product labels on the company website

**EPA** United States Environmental Protection Agency

Environmental Topics    Laws & Regulations    About EPA    Search EPA.gov

[CONTACT US](#)

## Pesticide Product and Label System

The Pesticide Product and Label System (PPLS) provides a collection of [pesticide product labels \(Adobe PDF format\)](#) that have been accepted by EPA under [Section 3 of the Federal Insecticide, Fungicide, and Rodenticide Act \(FIFRA\)](#). New labels were added to PPLS on February 06, 2018.

[+1 More](#)

Pesticide product labels provide critical information about how to safely handle and use registered pesticide products. An accepted pesticide product label represents the full content of EPA's registration decision regarding that product. Pesticide labels contain detailed information on the use, storage, and handling of a product. This information will be found on EPA stamped-accepted labels and, in some cases, in subsequent related correspondence, which is also included in PPLS. You may need to review several PDF files for a single product to determine the complete current terms of registration.

**Note:**

There are differences between product labels provided in PPLS and those found in the market place. The EPA stamped-accepted label describes the legal requirements for sale and use of that pesticide in the United States. States also register pesticide products and may apply more restrictive requirements than those found on the EPA label. Companies may add or change graphics, alter the product name (after notifying EPA), and add other marketing information. The label is the law!

To find a specific pesticide product label, enter the information requested below and select the **Search** button.

**EPA Registration, Distributor Product, or Special Local Need Number:**

The EPA Registration Number (EPA Reg. No.) appears on all registered pesticides sold in the United States. It is usually found on the back panel of the label along with the detailed instructions for use. Enter the company number (the first set of digits before the dash) to see all products marketed by that company or the entire number (including the dash) to view the label for a particular product. To search by



# Check Your Understanding

- True or False – disinfectants that are acceptable per the Bloodborne Pathogen law will be appropriate for most BSL-2 labs?
- If a disinfectant says it kills HIV-1, H1N1, Adenovirus and is fungicidal, it would be a good selection for a clinical lab that works with human serum.
- Why did OSHA choose “tuberculocidal” disinfectants as a good product to use with blood, serum, etc. . . ?



# Factors Influencing Efficacy

- Surface topography
- Temperature
- Relative humidity
- Water hardness
- Organic load
- Concentration
- Contact time



# Some Other Factors

- pH
- Age of the product/solution
- Method of application
  - spray vs. wipe
- Rate of application
- Storage conditions
  - Opaque vs. clear containers



# Chlorine

- Household bleach usually 5-6% Sodium hypochlorite (or ~50,000 ppm)
- In-use dilutions depend on application and amount of organic material present
  - Clean surfaces - 1,000 ppm Av CL (2% bleach or 0.1% sodium hypochlorite)
  - General disinfection - 5,000 ppm Av Cl (10% bleach or 0.5% sodium hypochlorite)
  - Organic material - 10,000 ppm Av Cl (20% bleach or 1% sodium hypochlorite)





# Bleach Dilutions

Dilutions of bleach solution	Use	JIK bleach	Normal commercial bleach	Ultra Clorox
<b>Undiluted (in the bottle)</b> = g/L = Chlorine ppm	Large spills	3.85% sodium hypochlorite	5.25% sodium hypochlorite	6.15% sodium hypochlorite
		~35 g/L	~50 g/L	~60 g/l
		~35,000 ppm chlorine	~50,000 ppm chlorine	60,000 ppm chlorine
<b>OSHA 1:100</b> =500 ppm =0.05% NaOCl	BBP work	~15 ml in 985 ml water	10 ml in 990 ml water (1% bleach)	~9 ml in 993 ml water
<b>WHO recommends for "clean conditions":</b> =1g/L =1,000ppm =0.1% NaOCl	Benchtops, BSCs	~30 ml JIK in 870ml water	~20 ml in 980 ml water (2% bleach)	~17 ml in 883 ml water
<b>WHO recommends for "dirty" conditions</b> =5g/L =5,000ppm =0.5% NaOCl	Spills, liquid waste decontamination	~150 ml JIK in 850 ml water or waste. Liquid waste should sit for 2 hours before sewerage.	~100 ml in 1000 ml water (or waste) (10% bleach)	~85 ml in 915 ml water

# Alcohols

- Not acceptable for disinfection of Bloodborne Pathogens (per OSHA)
  - i.e., Human tissue culture activities
- Typically ethyl or isopropyl alcohol
  - Often used in combination with other disinfectants
- 70% in water is most effective concentration
  - 100% alcohol is not effective!!!
- Should primarily be used in the lab for sanitization
  - Killing environmental organisms
  - Removing other disinfectants from surfaces



# General Laboratory Cleaning:

- Lab floor  $\geq$  weekly with a germicidal detergent
  - LPH, 1-Stroke Environ
  - Tuberculocidal plus actually clean dirt...
- Lab benches after working
  - Disinfectant, such as 2% bleach, Super Sani-Cloth
  - Unused areas also need cleaning (dust, mold)
- Sinks  $\geq$  weekly
  - Disinfectant or normal commercial cleaning products
  - Encourage mold growth
- Laboratory equipment (carts, centrifuges, trays)  $\geq$  weekly
  - Disinfectant



# BSC Daily Cleaning

- Clean all surfaces with a disinfectant before/after working
  - Alcohol OK before work
  - Disinfectant after work
    - Human/primate cell culture
    - Infectious agents
  - 2% bleach, Cavicide
    - Followed by alcohol
- **Swiffer Sweeper for cleaning BSC surfaces**
  - Dry Swiffer pad
  - Spray with disinfectant
  - Use new pad each time



# Interval BSC Cleaning

- Monthly minimum (SOP)
  - Remove work surface and grill
  - Clean with disinfectant
    - Soak if necessary to remove crusty material
- Clean after a spill in the BSC



**Clean trough and under work surface regularly**

# Additional Disinfectants

- For decontamination of BSCs, occasionally incubators
  - Formaldehyde
  - Vapor Phase Hydrogen Peroxide
  - Chlorine Dioxide
- Use of these requires training, specialized equipment, special PPE
- Algaecides, fungicides:
  - For water baths and incubators



# Decontamination of Biohazardous Liquid Waste

- Considerations
  - Mixed chemical/biohazardous or radioactive/biohazardous?
    - Usually remove biohazard status first, then ship or treat as radioactive or chemical waste
  - Local regulations or wastewater treatment plant requirements
    - Some may not allow large amount or concentrations of bleach, such as in an industrial setting



# Methods of Biohazardous Liquid Waste Decontamination

- Add full strength bleach to the waste, for a final dilution of 10% bleach
  - Allow to sit for > 30 minutes (or longer, depending on the organism of concern)
  - Sewer carefully, with water running (eye protection)
  - Higher concentrations of bleach may be problematic for personnel and equipment





# Other solutions for liquid wastes



Treatment and pumping system for instrument waste

- If large quantities of serum or blood present, bleach may be problematic
  - Gas, odors
  - Engineered pumping and treatment systems
  - Biowaste holding tanks, etc.

# Check Your Understanding

- What common, inexpensive disinfectant should be prepared daily?
- Which common class of disinfectant is more effective when diluted, and has no activity against bacterial spores?
- True or False? Disinfectants such as “Lysol” may use the same name for many different formulations.



# Other Handy References?

Public Health Agency of Canada / Agence de la santé publique du Canada

Canada

Public Health Agency of Canada  
www.publichealth.gc.ca

Français Home Contact Us Help Search  
canada.gc.ca

Home > Laboratory Biosafety and Biosecurity > Biosafety Programs and Resources > Pathogen Safety Data Sheets and Risk Assessment

Agency Information

About the Agency

Diseases & Conditions

Infectious Diseases

Chronic Diseases

Health & Safety

Travel Health

Food Safety

Immunization & Vaccines

Emergency Preparedness & Response

Health Promotion

Injury Prevention

Lab Biosafety & Biosecurity

Research & Statistics

Surveillance

Information

## Pathogen Safety Data Sheets and Risk Assessment

Pathogen Safety Data Sheets (PSDSs) (previously titled Material Safety Data Sheets for infectious substances) are technical documents that describe the hazardous properties of a human pathogen and recommendations for work involving these agents in a laboratory setting. These documents have been produced by the Public Health Agency of Canada as educational and informational documents for laboratory personnel working with these infectious substances. For those working with animal pathogens, your information on the [Canadian Food Inspection Agency's Information page](#).

Please note that although the information, opinions, and recommendations contained in these documents are based on peer-reviewed literature sources believed to be reliable, the Agency of Canada assumes no responsibility for the accuracy, sufficiency, or completeness of the information contained in the PSDSs, nor for any loss or injury resulting from the use of the information contained within them. Newly discovered information may not be reflected in these PSDSs and this information may not be complete.

PSDS by Pathogen Name

A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z

A

- Actinobacillus spp. **Updated!**

Public Health Agency of Canada  
Pathogen Safety Data Sheets  
<https://www.canada.ca/en/public-health/services/laboratory-biosafety-biosecurity/pathogen-safety-data-sheets-risk-assessment.html>

## SECTION IV - VIABILITY

**DRUG SUSCEPTIBILITY:** No specific antiviral available; cidofovir has shown promise in the treatment of adenoviral ocular infections.

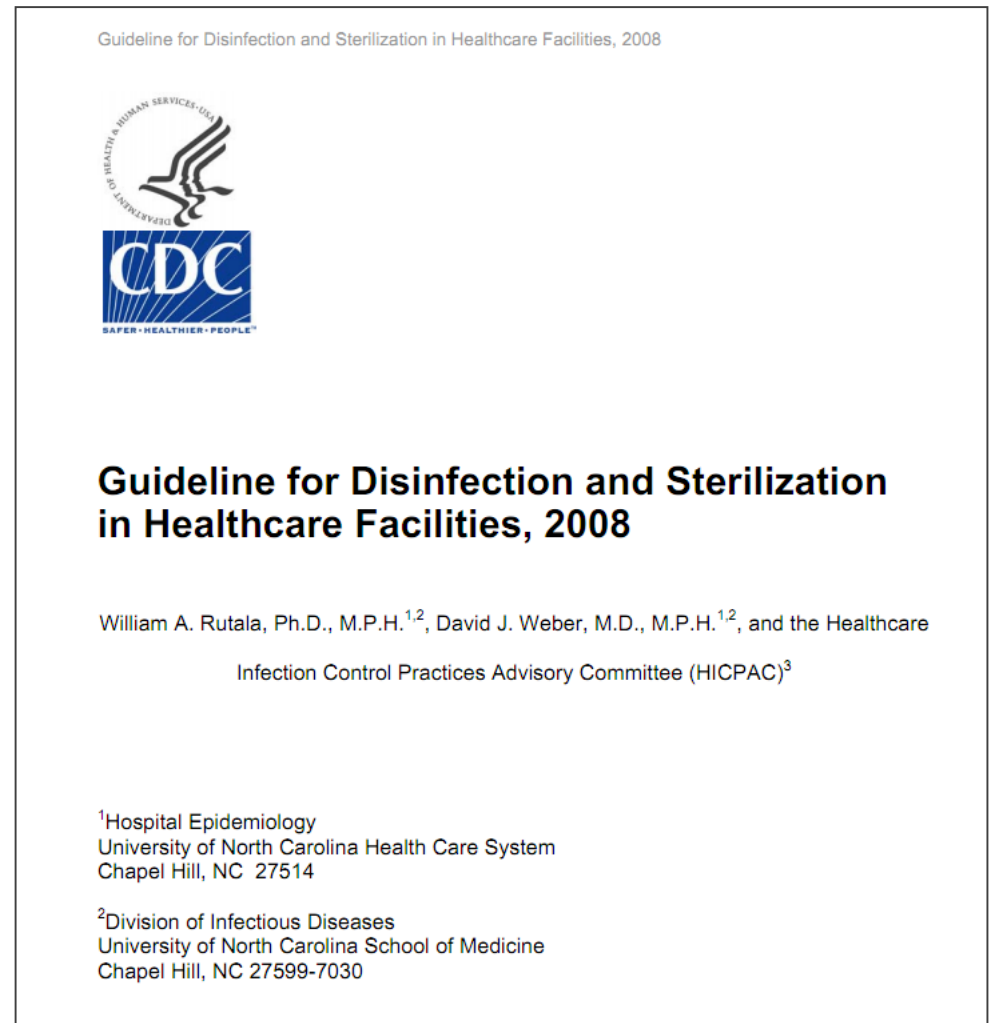
**SUSCEPTIBILITY TO DISINFECTANTS:** Susceptible to 1% sodium hypochlorite, 2% glutaraldehyde, 0.25% sodium dodecyl sulfate

**PHYSICAL INACTIVATION:** Sensitive to heat >56°C; unusually stable to chemical or physical agents and adverse pH conditions

**SURVIVAL OUTSIDE HOST:** Resistance to chemical and physical agents allows for prolonged survival outside of the body. Adenovirus type 3 survived up to 10 days on paper under ambient conditions; adenovirus type 2 survived from 3-8 weeks on environmental surfaces at room temperature

# Other References

- Useful comparisons and summaries of agents
- Charts of various applications



<https://www.cdc.gov/infectioncontrol/guidelines/disinfection/index.html>

# Other References

[www.aphl.org/biosafety](http://www.aphl.org/biosafety)

- Biosafety/Biosecurity Training
- Resources/Tools
- Additional Resources

The screenshot shows the APHL website's navigation menu and a specific resource page. The navigation menu includes: Search for Training and Resources, Our Value (About APHL & Our Membership), Our Work (Programs, Publications & Services), Your Resources (Member, Funding, Emergency & Contact Information), Your Development (Training, Conferences & Careers), I Want To, and Follow (From APHL, with social media icons for Facebook, Twitter, and Instagram). The main content area features a breadcrumb trail: APHL | APHL PROGRAMS | PUBLIC HEALTH PREPAREDNESS & RESPONSE | BIOSAFETY & BIOSECURITY | LAB BIOSAFETY & BIOSECURITY RESOURCES. The page title is 'Lab Biosafety & Biosecurity Resources'. A sidebar on the left lists: Biosafety & Biosecurity Training, Lab Biosafety & Biosecurity Resources (highlighted), and Biosafety Community of Practice. The main text states: 'APHL, working in partnership with the US Centers for Disease Control and Prevention, offers tools and resources to strengthen biosafety and biosecurity practices in public health and clinical laboratories.' Below this are three teal buttons: '+APHL Resources', '+Training Resources', and '+Additional Resources'. On the right, there is an 'Ask an expert' button, a 'CDC Biosafety' link, 'Upcoming Training' (ABSA Conference (10/13 /2017)), and 'In the News' (Pet rats in Illinois, Wisconsin linked to Seoul virus outbreak).

Questions?

