



CETA Application Guide for the use of
Surface Decontaminants in Biosafety
Cabinets
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1.0 Background

When presented with the task of surface decontaminating a Biosafety Cabinet (BSC), the certifier faces a wide variety of biological agents, and a number of chemical solutions to inactivate them. Further information on the different biological agents can be found in the *References* section of this Applications Guide.

2.0 Agents

The following list represents the significant types of agents that may be found in Biosafety Cabinets. They are listed as the most resistant to chemical decontaminants first, to the most sensitive agent at the bottom.

- 2.1 Prions – Prions are a type of infectious agent composed only of proteins, and are extremely resistant to most chemicals.
- 2.2 Bacterial endospores - Thick-walled dormant form of some bacteria. They are more resistant than vegetative bacteria to chemicals, UV light, drying and heat.
- 2.3 Protozoan cysts (oocysts) - *Cryptosporidium* and *Giardia* are two genera of protozoa that infect the intestinal epithelial cells. They are shed in the feces as a resistant cyst (oocyst). Both are resistant to many disinfectants.
- 2.4 Mycobacteria - A genus of bacteria that contains higher concentrations of lipids (fats) in their cell wall. This makes them more resistant to many disinfectants. The most notorious member of this genus is *M. tuberculosis*.
- 2.5 Non-enveloped (naked) viruses - Are composed of a protein coat and genetic material, such as Adenovirus or Polio. These viruses are generally more resistant to disinfectants and dessication (drying) than viruses that have a lipid envelope.
- 2.6 Fungi and fungal spores - Fungi are plant-like organisms that lack chlorophyll and do not photosynthesize. In nature, fungi usually live on dead tissue, but some can also infect living organisms. Examples include mushrooms, yeast or filamentous (mold). Many fungi also generate spores, but they are not as resistant as bacterial endospores.

- 2.7 Vegetative bacteria - Metabolically active bacteria are called vegetative. A major classification of bacterial is based on the structure of the cell wall. Two major groups, Gram positive and Gram negative are identified by a staining procedure. Their different cell walls affect their sensitivity to disinfectants, with gram negative bacteria slightly more resistant to most disinfectants.
- 2.8 Enveloped viruses - Viruses that are have a lipid membrane around their protein coat, such as HIV or influenza. These viruses are generally less resistant to disinfectants and dessication than naked viruses-destroy the lipid membrane, and the virus is no longer infectious.
- 3.0 Definitions
- Sterilants** can kill all microbes, spores and viruses, given enough time.
- High-Level disinfectants** kill all viruses and vegetative cells, but they may not kill endospores reliably.
- Intermediate-Level disinfectants** destroy all vegetative cells including Mycobacteria, fungi, and most, but not all viruses. They cannot kill endospores.
- Low-Level (General Purpose) disinfectants** destroy vegetative bacteria, except Mycobacteria, fungi and non-enveloped viruses
- 4.0 Types of Disinfectants commonly used in BSCs
- 4.1 Gluteraldehyde
 - 4.2 Peroxide/Peracetic acid
 - 4.3 Chlorine dioxide
 - 4.4 Halogens
 - 4.5 Chlorine (sodium hypochlorite)
 - 4.6 Iodine
 - 4.7 Alcohols (Isopropyl or ethanol)
 - 4.8 Phenolics
 - 4.9 Quaternary ammonium compounds
- 5.0 Precautions
- When handling, using, or disposing of chemical decontaminants, always follow the instructions on the product label
- 6.0 Applications Matrix
- The attached matrix outlines the properties, efficacy and characteristics of the decontaminants listed in Part 7.0.



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7.0 Properties of Common Liquid Surface Decontaminants

Decontaminant	Gluteraldehyde	Peroxide/ Peracetic acid/ Acetic acid	Chlorine Dioxide	Chlorine	Iodophor	Alcohol	Phenolic	Quaternary Ammonium Compounds
Classification	Sterilant	Sterilant	Sterilant	High Level	Intermediate	Intermediate	Intermediate	Low Level
Parameters for use:								
Concentration	2%	1%	1:5:1 / 100-1000 ppm	0.01-5%	0.5-2.5%	70-85%	0.2-3%	0.1-2%
Contact time (min.)	10-600	10-720	10-600	10-30	10-30	10-30	10-30	10-30
Stability > 1 week ₁	+		+		+	+	+	+
Agents:								
Bacterial Endospores	+	+	+	+/-				
Naked Viruses	+	+	+	+	+/- ₂	+/- ₂	+/- ₂	
Mycobacterium	+	+	+	+	+	+	+	
Vegetative Bacteria	+	+	+	+	+	+	+	+
Enveloped Viruses	+	+	+	+	+	+	+	+
Characteristics:								
Inactivated by Organics		+		+	+	+	+/-	+
Residual	+	+	+	+/-	+		+	
Corrosive		+		+	+		+	
Flammable						+		
Skin Irritant	+	+	+	+	+		+	
Eye Irritant	+	+	+	+	+	+	+	
Respiratory Irritant	+	+	+	+	+	+	+/-	
Toxic	+	+	+	+	+	+	+	+
Use in BSCs:								
Routine Surface Decon				+/-	+	+		+
Biohazardous Spill		+/-	+	+/-	+		+	+/-

- 1- Protected from light and air
- 2- Results vary depending on the virus

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7.1 Liquid Surface Decontaminant Resources

Hydrogen peroxide/Peracetic acid/Acetic acid

Spor-Klenz® – Available from Steris Corporation. On the web at: www.steris.com

Decon-Spore 200 Plus® - Available from Veltek Associates Inc. 15 Lee Boulevard Malvern, PA 19355 Phone: 610-644-8335 On the web at: <http://www.sterile.com>

Chlorine Dioxide

2-part liquid-

Clidox-S® – Available from Pharmacal Research Laboratories, P.O.Box 369 Naugatuck, CT. 06770 Phone: 1-800-243-5350 On the web at: www.pharmacal.com

Tablets/Powders-

Virkon-S – Available from Pharmacal

Exterm – Available from Clordisys Solutions, Inc. P.O. Box 549 Lebanon, NJ 08833 Phone: (908) 236-4100 On the web at: <http://www.clordisys.com>

Gluteraldehyde

Cidex® Johnson & Johnson, Advanced Sterilization Products. On the web at: http://www.jnigateway.com/index.jhtml?_requestid=883947

Sodium Hypochlorite

In prepackaged spray - Bleach-Rite® by Current Technologies 1-800-456-4022 In prepackaged towelettes – Hype-Wipe® by Current Technologies

Iodophors

Wescodyne® – Available from Steris Corporation.

Alcohol

Ethanol - Liquid Sanihol 70® – Decon Laboratories, Inc. 460 Glennie Circle King of Prussia, PA 19406 (800) 332-6647

Isopropyl - Liquid- CiDehol 70®- *Decon Laboratories, Inc.*

Towelettes-

CiDehol® 70 Wipes - *Decon Laboratories, Inc.*

Phenolics

Vesphene® - Available from Steris Corporation

Hil-Phene® - Hillyard, Inc. 302 North 4th Street P.O. Box 909 St. Joseph, Missouri 64501 800-365-1555 On the web at: <http://www.hillyard.com>

Quaternary Ammonium Compounds

Liquid - Conflikt® - *Decon Laboratories, Inc.*

Aerosol - End-Bac II® - Johnson Diversey Inc. On the web at: <http://www.johnsondiversey.com/Cultures/en/default.htm>

References

Disinfection, Sterilization, and Preservation (Hardcover)

by Seymour S. Block (editor) 5th edition, Lippincott, Williams & Wilkins 2001

Biological Safety: Principles and Practices (Hardcover)

by Diane O. Fleming (Editor), Debra Long Hunt (Editor) 3rd edition, ASM Press 2000

The Foundations of Laboratory Safety: A Guide for the Biomedical Laboratory (Brock/Springer Series in Contemporary Bioscience) Stephen R. Rayburn 1990

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