

Disinfectants

1. Introduction

Disinfectants are used almost everywhere people want to kill disease-causing microorganisms - in homes, schools, day care centers, hospitals, nursing homes, doctor and dentist offices, restaurants, food production and processing plants, on farms, and a variety of other places.

OSHA's Bloodborne Pathogen Standard has caused recent concern and a need to protect employees from blood exposure in the workplace. The need to clean and disinfect surfaces contaminated with blood spills is an important component of the "Exposure Control Plan" and the selection of an appropriate disinfectant is essential.

Although the role of the inanimate environment in transmitting infections has not been completely defined, the use of disinfectants is considered an integral part of Infection Control Programs and efforts. In fact, health-care organizations recommend, and many regulatory agencies require, their use.

Selecting an appropriate disinfectant can be a confusing process. The factors to consider are numerous, the instructions can be complicated and misuse may result in a violation of the law.

2. Regulation

The Environmental Protection Agency (EPA) regulates disinfectants as pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended (FIFRA). The EPA may register a disinfectant only if EPA determines that it is effective, when used as directed, without causing an unreasonable risk to public health or the environment.

3. EPA Authorization

By law disinfectant labels bear both an EPA registration number and an EPA establishment number.

4. Disinfectant Characteristics

- Level of Activity
- Effective Concentration
- Toxicity to human and animals
- Corrosiveness to materials and surfaces
- Compatibility with other substances (Surfactants)
- Effective pH ranges
- Effectiveness in organic loads (Pus, blood, feces)
- Effectiveness in hard water
- Staining or discoloration short or long term
- Fast acting
- Appearance (acceptance of dyes, clearness, emulsions)
- Odor and ability to be deodorizing
- Residual Activity
- Water Solubility
- Stability
- Consistent supply and production
- Cost
- Convenient to mix, dispense and use
- Cleaning ability
- Broad spectrum

5. Levels of Microbial Destruction

1. *Sterilization*: kills all spores and all microorganisms
2. *High Level Disinfection*: sporicidal except high levels of spores
3. *Intermediate Level*: kills TB, vegetative bacteria, most viruses and most fungi
4. *Low Level*: kills most bacteria, some viruses and some fungi

6. Methods for Microbial Control

For Intermediate Level Disinfection: Ethyl or Isopropyl Alcohol (70-90%), Phenolic Germicide Detergent, Iodophor Germicide Detergent

For Low Level Disinfection: Sodium Hypochlorite (100 ppm), Quaternary Ammonium Germicide Detergent, or any intermediate level disinfection method

7. Signal Words and Symbols The signal word is required on the front panel immediately below the child hazard warning statement and also on the side panel under Hazards to Humans and Domestic Animals. The size of the signal word is dictated by the size of the label.

- **CAUTION** - Low Toxicity or comparatively free from danger
- **WARNING** - Moderately Toxic
- **DANGER** - Highly toxic

8. Product Type: Quat vs. Phenolic

Phenolic and Quaternary Ammonium disinfectants are the two primary choices for use on environmental hard surfaces. Both are normally combined with detergents for use as "one-step" cleaner-disinfectants. Quaternary Ammonium disinfectants are usually the product of choice for routine environmental cleaning. Phenolic disinfectants are required for areas such as surgery of emergency treatment rooms where blood contamination is likely. OSHA has defined an "appropriate disinfectant" for blood spills as a product that is effective against HIV-1 and HBV or is Tuberculocidal.

9. Cleaning Ability

Disinfectant cleaners should have acceptable cleaning properties as required by their user's circumstances. In general, traditional alkaline products with lower use-dilutions, normally, provide better cleaning performance. Newer neutral disinfectants many time have an equal proportion of all ingredients in their formulas, thus their cleaning ability would be the same.

For example, a 2 ounce per gallon use dilution (1:64) is generally a better cleaner than a 1/2 ounce per gallon (1:256) product unless the product has been formulated to have the same percent of inert ingredients (everything except the actives). This is true with some of the newer neutral pH products.

Cleaning is not always necessary and the choice of a straight disinfectant, sanitizer, or a disinfectant/deodorant could be the right choice. If cleaning and disinfecting is required the product must indicate cleaning as a characteristic on the label and give directions for use as a cleaner.

10. Definitions

"..CIDE" or "..CIDAL": A suffix that means "to kill" **"..Cide"** is used when the word is used as a noun and **"..Cidal"** is used when the word is an adjective. Generally refers to chemical agents when referring to control of microorganisms on inanimate objects and environmental surfaces.

Algaecide: A chemical agent that kills algae.

Bactericide: A chemical agent that kills bacteria, but not ordinarily bacterial spores.

Fungicide: A product that kills fungi (including yeast's).

Germicide: A term that is used in the same context as disinfectant.

Mildewcide: A chemical agent that kills mildew (a defacing fungus).

Sporicide: A chemical agent that destroys bacterial spores as well as vegetative forms of microorganisms.

Tuberculocide: An agent that is intended to destroy or inactivate tuberculosis bacteria.

Virucide: A chemical product that kills viruses.

Disinfectant : A chemical product that kills microorganisms, except bacterial spores, on inanimate objects and environmental surfaces.

Disinfection: A process that kills microorganisms, except bacterial spores, on inanimate objects and environmental surfaces.

Efficacy: The capacity of a disinfectant product to control the indicated microorganisms. The term "efficacy" is the same as "product performance" and "effectiveness".

Epidemiology: The study of disease outbreaks. Investigations normally look at the source of the causing agent, transmission and the control measures for contagious diseases and infections.

HBV: Refers to the Hepatitis B Virus.

HIV: Refers to the virus that causes AIDS.

Inanimate: The state of being without life. Is most often used in reference to objects and environmental surfaces that need to be cleaned.

Infection: The invasion and multiplication of microorganisms into the body and the production of characteristics or symptoms of a disease.

Microorganisms: Refers to living organisms that are too small to be seen without the aid of a microscope. Includes bacteria, viruses, fungi, rickettsiae, & protozoa.

Pathogen: Any disease producing agent or microorganism. Pathogenic refers to an organism's ability to cause disease or infection.

Phenol Coefficient: A measure of the germicidal ability of a product in relation to a standard phenol solution. The activity is expressed as a ratio between the concentrations of the two solutions. This method is obsolete and has been replaced with the A.O.A.C. Use Dilution Method.

Phenolics: A class of disinfectants that are referred to as "synthetic phenols" and which are usually good broad spectrum Tuberculocidal products.

Quats: A class of disinfectants that are widely used as general germicidal cleaners for environmental hard surface cleaning. "Quats" are not Tuberculocidal, but offer good cleaning, deodorizing, and disinfecting performance.

Sanitize: Refers to the reduction of microorganisms to a safe level as determined by public health requirements. Most always used in reference to food service sanitation.

Sterilize: To kill, destroy or eliminate viruses and all living bacteria, fungi, and their spores.

Topping Off: A practice of adding more product to a container of cleaning chemicals, disinfectant solutions, hand care products, or other solutions. "Topping Off" becomes a concern when solutions become contaminated because containers are not rinsed or cleaned between refills.

Use Dilution Method: A method approved by the A.O.A.C. (Association of Official Analytical Chemists) that establishes the dilution rate that the product is effective when used in accordance with the label instructions.