 **SELECTING THE PROPER DISINFECTANT** 

| **DISINFECTANT** | **USES** | **MECHANISM OF ACTION** | **USE PARAMETERS AND EXAMPLES** | **ADVANTAGES** | **DISADVANTAGES/ HAZARDS** |
| --- | --- | --- | --- | --- | --- |
| **Alcohols** | * Surface disinfection * Skin antiseptic * Bactericidal * Fungicidal * Tuberculocidal * Virucidal (Variable/ limited activity, depending on type of alcohol used and type of virus.) | * Precipitates proteins; denatures lipids. * Presence of water as diluting agent assists with killing action. | * 60-90%; 70% is standard. * Ethanol, isopropanol | * Rapidly bactericidal against vegetative forms of bacteria. * Leaves no residue. * Only recommended for final surface cleaning after using another disinfectant. * More effective when commercially combined with other disinfectants. | * Flammable * Rapid evaporation, especially in biosafety cabinet and chemical fume hood (insufficient contact time). * Not recommended for sterilizing medical/ surgical materials (not sporicidal). * Inactivated by organic matter. * Degrades rubber, plastics, and adhesives. * Toxic and eye irritant. Intoxicating fumes. |
| **Aldehydes** | * Medical equipment * Bactericidal * Fungicidal * Tuberculocidal * Virucidal (variable/ limited activity) * Sporicidal | * Denatures proteins * Disrupts nucleic acids | * Formalin * Activated glutaraldehyde * Potentiated acid glutaraldehyde, stabilized alkaline glutaraldehyde * Calgocide 14, Cidex, Vespore | * Good activity against vegetative bacteria, spores, and viruses * Non-staining, relatively noncorrosive * Use as a sterilizer on plastics, rubber, lenses, stainless steel, cement, and other items that cannot be autoclaved | * Carcinogen, toxic * Slow acting * Some types not stable in solution. * Affected by pH, temperature, and humidity. * Inactivated by organic material, hard water, soaps and detergents. * Only use in well ventilated areas, such as chemical fume hood. |
| **Chlorine Compounds** | * Surface disinfectant; for submerging items; and for disinfecting liquid cultures. * Decontamination of blood or body fluid spills. * Bactericidal * Virucidal * Fungicidal * Tuberculocidal (with extended contact time) * Sporicidal (good at 2500 ppm) | * Denatures proteins | * Effectiveness is based on the amount of free hypochlorous acid found in solution. Need at least 500 to 5000 ppm free chlorine. * 10% bleach solution typically has 5150-6250 ppm free chlorine. * 10% bleach solution has biocidal effect on M. Tuberculosis, S. auerus, other vegetative bacteria and HIV after 30 minutes. Good for inactivation of HBV, HCV, HIV, in cleanup of blood spills. * Sodium hypochlorite (bleach), calcium hypochlorite, chlorine dioxide, Sodium dichloroisocyanurate; Clorox, Cyosan, Purex, Baciticide, Dispatch | * Kills hardy viruses (e.g. hepatitis) * Kills wide range of organisms * Inexpensive * Penetrates well * May be used on food prep surfaces. * Commercially available sodium hypochlorite products have extended shelf life and have shorter, EPA recommended, contact times. | * Corrodes metals such as stainless steel, aluminum, requiring a rinse with 70% ethanol. NOT recommended for biosafety cabinet decontamination. * Inactivated rapidly in presence of organic matter. Requires reducing organic matter (such as blood) by wiping up, use of detergent, or multiple treatments with bleach solution. * Increase in alkalinity decreases bactericidal properties. * Inactivated by light, UV radiation, and some metals. * Dilutions of household bleach lose activity rapidly. Must be made fresh daily. * Toxic gas released if mixed with strong acids or ammonia * Eye, skin and respiratory irritant. |
| **Iodophors and Iodine Compounds** | * Disinfecting some semi critical medical equipment * Disinfecting liquid cell cultures * Antiseptic * Bactericidal * Virucidal * Fungicidal * Tuberculocidal * Sporicidal (variable or limited activity) | * Denatures proteins * Iodophors are solutions that contain iodine and a solubilizing agent, which enables slow release of free iodine. * Some contain non-ionic detergents. | * 75–150 ppm available free iodine for disinfection. * Povidone-iodine and poloxamer-iodine | * Rapid biocidal action for many organisms * Kills broad range of organisms * Low tissue toxicity * Kills immediately rather than by prolonged period of stasis * Stable in storage if kept cool and tightly covered * Not affected by hard water * May be used on food prep surfaces | * Require prolonged contact times to kill certain fungi and bacterial spores * May stain clothing and surfaces * May tarnish silver, silver plate, & copper * Affected by pH * Rapidly inactivated by organic matter * Requires frequent application * Not suitable as hard-surface disinfectant * Vaporize at 120°F to 125°F (should not be used in hot water) |
| **Phenolic Compounds** | * Environmental surfaces (e.g., laboratory surfaces) and noncritical medical devices * Bacterial * Fungicidal * Tuberculocidal * Virucidal | * Disrupts cell walls * Denatures proteins * At high concentrations, phenol acts as a gross protoplasmic poison * Low concentrations inactivate essential enzyme systems | * Ortho-phenylphenol and ortho-benzyl-para-chlorophenol * One-Stroke Environ®, Pheno-Tek II®, Tek-Trol®, Lysol® | * Non-corrosive * Stable in storage * Effective in presence of organic matter, hard water, soaps, and detergents | * Alkaline pH reduces effectiveness * Unpleasant odor * Leaves gummy residue * Not for use on food contact surfaces * Can damage rubber, plastic * Irritation to skin and eyes * May be toxic to animals, especially cats and pigs |
| **Peroxygen Compounds** | * Whole room and surface disinfectant. * Wound disinfectant. * Bacterial * Fungicidal (variable or limited activity) * Tuberculocidal (variable or limited activity) * Virucidal * Sporicidal | * Denature proteins and lipids | * Hydrogen peroxide/ accelerated HP, peracetic acid, potassium peroxymonosulfate * Rescue®, Oxy-Sept 333®, Virkon-S® * Hydrogen peroxide effective concentration: 3-25% | * Fast acting * Effective in presence of organic matter, hard water, soaps, and detergents * Low toxicity at lower concentrations * Environmentally friendly * Shelf stable when stored according to manufacturer's recommendations. | * May damage some metals (e.g., lead, copper, brass, zinc) * Concentrated forms can cause severe skin burns and eye damage; harmful if inhaled. * Powdered form may cause mucous membrane irritation. |
| **Quaternary Ammonium Compounds (QACs)** | * Whole room and surface disinfectant. * Food prep surfaces * Bactericidal * Virucidal (enveloped viruses only) * Fungicidal * Sporicidal | * Denatures proteins * Binds phospholipids of cell membrane * Inactivates energy-producing enzymes | * Alkyl dimethyl benzyl ammonium chloride; didecyl dimethyl ammonium bromide; and dioctyl dimethyl ammonium bromide * Roccal-D®, DiQuat®, D-256® | * Are cationic detergents (use to remove organic material followed by second application for disinfection) * Rapid action * Stable in storage * Best at neutral or alkaline pH * May be used on food prep surfaces (followed by water rinse) | * Inactivated by organic matter, hard water, soaps and anionic detergents * Do not use with cotton cloths or gauze pads (reduces activity) * High concentrations corrosive to metals * Irritation to skin, eyes, and respiratory tract |

Note: The information listed above is a general overview of available disinfectants. Please refer to information found in the references below for more information, as well as manufacture’s information about the specific organisms a disinfectant is effective against.

References:

1) [Chemical Disinfectants: Guideline for Disinfection and Sterilization in Healthcare Facilities (2008). Centers for Disease Control](https://www.cdc.gov/infectioncontrol/guidelines/disinfection/disinfection-methods/chemical.html).

2) [Disinfection. The Center for Food Security & Public Health. Iowa State University](https://www.cfsph.iastate.edu/infection-control/disinfection/).

3) [Selected EPA-Registered Disinfectants. U.S. Environmental Protection Agency](https://www.epa.gov/pesticide-registration/selected-epa-registered-disinfectants).