 **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.
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| **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.
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| **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.
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| **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)
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| **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
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| **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.
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| **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
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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).