



# SELECTING THE PROPER DISINFECTANT



DISINFECTANT RECOMMENDED	USES	HOW THEY WORK	USE PARAMETERS AND EXAMPLES	ADVANTAGES	DISADVANTAGES/ HAZARDS
<b>Alcohols</b>	<ul style="list-style-type: none"> <li>• Cleaning some instruments</li> <li>• Cleaning skin</li> <li>• Variable against some bacterial and fungal species</li> </ul>	<ul style="list-style-type: none"> <li>• Changes protein structure of microorganism</li> <li>• Presence of water assists with killing action</li> </ul>	<ul style="list-style-type: none"> <li>• 70%</li> <li>• ethyl, isopropyl</li> </ul>	<ul style="list-style-type: none"> <li>• Compatibility combined with other disinfectants (quaternaries, phenolics, and iodine) to form tinctures</li> <li>• Fairly inexpensive</li> <li>• Only recommended for final surface cleaning after using another disinfectant</li> </ul>	<ul style="list-style-type: none"> <li>• Flammable</li> <li>• <b>NOT</b> recommended for disinfecting, including biosafety cabinets</li> <li>• 70% evaporates too fast to allow for sufficient contact time</li> <li>• Not active when organic matter present</li> <li>• Not active against certain viruses</li> <li>• Toxic and an eye irritant</li> </ul>
<b>Aldehydes</b>	<ul style="list-style-type: none"> <li>• Effective against wide spectrum of bacteria &amp; viruses when used properly (10 hour contact period).</li> <li>• Bactericidal (good)</li> <li>• Fungicidal (good)</li> <li>• Tuberculocidal (excellent)</li> <li>• Virucidal (good)</li> <li>• Sporocidal (good)</li> </ul>	<ul style="list-style-type: none"> <li>• Coagulates cellular proteins</li> </ul>	<ul style="list-style-type: none"> <li>• Formaldehyde Solutions (8%)</li> <li>• Formaldehyde – Alcohol Solutions (8% in 70% alcohol)</li> <li>• Activated glutaraldehyde (2% solutions)</li> <li>• Formalin – liquid water solution</li> <li>• Paraformaldehyde – solid polymerized compounds</li> <li>• E.g., Calgocide 14, Cidex, Vespore</li> </ul>	<ul style="list-style-type: none"> <li>• Good activity against vegetative bacteria, spores, and viruses</li> <li>• Non-staining, relatively noncorrosive</li> <li>• Useable as a sterilant on plastics, rubber, lenses, stainless steel and other items that can't be autoclaved</li> </ul>	<ul style="list-style-type: none"> <li>• Carcinogen</li> <li>• Not stable in solution</li> <li>• Has to be in alkaline solution</li> <li>• Inactivated by organic material</li> <li>• Glutaraldehyde not recommended due to low exposure limit</li> <li>• Must only be used in chemical fume hood – limited stability after activation (for alkaline glutaraldehyde)</li> <li>• Skin sensitizer / eye irritant</li> </ul>

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Aug 05

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<b>Chlorine Compounds</b>	<ul style="list-style-type: none"> <li>• Cleanup of blood or body fluid spills</li> <li>• Bactericidal (good)</li> <li>• Fungicidal (good)</li> <li>• Sporocidal (good at &gt;1000 ppm Sodium Hypochlorite)</li> </ul>	<ul style="list-style-type: none"> <li>• Free available chlorine combines with contents within microorganism, reaction byproducts cause its death</li> <li>• Need 500 to 5000 ppm</li> <li>• Produce chemical combination with cell substances</li> <li>• Depends upon release of hypochlorous acid</li> </ul>	<ul style="list-style-type: none"> <li>• 1:10 dilution household bleach with water biocidal effect on <i>M. Tuberculosis</i>, <i>S. auerus</i>, other vegetative bacteria and HIV after 10-20 minutes</li> <li>• 1:5 dilution for bacterial spores and mycobacteria</li> <li>• 1:10 dilution lasts about one month, stored at room temp in a closed plastic container, away from heat and light</li> <li>• neutralizes rapidly in presence of organic matter</li> <li>• Good for inactivation of HBV, HCV, HIV, in cleanup of blood spills</li> <li>• Undiluted bleach for surface disinfecting after possible contamination with the CJD virus; however NIH is recommending 1.0 N NaOH. - E.g., Bleach solutions (sodium hypochlorite), Clorox, Cyosan, Purex, Baciticide, Dispatch</li> </ul>	<ul style="list-style-type: none"> <li>• Kills hardy viruses (e.g. hepatitis)</li> <li>• Kills wide range of organisms</li> <li>• Inexpensive</li> <li>• Penetrates well</li> <li>• Relatively quick microbial kill</li> <li>• May be used on food prep surfaces</li> </ul>	<ul style="list-style-type: none"> <li>• Corrodes metals such as stainless steel, aluminum</li> <li>• Organics may reduce activity</li> <li>• Increase in alkalinity decreases bactericidal properties</li> <li>• Unpleasant taste/odor</li> <li>• Tuberculocidal with extended contact time</li> <li>• Eye, skin and respiratory irritant</li> <li>• NOT recommended for biosafety cabinet decontamination</li> </ul>
<b>Iodophor</b>	<ul style="list-style-type: none"> <li>• Disinfecting some semi critical medical equipment</li> <li>• Vegetative bacteria and viruses</li> </ul>	<ul style="list-style-type: none"> <li>• Iodine with carriers</li> <li>• Free iodine enters microorganism and binds with cellular components</li> </ul>	<ul style="list-style-type: none"> <li>• Dilution critical</li> <li>• 100 ppm available iodine</li> <li>• Need 30 to 50 ppm</li> </ul>	<ul style="list-style-type: none"> <li>• Highly reactive – rapid biocidal action</li> <li>• Kills broad range of organisms</li> </ul>	<ul style="list-style-type: none"> <li>• Poor activity against bacterial spores</li> <li>• May stain plastics or corrode metal</li> </ul>

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<b>Iodophor (cont.)</b>		<ul style="list-style-type: none"> <li>Carrier helps penetrate soil/fat</li> <li>Probably by disorder of protein synthesis due to hindrance and/or blocking of hydrogen bonding</li> </ul>	<ul style="list-style-type: none"> <li>E.g., Bactergent, Hy-sine, Ioprep, Providone (iodine / betadine), Wescodyne – Steris Corp. (16% phosphoric acid, 1.75% iodine); dilute 1:213 (18 ml to 1 gal. of water for proper strength)</li> </ul>	<ul style="list-style-type: none"> <li>Effective against Gram negative &amp; Gram positive organisms, some viruses, and tubercle bacilli</li> <li>Low tissue toxicity</li> <li>Kills immediately rather than by prolonged period of stasis</li> <li>Most effective in acid solutions</li> <li>Stable in storage if kept cool and tightly covered</li> <li>Not affected by hard water</li> <li>May be used on food prep surfaces</li> <li>Built in indicator (still active if solution born or yellow)</li> </ul>	<ul style="list-style-type: none"> <li>May tarnish silver, silver plate, &amp; copper</li> <li>May stain skin/laundry</li> <li>Odor</li> <li>Some organic and inorganic substances neutralize / reduce effectiveness</li> <li>Vaporize at 120°F to 125°F (should not be used in hot water)</li> <li>Tuberculocidal with extended contact time</li> <li>Sporicidal (some)</li> </ul>
<b>Mercurials</b>	<ul style="list-style-type: none"> <li>Exhibit good activity against viruses, but not recommended for general use</li> </ul>	<ul style="list-style-type: none"> <li>The affinity of Hg for sulfhydryl groups in proteins</li> </ul>	<ul style="list-style-type: none"> <li>Exhibit good activity against viruses at 1:1000 concentration</li> <li>Organic mercurials include: Mercurochrome, Merthiolate, and Metaphen</li> </ul>	<ul style="list-style-type: none"> <li>Used as a disinfectant and as a preservative (BANNED IN THE U.S.)</li> </ul>	<ul style="list-style-type: none"> <li>TOXIC!</li> <li>Not recommended for general use; poor against vegetative bacteria</li> <li>Create difficulties in waste disposal</li> <li>Useless as sporicides</li> <li>Potent neurotoxins</li> </ul>
<b>Phenolic Compounds</b>	<ul style="list-style-type: none"> <li>Bacterial (excellent)</li> <li>Fungicidal (excellent)</li> <li>Tuberculocidal (excellent)</li> </ul>	<ul style="list-style-type: none"> <li>Gross protoplasmic poison</li> <li>Disrupts cell walls</li> <li>Precipitates cell proteins</li> </ul>	<ul style="list-style-type: none"> <li>500 ppm active agent.</li> <li>E.g., Hil-Phene, Lph, Metar, Vesphene, Amphyl, Cidecon, LopHene</li> </ul>	<ul style="list-style-type: none"> <li>Nonspecific concerning bactericidal and fungicidal action</li> </ul>	<ul style="list-style-type: none"> <li>Unpleasant odor</li> <li>Leaves gummy residue</li> <li>Some areas have disposal restrictions</li> </ul>

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<b>Phenolic Compounds (cont.)</b>	<ul style="list-style-type: none"> <li>Virucidal (excellent)</li> </ul>	<ul style="list-style-type: none"> <li>Low concentrations inactivate essential enzyme systems</li> </ul>		<ul style="list-style-type: none"> <li>When boiling water would cause rusting, the presence of phenolic substances produces an antirusting effect</li> <li>Stable in storage</li> <li>Germicidal against Gram-negative and Gram-positive organisms and tubercle bacilli</li> <li>Effective over large pH range</li> </ul>	<ul style="list-style-type: none"> <li>Effectiveness reduced by alkaline pH, natural soap, organic material</li> <li>Very limited sporicidal activity</li> <li>Low solubility in water</li> <li>Prolonged contact deteriorates rubber</li> <li>Can cause skin and eye irritation</li> <li>Not for use on food contact surfaces</li> <li>Corrosive and toxic</li> </ul>
<b>Quaternary Ammonium Compounds (QUATS)</b>	<ul style="list-style-type: none"> <li>Ordinary housekeeping (e.g. floors, furniture, walls)</li> <li>Bactericidal (excellent)</li> <li>Fungicidal (good)</li> <li>Virucidal (good, but not as effective as phenols)</li> <li>Acceptable to control vegetative bacteria and non-lipid-containing viruses</li> </ul>	<ul style="list-style-type: none"> <li>Affects proteins and cell membrane of microorganism</li> <li>Release nitrogen and phosphorous from cells</li> </ul>	<ul style="list-style-type: none"> <li>400 ppm active agent</li> <li>E.g., Coverage 258, End-Bac, Hi Tor, Conflikt, TB Quat</li> </ul>	<ul style="list-style-type: none"> <li>Contains a detergent to help loosen soil</li> <li>Rapid action</li> <li>Colorless, odorless (but act as a deodorizers)</li> <li>Non-toxic, less corrosive</li> <li>Highly stable</li> <li>May be used on food prep surfaces</li> <li>Stable in storage</li> <li>Effective at temps up to 212°F</li> <li>Effective against Gram-positive organisms, bacteriostatic in high dilutions</li> <li>More effective in alkaline than acid solutions</li> </ul>	<ul style="list-style-type: none"> <li>Does not eliminate spores, T bacteria, some viruses</li> <li>Effectiveness influenced by hard water</li> <li>Layer of soap interferes with action</li> <li>Non-irritating to skin but avoid skin or eye contact</li> <li>Toxic</li> <li>Ineffective against tubercle bacilli, spores and viruses</li> <li>Neutralized by soap and effectiveness reduced by organic material</li> </ul>