Properties of Commonly-Used Laboratory Disinfectants For Surface Cleaning

Class of Disinfectants and Examples	How they Work	Advantages	Disadvantages	Hazards
Alcohols Examples: Ethyl alcohol, Isopropyl alcohol	Damage cell membranes, denaturing essential microbial proteins and interfering with metabolism and resulting in cell lysis. Mixtures of alcohols and water are more microbiocidally active than absolute alcohol; however, activity drops sharply if alcohol content falls below 50%	• Does not leave residues • Inexpensive	• Effectiveness against non-lipid containing viruses is variable • Requires significant contact time to be effective • Evaporates before required contact time • Ineffective against spores • May harden rubber • Can dissolve some glues	Flammable
Chlorine Compounds Example: Household Bleach	Free available chlorine reacts with contents within microorganism, reaction byproducts cause its death Stability of free available chlorine is dependent upon chlorine concentration, pH of organic matter and light.	• Inexpensive • Effective against lipid and non-lipid viruses • Wide bactericidal spectrum	• Solutions must be made fresh regularly to maintain free available of chlorine at levels that deactivate organisms • Corrodes metals • Organics may reduce activity • Increase in alkalinity decreases bactericidal property • Unpleasant odor • Needs extended contact time to be considered tuberculocidal	Care must be taken not to inadvertently mix chlorine bleach with other disinfectants, due to potential to generate chlorine gas. Never autoclave chlorine bleach.
Quaternary Ammonium Compounds	Affects proteins and cell membrane of microorganism	• Primarily effective against gram positive bacteria; • Good for water baths, incubators where halide or phenolic residues are not desired.	• Does not eliminate spores • May not be effective against non-lipid viruses	If used according to manufacturer's directions, considered non-toxic.

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List of Disinfectants

Disinfectants	How they Work	Advantages	Disadvantages	Hazards
Phenolics Examples: Wescodyne, Carbolic Soap	Breaks down proteins through proteolysis.	• Active against vegetative bacteria and lipid-containing viruses	• Not effective against spores • Variable activity against non-lipid containing viruses • Unpleasant odor • Some areas have disposal restrictions • Effectiveness reduced by alkaline pH, natural soap or organic material • Not considered sporicidal	May be absorbed by latex gloves Can penetrate the skin Irritant
Iodophors Example: Vesphene	Quickly penetrates cell wall of microorganism; disrupts protein and nucleic acid structure and synthesis.	• Kills broad range of organisms • Kills immediately rather than by prolonged period of stasis • Not affected by hard water	• Stains plastics and can corrode metal • Iodophors designed to be used as skin antiseptics (such as povidone-iodine) should not be used for disinfection of surfaces • Not considered to be effective against spores	Skin and eye irritant Corrosive Toxic
Accelerated Hydrogen Peroxide Example: Accel Wipes	Hydrogen peroxide generates free hydroxyl radicals, which attack membrane lipids, essential cell components and causes DNA strand breakage in growing bacteria	• Stable in storage • Effective against a broad spectrum of microbes	• Check product label to determine contact times required for product to be considered tuberculocidal and virucidal.	

References:

Russell, Hugo & Ayliffe's Principles and Practice of Disinfection , Preservation and Sterilization, 5th ed. (ed. A.P. Fraise, J. Maillard, S.A .Satter, John Wiley & Sons, New York, pp. 5-70.

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