OH&S Occupational Health and Safety

Safety Shorts

Disinfectants

Which should you choose?

The choice of the appropriate disinfectant is critical for any work involving a biohazardous agent. A number of different classes of disinfectants are available including phenols, quaternary ammonium compounds, chlorhexidine compounds, halogen compounds, alcohols, aldehydes, etc. The decision as to the most appropriate agent requires a knowledge of both the organism's susceptibility to the agents and the type of substrate that will require decontamination. Agents offering the lowest potential for personnel or environmental toxicity should be used whenever possible.

Each laboratory must prepare a specific protocol for handling the decontamination of work surfaces, equipment, and spills. The CDC recommends the use of a 1:10 dilution of household bleach (5,250 ppm sodium hypochlorite final dilution) in neutral water with a 20 minute contact time for the decontamination of blood spills. Other disinfectant solutions may be more appropriate for other situations.

The attached table outlines examples, usage tips, advantages, and disadvantages of common disinfectants.

Disinfectants – Selection and Use Table

Type	Dilution	Examples	Tips for Use	Advantages	Disadvantages
Chlorine Cmpds.	1:10 (~5000ppm free chlorine)	Clorox, household bleach, Bleach-Rite	-Store diluted solution in sealed container protected from light -Use to decontaminate liquid culture media, for spill cleanup, and to wipe down work surfaces -Contact Time from 10-30 minutes	-Relatively nontoxic -Low cost -Effective with detergents -Fast acting -Broad spectrum effectiveness -Deodorizing/sanitizing	-Inactivated by organic material such as blood, do not use at less than 1:10 dilution -Corrosive -Irritates mucus membranes, eyes, and skin -No residual activity on surfaces -Can damage clothing -Produces toxic chlorine gas if mixed with acids or ammonia compounds -Prolonged deterioration on standing
Alcohols	-Dilute to 70% in water, (looses effectiveness at concentrations above 90%)	Isopropanol, Purel, Rubbing Alcohol	-Use to clean instruments and wipe down interior of Biological Safety Cabinets and bottles, etc. to be put into Biological Safety Cabinets -Use as topical antiseptic on intact skin -Contact Time from 10-30 minutes	-Non-corrosive -Effective with detergent -Leaves no residue -Effective bactericide with adequate contact time -Non-staining	-Can have reduced effectiveness in organic material, does not penetrate organic material -Flammable -No residual activity and limited effective exposure time due to high rate of evaporation -Some incompatibility with rubber and plastic material
Phenolics	500 ppm active agent or 1%-5%	Triclosan, chloroxylenol	-Commonly used to clean walls, floors, etc -Useful in areas where organic matter cannot always be removed, such as animal areas -Contact Time approximately 10 minutes	-Good effectiveness in organic material -Effective with detergent -Has some residual effectiveness -Stable in storage	-Toxicity varies with specific compound, -Can be absorbed through skin and Latex gloves -Some formulations may have unpleasant odor -Corrosive -Skin irritant -Not effective against spores and some viruses -Prolonged contact deteriorates rubber
Quaternary Ammonium Cmpds.	400 ppm active agent or 0.1%-2.0%	Vindicator, Lysol I.C., Hil-Phene	-Surfaces must be rinsed free of anionic soap or detergents before use -Commonly used to clean walls, floors, etc -Contact Time approximately 10 minutes	-Strong surface activity -Low toxicity -Non-corrosive -Effective over wide pH range -Easily prepared and used -Effective against Gram-positive microbes	-Easily inactivated by organic materials, anionic detergents, and salts of metals in water (hard water) -Skin irritant -Ineffective against Gram-negative, tubercle bacillim spores, and viruses -Neutralized by soap -Contact dermatitis can result
Iodophor	25-1600 ppm available iodine	FAM 30	-Effective against Gram-negative and Gram-positive organisms, some viruses, and tubercle bacilli -Most effective in acidic solution -Refer to manufacturer for required contact time	-Stable if kept cool & tightly covered -built in indicator (active if brown or yellow) -generally non-corrosive -readily miscible with water -Convenient	-Poor activity against spores -vaporizes at 120^{o}F (should not be used in hot water) -may tarnish silver, silver plate, copper -Relatively expensive -Can Be Toxic -Dilution critical