

Guidance on disinfectants

1. Selection of disinfectant

The following factors should be considered when choosing a disinfectant

- The spectrum of organisms to be inactivated. Check manufacturers' details.
- The circumstances of use.

The organic load will affect efficiency. Efficacy against virus will be less if virus is intracellular.

The following can affect activity:

- presence of other chemicals e.g. salts
- organic material may affect activity.
- pH. Temperature
- Hardness of water used to dilute product

Surfaces to be disinfected

Disinfectants containing acids, alkalis, electrolytes and hypochlorites can adversely affect metal parts and cause corrosion.

Disinfectants containing organic solvents can damage plastic.

Hazardous properties of the disinfectant

A risk assessment is required for the preparation and use of disinfectants. Some may have toxic or corrosive properties and particular caution must be exercised in choosing powerful sensitisers such as formaldehyde and glutaraldehyde.

The potential formation of hazardous/toxic products, either in use or as a result of mixing with other disinfectants must also be considered. Consult the manufacturer's material safety data sheet.

The following tables summarise the efficacy and properties of some common disinfectants.

DISINFECTANT	ACTIVE AGAINST						
Type	Vegetative Bacteria	Bacterial spores	Fungi	Envelope virus	Non-enveloped virus	Mycobacteria	Tse & prions
Peroxygen Compounds e.g. Virkon	+	+	+	+	+	+	-
Hypochlorite e.g. Chlorox	+	+	+ ¹	+	+	+ ¹	+
Phenolics e.g. Hycolin	+		+	+	+ ²	+	
Surface active agents	+	-	+ ¹	+ ²	+ ²		-
Alcohols 70% ethanol 60% propanol	+	-	-	+	+	+	-
Aldehydes e.g. formaldehyde, glutaraldehyde	+	+	+	+	+	+	-

+ generally effective

1 limited activity

- generally ineffective

2 depends on virus

Type	Adverse properties			Inactivated by		
	Toxicity	Corrosive to metal	Flammable	Organic Matter	Detergent	Hard water/salt
Peroxygen Compounds e.g. Virkon	Irritant	Y On prolonged contact	-	-	-	-
Hypochlorite e.g. Chlorox	Toxic Corrosive	Y	-	-	Y Anionic	-
Phenolics e.g. Hycolin	Toxic & corrosive	-	-	-	Y Anionic	Y
Surface active agents Cetrimide, Tego	-	-	-	Y	Y Cationic	Y
Alcohols 70% ethanol 60% propanol	harmful	Y	-	-	-	-
Aldehydes e.g. formaldehyde, glutaraldehyde	Toxic & irritant	-	-	-	-	-

2. Use of disinfectants

Effective disinfection is dependent on:

Activity. Once diluted the activity decays with time. Some disinfectants degrade faster than others. Consult manufacturers' data. Some disinfectants such as Virkon have a colour indicator; those that don't should be labelled with an expiry date.

Contact time. Check manufacturers' data and ensure the micro-organism remains in contact for the recommended time. Be aware that disinfectants will not easily penetrate solid material such as tissue and cell pellets, therefore autoclaving may be a better means of inactivation.

3. Information on specific disinfectants.

3.1. Virkon is a commercial disinfectant consisting of a balanced, stabilised blend of peroxygen compounds, surfactant, organic acids and an inorganic buffer system and is widely used within the Institute. It has been shown to be effective against a greater range of micro-organisms than Trigene.

Direct enquiries for efficacy data to the Safety Office

Working concentrations are as follows:

	Concentration/instructions	Contact time
Hard surfaces, benches, floors etc.	A solution containing 1% Virkon	1 hour
Safety cabinets	Metal parts ** 1% Virkon, followed by 70% alcohol	10 mins** 10mins
Discard jars, plastic tissue culture flasks, glassware	A solution containing 1% Virkon. Ensure all surfaces are in contact with the disinfectant.	1 hour
Supernatants:	For level 1 bacteria in culture broth: - 2% Virkon diluted 1:1 in broth. For level 1 tissue culture medium or other buffered system: - 3% Virkon diluted 2:1 in culture medium.	1 hour
Spillages:	Virkon powder directly onto spill, Scrape mixture into yellow bag for incineration. Swab area with 1% solution	Until liquid absorbed
Skin spillages:	A solution containing 1% Virkon, then rinse well with water.	
Contaminated clothing	Where autoclaving is not possible/appropriate soak in 1% Virkon. [test small area for colour fastness]	1 hour

Contact Times

A minimum contact time of 1 hour is recommended for complete disinfection of virus, yeasts and bacteria with Virkon.

When Virkon comes into contact with protein, chlorine is produced which will cause corrosion of metals.

**** Prolonged exposure of metal can also cause corrosion. Do not expose metal parts in excess of 10 mins.**

Precautions in use

Dilute solutions have low toxicity and no irritancy; however the powder is moderately irritant to eyes and respiratory tract. Avoid inhalation of powder or contact with skin /eyes. In case of eye contact rinse immediately with water and seek medical advice. Virkon is available in tablet and sachet form, thus reducing risk of contact with powder.

- 3.2. Distel** [formerly Trigene] is a halogenated tertiary amine compound with a blend of surface active disinfectants and detergents. It is of low toxicity and less irritant than Virkon but has not been shown to be effective against as many organisms as Virkon. It is considered effective for fungi. Details of efficacy data can be obtained from the Safety Office.

A working concentration of 2% is recommended for disinfection of surfaces, and discard jars.

For inactivation of body fluids [blood/urine] and for wiping up spillages use 10% Distel

3.3. Alcohols

70% Ethanol and 60% iso-propanol have relatively poor efficiency and are susceptible to interference. They can be used as a surface disinfectant for metal parts and surfaces where the use of Virkon may not be possible. [E.g. centrifuge parts and internal surfaces of MSCs]. Care should be exercised when spraying items with alcohol as there is a flammability hazard.

3.4. Aldehydes

Formaldehyde and glutaraldehyde are extremely hazardous chemicals, being both irritant and toxic. Both have maximum exposure limits. They must not be used for general disaffection but may be used for fumigation of Cat 3 labs or of specific items of sensitive equipment. A written safe operating procedure is required.

3.5. Hypochlorite [bleach, chloros and presept]

Has a rapid action but is inactivated by protein and organic matter, When mixed with acid chlorine vapour is produce. Hypochlorite also reacts with formaldehyde to produce a carcinogenic gas. Solutions decompose rapidly and must be replenished daily.

3.6. Phenolics

Whilst an effective disinfectant, particularly for mycobacterium, phenol is very toxic and can cause skin burns. It will also damage plastic.