

Disinfection

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Disinfection: Importance and Methods

What is disinfection?

• Disinfection is the process, which involves the elimination of most pathogenic microorganisms (excluding bacterial spores) on inanimate objects. • Chemicals used in disinfection are called disinfectants. Different disinfectants have different target ranges, not all disinfectants can kill all microorganisms.

Importance of disinfection:

To minimise number of organisms in the population worldwide. The method of disinfection is used internationally for the safety of humans, to decrease the scale of transmission of diseases. A large emphasis of sterilisation and disinfection has been placed in the food industry, water sanitisation and medical care and hospitals. As these have found to be largest affected organisations with microorganisms and modes of transmission amongst the population. Different disinfectants are used in different industries, which target the specific flora.

Disinfection techniques are classified according to:

Consistency

- **Liquid** (Alcohols, Phenols)
- **Gaseous** (Formaldehyde vapor, Ethylene oxide)

Spectrum of activity (Figure 2)

- **High level**
- **Intermediate level**
- **Low level**

Mechanism of action

- **Action on membrane** (Alcohol, detergent)
- **Denaturation of cellular proteins** (Alcohol, Phenol)
- **Oxidation of essential sulfhydryl groups of enzymes** (H₂O₂, Halogens)
- **Alkylation of amino-, carboxyl- and hydroxyl group** (Ethylene Oxide, Formaldehyde)
- **Damage to nucleic acids** (Ethylene Oxide, Formaldehyde)

Figure 1: Illustration of the different techniques of disinfection.

Figure 1

Common uses of disinfectants:

Aldehydes: surface disinfection, fumigation of rooms, chambers and operating theatres.

Alcohol: 70% aqueous alcohol is more effective at microbial killing. 70% Ethyl alcohol is used as antiseptic on skin.

Phenol: first used by Lister to prevent infection in surgical wounds. In high concentrations used as a disinfectant and in low concentrations as an antiseptic.

Halogens: Iodine (antiseptic), Chlorine (bleach)

Figure 2: Showing the spectrum of activity of the different disinfectants to organisms.

Figure 2

Vibrations:

Ultrasonic vibrations:

• With a frequency of > 20,000 cycle/second kills bacteria and some viruses, when exposed for an hour.

Microwaves:

• Antimicrobial effect, disruption of cells • *Common uses:* disinfection of instruments and reduction of microbial load. This method does not affect many viruses.

Filtration:

Filtration does not kill microbes, it separates them out. Different filters are used for the separation of different organisms and particles.

Different types:

- Earthenware filters
- Asbestos filters
- Sintered glass filters
- Membrane filters
- Air filters

• *Common uses:* Removing microbes from serum, antibiotic and sugar solutions, preparing virus suspensions, clarifying and purifying fluids etc.

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