

Chemical factors

A- DISINFECTANTS AND ANTISEPTICS

Disinfection are chemical agents designed to inactivate or destroy microorganisms inanimate objects or surfaces, but not necessarily endospores, it safe to handle, but is generally to toxic to use on human tissues.

antiseptic refers to an agent that kills or inhibits growth of microbes but is safe to use on human tissue.

There are 2 common antimicrobial **modes of action** for disinfectants, antiseptics, and sanitizers:

1. They may **damage the lipids and/or proteins of the cytoplasmic membrane** microorganisms resulting in **leakage of cellular materials** needed to sustain life.
2. They may **denature microbial enzymes and other proteins**, usually by disrupting the hydrogen and disulfide bonds that give the protein its three-dimensional functional shape. This **blocks metabolism**.

There are a number of factors which influence the antimicrobial action of disinfectants and antiseptics, including:

1. The concentration of the chemical agent.
2. The temperature at which the agent is being used. Generally, the lower the temperature, the longer it takes to disinfect or decontaminate.
3. The kinds of microorganisms present. Endospore producers such as *Bacillus* species, *Clostridium* species, and acid-fast bacteria like *Mycobacterium tuberculosis* are harder to eliminate.
4. The number of microorganisms present. The more microorganisms present, the harder it is to disinfect or decontaminate.
5. The nature of the material bearing the microorganisms. Organic material such as dirt and excreta interferes with some agents.

The best results are generally obtained when the initial microbial numbers are low and when the surface to be disinfected is clean and free of possible interfering substances.

A large number of such chemical agents are in common use. Some of the more common groups are listed below:

1. Phenol and phenol derivatives

Phenol (5-10%) was the first disinfectant commonly used. However, because of its toxicity and odor, **phenol derivatives (phenolics)** are now generally used.

2. Soaps and detergents

Soaps are microbicidal. Their use aids in the **mechanical removal** of microorganisms by breaking up the oily film on the skin (emulsification).

Detergents may be **Anionic** (negatively charged) **detergents**, such as laundry powders, mechanically remove microorganisms but not very microbicidal. **Cationic** (positively charged) **detergents** alter membrane permeability and denature proteins. They are effective against many vegetative bacteria, some fungi, and some viruses

3. Alcohols

70% solutions of **ethyl or isopropyl alcohol** are effective in killing vegetative bacteria, enveloped viruses, and fungi. However, they are usually ineffective against endospores and non-enveloped viruses.

4. Chlorine

Chlorine gas reacts with water to form **hypochlorite ions**, which in turn denature microbial enzymes. Chlorine is used in the chlorination of drinking water, swimming pools, and sewage.

5. Iodine and iodophores

Iodine also denatures microbial proteins, Iodophores are a combination of iodine and an inert polymer such as polyvinylpyrrolidone that reduces surface tension and slowly releases the iodine. **Iodophores** are less irritating than iodine and do not stain. They are generally effective against vegetative bacteria, *Mycobacterium tuberculosis*, fungi, some viruses, and some endospores.

6. Aldehydes

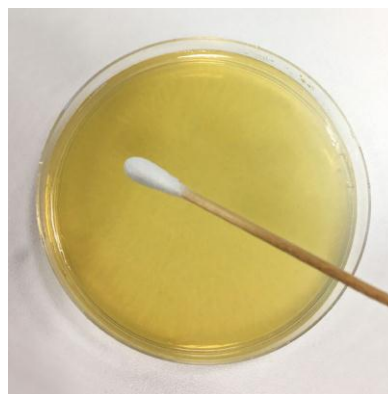
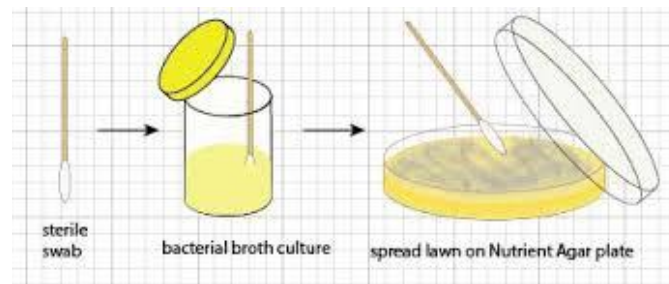
Aldehydes, such as formaldehyde and glutaraldehyde, denature microbial proteins, extremely active and kills most forms of microbial life. It is used in embalming, preserving biological specimens, and in preparing vaccines.

Materials and tools: Flasks containing N.A. - bacterial inoculation needles - sterile forceps - empty and sterile petri dishes - disinfectants discs paper of Absolut (alcohol - Dettol – Clorox)

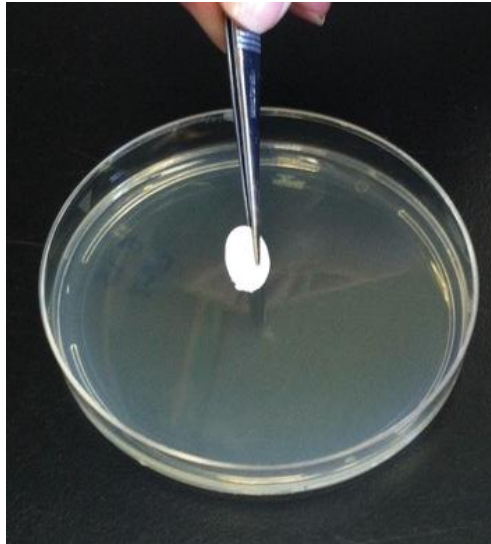


The method of work:

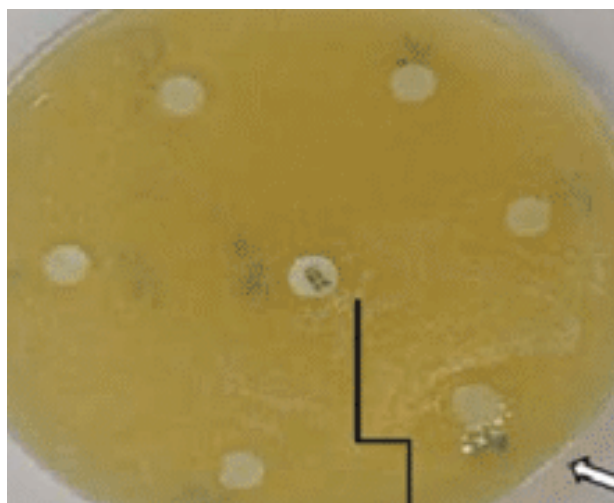
- 1- Under aseptic conditions, inoculate cooled N.A from bacterial culture broth through swab.



2-Using sterile forceps, the disinfectants impregnated with various disinfectants are placed on equal dimensions on the surface of the inoculated dish in the bacterial culture, taking into account leaving an appropriate distance between them and pressing them a little to fix them.



3- Each type of disinfectant is symbolized from the back of the plate so that it is easy to distinguish between them when examining the effect of disinfectants on growth after incubation.



4-Prepare dishes for microbes without disinfectants, such as sample control.

5-Bacteria were incubated at 37 ° C for 24 hours.

6- Record areas of inhibition zones around the discs, then measure their diameter with a ruler to determine the most effective disinfectant against used bacteria.

