CHEMICAL METHODS OF STERILIZATION

Action of chemical agents

Mechanism:

• Protein coagulation
• Disruption of cell membrane resulting in exposure, damage/loss of contents
• Removal of sulfhydryl group essential for normal functioning of enzyme
• Substrate competition.
1. Reagents:

Alcohol

- Frequently used are Ethyl alcohol, Isopropyl alcohol.
- These must be used at concentration 60-90%.
- Isopropyl alcohol used in disinfection of clinical thermometer.
- Methyl alcohol is effective against fungal spores, treating cabinets and incubators.
- Methyl alcohol is also toxic and inflammable.

Aldehyde

- Formaldehyde:
- Having Bactericidal, sporicidal and has lethal effect on viruses.
- Used to preserve anatomical specimens, destroying anthrax.
- Spores on hair and wool.
Glutaraldehyde:
• Effective against tubercle bacilli, fungi, viruses.
• Less toxic and irritant to eyes, skin
• Used to treat anaesthetic rubber, face masks, plastic endotracheal tubes, metal instruments and polythene tubing.

2. Dyes:
Two groups of dyes:
1. Aniline dye
2. Acridine dye
• Both are bacteriostatic in high dilution but are of low bactericidal activity.
• Aniline dye is more active against gram +ve than gram-ve organisms.

Some important dyes:
• Proflavine
• Acriflavine
• Euflavine
• Aminacrine
• These Impair the DNA complexes of the organisms and thus kill or destroy the reproductive capacity of the cell.
Halogen

• **Iodine**

• **Used as Skin disinfectant**

• **Having Active bactericidal activity & moderate action on spores.**

• **Chlorine**

• **Used to disinfect Water supplies, swimming pools and food and dairy industries.**

• **Along with hypochlorides are bactericidal. Also act on viruses.**
Phenols

• These are obtained from distillation of coal tar between 170-270 C.
• Lethal effects are:
• Capacity to cause cell membrane damage, releasing cell contents and causing lysis.
• Low concentration will precipitate proteins.

3. Gases:

• Types of gases used for sterilization:
• Ethylene oxide
• Formaldehyde gas
• Beta propiolactone (BPL).

Ethylene oxide:

• Action is due to its alkylating the amino, carboxyl, hydroxyl and sulphydryl groups in protein molecules.
• Also on DNA and RNA.
• Items: heart-lung machines, respirators, sutures, dental equipment, books, clothing.
Formaldehyde gas:

• This is widely employed for fumigation of Operation Theatre and other rooms.
• Formaldehyde is produced by adding 150g of KMnO4 to 280ml of formalin for every 1000cu.ft of room volume, after closing the windows and other outlets.
• After fumigation, the doors should be sealed and left unopened for 48 hours.

Beta propiolactone:

• Product of ketane and formaldehyde with a boiling point of 163 C.
• Having rapid bactericidal activity but carcinogenic.
• Capable of killing all microorganisms and is very active against viruses.