Sterilization

Sterilization is freeing of an object from pathological microorganisms (M.O.) including bacteria and their spores, viruses, yeasts, molds. Or it is the absence of all living organisms.

Mechanism of sterilization

The lethal mechanism of the above methods of sterilization I damaging DNA, coagulating the protein of the M.O., cell membrane lyses, oxidation.

Sources of laboratory Contamination

Contamination of the environment with M.O. may be:

- air born
- from hair and clothing
- working surfaces

Methods of Sterilization

There are three methods of sterilization:

I. Physical methods.
II. Chemical methods.
III. Mechanical methods

I/ Physical methods of sterilization:

A. Heat sterilization

1. **Dry heat sterilization**:
   Red heat, Flaming,Incineration and Hot air oven (130-180 °C) for 2- 4 hr.,
2. **Moist heat sterilization**
   a) pasteurization (63°C for 30 min), to sterilize milk and food products.
   b) Boiling (5-10 min) to sterilize rubber tubes, glass syringes (kills all non-spore forming bacteria).
   c) Steaming (tyndillization) steam 30 min for 3 days, used to sterilize gelatin media, sugar media.

d) autoclaving (15 lb,121°C,20 min),used for sterilization of surgical tools and clothes, culture media and to sterile inoculated medias.

B. Radiation sterilization

Two types of rays are used:

1. Non-ionizing type, like ultra-violate rays, infra-red rays
2. Ionizing type, like Gamma rays, X ray, Beta rays

Application, used to sterilize food factories, surgical sutures, thermos labile drugs, disposable syringes, water, air, surfaces.

C. Gaseous sterilization

Ex. Ethylene oxide, formaldehyde, carbon dioxide. the advantage of using gases for sterilization was there high penetration and it is compatible with most materials; but they have toxic residual and they are explosive. Application, used to sterile plastic syringes, poultry hoses.....etc.

II/ Chemical methods of sterilization

A- **Antiseptic**: - It is chemical substance that inhibit the growth of M.O. on living tissues, ex. 70% alcohol, heptane, salt, formaldehyde(formalin).

B- **Disinfectant**: - IT is a chemical substance used to sterilize nonliving objects, ex. Phenol, Lysol (any detergent).

The disinfectant may be described either as:

Bacteriostatic: any substance which inhibits the growth and multiplication of bacteria but do not necessarily kill them.

Bactericidal: any substance which kills the bacteria and their spores.

III/Mechanical method of sterilization

Filtration: It is the possibility to render any solution free from bacteria by passing through special filter medium. There are some types of filter membranes (porcelain, siliceous earth, asbestos membrane filter). Application, used to sterilize serum, toxins, air, antibiotics.