Sterilization and Disinfection

Sterilization:

It is a process that kills all living microorganisms.

Disinfection:

It is a process that reduce the number of microorganisms.

Sterilization

Sterilization done by:

- Heat (dry or moist heat).
- Ionizing radiation.
- Filtration.

Heat

A. Dry heat: by using high temperature (no water), Ex:

- Incineration:

- It's a huge oven, temp. >100 °C .
- Used to destroy dead animals and infectious items.

- Bunsen burner (flame):

- Used for sterilization of loops, iron needles.

- Oven:

- Temp. 160 -180 °C, Leave it for 1-2 hours.
- Used to sterilize the metals, glass wares, powders, ointments (oil).
- Can not use it for plastics, heat sensitive material, solutions.

B. Moist heat: by using high temperature and water, Ex:

- Autoclave:

-Temp. 121 °C under 15 atm pressure for 15-20 min.

-Use it for sterilization of glass wares, media, solutions.

-Can not use it for metals, powders, heat sensitive material.

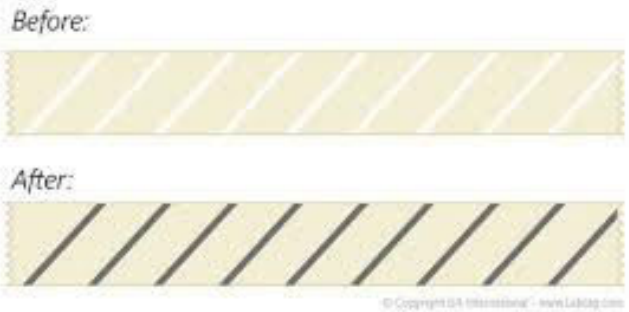
Indicators to check the efficiency of the autoclave and oven:

A. Chemical indicators:

- Autoclave tape: it turns from white to black if it is working good (use it to check the autoclave)

- Brown's tube: (use it to check the oven) Its color turns from white to red.

Autoclave tape



B. Biological indicator:

Use spore strip:

- It's a filter paper soaked with spores of *Bacillus stereothermophilus* (grow at 70 °C).
- Put the strip in broth, place it inside the autoclave, then put it in the incubator for 24 hours. The result:

- Turbidity ----> growth----> autoclave is not good
- Clear ----> no growth----> autoclave is good

Ionizing Radiation

- It is an electromagnetic waves (Ex. ϰ-rays, X-rays). It has short wave length with high energy and strong penetration.

Use it for sterilization of:

1) Plastic items like: petridish, syringes, pipettes.

2) Heat sensitive materials: antibiotics, drugs, vaccines).

3) Fresh meat, canned food.

Filtration

- Used for sterilization of liquid solutions which are sensitive to heat. Like: toxins, I.V fluids, protein, sugar.

Principle of this test:

- We use millipore filters: it's a thin membrane with a pore size 0.45 Mm or smaller 0.22 Mm.

- Fluid is allowed to pass through the filter with the help of the vacuum pump (it produce –ve pressure to force the fluid to pass through the filter).

Disinfection

- Disinfection is done by using disinfectant.
- Disinfectant: Is a chemical substance that kill or inhibit the growth of organisms.

Disinfectant can be:

A. Bactericidal: chemical substance that kill the organisms. Ex. : phenol (Detol), sodium hypochloride (Clorox).

B. Bacteriostatic: chemical substance that inhibit the growth of organisms. Ex. : 70% alcohol swap.

To test the efficiency of a disinfectant in the lab we do:

Minimum Inhibitory Concentration (MIC).

- The last tube which shows no growth is the MIC of that disinfection.

- or the MIC: is the least concentration that inhibit the growth of organism.