

Sterilization And Disinfection

Sterilization:

It is a process that kills **all** living microorganisms.

Disinfection:

The treatment of material with chemicals in order to **reduce** the number of organisms.

1

Sterilization

Physical Sterilization done by:

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

A

Heat

1. **Dry heat:** by using high temperature.

A. Incineration:

it's a huge oven, temp. $>100\text{ }^{\circ}\text{C}$

used to destroy dead animals and infectious items.

B. Bunsen burner (flame):

used for sterilization of loops, iron needles.

C. Oven:

temp. $160\text{-}180\text{ }^{\circ}\text{C}$. 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.

2. Moist heat: by using water.

1. 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.

Autoclave



Indicators to check the efficiency of the autoclave and oven:

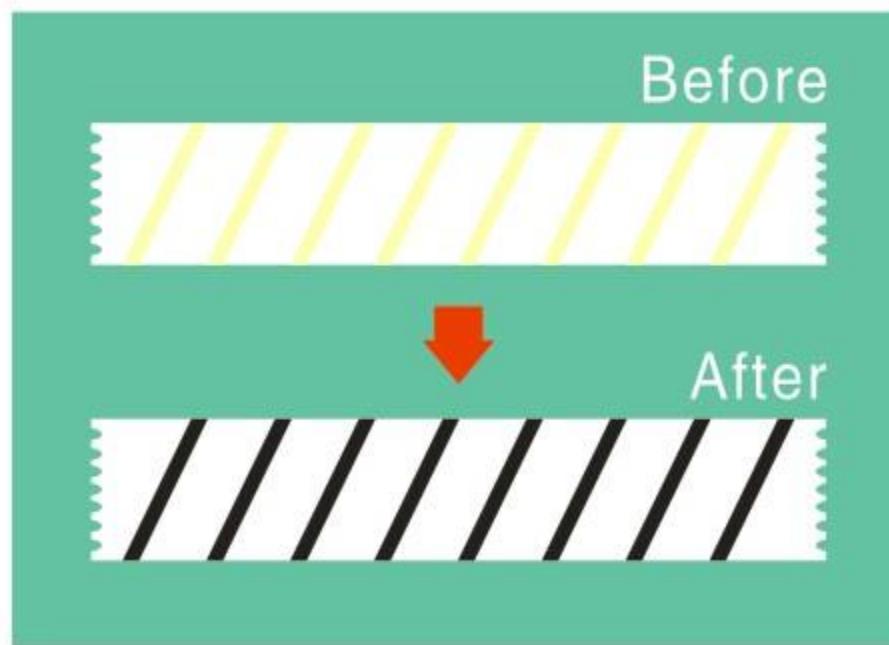
1- Chemical indicator:

We can use tow types:

a) *Autoclave tape*: it turns from white to black if it is working good.

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

Autoclave tape



2- Biological indicator:

Spore strip:

it's a filter paper soaked with spores of bacillus stereo thermophilus (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

B

Ionizing radiation

- It is an electromagnetic waves (Ex. X-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.



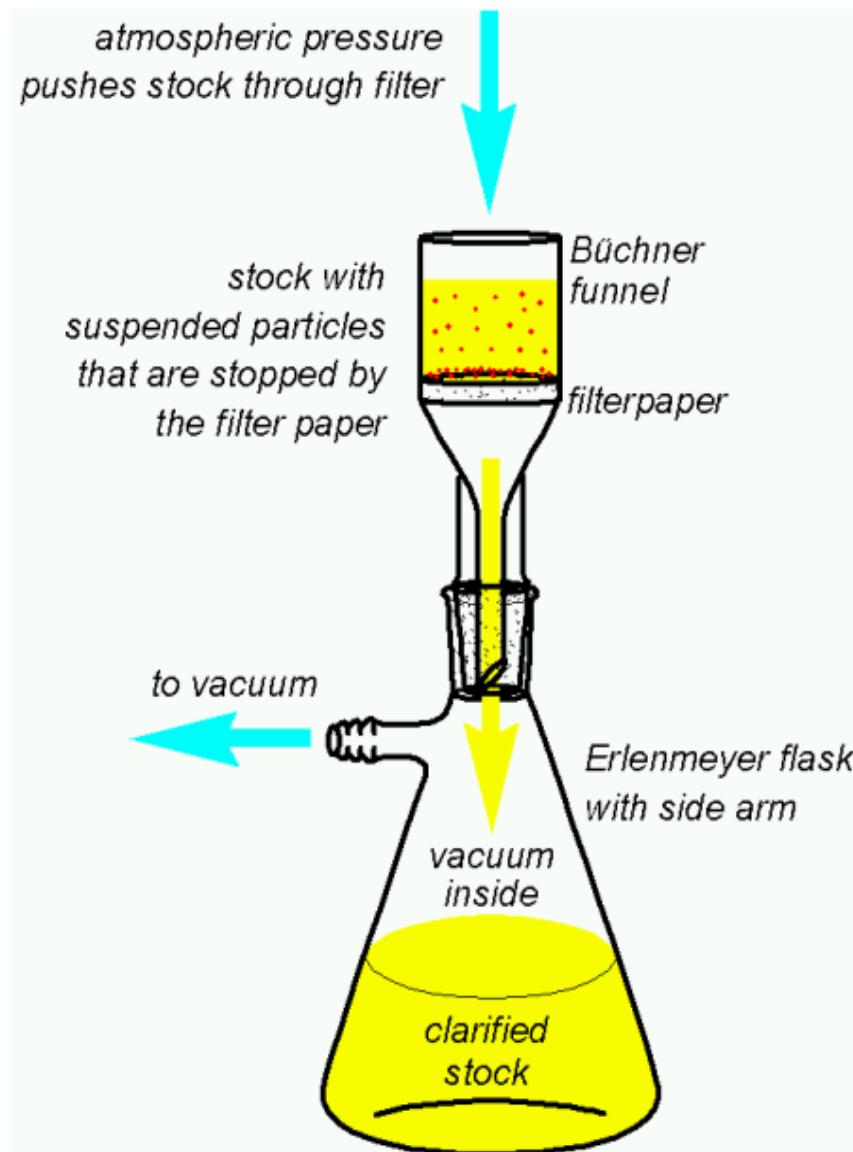
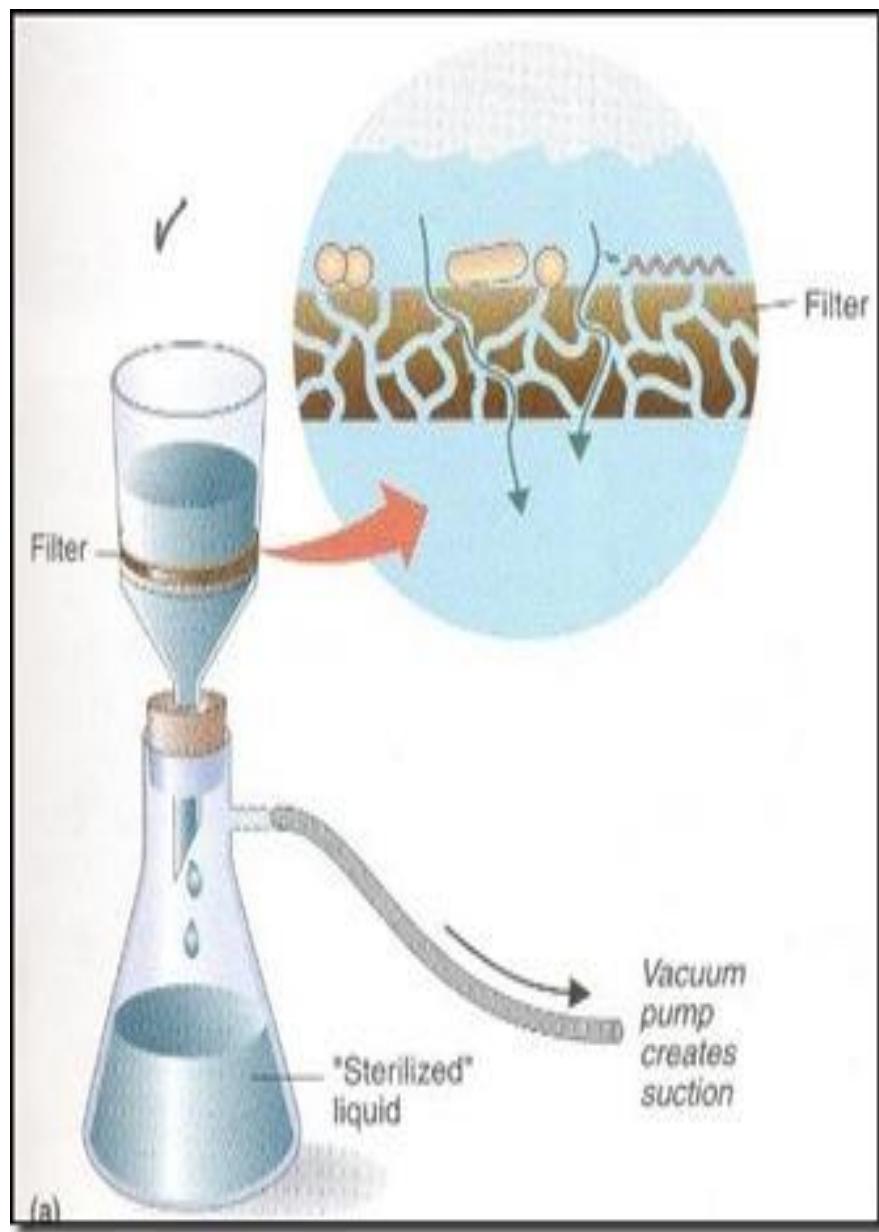
C

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).



2

Disinfection

- Disinfection is done by using disinfectant.
- **Disinfectant:** its a chemical substance that kill or inhibit the growth of organisms.
- Unable to destroy spores and some could not kill non envelop viruses
- It 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 least concentration that inhibit the growth of organism.

Antimicrobial agent

