



Lecture 8 – part 2

Sterilization & Disinfection



Objectives

Physical methods for sterilization

Moist heat (Autoclave)

Dry heat

Ionizing radiation

Filtration

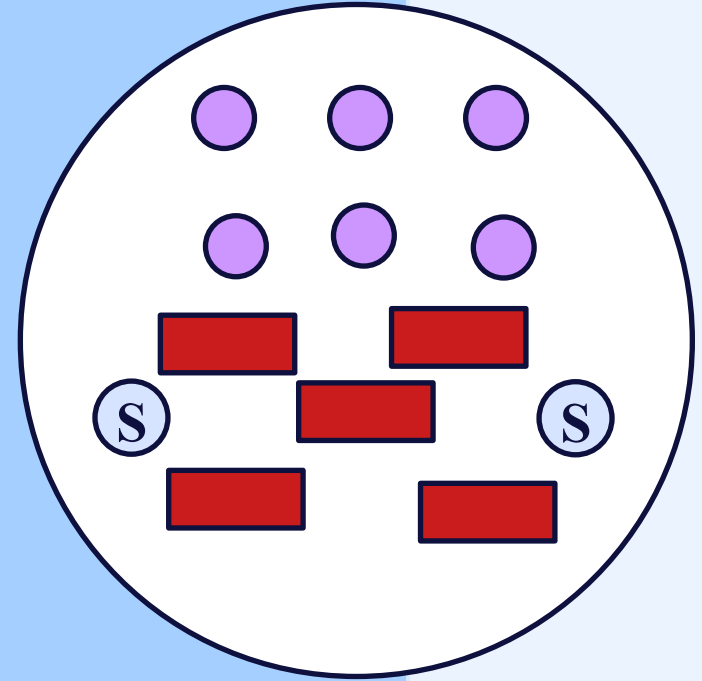
Physical methods for sterilization

I) Moist heat above 100°C (Autoclave)



Sterilization

**Killing all microbes including
bacterial spore.**



Moist heat above 100°C (Autoclave)



Steam



Pressure



Temp.

Time.





Moist heat above 100°C (Autoclave)

Pressure: 2

3

Heat: 121 °C

134 °C

Time: 20 min.

6 min.

Discharge tap

Lid

Pressure gauge

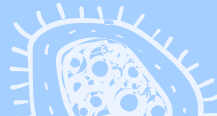
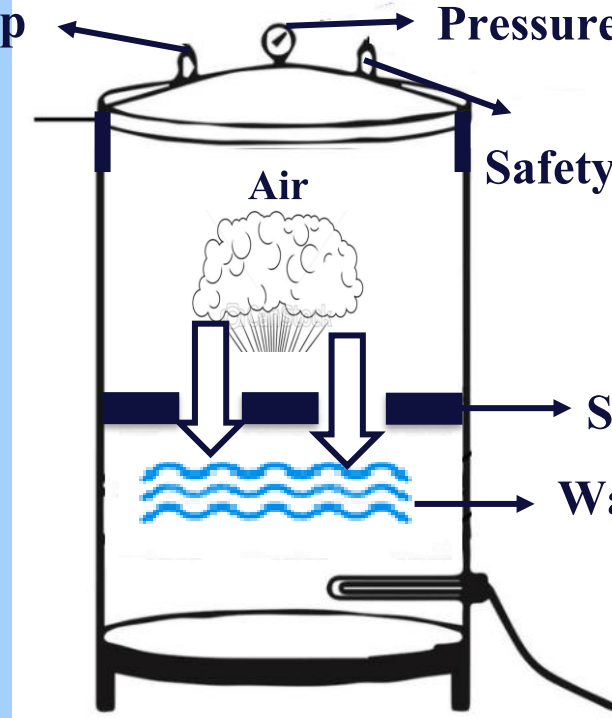
Safety valve

Air

Shelf

Water

Electrical power





Moist heat above 100°C (Autoclave)

Prevacuum autoclave

Gravity displacement autoclave





Moist heat above 100°C (Autoclave)

Denaturation

Coagulation





Moist heat above 100°C (Autoclave)

Surgical instruments

Bed linen

Surgical dressings

Gauze

Cotton





Moist heat above 100°C (Autoclave)

Advantages

High penetration

Latent heat

Non-toxic

Rapid





Moist heat above 100°C (Autoclave)

Disadvantages

Not suitable for heat-sensitive objects

**Sterilized objects -
moist**



Physical methods for sterilization

I) Moist heat above 100°C (Autoclave)

Monitoring of steam sterilizer

Monitoring of steam sterilizer

1

Mechanical indicators



Monitoring of steam sterilizer

2

**Chemical
indicators**

Before

After

Monitoring of steam sterilizer

3

**Biological
indicators**



Geobacillus Stearothermophilus

G. Stearothermophilus

Physical methods for sterilization

Dry heat



Dry heat

- 1) Incineration
- 2) Direct flame
- 3) Hot air oven



1) Incineration

**Burning of
Contamination
Materials**



2) Direct Flame

Loop

Points of

forceps



3) Hot air oven

Heat 160°C -2 hr.

Heat 170°C – 1hr.



3) Hot air oven

Sterilization of

Glass-ware

Powders

Oils

Surgical instruments



3) Hot air oven

Advantages

Non-toxic

Inexpensive

Not corrosive



3) Hot air oven

Disadvantages

Slow heat penetration

Time consuming

Not suitable for heat-sensitive
objects



Physical methods for sterilization

Radiation



Radiation

Emitted from
Radioactive
Cobalt 60

(Gamma rays)



Radiation

Breaks DAN



Radiation

used in:-

Gloves



Catheters



Surgical sutures



Physical methods for sterilization

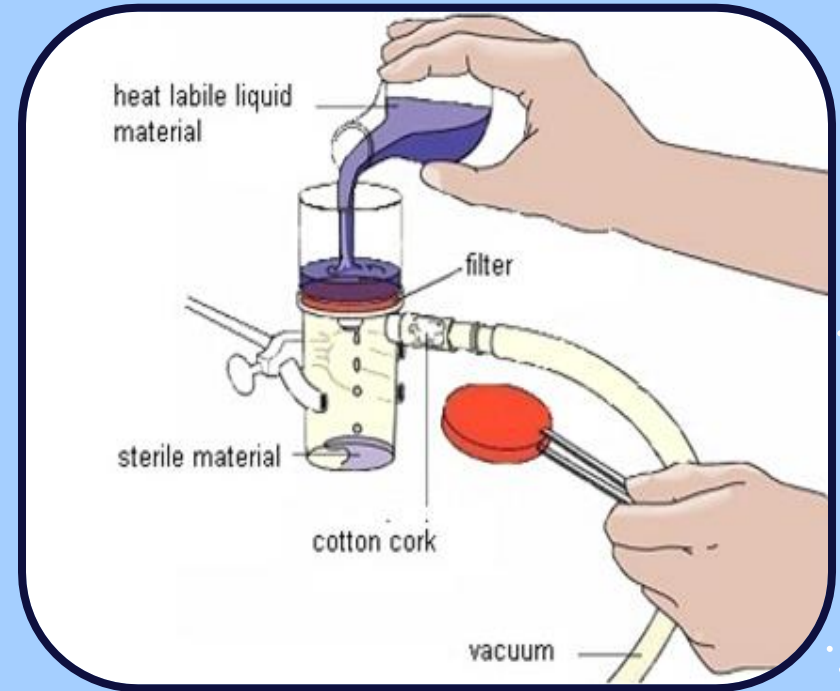
Filtration



Filtration

**Remove microorganisms from
biological fluids**

**e.g. Serum, Plasma, Hormones &
Vitamins**



Filtration

Membranes made from:-

Cellulose nitrate

Polyester



Filtration

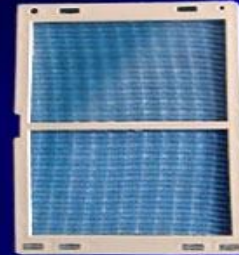
HEPA filters

(High Efficiency Particle Arresters)

Operation room

Drug filling cubicles

Filter-90 series





Chemical methods for sterilization

Gaseous



Chemical methods for sterilization

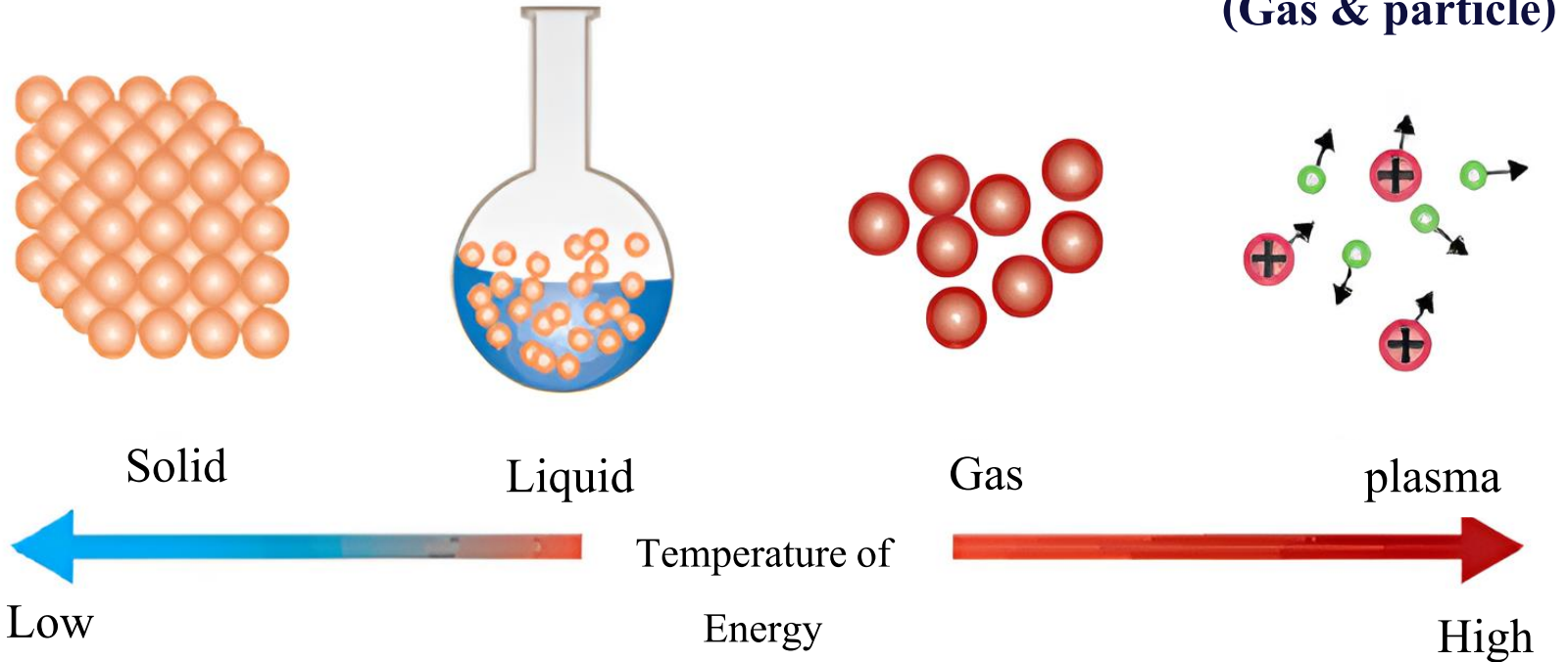
1) Gaseous

Plasma gas sterilizers



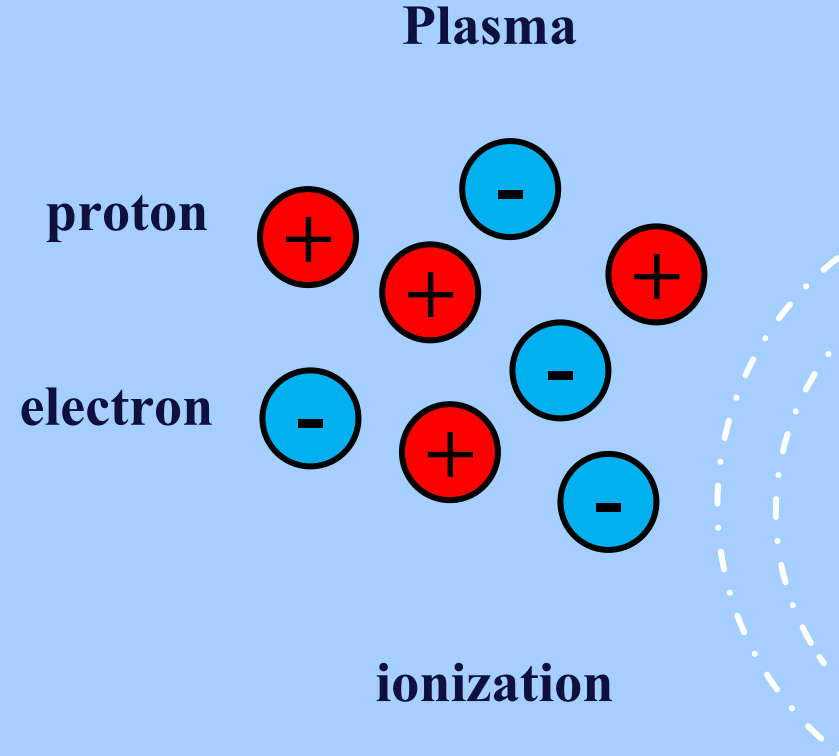
Plasma gas sterilizers

PHASES OF MATTER



Plasma gas sterilizers

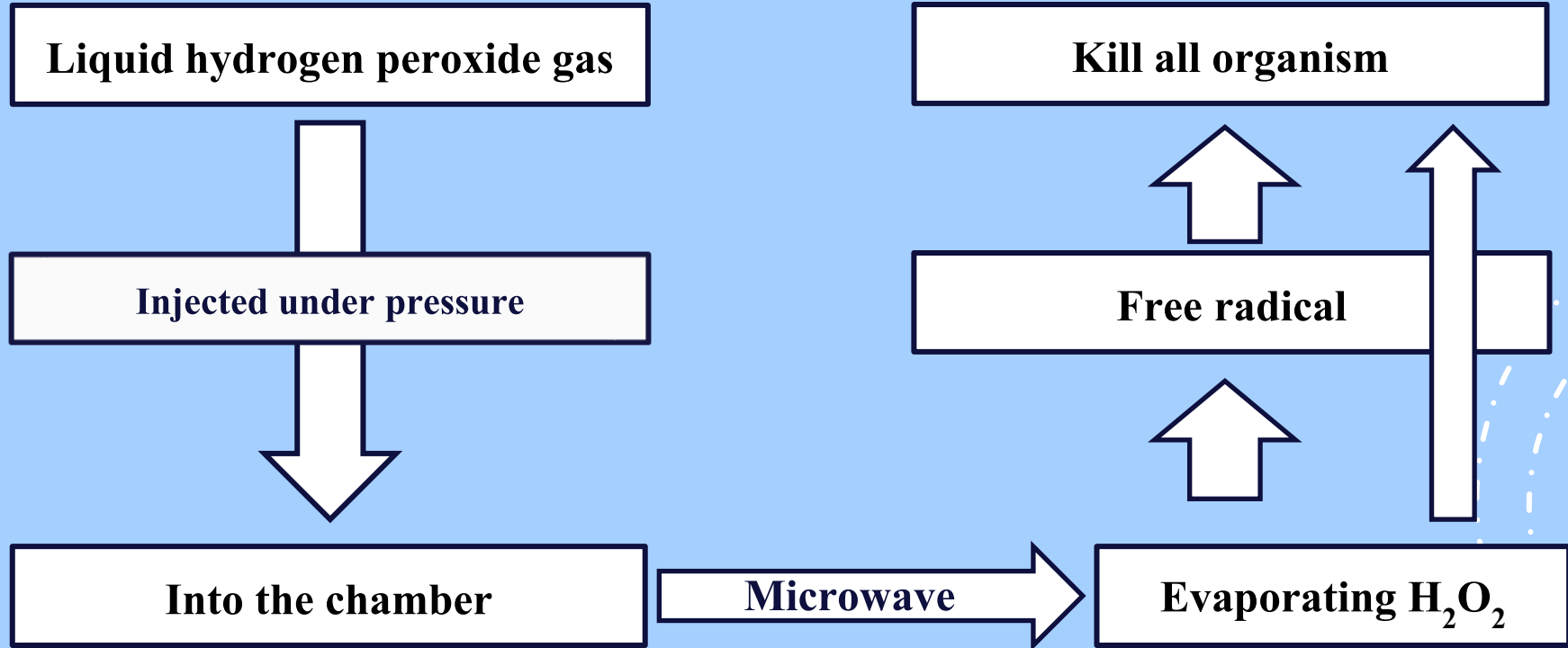
**Plasma = any gas that
contains electrons, ions**



Plasma gas sterilizers

- 1) Hydrogen peroxide gas plasma**
- 2) Ethelene oxide gas sterilization**
- 3) Peracetic acid gas sterilization**

1) Hydrogen peroxide gas plasma



1) Plasma gas sterilizers

Used for:-

- **Heat sensitive devices e.g.**
 - **Plastic**
 - **Laparoscopes**
 - **Arthroscopes**



1) Plasma gas sterilizers

Advantages

- **Non toxic**
- **Suitable for Heat sensitive**



1) Plasma gas sterilizers

Disadvantages

- **Total time of sterilization cycle is about 50 minutes**



Chemical methods for sterilization

I) Gaseous

2) Ethylene oxide (EO)



2) Ethylene oxide (EO)

EO gas is a highly lethal alkylating agent

Kill all organism including spores



2) Ethylene oxide (EO)

- Items exposed to EO at 55°C for 3-6 hr.
- Then aerated for 8-12 hr. to remove any trace of the gas



Chemical methods for sterilization

I) Gaseous

3) Peracetic acid



3) Peracetic acid

Acetic acid and hydrogen peroxide



3) Peracetic acid

Denaturation

Oxidation (enzymes)

Disrupt cell wall



The best sterilant

Chemical solution

Glutaraldehyde 2%

Peracetic acid



Chemical solution

Glutaraldehyde 2%

High level disinfectant (for 20 min.)

Sterilization (10hrs)

