Lecture 8 – part 2

Sterilization&

Disinfection

Objectives

Physical methods for sterilization

Moist heat (Autoclave)

Dry heat

Ionizing radiation

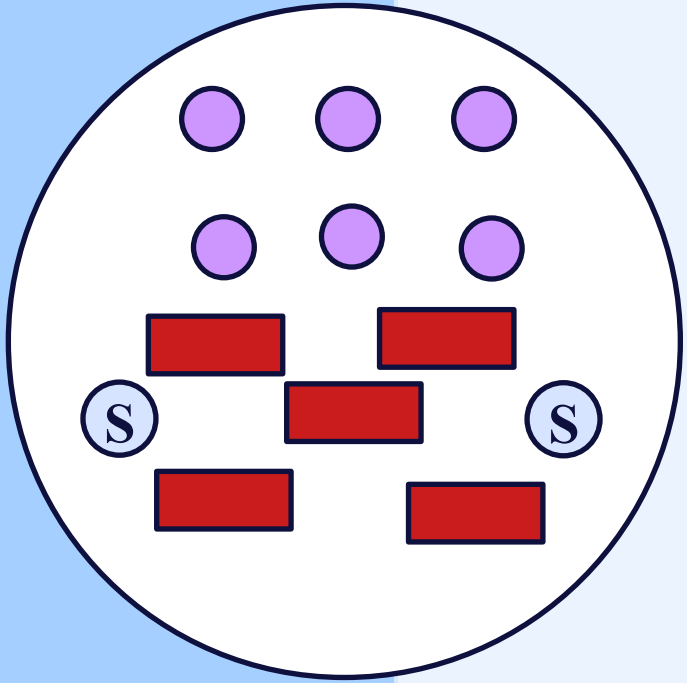
Filtration

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.

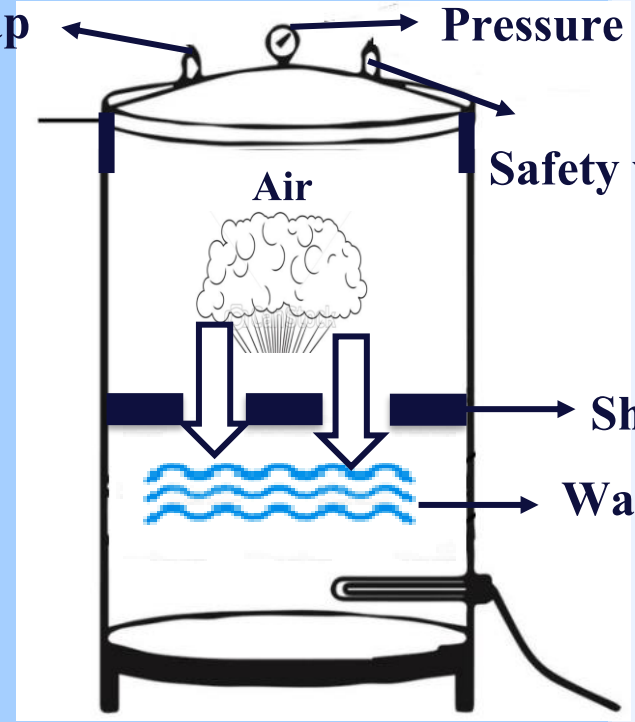
Time.

Moist heat above 100°C (Autoclave)

Pressure: 2 | 3

Heat: 121 °C | 134°C

Time: 20 min. | 6 min.



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

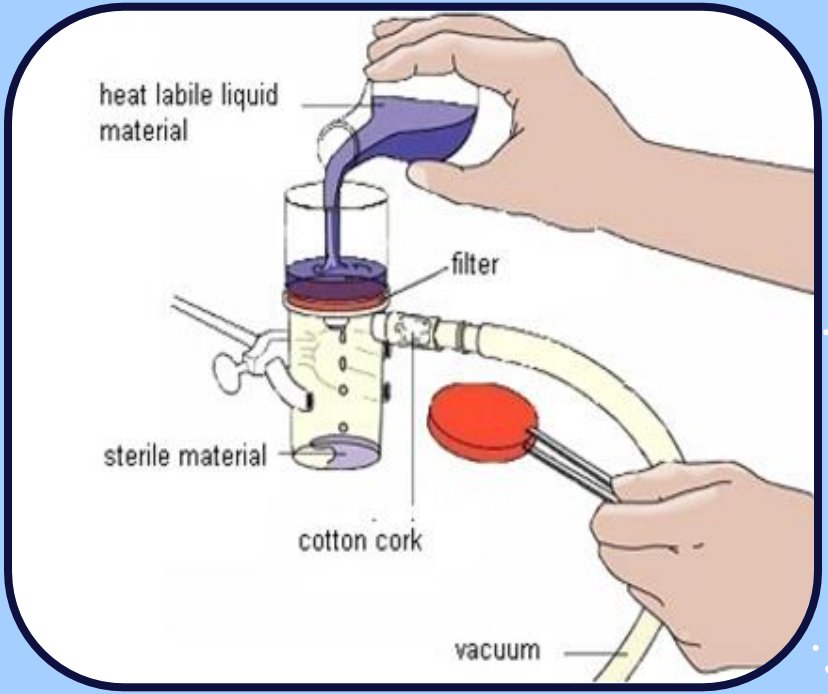
Physical methods for sterilization

Filtration

Filtration

Remove microorganisms from biological fluids

e.g. Serum, Plasma, Hormones & Vitamins



Filtration

Membranes made from:-

Cellulose nitrate

Polyester

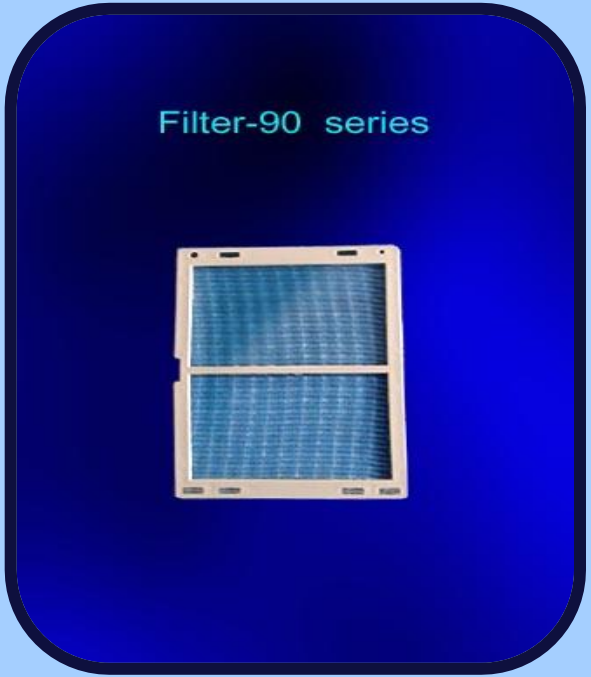
Filtration

HEPA filters

(High Efficiency Particle Arresters)

Operation room

Drug filling cubicles



Chemical methods for sterilization

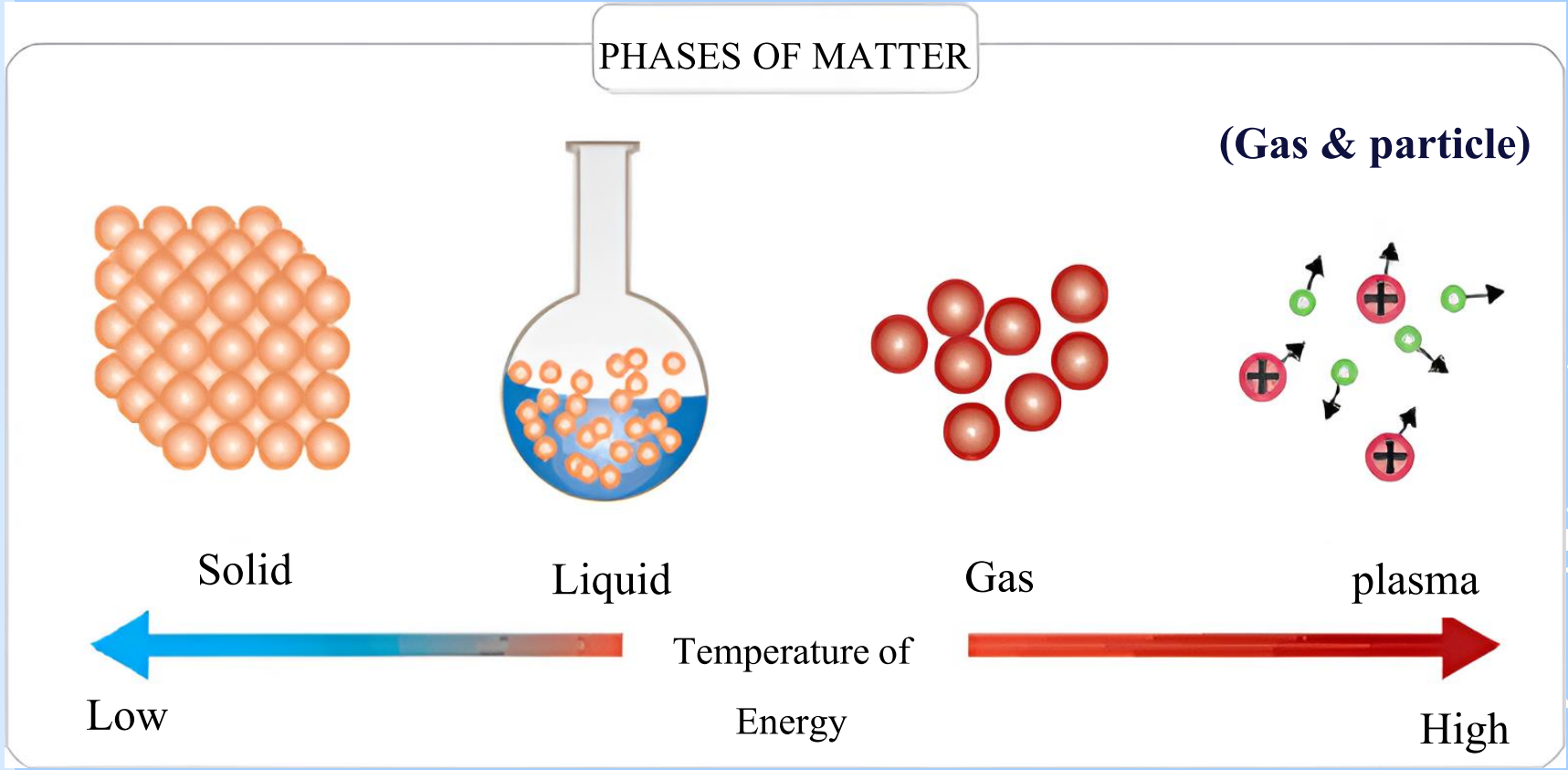
Gaseous

Chemical methods for sterilization

1) Gaseous

Plasma gas sterilizers

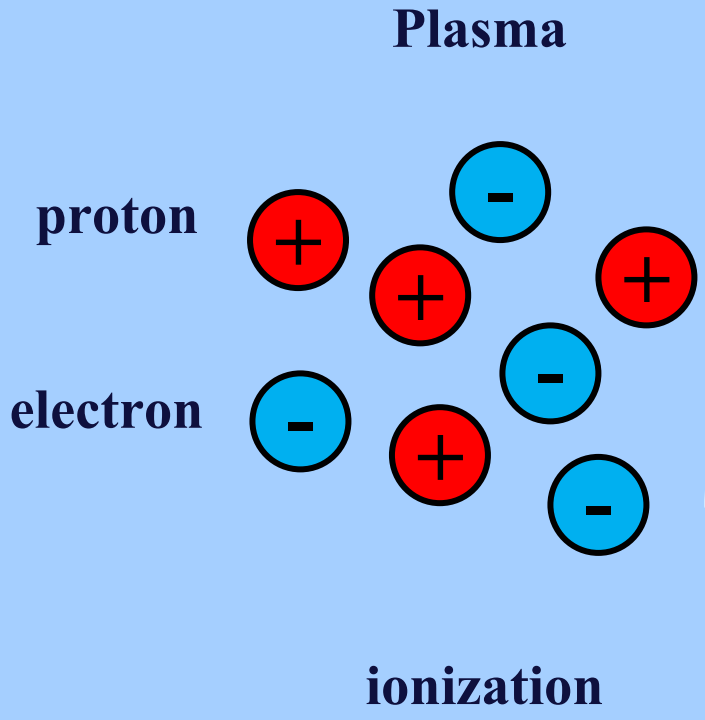
Plasma gas sterilizers



Plasma gas sterilizers

Plasma = any gas that

contains electrons, ions



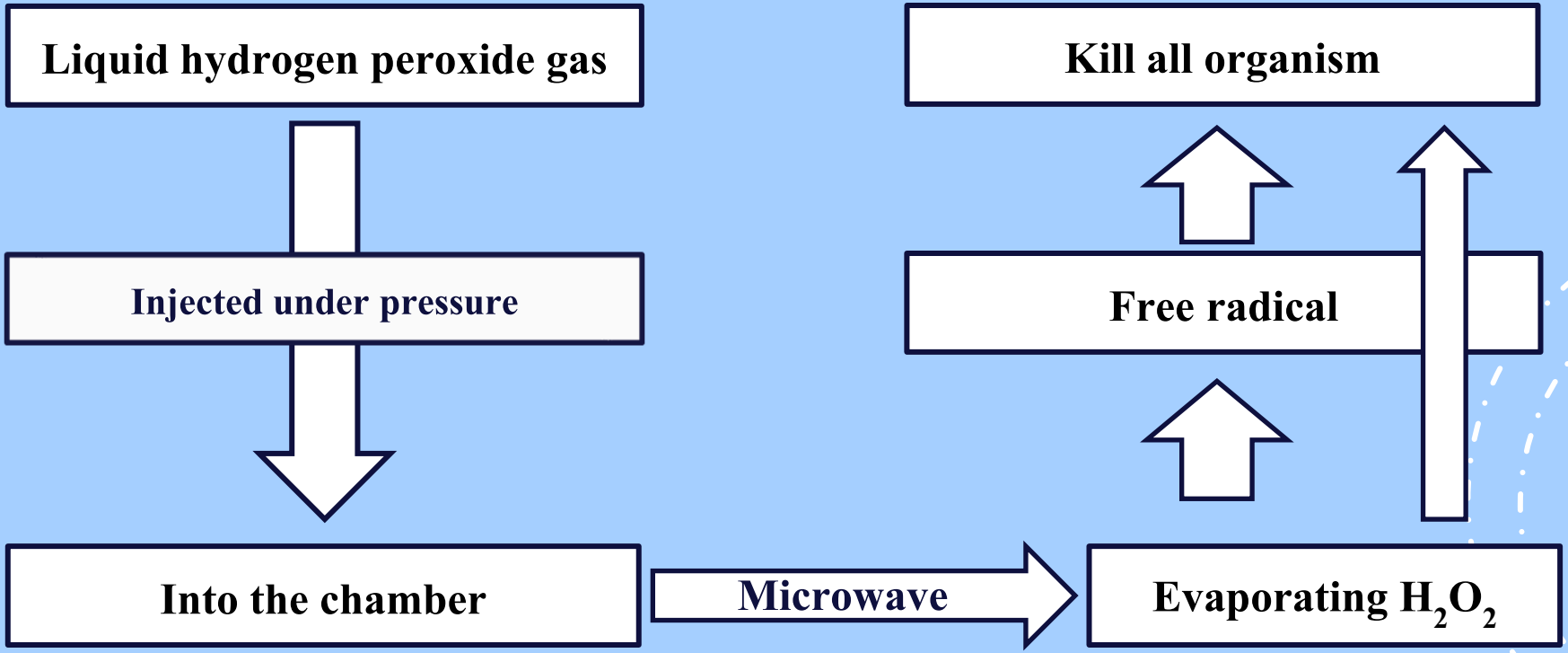
Plasma gas sterilizers

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)