Tishk International University
Faculty of Applied Science
Nutrition and Dietetics Department

Methods of Sterilization

Food Microbiology /3rd Lab
2nd Grade / Spring Semester

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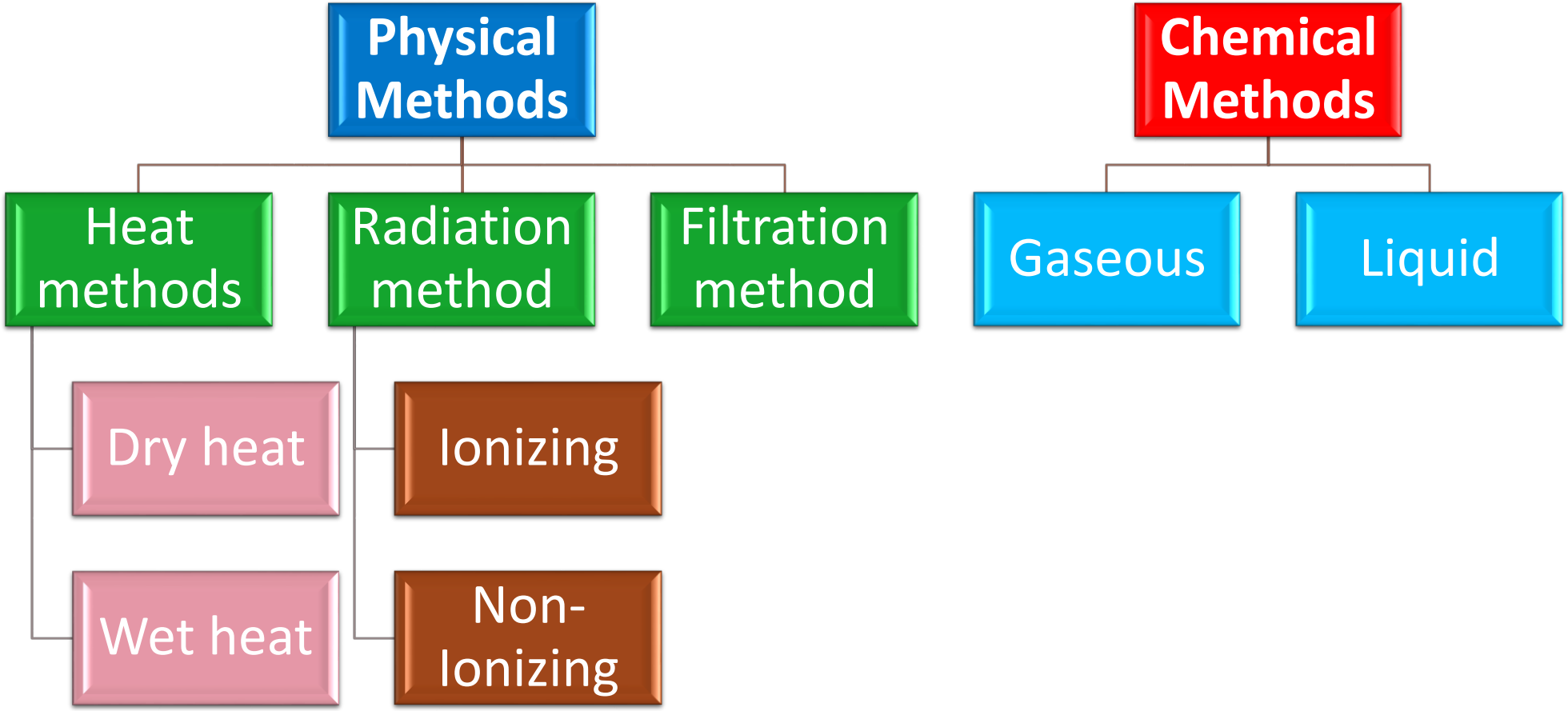
Definition

Sterilization: involves the removal or killing of all living microorganisms, including bacteria and their spores.

Disinfection: refers to the removal or killing of disease-causing microorganisms.

Methods of sterilization



Sterilization by Heat

Heat is the most **practical, reliable**, and **inexpensive** method of sterilization. It is used for sterilization of objects and materials that can withstand high temperatures.

- **Types of heat sterilization:**

1. Dry heat
2. Moist Heat

➢ Dry Heat Sterilization

- Red Heat
- Flaming
- Incineration
- Hot Air Oven

➢ Moist Heat Sterilization

- Below 100 °C ➡ **Pasteurization**
- At 100 °C ➡ **Boiling**
- Above 100 °C ➡ **Autoclaving**

Dry Heat Sterilization cont.

❑ **Red heat:** means holding object in Bunsen flame till they become red hot.

Used for sterilization of:

- ✓ Inoculating loops & Needles
- ✓ Tips of Forceps

Dry Heat Sterilization cont.

- **Flaming:** passing the object through the flame of Bunsen burner without heating to redness

Used for sterilization of:

- Glass slides
- Mouth of culture tubes.

Dry Heat Sterilization cont.

- **Incineration:** Medical waste materials can be disposed of through a process called **incineration**, which involves burning the waste at very high temperatures ranging from **870°C to 1200°C.**

Medical waste incinerator

Dry Heat Sterilization cont.

❑**Hot air oven:** uses dry heat to sterilize laboratory equipment and other materials in a high temperature (160 ℃ - 180 ℃)

Equipment that can sterilize by hot air oven:

✓Glassware and pipettes

✓Powders

✓Materials that contain oils

✓Metal equipment

Moist Heat sterilization

- **Pasteurization (under 100 °C):** is a process that involves heating a liquid to a specific temperature for a set amount of time and then rapidly cooling it. This process **destroys all viruses and harmful organisms such as bacteria, protozoa, and molds.** Pasteurization is commonly used in **milk processing.**

Moist Heat sterilization

- **Boiling (at 100 °C):** Boiling water can be used to kill bacteria and viruses.
- **Autoclaving (above 100 °C):** This is the most reliable sterilization method, as it kills all kinds of bacteria and spores at a temperature of 121°C for 20 – 30 minutes.

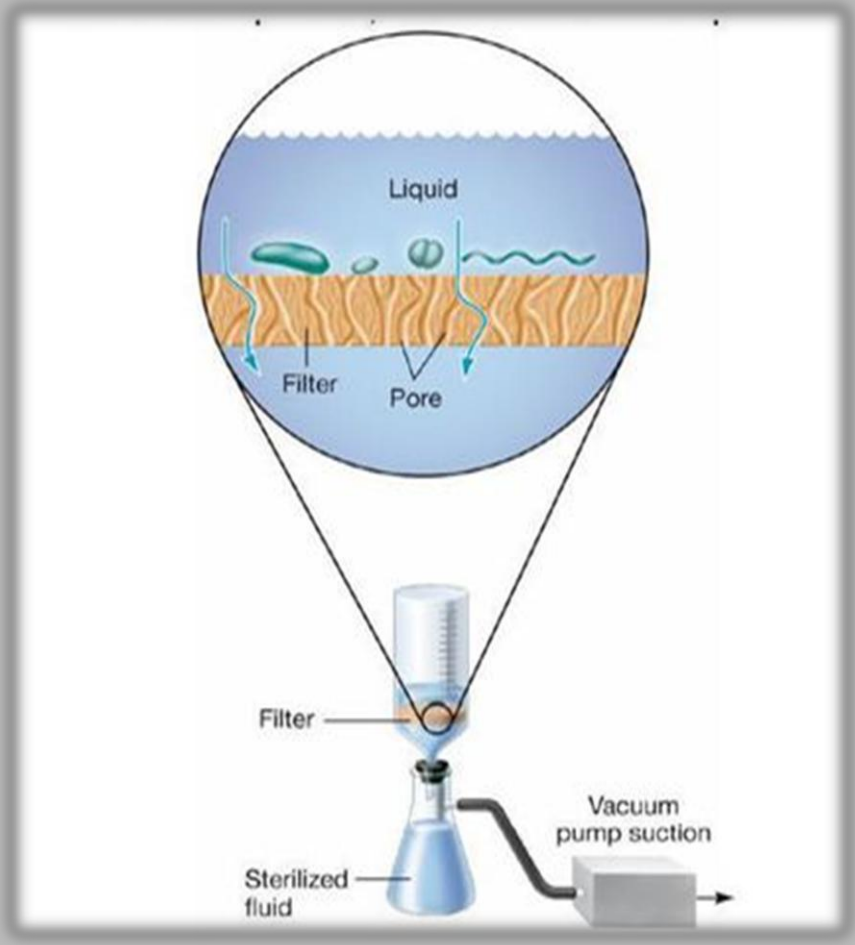
This method is used for sterilizing:-

- Culture media
- Surgical supplies, such as dressings and surgical instruments

Filtration

- It is possible to remove bacteria from fluids by passing them through filters **with small pores that bacteria are arrested.**

They are used for sterilizing liquids that would be damaged by heat as **antibiotic solutions and vaccines.**



Sterilization by Irradiation

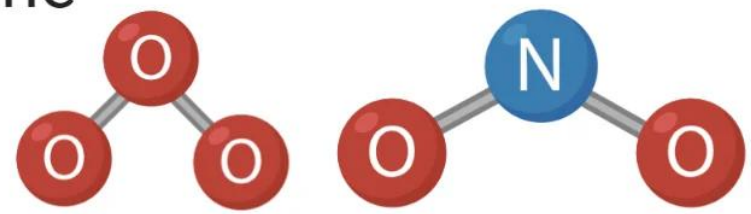
Ionizing	Non-Ionizing
• Gamma Rays	• Ultraviolet (UV) Rays

1. **Ultraviolet radiation:** is used for sterilizing the interiors of biological safety cabinets.
2. **Gamma Rays:** are used for sterilizing articles that cannot withstand heat, such as gloves and plastic syringes.

Chemical Sterilization

Gaseous Sterilization

- Ethylene oxide
- Formaldehyde
- Nitrogen dioxide (NO_2)
- Ozone



Liquid Sterilization

- Hydrogen peroxide
- Glutaraldehyde
- Hypochlorite

LAB ACTIVITY

1. Name two types of dry heat sterilization.
2. Removal of all life forms (spores) Process of destroying or removing certain defined microorganisms called ……..
3. Incineration used for ……..
4. In which condition will filtration be used?
5. Red heat sterilization is used for sterilizing 1. ……., 2. ……..