



Sterilization



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OUTCOMES

- **Define Sterilization.**
- **Importance of sterilization.**
- **Methods of sterilization.**

Conclusion.



Sterilization:

- The process by which an article, surface or medium is freed of all living microorganisms either in the vegetative or spore state.
- Essential concept in the preparation of sterile pharmaceutical products.
- It aims to provide a product that is safe and eliminates the possibility of introducing microorganism.



Importance of sterilization

➤ Prevents growth of diseases.

in any medical tool/device used, bacteria comes onto it. If left unchecked or not disinfected properly, it is highly likely that bacteria will grow.

➤ Prevents the spread of diseases.

If surgical equipment is not properly sterilized, patients treated are exposed to a disease the previous patient had.

➤ Prevents double surgeries.

If unsterilized equipment is used, it can cause an infection leading to another surgery later on in order to remove it.



Method of sterilization

1. Physical method

- Dry heat sterilization.
- Moist heat sterilization.
- Sterilization by radiation (gamma radiation).



2. Chemical method

- That damage the cell membranes.
- That damage proteins.
- That modify function groups of protein and nucleic acids



Dry heat sterilization



Red heat

Flaming

Hot air oven

Incineration

Dry heat sterilization

➤ **Oven:**

Specially designed instrument- electrically heated and thermostatically controlled.

Expose at 160 C for 1 hour.

Advantage

It is suitable method for sterilization of substances destroyed by moisture.

Disadvantage

Long heating time, high temperature.



Moist heat sterilization

Moist heat is divided into three forms:

- At temperature below 100°C : Water bath
- At a temperature of 100°C : Boiling
- At temperature above 100°C : Steam under pressure



Moist heat sterilization

➤ Autoclave

Heating process in autoclave- saturated steam under pressure is allowed to penetrate through materials for 15 minutes and temperature

121°C

Advantage

Micro organism are killed most efficiency in lesser time due high pressured saturated steam.

Disadvantage

Unsuitable for materials not withstanding temperature of 115c or more during heating.



Chemical agents

Major categories

- Alcohol
- Halogen
- Aldehyde
- Heavy metal
- Phenol & Phenol derivative
- Chlorhexidine
- Oxidizing agent



A. Agents that Damage the Cell Membrane

➤ **Surface-active agents**

Substances that alter the energy relationship at interfaces, producing a reduction of surface or interfacial tension, are referred to as surface active agents or surfactants.

➤ **Phenols and phenolic**

Phenol: Phenols are obtained by distillation of coal tar between temperatures of 170°C and 270°C. It is now rarely used as an antiseptic or disinfectant.

Phenolic: Derivatives of phenol are called phenolic.

➤ **Alcohol**



B. Agents that Damage Proteins

- **Acids and alkalis:** Many aliphatic and aromatic acids are employed as preservatives, especially in the food industry, and, to some extent, in pharmaceutical and cosmetic products.
- **Alcohols:**
Ethyl alcohol (ethanol) and isopropyl alcohol are the most frequently used. They rapidly kill bacteria including tubercle bacilli but they have no action on spores and viruses.



C. Agents that Modify Function Groups of Proteins and Nucleic Acids

➤ **Heavy metals:** For many years the ions of heavy metals such as mercury, silver, zinc and copper were used as germicides

➤ **Dyes:**

Aniline dyes and acridine dyes are two groups of dyes which are used extensively as skin and wound antiseptic.

➤ **Oxidizing Agents:**

The most useful antimicrobial agents in this group are the halogens and hydrogen peroxide.



Conclusion

CONCLUSION

- Sterilization destruction of all living microorganisms, bacteria, and spores.
- Importance of sterilization are prevents growth of diseases, prevents the spread of diseases and prevents double surgeries.
- The Physical method are dry heat sterilization, moist heat sterilization and sterilization by radiation.
- Chemical method that damage the cell membranes, that damage proteins and that modify function groups of protein and nucleic acids.



Reference

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Thank
You

