Sterilization

Sterilization is a process that kills all forms of microbial life, including bacterial endospores.

advantages of sterilization

- 1-Prevent transmission of diseases.
- 2-Prevent contamination and growth of undesirable bacteria.
- 3-Prevent spoilage of material by microorganisms.

Disinfection is a process that destroys pathogenic organisms, but not necessarily all microorganisms, endospores, or prions. However, some disinfectants will kill endospores with prolonged exposure times.

Antisepsis Reduction of or inhibition of microbes found on living tissue.
skin or mucous membrane and are used to prevent infection by inhibiting the growth of bacteria

DIFFERENCES BETWEEN ANTISEPTICS AND DISINFECTION

1. All antiseptics are disinfectants. All disinfectants are not antiseptics.
2. It can be apply on the live tissues. It can be applied on inanimate object.
3. E.g.:- Skin or mucous membrane. E.g.:- Surface, lab working tables, floor or material.

Decontamination is the removal of pathogenic microorganisms so items are safe to handle or dispose of.

Methods of Sterilization

Physical Methods
Radiation Method
Chemical Method

The physical methods of sterilization include:

HEAT

.• **Moist heat:**(steam under pressure)

STERILIZATION BY MOIST HEAT

Moist Heat is divided into 3 methods;

1) Temperature bellows 100°C e.g.: Pasteurization of milk.

2) Temperature at 100°C

e.g.: Boiling of water.

3) Temperature above 100°C (Steam under pressure) e.g.: Autoclave.

The holding period is 121° C at 15 pound pressure for 15 minutes.

• **Dry heat** :

Dry Heat Sterilization

i. **Red heat:** Inoculating wires, loops and points of forceps are sterilized by holding them almost vertically in a Bunsen flame until red hot.

ii. **Flaming:** Scalpel blades, glass slides, mouth of culture tubes and bottles are exposed to a flame for a few seconds

iii. **Incineration:** This is an efficient method for the sterilization and disposal of contaminated materials at a high temperature. Such as pathological waste materials, surgical dressings, contaminated material, animal carcasses and other clinical was

iv. **Hot air oven:**

• **FILTRATION** (Membrane filters)

• Membrane filters are widely used which is made of cellulose esters or other polymers.

• Their average pore diameters (APD) are 0.22 mm size.

• Filtration helps to remove bacteria from liquids such as sera and solutions of sugars or antibiotics used for preparation of culture media.

RADIATION

two types of radiation are used for sterilization – nonionizing & ionizing.

• Clean surfaces like inoculation hoods, microbiology & other laboratories, hospital wards and operation theatres etc.
• X-rays, Gamma rays & Cosmic rays are highly lethal to all cells including bacteria.
• They have very high penetrative power. They damage DNA by various mechanisms.

Applications

Commercial plants use gamma radiation for sterilization of disposable items such as plastics syringes, swabs & animal feeds etc.

• Chemicals (ethylene oxide gas, hydrogen peroxide gas plasma, vaporized hydrogen peroxide, and other liquid chemicals)

Chemical Methods of Disinfection

Chemical disinfectants comprise many classes, including:
• Alcohols
• Aldehydes
• Halogens (chlorine and chlorine compounds)
• Peracetic acid
• Hydrogen peroxide
• Quaternary ammonium compounds
• Phenolics

- ❖ Chemicals used to destroy all life are called **chemical sterilants,** or **biocides;** .

Disinfectants used on living tissue (skin) are called **antiseptics.**

household bleach. The disinfecting capability of bleach is bactericidal, virucidal, fungicidal, mycobactericidal, and sporicidal. It is inexpensive and effectiveness is not decreased based on the quality of the water used in the solution preparation.

disadvantage is that hypochlorite may cause minor ocular, oropharyngeal, and esophageal irritation if an individual is exposed to high concentrations without proper ventilation. It is also corrosive to metals in high concentrations, discolors fabrics, and can produce a toxic gas if improperly mixed with ammonia or acid in other cleaning agents. The Centers for Disease Control and Prevention (CDC) recommends that tabletops be cleaned after blood spills with a 1:10 dilution of bleach.

cold sterilization. (formaldehyde and glutaraldehyde) their irritating fumes are generally not used as surface disinfectants. Glutaraldehyde, which is sporicidal (kills endospores) in 3 to 10 hours, is used for medical equipment such as bronchoscopes, because it does not corrode lenses, metal, or rubber. Peracetic acid, effective in the presence of organic material, has also been used for the surface sterilization of surgical instruments. The use of glutaraldehyde or
peracetic acid