

Hot air oven

Hot air oven

- An oven provides a temperature higher than that of atmosphere.
- The temperature range covered by ovens is between **50-250°C**.
- These are used for rapid evaporation of materials, rapid drying and for sterilization of articles that can be sterilized by dry heat.

- Dry heat sterilization technique requires longer exposure time (**1.5 to 3 hours**) and higher temperatures than moist heat sterilization.

Principle

- Sterilizing by dry heat is accomplished by conduction. The heat is absorbed by the outside surface of the item, then passes towards the Centre of the item, layer by layer. The entire item will eventually reach the temperature required for sterilization to take place.
- Dry heat does most of the damage by oxidizing molecules. The essential cell constituents are destroyed and the organism dies. The temperature is maintained for almost an hour to kill the most difficult of the resistant spores.



Dry heat – Hot air oven



Working

- The most common time-temperature relationships for sterilization with hot air sterilizers are
 - 170°C (340°F) for 30 minutes,
 - 160°C (320°F) for 60 minutes, and
 - 150°C (300°F) for 150 minutes or longer depending up the volume.

- The contents must not be removed from the oven immediately as a slow cooling period is necessary – ideally when the temperature has reduced down to 50°C, but no less.
- The reason for the gradual cooling period is to avoid the cracking of glassware as well as preventing air (that could potentially contain contaminating organisms) entering the oven.

- Used for glassware, forceps, swabs, water impermeable oils, waxes & powders
- Before placing in hot air oven
 - Dry glassware completely
 - Plug test tubes with cotton wool
 - Wrap glassware in Kraft papers
- Don't over load the oven
- Allow free circulation of air between the material

Quality control

to check whether the equipment is working properly

1. Chemical controls: Browne's tubes

Color change from red to green



2. Biological controls: paper strips containing 10^6 spores of *Clostridium tetani*

- Place strips in oven along with other material for the sterilization
- Later culture the strips in thioglycollate broth at 37 °C for 5 days
- Growth in medium indicates failure of sterilization

Advantages

- A dry heat cabinet is easy to install and has relatively low operating costs
- It penetrates materials
- It is nontoxic and does not harm the environment
- it is noncorrosive for metal and sharp instruments.

Disadvantages

- Time consuming method because of slow rate of heat penetration and microbial killing.
- High temperatures are not suitable for most materials.