



Subject: Medical Instrumentations  
Lecturer: MSc. Mohammed Tareq Fakhri  
Class: Second Class  
Academic year: 2023-2024  
Lecture: Second lecture



# *Hot air ovens*

**Introduction:** Hot air oven are electrical devices used in sterilization. . The oven uses dry heat to sterilize articles over several hours to destroy microorganisms and bacterial spores. Generally, they can be operated from 50 to 200 °C. It is found in hospitals and laboratories where medical professionals and laboratory technicians use it. Examples of items that aren't sterilized in a hot air oven are surgical dressings, rubber items, or plastic material.

➤ **Items that are sterilized in a hot air oven include:**

- Glassware (like petri dishes, flasks, pipettes, and test tubes)
- Powders (like starch, zinc oxide, and sulfadiazine)
- Materials that contain oils
- Metal equipment (like scalpels, scissors, and blades)

## The parts of oven

### **A. mechanical part:**

**1. The body** made of aluminum alloy characterized by:

- ✓ Resisting the mechanical shocks, oxidation and corrosion.
- ✓ Rectangular shape to be easily placed.



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**2. The chamber (inner room):** is double walled, inner layer made of aluminum alloy or stainless steel alloy and the outer layer made of fiber glass .The inner room has ribs to put shelves in the wanted levels.

1. Resisting the mechanical shocks
2. Resisting the oxidation.

**3. Fiber glass:** There are two types of fiber glass:

**a) Brown fiber glass:** be sometimes cheap, but it is a **dangerous** substance because it causes inflammation in the chest should be wary of dealing with.

**b) Yellow fiber glass:** Available by many and is also a serious but less dangerous than brown, because the sensitivity and must to be careful to wear gloves. The advantage of fiberglass good insulator of heat and use it in your device due to lack of access of heat from inside the device to the outside and maintain the internal temperature, [very bad conduction heat so it is suitable for heat insulation purpose].

**4. The shelves (mesh):** they are plates on which the objects are placed; the number of shelves is varying according to the number and size of objects, the oven capacity. It **characterized by:**

- They are made of aluminum which is considered as oxidation resisting material.
- When they are placed in their locations on the ribs some area is lifted to allow movement of air, some shelves contain openings to help this purpose.



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## **B. Electric part:**

- 1. Power supply:** The used supply in dry sterilized device is 220v — 50Hz.
- 2 The Heater:** The electric heating system is the system in which heating produce by rising of temperature caused by the passing of electric current through a conductor having a high resistor to current flow, it is only placed in base of the instrument.

**The heater element has the following characteristics:**

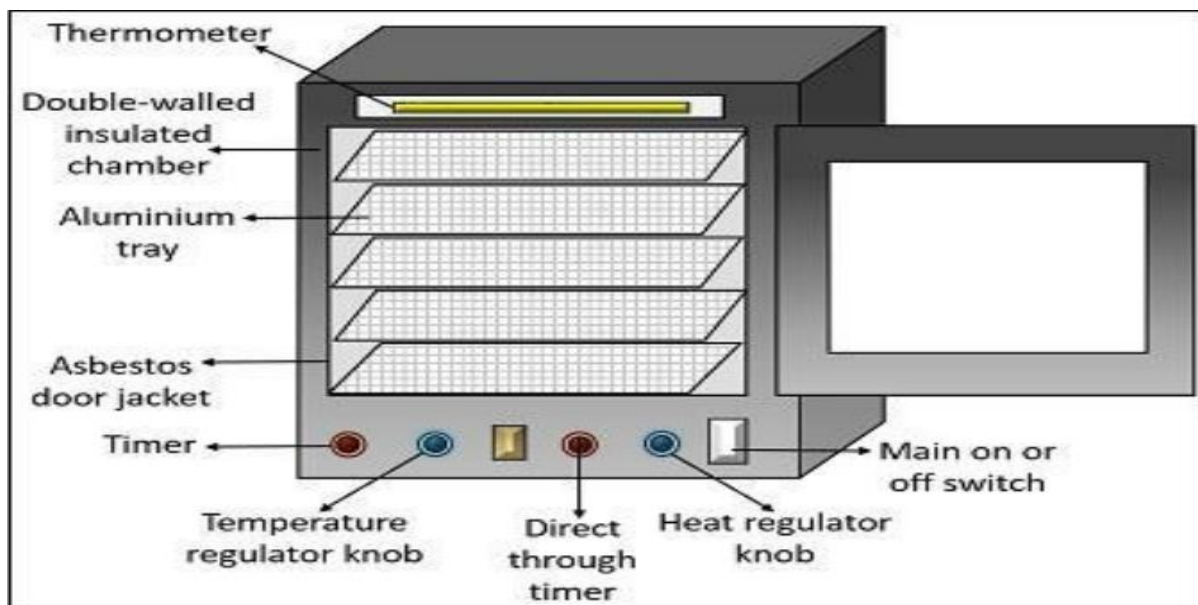
- 1- High resistance
- 2- Electrical insulation.
- 3- Thermal conductivity.

**There are 6 types of heaters used in dry oven:**

1. One side circular type heater.
  2. One side U type heater.
  3. One side wave type heater
  - 4 One side square type heater
  5. Three sides type heater.
  6. Four sides type heater.
- 3. Thermometer:** measures the temperature.
  - 4. Thermostat:** used to select the wanted temperature of heating in range of (50 to 200 °C)
  - 5. Timer:** There are two type of timer electrical or mechanical at range 5-60 min given period of time required for sterilization.

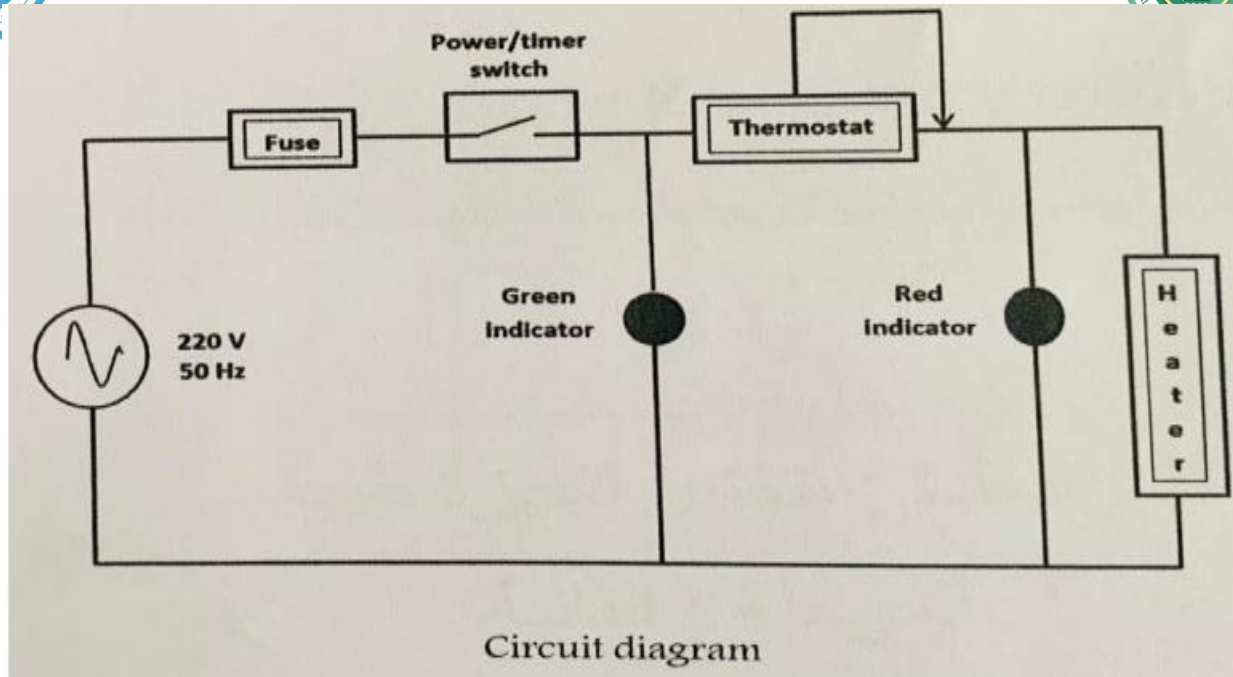


6. **Fuse:** To protect the circuit from high current, high loads, short circuits..
7. **Control panel:** (oven door) contains several elements and the most important about indicator power lamp usually green & indicator heater lamp usually red & contains switch on-off and timer & knob.



### ➤ Circuit description

When the circuit supply by the electric energy (current), the current passes across the fuse to reach the thermostat for controlling the circuit operation. When the device reach to the over required temperature, the thermostat cut off the electric current from the heater. When decrease temperature, the heater slightly returns on by the thermostat.



### ➤ Faults:

- 1) Malfunction of the thermometer and thermostat.
- 2) Heater failure.
- 3) Timer malfunctions.

### ➤ Discussion:

- 1) What is oven sterilization?
- 2) What are items can be sterilize by oven?
- 3) Can you use an oven as an autoclave?
- 4) What are the common faults with the device oven?