

Laboratory Incubators

Incubator, in microbiology, is an insulated and enclosed device that provides an optimal condition of temperature, humidity, and other environmental conditions required for the growth of organisms.

An incubator is a piece of vital laboratory equipment necessary for the cultivation of microorganisms under artificial conditions.

An incubator can be used for the cultivation of both unicellular and multicellular organisms.



Figure 1: incubator components.

Principle/ Working of Incubator

An incubator is based on the principle that microorganisms require a particular set of parameters for their growth and development.

All incubators are based on the concept that when organisms are provided with the optimal condition of temperature, humidity, oxygen, and carbon dioxide levels, they grow and divide to form more organisms.

Components of laboratory incubators

A laboratory incubator is made up of various units, some of which are:

Cabinet

- The cabinet is the main body of the incubator consisting of the double-walled
- The outer wall is made up of stainless steel sheets while the inner wall is made up of aluminum.
- The space between the two walls is filled with glass wool to provide insulation to the incubator.
- The insulation prevents heat loss and in turn, reduces the electric consumption, thereby ensuring the smooth working of the device.

Door

- A door is present in all incubators to close the insulated cabinet.
- The door also has insulation of its own. It is also provided with a glass that enables the visualization of the interior of the incubator during incubation without disturbing the interior environment.
- A handle is present on the outside of the door

Control Panel

- On the outer wall of the incubator is a control panel with all the switches and indicators that allows the parameters of the incubator to be controlled.

Thermostat

- A thermostat is used to set the desired temperature of the incubator.
- After the desired temperature is reached, the thermostat automatically maintains the incubator at that temperature until the temperature is changed again.

Perforated shelves

- Bound to the inner wall are some perforated shelves onto which the plates with the culture media are placed.
- The perforations on the shelves allow the movement of hot air throughout the inside of the incubator.
- In some incubators, the shelves are removable, which allows the shelves to be cleaned properly.

L-shaped thermometer

- A thermometer is placed on the top part of the outer wall of the incubator.
- One end of the thermometer provided with gradations remains outside of the incubator so that temperature can be read easily.
- The next end with the mercury bulb is protruded slightly into the chamber of the incubator.

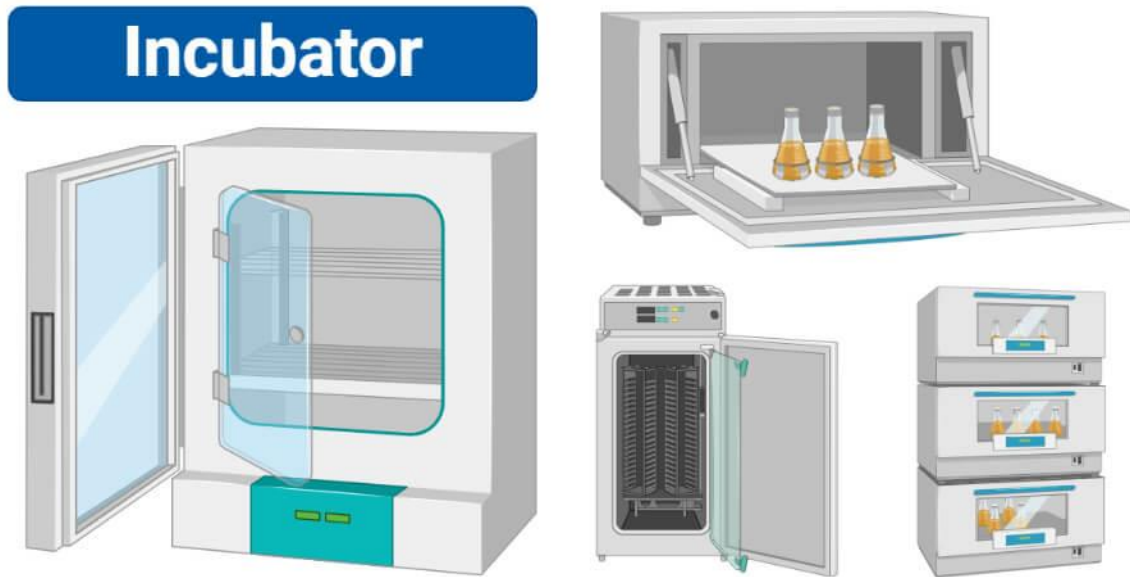
HEPA filters

- Some advanced incubators are also provided with HEPA filters to lower the possible contamination created due to airflow.
- AN air-pump with filters creates a closed-loop system so that the air flowing inside the incubator generates less contamination.

Humidity and gas control

- The CO₂ incubators are provided with a reservoir underneath the chamber that contains water.
- The water is vaporized to maintain the relative humidity inside the chamber.
- Similarly, these incubators are also provided with gas chambers to give the desired concentration of CO₂ inside the incubator.

Once the cultures of organisms are created, the culture plates are to be placed inside an incubator at the desired temperature and required period of time. In most clinical laboratories, the usual temperature to be maintained is 35–37°C for bacteria.



Figure(2): types of incubators

Incubators are divided into the following types:

Benchtop incubators

These incubators are the basic types of incubators with temperature control and insulation.

CO₂ incubators

- CO₂ incubators are provided with automatic control of CO₂ and humidity. It's used for the growth of the cultivation of different bacteria requiring 5-10% of CO₂ concentration.

Cooled incubators

- Incubators are fitted with modified refrigeration systems with heating and cooling controls.

Shaker incubator

- A thermostatically controlled used to cultivate microorganisms (broth or liquid **culture media**).

Portable incubator

- Portable incubators are smaller in size and are used with environmental microbiology and water examination.

Applications of lab incubators:

Some of the uses of incubators are given below:

1. Incubators are used to grow microbial culture or cell cultures.
2. Incubators can also be used to maintain the culture of organisms to be used later.
3. Some incubators are used to increase the growth rate of organisms, having a prolonged growth rate in the natural environment.
4. Specific incubators are used for the reproduction of microbial colonies and subsequent determination of biochemical oxygen demand.
5. These are also used for breeding of insects and hatching of eggs in zoology.
6. Incubators also provide a controlled condition for sample storage before they can be processed in the laboratories.