INCUBATOR

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LABORATORY INCUBATOR

- A **laboratory incubator** is a heated, insulated box used to grow and maintain microbiological or cell cultures.
- The **incubator** maintains optimal temperature, humidity and gaseous content of the atmosphere inside.
- Laboratory incubators are used to grow and maintain cell cultures and are available in a variety of sizes and types.
- The incubator market is divided into two main categories: the gassed incubators which are the CO2 incubators, and the non gassed or microbiological incubators.

NECESSITY OF INCUBATORS

- Laboratory incubators provide the comfort of working with microbiological cultures, cell cultures and tissue cultures
- This is the ultimate equipment for growing and storing bacterial cultures.
- Incubators protect cells from changes in temperature, humidity, CO2 and O2.
- The range of temperature may vary (according to the model) 0°C to 80°C, though is normally used from 5ºC -37ºC.

Principle

- 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.
- In an incubator, the thermostat maintains a constant temperature that can be read from the outside via the thermometer.
- The temperature is maintained by utilizing the heating and no-heating cycles.
- During the heating cycle, the thermostat heats the incubator, and during the no-heating period, the heating is stopped, and the incubator is cooled by radiating heat to the surrounding.
- Insulation from the outside creates an isolated condition inside the cabinet, which allows the microbes to grow effectively.
- Similarly, other parameters like humidity and airflow are also maintained through different mechanisms that create an environment similar to the natural environment of the organisms.
- Similarly, they are provided with adjustments for maintaining the concentration of CO2 to balance the pH and humidity required for the growth of the organisms.
- Variation of the incubator like a shaking incubator is also available, which allows for the continuous movement of the culture required for cell aeration and solubility studies.

TYPES OF INCUBATORS

Standard incubators.

These incubators can be gravity or fan assisted convection and their range of temperature is from ambient to a maximum of 80°C or 100°C

Cooled incubators:

These incubators work at temperatures close to or below ambient temperature

TYPES OF INCUBATORS

Humidity incubators:

These incubators control both, temperature and humidity, thanks to a refrigeration system rather than by direct heating.

CO2 (carbon dioxide) incubators:

- These incubators are widely used in Biological and it is used when it is necessary to maintain a determined percentage of carbon dioxide in the incubator.
- The level of CO2 is controlled by a thermal conductivity sensor or infra-red sensor.
- The humidity is usually obtained from a tray of water which is constantly evaporating.

TYPES OF INCUBATORS

Shaking incubators:

- These incubators shakes in a temperature controlled atmosphere.
- There are different size of this type of incubators, with a range of temperature from ambient or refrigerated.

Hybridisation incubators or hybridisation ovens:

These incubators hold different sizes of hybridization bottles and rotate them at a set speed to enable hybridization in molecular biology.

OTHER TYPES OF INCUBATORS

- Round bottomed, down dwelling incubators
- Trough type incubators
- Revolving barrel incubators
- Double enclosure incubators
- Bucket incubators

VARIOUS TYPES OF LAB INCUBATORS

CHOOSING THE APPROPRIATE INCUBATOR

- **Internal volume**. Compare always the internal dimensions to determine according to the lab requirement, and the external dimensions when thinking about lab space available, the bench or floor standing.
- **Aluminium clad or stainless steel interior.** Bear in mind that stainless steel is easier to clean and resistant to corrosion, in contrast to aluminium.
- **Gravity or fan forced convection**. Depending on the importance of temperature uniformity. Fan-forced is appropriate to keep uniformity, but if drying out is not a priority then gravity convection is a better option.
- **Digital or analogue control/display.** Analogue control is based on a numbered dial and needs a thermometer or dial thermometer to display the actual temperature

- **Shelves.** Depending on the type of space required, the number of shelves can be relevant for the researcher.
- **Inner glass door.** When the incubator has a glass door, the researcher is enabled to see the sample without open the door, so this guarantees the temperature stability.
- **Safety features*:*** Some models have an alarm system in case of variations of temperature, whether it is too high or too low.

APPLICATIONS

- Growing cell cultures
- Reproduction of germ colonies with subsequent germ count in the food industry
- Reproduction of germ colonies and subsequent determination of biochemical oxygen demand (wastewater monitoring)
- Reproduction of micro organisms such as bacteria, fungi, yeast or viruses
- Breeding of insects and hatching of eggs in zoology
- Controlled sample storage
- Growing of crystals/protein crystals

APPLICATIONS

Infant incubator

Poultry egg incubator

Laboratory incubator

THANK YOU