PH Meter

PH meter: Its instrument used for measure the effective concentration of hydrogen ions in a solution in general terms there are three parameters involved in the effective concentration.

- the first it the actual molar concentration or base hydrogen.
- the second is the dissociation of acid and the third is the temperature.

The (PH) defined as the negative log of the hydrogen ion activity at temperature 25 °C and has 0.0000007 mole of hydrogen per liter PH - Log (H+)
Buffer solution: have some properties

- First: buffer value which is indicated by the Greek letter and is also called the (Van slyke).
- Second: buffer value indicates the resistance of a buffer to PH change effect the addition of acid or base. defined as the amount of completely dissociated acid or base equivalent gram/liter.
- Third: is temperature stability or the capacity of change the PH with a change in temperature.

Application of pH Meter

- **Pharmaceutical**
- **Agriculture**
- **Wine**
- **Soil testing**
- **Food products such as butter and yogurt**

The main parts of PH meter

1-Electrode holder

2- Electrode

3- Scale range from 0-14

4- Switch off/on

5- Temperature knob

6- Adjustment knob

Operation of PH meter

1-Running the instrument and allow to warm up for a few minutes.

2- Adjust the temperature on the actual temperature reading.

3- Washing the electrode by distilled water and read the reference buffer.

4- Adjust the reading of the reference buffer on the scale according to the actual value of the reference.

5- Read unknown sample by dipping the electrode system in to the sample flask

Part of electrode

1-Reference electrode

2- Glass electrode

3- Membrane

4- Retaining ring

5- Calomel electrode

Maintenance for electrode

1- Disconnect the power supply for instrument.

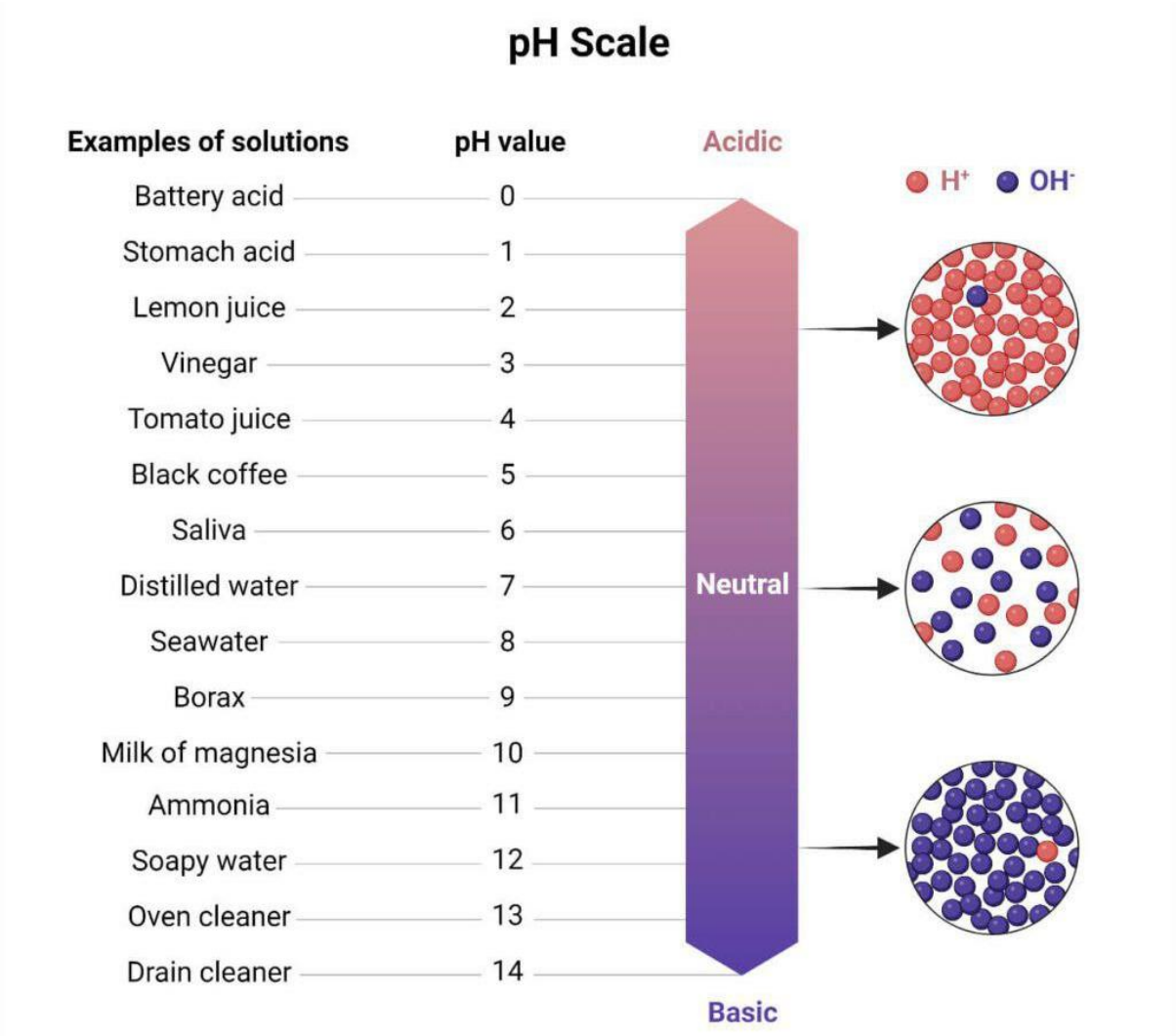
2-Washing the electrode in distilled water after each measuring.

3- Keep the electrode in distilled water at the end of each experiment.

4- Glass electrode are best kept in buffer solution PH = 7.

5- kept the PH meter clean and cover after used.

PH meter



samples	PH value
Gastric juice	1.5- 3.5
blood	7.35- 7.45
Pancreatic juice	7.5- 8.0
Blood plasma	7.35- 7.45
Cerebrospinal fluid	7.2- 7.4
Tears	7.2- 7.4
Interstitial fluid	7.2- 7.4
Saliva	6.4- 7.0
Distilled water	7.42
Normal tap water	7.45
Pond water	8.24
RO drink water	7.02
Milk	6.7
Lemon juice	2

Incubator

it is important instrument in the laboratory microbiology used in biological research. for development of bacteria, fungi and other microorganisms. Also depends on heat and thermal control. It is similar in work to the work of the water bath the temperature ranges (25-60 C). The incubator maintains optimal temperature, humidity and gaseous content of the atmosphere inside. Many incubators include a programmable timer which may be set to cycle through different temperatures and humidity levels.

Type of incubator:

1-Ordinary incubator: it's similar to heat oven in terms of the principle of work. but different the value of thermal where the temperature ranges (25-60 C).

2- Incubator CO2: works this incubator the same principle with the presence of gas CO2 and which is controlled by the constant pressure at a rate of (5- 20%).and used for the development of bacteria and in particular that need CO2.

3- Shaker Incubator: in order to provide optimal conditions for cell growth, some types of agitation or shaking is necessary to incorporate oxygen and evenly distribute nutrients throughout the culture media**.**

Ordinary incubator

Types of laboratory incubator

Uses of Incubator

Incubators have a wide range of applications in various areas including cell culture, pharmaceutical studies, hematological studies, and biochemical studies.

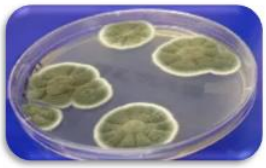
Some of the uses of incubators are given below:

- Incubators are used to grow microbial culture or cell cultures.
- Incubators can also be used to maintain the culture of organisms to be used later.
- Reproduction of micro organism such as the bacteria, virus, fungi and yeast.
- Some incubators are used to increase the growth rate of organisms, having a prolonged growth rate in the natural environment.
- Specific incubators are used for the reproduction of microbial colonies and subsequent determination of biochemical oxygen demand.
- These are also used for breeding of insects and hatching of eggs in zoology.

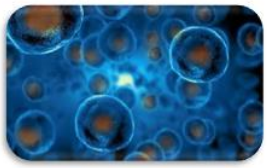
Uses of incubator:

1- **Bacterial growth**

3- **Fungal growth**



2- **Cell growth**



4- **Egg growth**

The components / parts of incubator

1- Cabinet

This is the frame of the whole incubator. Generally, the outer layer is made of corrosion-resistant stainless steel plate, and the inner layer is made of aluminum with good thermal conductivity. The two walls are filled with glass wool to ensure better temperature control. Inside the incubator is an inward protrusion to support the shelves inside the lab incubator.

2- Door

In order to prevent the entry of outside air and to ensure a stable internal environment, lab incubators are usually well-sealed and have a reliable door. The doors are usually made of transparent glass with an insulating layer, which makes it easy to observe the status inside the incubator. The door is also fitted with an asbestos door gasket to prevent the entry of outside air.

3- Control Panel

Monitor the temperature, humidity and other parameters inside the incubator, with all the switches and control keys.

4- Thermostat

The thermostat is used to set the desired temperature of the incubator. Once the desired temperature is reached, the thermostat automatically maintains the lab incubator until the temperature changes again.

5- Perforated shelf

The shelves hold the culture media and the perforated design allows for a more even temperature flow in the chamber.

6- HEPA Filter

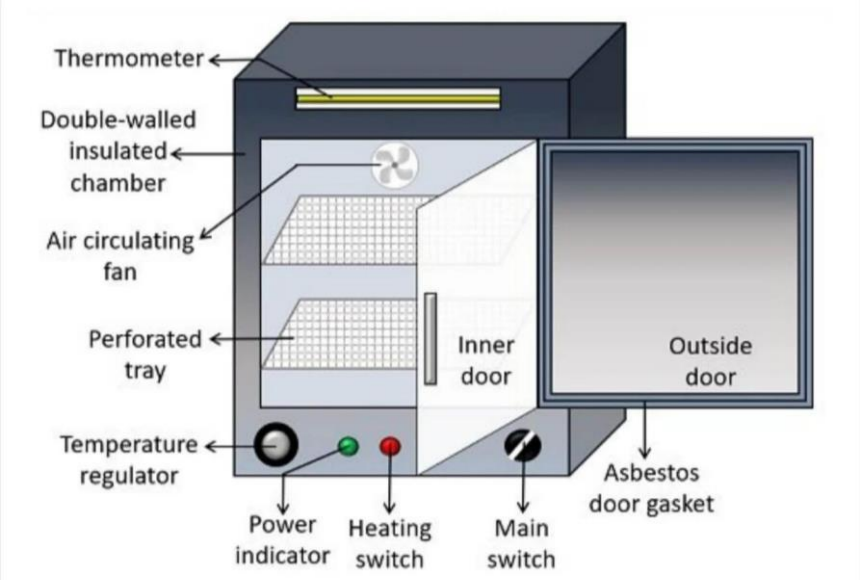
Some state-of-the-art incubators are also equipped with HEPA filters to minimize possible contamination caused by airflow.

7- Humidity

CO2 incubators typically have a reservoir underneath the chamber to maintain the relative humidity of the chamber by evaporating water.

8- Data Logging and Remote Monitoring

Some advanced lab incubators will also feature data logging and remote monitoring so that users can monitor and control experimental conditions even when they are not in the lab.



Parts/Components of Incubator

Points that you should care about in Incubator

- ❖ Always wear gloves when handling containers to be placed inside the unit.
- ❖ If using a humidity pan, change the water in the pan at least once per week.

- ❖ Remember to clean the outside of the unit, especially the door handle.
- ❖ Sterilize inside the incubator often.
- ❖ Check and calibrate the temperature regularly