334 MBIO
Biochemical Instrumentation Techniques

- Lab 2 -

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1957

The pH meter

- pH is the negative logarithm of hydrogen ion activity: pH = – log $[H^+]$.
- It is based on the concentration or the activity of hydrogen ions, of either an aqueous solution, or semi-solid substances .

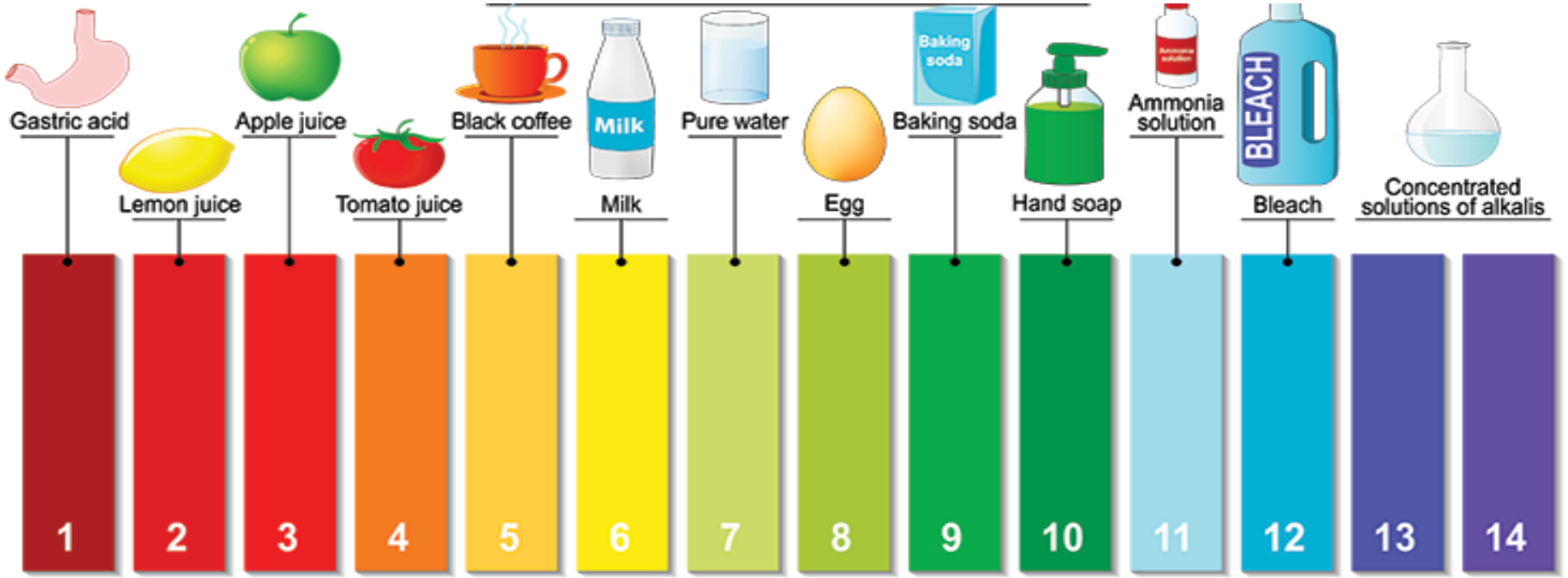
pH Scale and Interpretation

The pH value of a substance is directly related to the ratio of the hydrogen ion and hydroxyl ion concentrations, as follows:

- **Acidic :** pH < 7 (Higher H^+ concentration)
- **Natural :** pH = 7
- **Alkaline (Base) :** pH > 7 (Higher OH^- concentration)

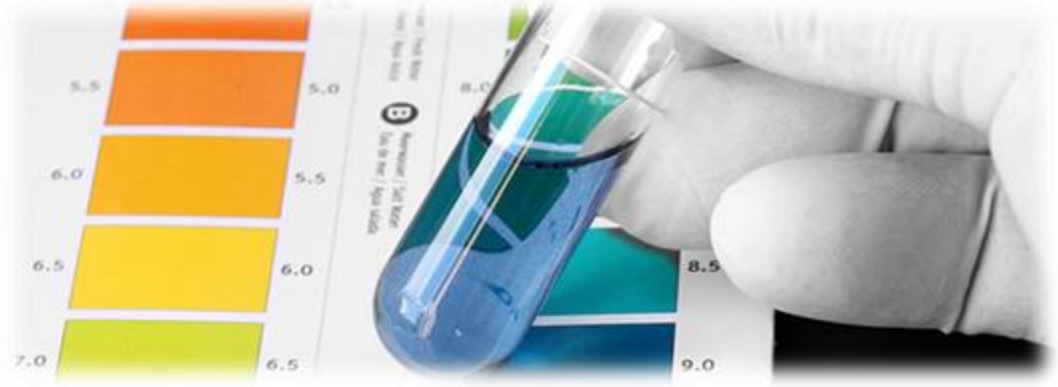
pH Scale and Interpretation

- It measures the acidity or alkalinity of a solution on a scale of 0 to 14.



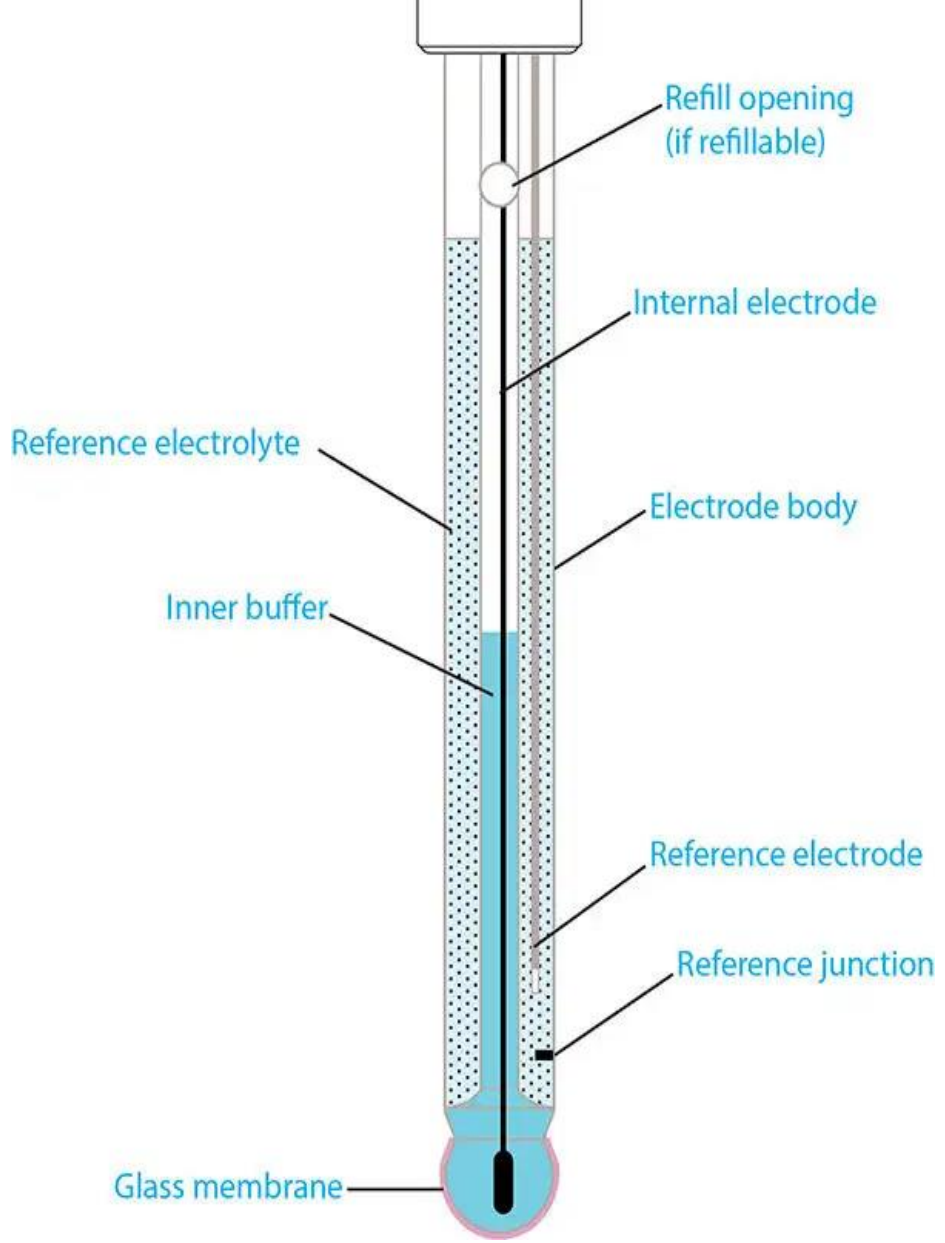
pH Scale and Interpretation

- How to control the pH:
  - Adding acids increases H^+ ions.
  - Adding bases increases OH^- ions.



Components of a pH Meter

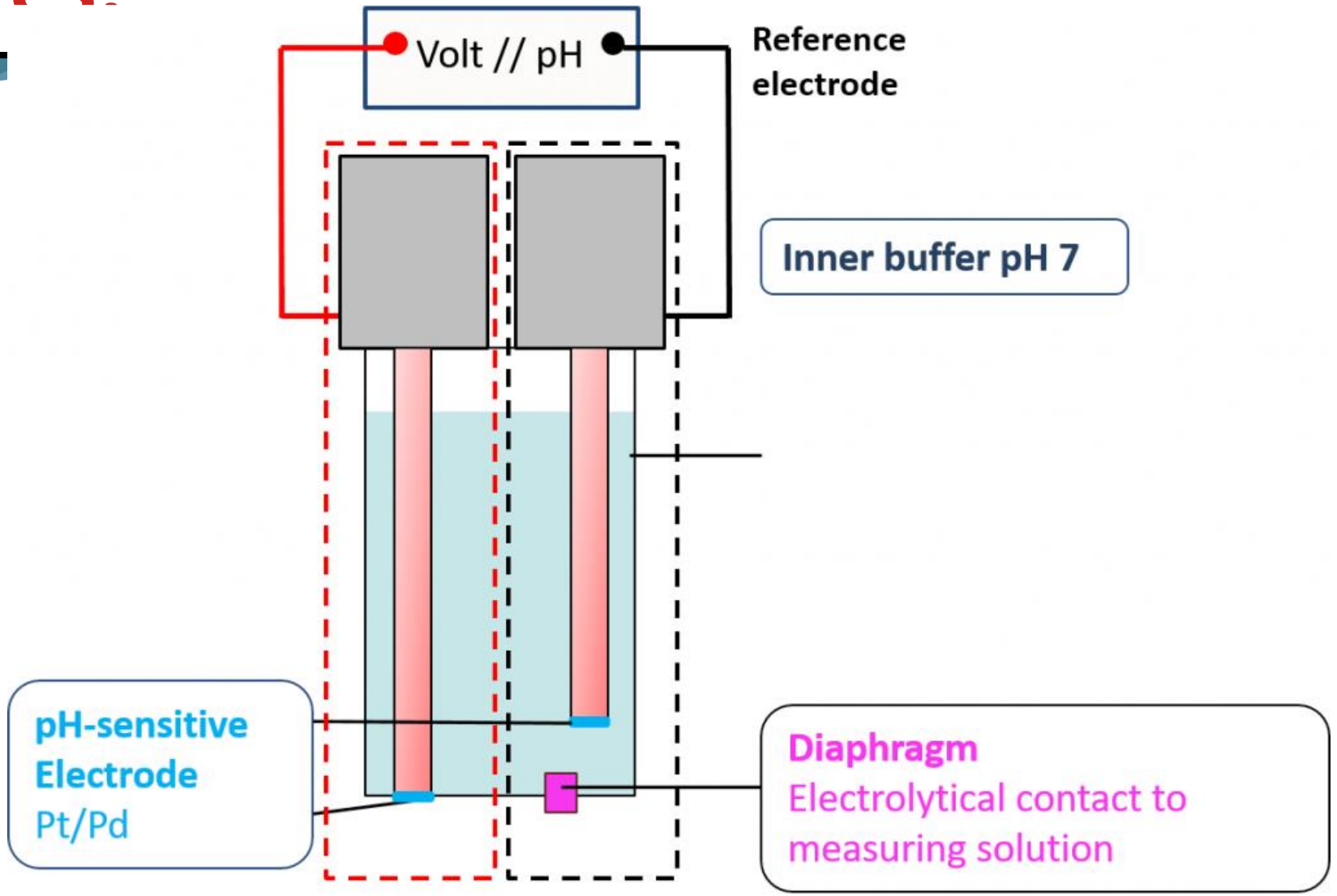
- It consists of a pH measuring electrode (pH-sensitive electrode), a reference electrode, or combination electrode.
- The pH measuring **electrode** is a hydrogen ion sensitive **glass bulb**.



Key Features:

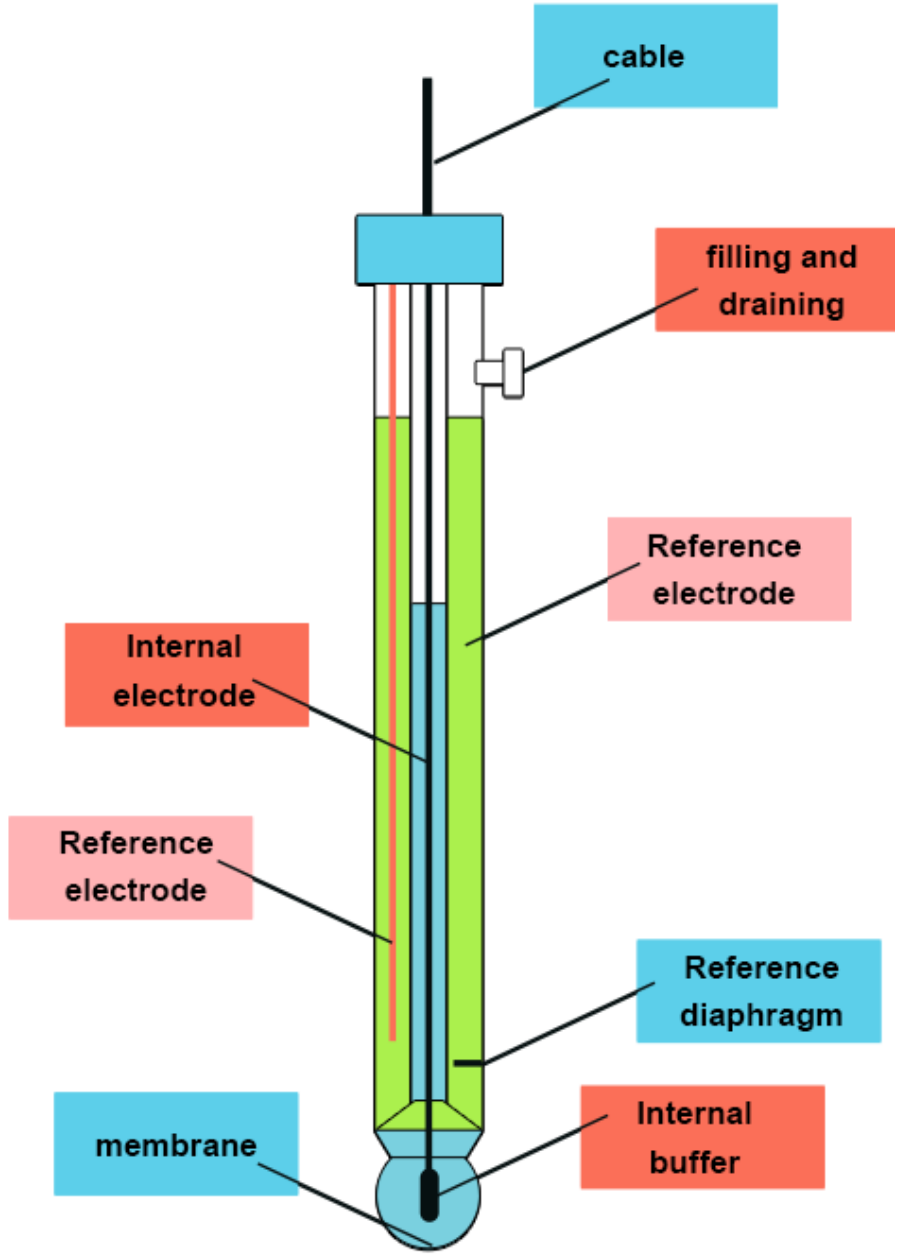
- **Electrode Holding Arm:** Supports the probe for immersion in the sample.
- **Combination Electrode:** Contains a pH-sensitive glass bulb for detecting H^+, and reference electrode with stable output.
- **Display Panel:** Shows the measured pH value.

Key Features:



How it works

- The probe contains two electrodes:
  - One in a liquid of fixed pH.
  - One in the sample to detect H^+ concentration.
- The voltmeter measures the difference in voltage between these electrodes.



How it works

- The meter translates the voltage difference into a pH value, which is displayed on the screen.

Applications of pH Meters

- **Laboratory Work** ⟶ Chemical analysis and experiments.
- **Agriculture** ⟶ Soil testing for crop optimisation.
- **Water Quality** ⟶ Monitoring water supply, swimming pools, and environmental systems
- **Healthcare** ⟶ Ensuring that solutions are safe when applied to patients or lethal as sterilant and disinfectants.

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