Ministry of Higher Education and Scientific Research

Al- Mustaqbal University

College of Science

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Lecture (9)

Buffer

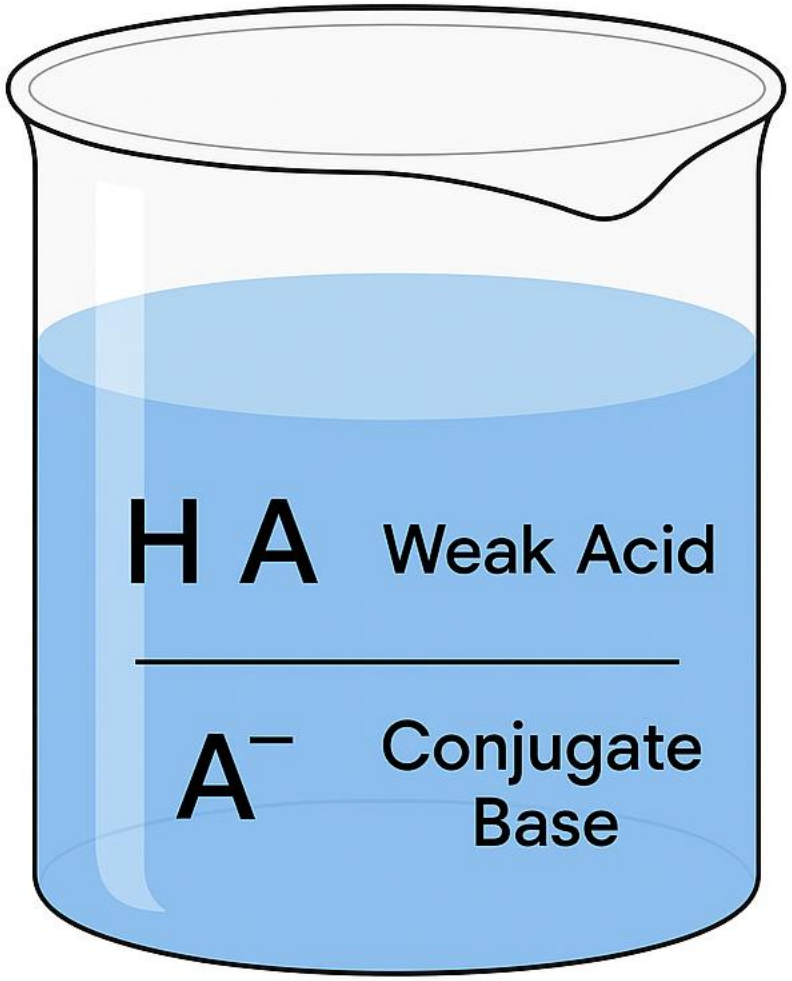
What is a Buffer?

A buffer is a solution made of a weak acid and its conjugate base (or a weak base and its conjugate acid).

It resists changes in pH when small amounts of strong acid or base are added.

- Real-life example: The human body uses buffer systems to keep blood pH around 7.4.

Buffer Solution



Components of a Buffer System

- Acidic Buffer: Weak acid + its conjugate base (e.g., Acetic acid + Sodium acetate)
- Basic Buffer: Weak base + its conjugate acid (e.g., Ammonia + Ammonium chloride)

How Does a Buffer Work?

- Strong acid added → reacts with conjugate base → forms weak acid → minimal pH change.
- Strong base added → reacts with weak acid → forms water and weak base → minimal pH change.

Biological Importance of Buffers

1. Bicarbonate Buffer (HCO_3^- / H_2CO_3): Maintains blood pH and neutralizes acids.
2. Phosphate Buffer (HPO_4^{2-} / $H_2PO_4^-$): Functions in intracellular fluids.
3. Protein Buffers (e.g., Hemoglobin): Accept or release H^+ ions.

Laboratory Applications

- Used in DNA, PCR, and enzyme assays.
- Ensures stable pH for effective reactions and enzyme function.

THE END

THANK YOU