Experiment
Preparation of Basic Buffer Solution and Measurement of pH

Aim
To prepare a basic buffer solution and determine its pH using a pH meter.

References
S.R. Kale; R.R. Kale: Practical Book of Biochemistry & Clinical Pathology; Nirali prakashan; 2020; 29th Edition Pahe no 15-17.

Requirements
- **Glassware Requirement:-** pH meter, Pipettes, beaker, volumetric flask, Glass rod.
- **Chemical Requirement:-** 0.1 M Ammonium hydroxide (NH_4OH), 0.1 M Ammonium chloride (NH_4Cl), Distilled water.

Principle
A **basic buffer** consists of a weak base and its salt with a strong acid. Example: **Ammonium hydroxide (NH_4OH) + Ammonium chloride (NH_4Cl).**

The pH is given by Henderson-Hasselbalch equation: pH = pKa + log([Salt]/[Acid]).

For ammonia system: pKa=9.25

Procedure
A. Preparation of Buffer Solution
1. Take **50 ml of 0.1 M NH_4OH** in a beaker.
2. Add **50 ml of 0.1 M NH_4Cl**.
3. Mix thoroughly using a glass rod.
4. Transfer to volumetric flask if required.

B. Calibration of pH Meter
1. Switch on the pH meter.
2. Calibrate using standard buffers (pH 7 and 9).
3. Rinse electrode with distilled water.

C. Measurement of pH

1. Dip electrode into buffer solution.
2. Allow reading to stabilize.
3. Record pH.
4. Repeat for 3 trials.

D. Study of Buffer Action

1. Take 20 ml buffer in two test tubes.
2. Add:
   - 1 ml **0.1 M HCl** (acid)
   - 1 ml **0.1 M NaOH** (base)
3. Measure pH again.

Observations

1.Buffer Preparation

Solution	Volume (ml)	Concentration
NH_4OH	50 ml	0.1 M
NH_4Cl	50 ml	0.1 M

2.Theoretical pH Calculation

- pH=9.25+log(1)=9.25

  Theoretical pH = 9.25

3.Experimental pH Values

Trial No.	Observed pH
1	9.22
2	9.27
3	9.24

Average pH = 9.24

4.Buffer Action

Addition	pH Before	pH After
+1 ml 0.1 M HCl	9.24	9.10
+1 ml 0.1 M NaOH	9.24	9.36

Result

The prepared basic buffer solution showed a pH of **9.24**, which is close to the theoretical value (**9.25**). The buffer resisted changes in pH upon addition of small amounts of acid and base.