CO4: Apply basic concepts of Spectroscopy and Electro-Analytical Technique in characterizing chemical compounds.

Batch: E1 **Roll No.: 16010321005**

Experiment/ assignment No._____5__

Experiment No.

Title **: Determination of strength of acid or base using pH metry Titration**

Aim: To determine the normality of unknown base using pH meter.

Requirements: (Unknown Conc.) KOH Solution, 0.1 N HClsolution

Distilled water

Apparatus: Burette, pipette, beaker, pH meter etc.

Theory: In an acid-base titration, the equivalence point is reached when equal number of moles of base have been added from the burette. The molarity of the base can then be calculated since the number of moles of base added is the same as the number of moles of acid in the flask, and the volume of the base added is also known.

Often the pH of the solution will change sharply at the equivalence point. An acid-base indicator works by changing color over a given pH range. If an indicator which changes color near the equivalence point is chosen, there is also a sharp change in the color of the indicator at the equivalence point because of sharp change in pH.

Such titration can also be performed by pH meter without using an indicator. PH metric titrations have additional advantage due to their use in the titration where colour change is gradual and may not be detected precisely by colour change.

In pH metric titration, a graph is made with pH along the Y axis and volume of base added along the X axis. From this graph the equivalence point can be determined and the normality of the base can be calculated.

Observation:

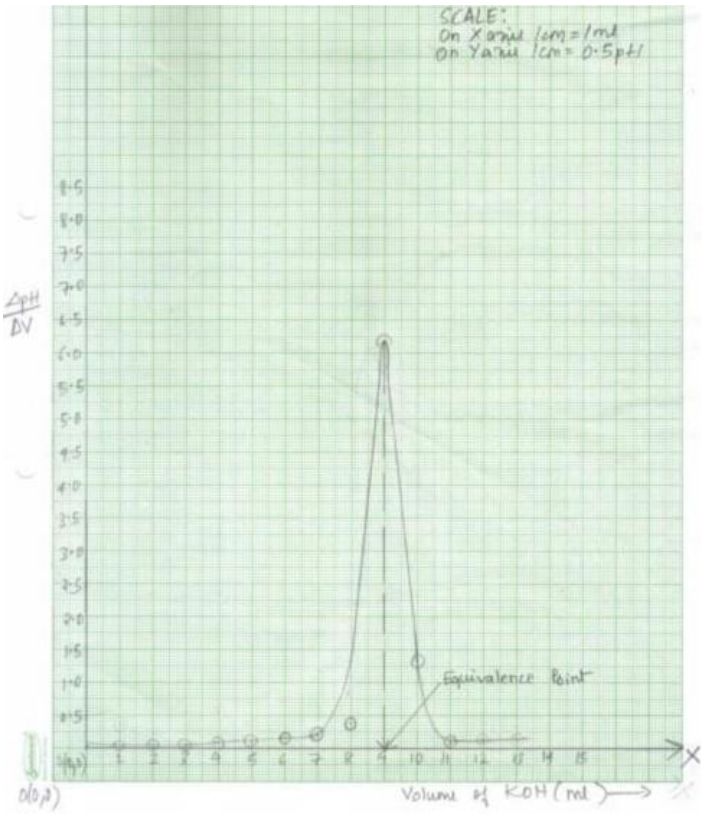
Sr. No.	Volume of KOH (mL)	pH	ΔpH	ΔV	ΔpH/ΔV
1.	0.0	1.83	00.00	1	00.00
2.	1.0	1.90	0.07	1	0.07
3.	2.0	1.96	0.06	1	0.06
4.	3.0	2.02	0.06	1	0.06
5.	4.0	2.13	0.11	1	0.11
6.	5.0	2.22	0.09	1	0.09
7.	6.0	2.38	0.16	1	0.16
8.	7.0	2.60	0.22	1	0.22
9.	8.0	3.00	0.40	1	0.40
10.	9.0	9.20	6.20	1	6.20
11.	10.0	10.56	1.36	1	1.36
12.	11.0	10.69	0.13	1	0.13
13.	12.0	10.85	0.16	1	0.16
14.	13.0	11.00	0.15	1	0.15

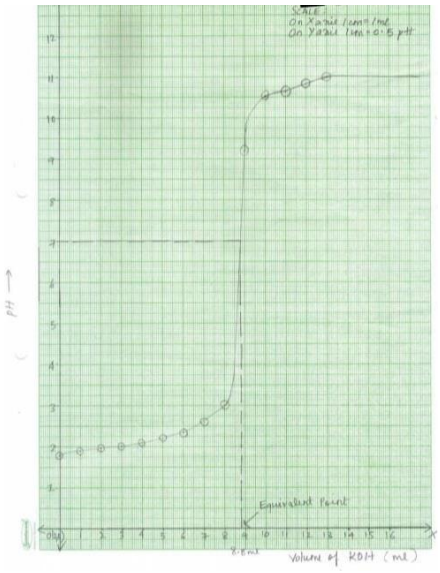
CALCULATIONS

1. Plot a graph of the pH vs mL of KOH added. The pH should be on the Y axis and the mL of KOH should be on the X axis. The graph should be of such a size that 1mL is represented by 1 square on the graph and the pH scale is spread out as much as possible.

2. There should be a region on your graph where the slope is very steep. Determine the Neutralization point. This is the equivalence point. Record the mL of KOH added at the equivalence point as determined from the graph.

3. Use the relationship: $N_1V_1 = N_2V_2$ to determine the Normality of the base.





Volume from Graph-1= _____9_____

Volume from Graph-2= _____9_____

Volume from calculation= _____9_____

Procedure :

Calibrate the pH meter using standard buffer solution. Pipette out 10ml of 0.1N HCl solution in 125ml beaker. Insert probe of pH meter in the beaker add distilled water. Measure and record the pH of the solution before any KOH has been added.

Add 1.0mL of KOH solution carefully from the burette. Record the pH when it has stabilized. Add another 1.0mL of KOH and record the pH. Continue adding KOH in 1.0mL increments until you have obtained a pH reading around 11.

Remove the pH electrode from the solution, rinse it with distilled water.

Result: The Normality of unknown Base solution = 0.11