SRI Y.N. COLLEGE (AUTONOMOUS) NARSAPUR,
W.G.Dt.

DEPARTMENT OF CHEMISTRY

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STUDY PROJECT

ON

CONDUCTOMETRIC TITRATION OF STRONG ACID VS WEAK BASE

BY

SN	Name of the student	Year	Group	Medium	Roll No
1	KOTTU MANIKANTA	III	MPC	EM	18
2	BOKKA TEJA	III	MPC	EM	29
3	REVU RAJKUMAR	III	MPC	EM	15

Guided by: Dr PSNH RAMACHANDRA RAO

CONDUCTOMETRIC TITRATION OF STRONG ACID Vs WEAK BASE (HCl Vs NH_4OH)

Aim: To determine the end point of the titration of strong acid against weak base by Conductivity meter.

Apparatus: 1. Conductivity meter 2. Conductivity cell 3. Micro burette 4. Beakers 5. Volumetric flasks 6. Magnetic stirrers

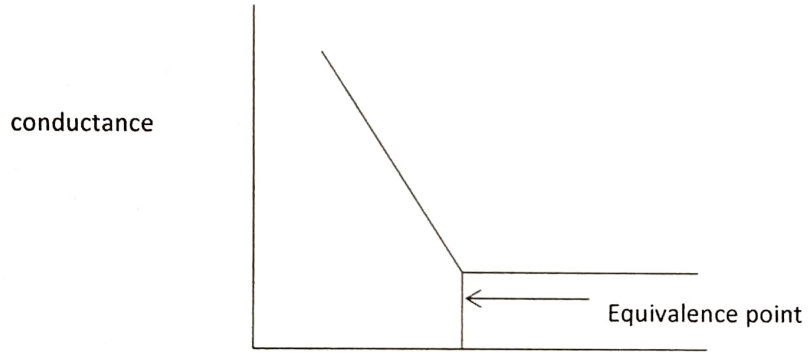
Chemicals: 1.0.1N HCl 2. 0.1N KCl 3. 1N oxalic acid 4. 1N NH_4OH

Theory:

Consider a titration of strong acid like HCl Vs weak base like NH4OH

$$HCl + NH_4OH \longrightarrow NH_4Cl + H_2O$$

Take HCl as titrate in a beaker, its initial conductivity is high, because strong acid completely dissociates in to H^+ions. When NH4OH is added as titrant, the OH^-& H^+ions reacts to produce water and the number of H^+ions decreases and the conductivity gradually decreases after every addition. After the end point, when all the H^+ionshave reacted, the further addition of NH_4OH causes increase in the number of OH^-ions & hence the conductivity starts to increase. Now plot conductivity Vs volume of NH_4OH, which gives two straight lines intersecting at the neutralization point as shown in below graph.



PROCEDURE:

Standardisation of NH_4OH solution:

Pipette out 20 ml of prepared NH4OH solution in a clean conical flask. Add one or two drops of methyl orange indicator and titrate against standard oxalic acid solution. Note down the end point at which the colour changes from pale yellow to pale pink.

S.No	Volume of NaOH (V_2)ml	Burette reading (ml)		Volume of Oxalic acid (V_1) ml
		Initial	Final	
1	10	0	16.2	16.2
2	10	0	15.8	15.8
3	10	0	15.8	15.8

Normality of NH_4OH (N_2) = N_1V_1/V_2

$$= \frac{0.1 \times 10}{15.8} = 0.0632.$$

Determination of Cell Constant: Take a conductivity cell & determine its cell constant using 0.1 N KCl solution.

Conductometric Titration:

1. Fill the burette with standard 1N NaOH solution.
2. Take 20 ml of the HCl solution in a 100 ml beaker and dip the conductivity cell in it and measure the conductance initially.
3. Now add NaOH from burette drop wise, i.e. 0.1 ml for each of the addition. After each of the addition, stir the solution gently by shaking and note down the change in conductance.
4. The measured conductance are regarded & tabulated in the table.
5. Plot the graph between conductivity against volume of base added, the intersection of two straight lines gives the end point as shown in the graph.
6. Calculate the strength of the given strong acid from the known strength of the given base solution.

S.No	Volume of NH_4OH (ml)	Conductance (mS)
1	0	5·89
2	1	5·62
3	2	5·62
4	3	4·19
5	4	4·65
6	5	4·22
7	6	3·68
8	7	3·15
9	8	3·91
10	9	3·60
11	10	3·21
12	11	3·21
13	12	3·11
14	13	3·09
15	14	3·05
16	15	3·03
17	16	3·01

Observations & Calculations:

The titre value corresponding to the point of intersection in the end point graph is_____ ml.

$$\text{Strength of HCl} = \frac{\text{End point titre value} \times \text{Normality of } NH_4OH}{\text{Volume of HCl taken in beaker}}$$

$$= \frac{10 \times 0.06}{10} = 0.06 \text{ N.}$$

Result:

The strength of HCl calculated is 0.06 N

CONDUCTOMETRIC TITRATION OF STRONG AND Vs WEAK BASE

HCl Vs NH_4OH