DOMS | Page No. | Date

Experiment No. 7. Name :

DETERMINATION OF THE STRENGTH OF A MIXTURE OF ACETIC ACID AND HYDROCHLORIC ACID BY CONDUCTOMETRY

Aim:

To estimate the strength of the mixture of acetic acid & hydrochloric acid present in a mixture by conductometry.

Principle:-

The conductivity of the solution is related to the mobility of ions in which in turn is related with the size of the ions. When a mixture of acids like a strong acid (HCl) & a weak acid (CH_3COOH) is titrated against a strong base ($NaOH$), HCl first reacts followed by CH_3COOH. When the titration of strong acid and strong base is carried out, there is a decrease in conductivity as highly mobile hydrogen ions (H^+) are replaced by sodium ions (Na^+).

$$NaOH + HCl \longrightarrow NaCl + H_2O$$

When the whole strong acid is consumed, base reacts with weak acid and conductivity

Teacher's Signature:

Experiment No. _____ Name : _____

DOMS Page No. Date

increases as unionized weak acid becomes the ionized ~~salt~~ salt.

$$CH_3COOH + Na^+ + OH^- \rightarrow CH_3COO^- + H^+ + Na^+ + OH^-$$

After both the acids are consumed, there is a steep increase in conductivity, is due to the fast moving hydroxide ion from the burette solution. From this, amount of the base consumed for an acid and in turn, the amount of acids present is calculated.

PROCEDURE :-

The given mixture of acids is diluted to 100 mL using distilled water in standard flask. 10 mL of this made up solution is pipetted out in clean beaker and 100mL of distilled water is added. The conductivity cell is dipped into the test solution and titrated against NaOH (0.5mL interval) with proper stirring. The conductance is measured after each 0.5 mL addition of NaOH. After complete neutralization, the amount of acids present in the given mixture is determined based on the volume of NaOH consumed. Volume of base consumed for strong acid

Teacher's Signature: _____

Experiment No. _____ Name : _____

and weak acid are determined by plotting a graph between conductance and volume of base added, where first end point corresponds to strong acid and end point corresponds to weak acid.

RESULT →

1. The strength of HCl present in the whole given solution is 0.0625 N.

2. The strength of CH_3COOH present in the whole of given solution 0.2000 N.

OBSERVATION →.

Titration b/w mixture of Acids & NaOH (Bottle -3)

Sr. No.	Volume of NaOH added (mL)	Conductance (Ω^{-1}).
1	0.0	8
2	0.5	7.2
3	1.0	6.4
4	1.5	4.9
5	2.0	3.7
6	2.5	3.9
7	3.0	3.6
8	3.5	3.7
9	4.0	3.8
10	4.5	4.0
11	5.0	4.2
12	5.5	4.4
13	6.0	4.5
14	6.5	4.7
15	7.0	4.9
16	7.5	5
17	8.0	5.1
18	8.5	5.2
19	9.0	5.3
20	9.5	5.4
21	10.0	5.6
22	10.5	5.8
23	11	6.0
24.	11.5	6.4

P.T.O.

Contd.

25	12.0	6.7
26	12.5	7.1
27	13.0	7.5
28	13.5	7.9
29	14.0	8.3
30	14.5	8.6
31	15	9

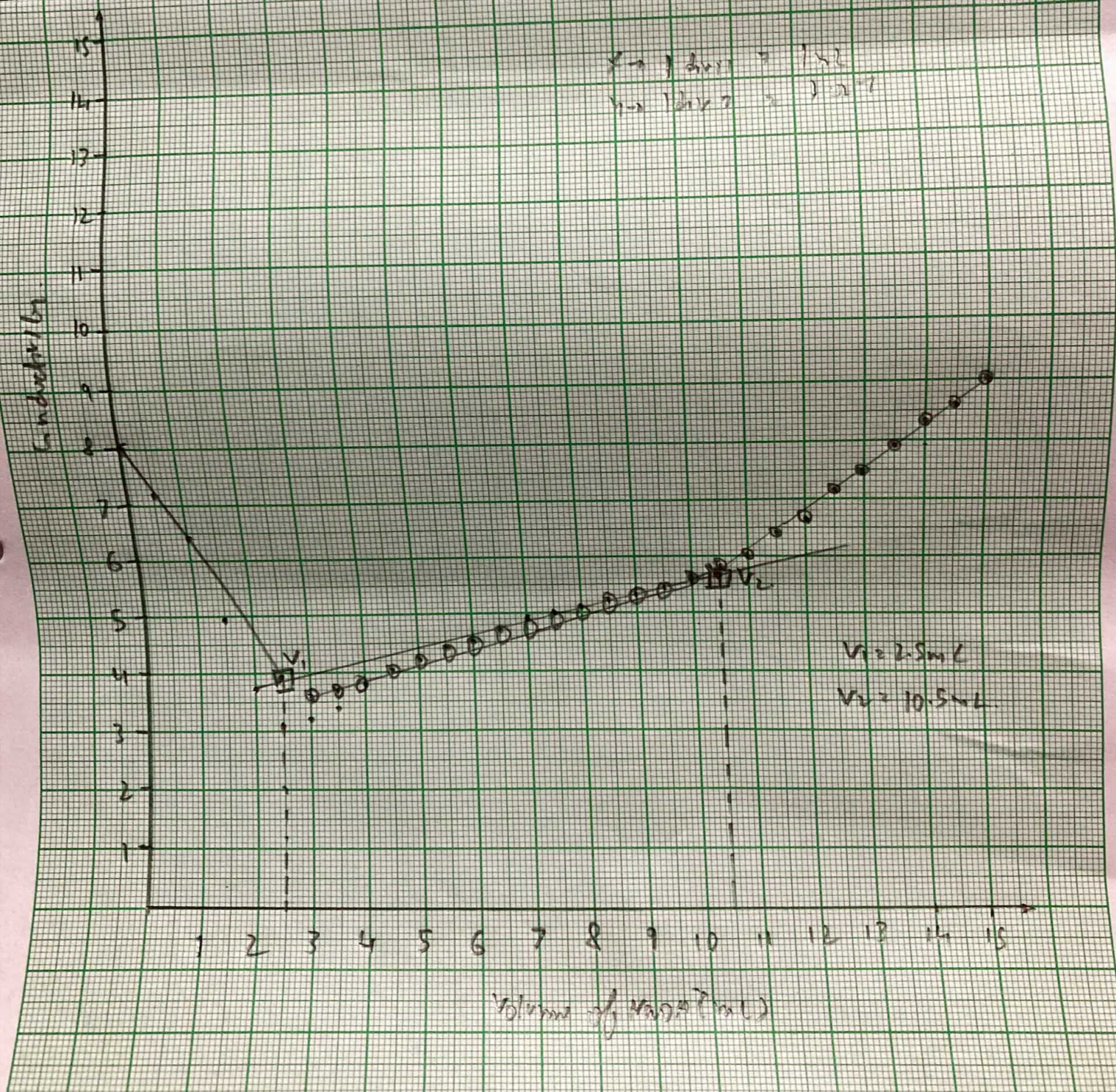
CALCULATION →

Strength of HCl →
Volume of mixture = 20 mL
Normality of HCl = 0.0625 (N_1)
Volume of NaOH = 2.5 mL (V_1).
Normality of NaOH = 0.5N.
Strength of HCl = $V_1 \times 0.5 / 20$ = $2.5 \times 0.5 / 20$ = 0.0625N.

Strength of CH_3COOH →

Volume of mixture = 20 mL
Volume of NaOH = 8 mL (V_2)
Normality of NaOH = 0.5
Strength of CH_3COOH = $\frac{0.5 \times (V_2 - V_1)}{20}$

= $\frac{8 \times 0.5}{20}$ = 0.2000 N


Temperature (°C)
Volume of NaOH (mL)
V_1
V_2
$V_1 = 2.5 mL$
$V_2 = 10.5 mL$