CH1102 LAB REPORT - 5

Determination of pH of all unknown buffer by color matching method.

AIM and OBJECTIVES :-

This experiment aims to measure pH of an unknown solution using bromocresol green indicator and a buffer sol^{n} of acetic acid and NaOH. Color matching of the unknown solution with known sample allows us to find approximate pH values.

APPARATUS REQUIRED :-

Burette was used for titration along with pipette and a few conical flasks and test tubes to store and transfer the sol^{n}s.

CHEMICALS REQUIRED :-

1) 100mL (1.5N) oxalic acid for standardised NaOH.
2) 100mL of (1.7N) Glacial acetic acid and 100mL of NaOH were used to prepare the buffer sol^{n}
3) Previously standardised 150mL NaOH sol^{n}
4) Bromocresol Green as indicator.
5) Distilled water for dilute sol^{n}.

EXPERIMENTAL PROCEDURE :—

1) 5g of Sodium hydroxide pellets were weighed and then dissolved in 250 ml of distilled water to prepare 0.5 N NaOH.

2) 5ml of glacial acetic acid (1.7N) mixed with 165 ml of distilled water to prepare 0.5N of acetic acid.

3) NaOH in the burette was standardised against 25 ml of 0.5N oxalic acid using phenolphthalein indicator.

4) Acetic Acid (25 mL) in conical flask was standardised against NaOH.

5) NaOH and acetic acid were diluted to 0.4N by adding requisite amount of water.

6) 0.4N acetic acid, 0.4N NaOH and distilled water were taken in three different burettes. Various amount of acetic acid NaOH and distilled water were added to test-tubes according to the table.

Test Table 1

Test Tube No:	2	3	4	5	6	7	8	9	10
Vol. of 0.4N Acetic Acid :	5	5	5	5	5	5	5	5	5
Vol. of 0.4N NaOH (mL) :	0.5	1	1.5	2	2.5	3	3.5	4	4.5
Vol. of H_2O (mL) :	4.5	4	3.5	3	2.5	2	1.5	1	0.5
pH :	3.72	4.05	4.27	4.45	4.63	4.80	4.99	5.23	5.57.

Unknown sol^n in test tube 1.

7) 13 drops of bromocresol green added to each test tube and shaken gently to get a homogeneously coloured sol^{n}. Various colors ranging from yellow to blue were observed.

8) The colour of unknown solution was matched to one of the test tubes to find out pH.

Indicator	Color	pH range (color change in interval)	Color change in basic range
Phenolphthalein	colourless	8.0 – 9.8	pink
Bromophenol Blue	Yellow	3.0 – 4.6	Violet
Bromomethyl Blue	Yellow	6.0 – 7.6	Blue
Methyl Red	Red	4.2 – 6.3	Yellow

Results :-

Preparation of extract (0.5M) of oxalic acid.

Weight reqd. = 4.5g

" taken = 4.5g.

Concentration = 0.5N

Preparation of 250 mL 0.5 mL NaOH solution.

Weight reqd. = 5g.

" taken = 5g.

Concentration = 0.5N

Standardization of NaOH with exact concentration of oxalic acid.

No.	Vol. of Oxalic Acid	Vol. of NaOH (mL)
1	25 mL	25.8 mL
2	25 mL	25.9 mL
3	25 mL	25.7 mL

Concentration of NaOH

$25 \times 0.5 = 25.8 \times N \rightarrow N = \frac{25 \times 0.5}{25.8} = 0.48\ N.$

Standardization of NaOH :-

No.	Volume of AcOH (mL)	Volume of NaOH (mL)
1	25 mL	25.1 mL
2	25 mL	25.2 mL
3	25 mL	25.1 mL

Concentration of AcOH :-

$$25 \times N = 25.13 \times 0.48$$

$$N = \frac{25.13 \times 0.48}{25}$$

$$= 0.486\ N$$

Preparation of exact 0.4N NaOH :-

82.6 mL of 0.484N NaOH then dilute it upto 100 mL.

Preparation of exact 0.4N AcOH :-

82.3 mL of 0.486N AcOH then dilute it to 100 mL.

pH of unknown solution in test tube is :-

Colour of test tube 1 and test tube 2 is same, so pH is 4.80.

Observation :-

Preparing test tubes according to table no. 1. We have to add 15 drops of bromocresol green in each test tube 1 to 10. After shaking all the test tubes, different colors appear in each test tube but the unknown sol^{n} containing test tube 1 shows similar colors with test tube 7 pH of that unknown substance is 4.8.

Conclusion :-

pH of that unknown substance is 4.8.