CH1102

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Expt. No. 08 : Determination of Phosphoric Acid in Soft Drinks.

AIMS AND OBJECTIVES :-

The aim of this experiment is to determine the amount of phosphoric acid (H_3PO_4) in commercially available soft drinks (eg. Cola) by titrating it with (NaOH) Sodium Hydroxide sol^n.

APPARATUS REQUIRED :-

→ 50 mL Burette
→ 25 mL Pipette
→ Conical Flask
→ Beaker
→ Magnetic Stirrer
→ pH meter.

CHEMICALS REQUIRED :-

→ Soft Drinks
→ 0.05 M Oxalic Acid
→ 0.05 M NaOH
→ Deionized Water
→ Phenolphthalein

EXPERIMENTAL PROCEDURE :-

- Standardization of NaOH (Secondary Standard) using Oxalic Acid (Primary Standard).
  - Take 25 mL of Oxalic Acid using pipette in a flask.
  - Add phenolphthalein indicator to the oxalic acid.
  - Titrate it with NaOH in burette.

• Estimation of H_3PO_4 in the soft drink

- Take 40mL of soft drink and 60mL of deionized water in the beaker.
- Heat it for 30 min and stir it using a magnetic stirrer.
- Allow it to cool down
- Add 0.5mL of standardized NaOH to the cola sol^n and note the pH.
- Continue to add 0.5mL of NaOH to the cola sol^n until the total NaOH added becomes 15mL and keep using the pH meter to note down the pH after each addition.
- Plot a graph with volume of NaOH at X-Axis and pH at Y-Axis.
- From the graph, record the volume of NaOH at which the pH jumps largest and use it to determine the normality of H_3PO_4 in the soft drink.

RESULTS AND OBSERVATIONS :-

1) Standardization of NaOH 0.05M Oxalic Acid

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

Avg. vol. of NaOH = 25.73 mL

$\Rightarrow S_{oxalic\ acid} \times V_{oxalic\ acid} = S_{NaOH} \times V_{NaOH}$

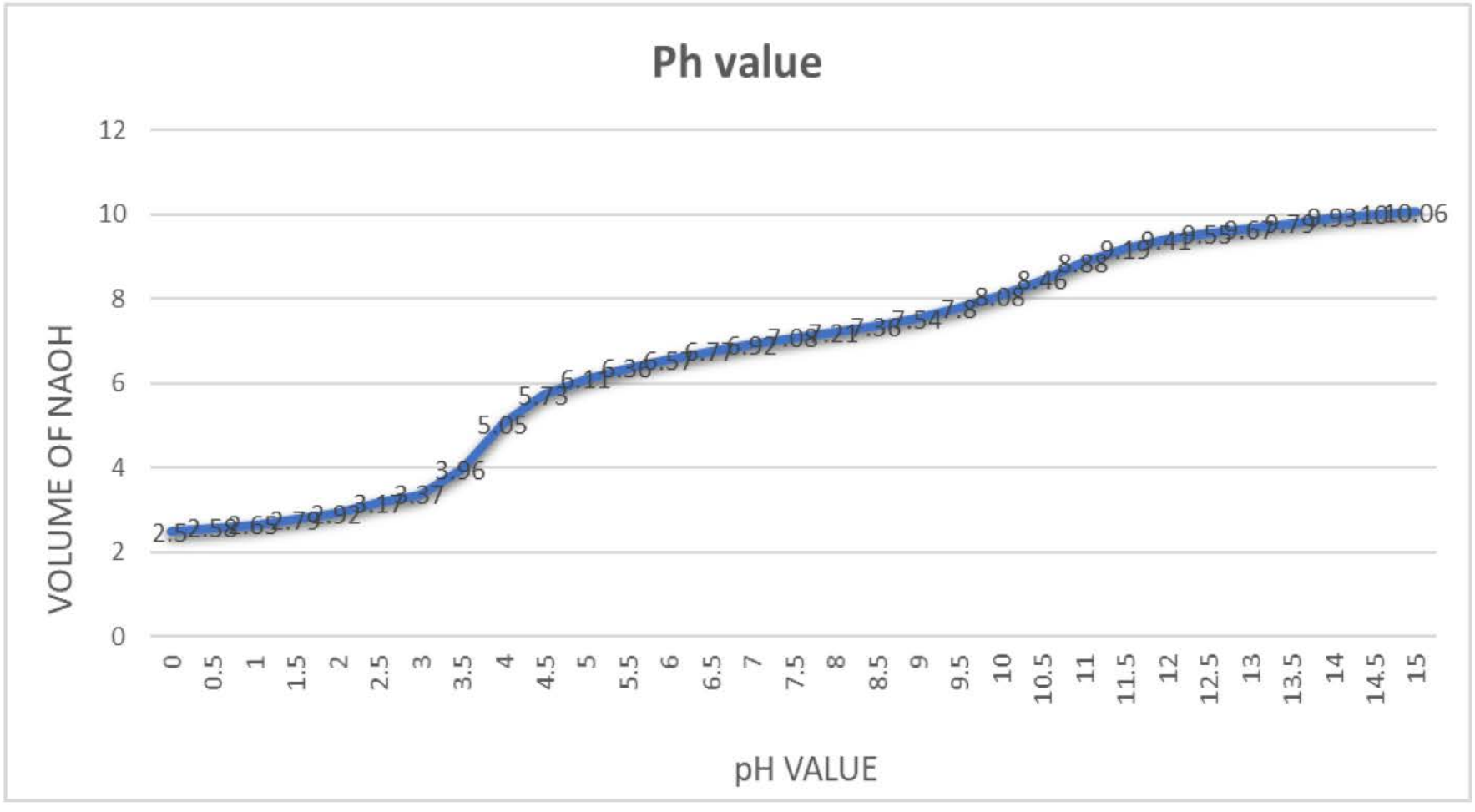
$\Rightarrow 0.05 \times 25 = S_{NaOH} \times 25.73$

$\Rightarrow S_{NaOH} = \underline{0.0486\ N}$.

2) Titration Table :-

Vol. of NaOH (mL)	pH
0.0	2.50
0.5	2.58
1.0	2.65
1.5	2.79
2.0	2.92
2.5	3.17
3.0	3.37
3.5	3.96
4.0	5.05
4.5	5.73
5.0	6.11
5.5	6.36
6.0	6.57
6.5	6.77
7.0	6.92
7.5	7.08
8.0	7.21
8.5	7.36
9.0	7.54
9.5	7.80
10.0	8.08
10.5	8.46
11.0	8.88
11.5	9.19
12.0	9.41
12.5	9.55
13.0	9.67
13.5	9.79
14.0	9.93
14.5	10.00
15.0	10.06.

3) Plot Volume of Standardized NaOH (mL) vs. pH graph.


Ph value
VOLUME OF NAOH
pH VALUE
0
2
4
6
8
10
12
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
6.5
7
7.5
8
8.5
9
9.5
10
10.5
11
11.5
12
12.5
13
13.5
14
14.5
15
3.96
5.05
5.73
10.06

⇒ Volume of NaOH at largest pH change = 3.5 mL

⇒ $S_{NaOH} \times V_{NaOH} = S_{H_3PO_4} \times V_{H_3PO_4}$

⇒ $0.0486 \times 3.5 = S_{H_3PO_4} \times 100$

⇒ $\boxed{S_{H_3PO_4} = 0.001701\ N}$

Conclusion :-

The concentration of H_3PO_4 in 100 mL of cola sol^n is 0.001701 N.