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Experiment-1

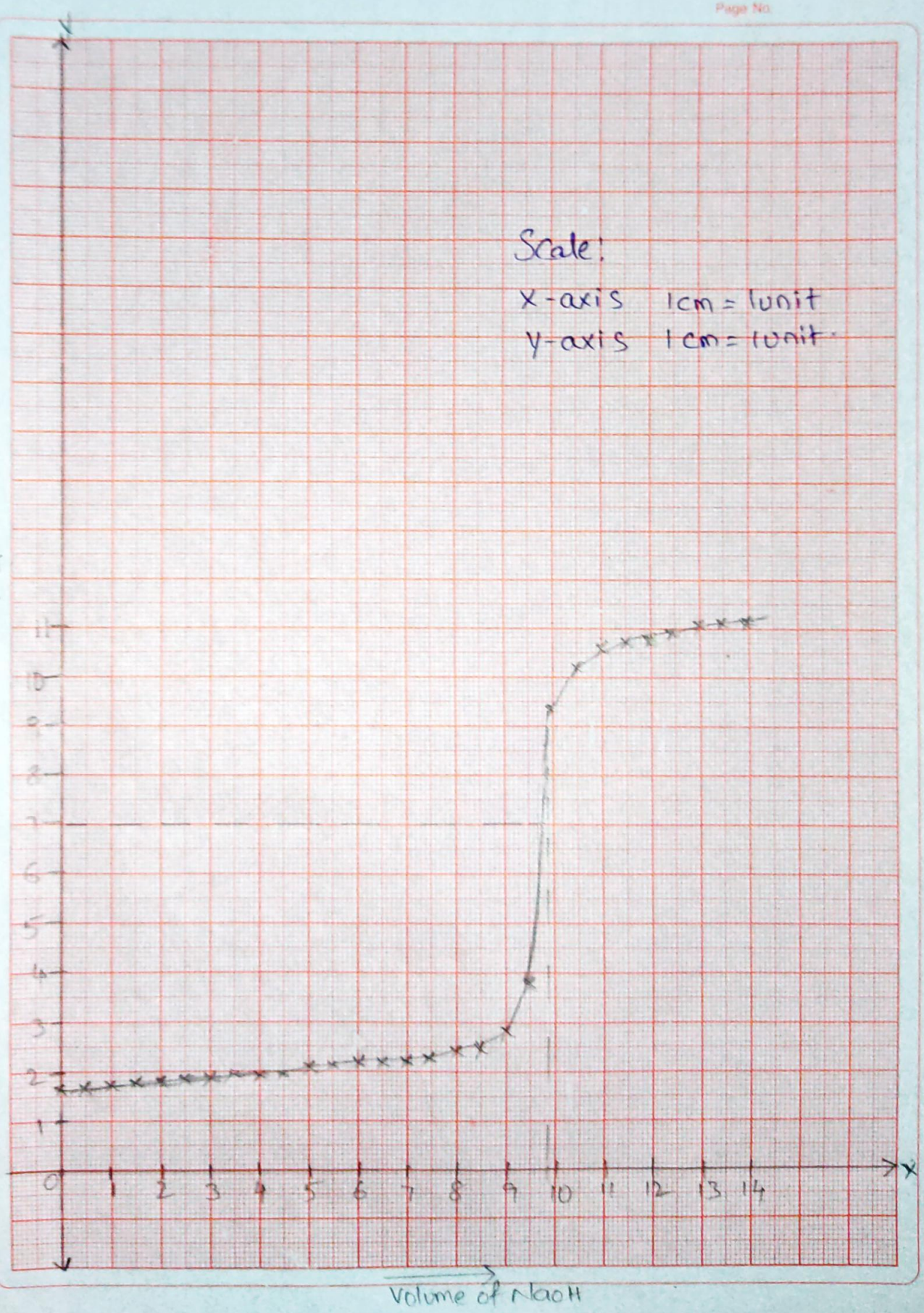
Title: Determination of molarity of HCl acid

Aim: To determine the molarity of the given dil. HCl acid by P-H metry by using 0.1M NaoH Solution.

Procedure: The standaad NaoH Solution is taken in 25ml burette (well cleaned). Then 20ml of dil HCl Solution will be taken in 250ml of beaker and then mixed with 80ml of deionisedwater. Then PH-electrode is placed in beakel to measure the PH of the Solution. Now By adding NaoH droptodrop it means by staating with 1ml. is added and P-H is measured Such that NaoH is added to the Solution with addition of 1ml by Succes Sive additions up to 15ml.

Observation: P-H will increase initially from Range of acid at PH = 2-4 and it Sharply increases at near PH = 7. Not more than 7. If we add NaOH like that only then after PH = 7 the PH will be increased to PH = 9-11 that is alkaline range

S NO	Addition of NaOH (ml)	Volume of NaOH (ml)	p^H measured
1	0	0	1.74
2	0.5	0.5	1.75
3	0.5	1	1.78
4	0.5	1.5	1.8
5	0.5	2	1.82
6	0.5	2.5	1.85
7	0.5	3	1.88
8	0.5	3.5	1.91
9	0.5	4	1.94
10	0.5	4.5	1.99
11	0.5	5	2.04
12	0.5	5.5	2.09
13	0.5	6	2.12
14	0.5	6.5	2.15
15	0.5	7	2.17
16	0.5	7.5	2.31
17	0.5	8	2.42
18	0.5	8.5	2.59
19	0.5	9	2.84
20	0.5	9.5	3.84
21	0.5	10	9.48
22	0.5	10.5	10.38
23	0.5	11	10.65
24	0.5	11.5	10.78
25	0.5	12	10.88
26	0.5	12.5	10.95
27	0.5	13	11.01
28	0.5	13.5	11.06
29	0.5	14	11.09


Scale:
x-axis 1cm = 1unit
y-axis 1cm = 1unit
pH
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
1 2 3 4 5 6 7 8 9 10 11
x
Volume of NaOH

Calculations:

V_1 = Volume of HCl given = 20 ml.

M_1 = Strength of HCl Solution = ... M

V_2 = Volume of NaOH Solution at end point = 9.8 ml

M_2 = Strength of NaOH solution = 0.1 M.

Strength of HCl Solution $M_1 = \frac{V_2 \times M_2}{V_1}$.

$= \frac{9.8 \times 0.1}{20}$

$= 0.049$ M.

Amount of HCl in 1L of given Solution $= 0.049 \times 36.5$

$= 1.786$ g/L.

Results:

Strength of given HCl Solution = 0.049M

Amount of HCl present in 1L = 1.786 g/L

Answers for the questions:

1) A) Solid NaOH consists of Na^+ and OH^- ions packed into crystalline lattice. when solid is added to water the ions float leading apoat to extra OH^- ions in the water

i.e $NaOH \longrightarrow Na^+ + OH^-$

The resulting large concentration of OH^- makes the solution more basicand leads to a dramatic increase in pH.

2) A) when an acidic solution is diluted with water the concentration of H^+ ions decreases and pH of the solution increases towards 7. To make the PH change by 1, a tenfold dilution is required. The acid is becoming less acidic

3) A) Acetic acid is a weak electrolyte. it is not completely ionized and hence gives less H^+ ion concentration, HCl is a strong acid. It is Completely ionized giving more H^+ ion concentration. AS $pH = -\log[H^+]$, less the $[H^+]$ greater will be pH