Aman

SCIENCE

Chemistry

Practical Note Book

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Class 12 Sec. 'C'

Subject _____ Roll No. _____

House _____

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	FUNCTIONAL GROUP			
	PRESENT ON IT			
7.	TO DETECT THE FORE-	2080-10-10	31-34	2080/11/09
	IGN ELEMENT PRESENT			
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	AND BASIC RADICAL			
	PRESENT IN THE			
	GIVEN SAMPLE OF			
	SALT.			

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EXPERIMENT NO:-1

NAME OF EXPERIMENT:- TO PREPARE 250ml DECINORMAL SOLUTION OF OXYLIC ACID.

Apparatus required.

i. Weighing machine
ii Watch glass
iii Volumetric glass
iv. Wash bottle

Chemical required

i. Oxylic acid (crystal)

THEORY

The solution which is prepare by disolving 1g equivalent of solid disolving 1liter solution is called normal solution. The solution which is prepare by disolving $\frac{1}{10}^{th}$ g equivalent of solute in 1liter solution is called deci-normal solution.

The primary standard substance are used to prepare primary standard solution. The condition required for the substance to be primary standard are given below.

1. The substance should be easily available in market in pure and dry state in reasonable price.
2. The substance should not be toxic.

iii. The substance should be easily soluble in water (solvent)
iv. The equivalent weight and molecular weight of substance should be high to ignore weighing error.
v. The substance should not be hygroscopic, deiquescant hydroscopic and efflorescent.

The primary standard solution is used to determine the strength of secondary standard solution.

PROCEDURE

1. Taken a watch glass, ~~and~~ washed it properly and ~~then~~ dry it.
2. Weigh the clean and dry watch ~~watt~~ glass and make the reading of machine zero.
3. Weigh 1.580 g oxalic acid on the watch glass accurately.
4. Transfer gently and carefully the oxalic acid from the watch glass into a clean 250 ml ~~Volumetric~~ ~~glass~~ beaker.
5. ~~Add some water from the wash bottle~~
5. Washed the watch ~~&~~ glass with distill water and transfer the washings to the beaker. Dissolve the oxalic acid crystals in beaker with gentle stirring.
6. Transfered the solution carefully into 250 ml measuring flask through funnel, wash the beaker with distilled water and transfer the washing into measuring flask.

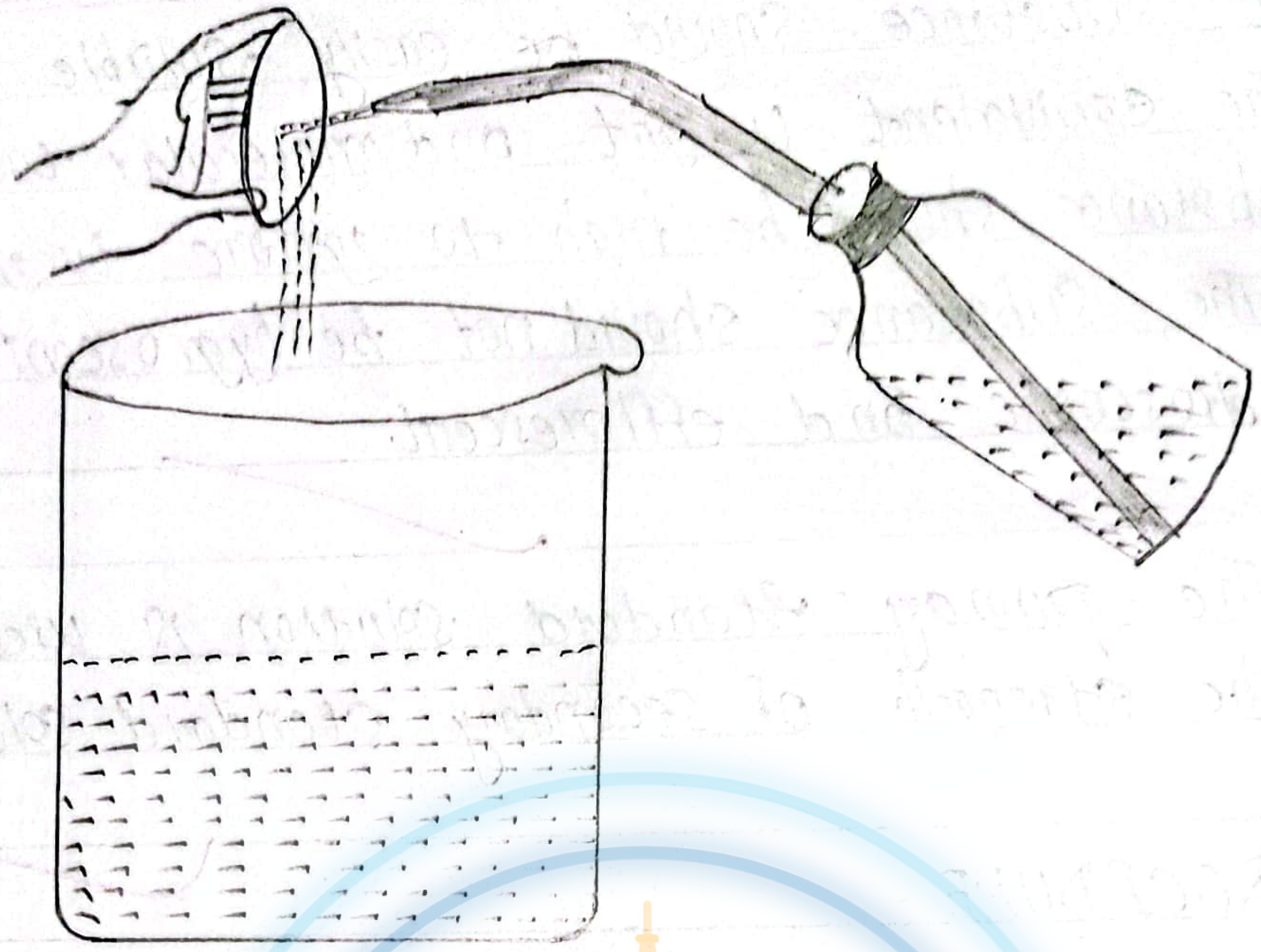

figure:- Washing of watch glass to transfer sticking particle to beaker.

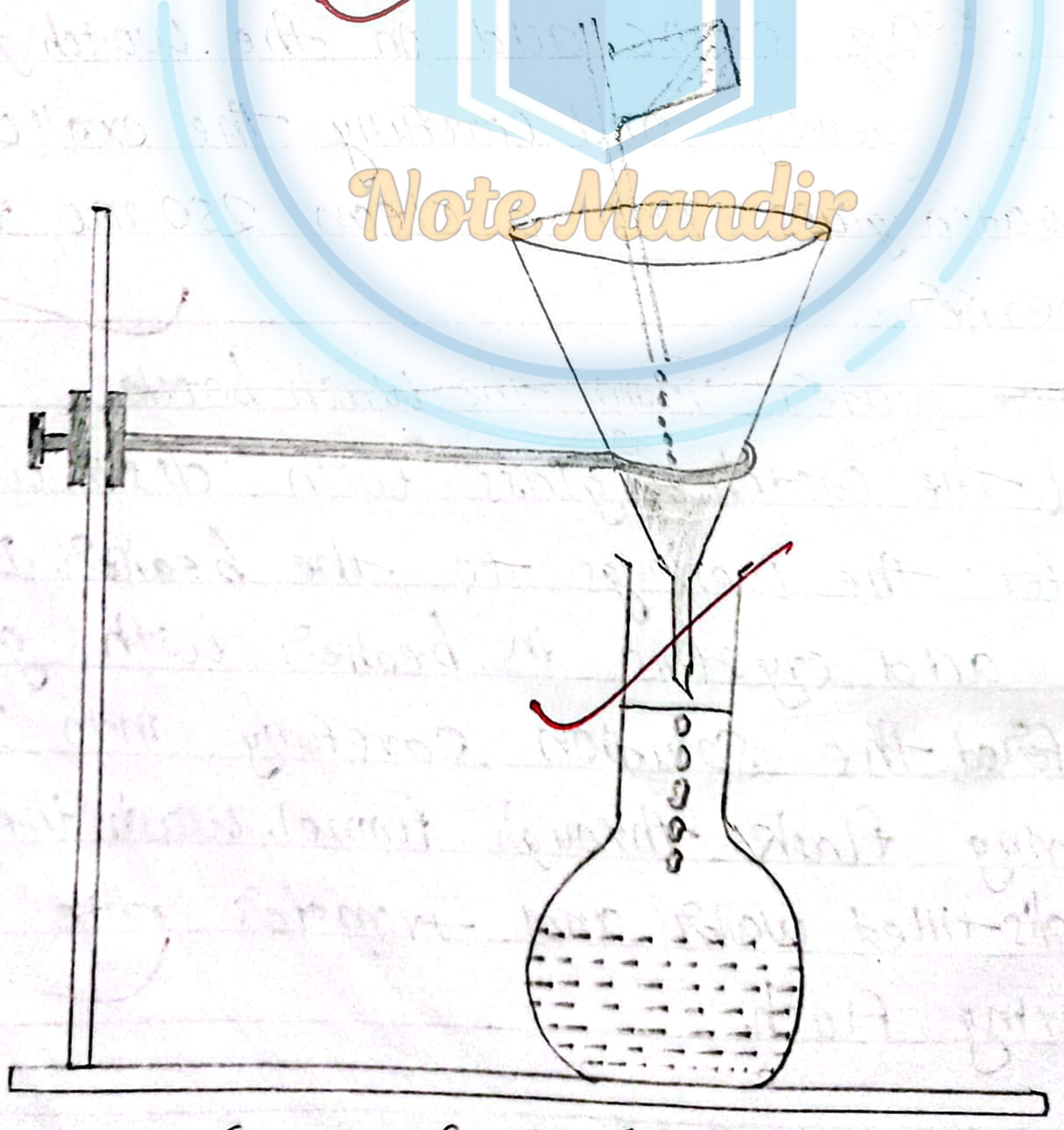

Fig. Transfering solution to measuring flask.

7. Add the distil water to measuring flask till the solution stands just below the graduated mark on the flask.
8. Now add last few drops with the pipette till the bottom of meniscus touches the ~~graft~~ graduated mark
9. Stopper the measuring flask and shake it gently to make the solution homogenous. Label it as M/20 ~~ox~~ oxalic acid solution.

RESULT

Hence, ~~the~~ 250 ml decinormal solution of oxilic acid is prepared

PRECAUTION

1. All the glass wares should be handled with care.
2. Limited amount of crystal oxilic acid should be taken

Ram
2080/9/04

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EXPERIMENT NO.:-2

NAME OF EXPERIMENT:- TO STANDARTIZED GIVEN NaOH SOLUTION BY THE HEIP OF STANDARD N/10 OXILIC ACID SOLUTION.

Apparatus required

1 Beaker
2 Conical flask
3 Funnel
4 Burette
5 Stond
6 Piette

CHEMICAL REQUIRED

1. Standard oxalic acid Solution
2. Dil. NaOH
3 Phenolphthalein

INDICATOR

Phenolphthalein - base strong

THEORY:-

Titration is the process of determination of strength of unknown solution by the help of standard solution in presence of indicator. The colour change of indicator indicates the completion of reaction. that is the end point of titration.

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The Strength of Unknown NaOH can determine by using Normality equation.

Molecular weight of oxalic acid solution $(C_2.H_2O_4.2H_2O) = 126$

$\therefore$ Equivalent weight of oxalic acid $= \frac{126}{2} = 63$

Now,

$$\text{Normality} = \frac{\text{weight in gm}}{\text{Equivalent weight} \times \text{Volume in litre}}$$

or, $\frac{N}{10} = \frac{\text{Weight in g} \times 1000}{63 \times 100}$

$\therefore$ Weight of oxalic acid to be taken $= 6.063$ gm

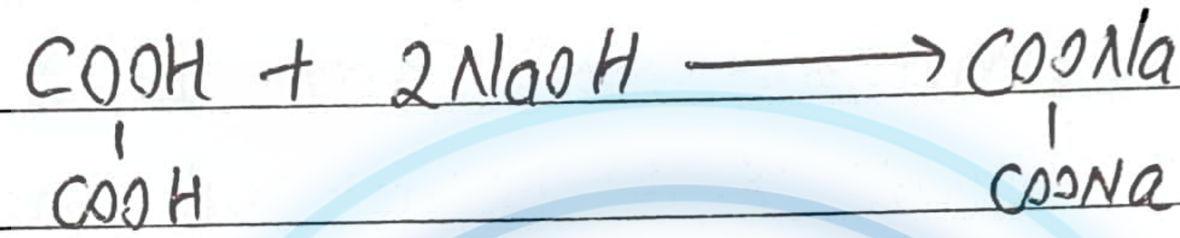
$$\text{Normality factor} = \frac{\text{weight taken}}{\text{weight to be taken}}$$

$= 1.580\text{gm} \div 0.63\text{gm}$

$= 2.50$

The unknown strength of approximately N/10 NaOH can be determined by titration against standard decinormal oxalic acid solution in presence of phenolphthalein indicator.

End point of titration is the point of completion of reaction of titration which is shown by the colour change of third chemical substance. Indicator is the third chemical substance used in titration which helps to predict the end point of titration by its colour change.



The unknown strength is calculated using the normality equation.

$$V_1 S_1 = V_2 S_2$$

where

V_1 = volume of acid (say)

S_1 = Normality of acid

V_2 = volume of alkali

S_2 = Normality of alkali

PROCEDURE

1. The whole apparatus was cleaned with water.
2. The burette was cleaned with distilled water and it was rinsed with standard solution of the acid.
3. The burette was clamped vertically to the stand so that the jet of the burette remains slightly above the mouth of the conical flask. The burette was-

-filled with acid upto the zero mark.

4 The pipette was cleaned with distilled water and it was rinsed with the given NaOH solution

5. 10ml of standard alkali was added into a clean conical flask with pipette. 2-3 drops of phenolphtholein was added and shaked gently.

6 The first reading was taken by running out of 1ml of acid at a time from the burette into the alkali taken in the conical flask. The flask was shaked during each addition giving the rotatory motion to the solution * into the flask.

7 When the pink colour disappeared, end point was attained. The volume of the acid was noted in the burette.

8 The conical flask was washed. The ~~prodet~~ procedure was repeated and some more reading was taken till we get at least two concurrent reading.

OBSERVATION TABLE

No of Obs	Vol. of alkali	Burette readings ml			Concurrent Vol. of alkali
		Initial	Final	Difference	
1	10 ml	0	10.5	10.5	
2	10 ml	10.5	20	9.5	10.5
3	10 ml	20	30.5	10.5	

CALCULATIONS

Volume of acid (V_1) = 10.5 mL

Strength of acid (S_1) = 0.1 N

Volume of alkali (V_2) = 10mL

Strength of alkali (S_2) = ?

We have

$$V_1S_1 = V_2S_2$$

$$10.5 \times 0.1 = 10 \times S_2$$

$$S_2 = 0.11$$

Again, Normality = Molarity $\times$ n

or $0.11 = \text{Molarity} \times 1$

Molarity = 0.11 M

Again, g/L = N $\times$ Equivalent Weight of NaOH

$= 0.11 \times 40$

$= 4.4$ g/L

Again,

$$\text{Purity \%} = \frac{\text{g/L}}{10} = \frac{4.4}{10} = 0.44\%$$

RESULT

Hence the strength of the given NaOH solution was found to be 0.11 N.

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PRECAUTIONS

1 All the glass wares should be handled with care.
2 Conical flask should never be rinsed with chemicals
3 Lower meniscus of solution should be observed while taking the readings
4 Excess of indicator should not be used.

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EXPERIMENT NO:- 3

NAME OF EXPERIMENT:- PREPARATION OF 250 ml N/10 ~~Soo~~ SOLUTION OF ~~CARBONATE~~ SODIUM CARBONATE

APPARATUS REQUIRED

1. Weighing balance
2. Volumetric flask (250 ml)
3. Stirring rod
4. Funnel
5.

CHEMICAL REQUIRED

1. Soelium Carbonate (Na_2CO_3)
2. Distilled water

THEORY

Soelium carbonate is a white, crystalline compound that readily dissolves in water. The normality of a solution is defined as the number of equivalents of solute per liter of solution. In this experiment, a N/10 Sodium Carbonate solution was to be prepared, meaning it would contain 1/10 th of a mole of sodium carbonate per liter of solution.

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PROCEDURE

1 Accurately weighed approximately 1.325 g of sodium carbonate using the weighing balance.

2 Transferred the weighed sodium carbonate into 100 ml beaker.

3. Added distilled water to the beaker and stirred the solution until the sodium carbonate was completely dissolved.

4. Used a funnel to transfer the dissolved sodium carbonate solution from the beaker into a clean and dry 250 ml volumetric flask.

5. Added distilled water carefully to the volumetric flask until the bottom of the meniscus touched the mark on the neck of the flask.

6 Stoppered the flask and shook it gently to ensure through mixing

RESULTS

The sodium carbonate solution with a normality of N/10 was successfully prepared.

PRECAUTIONS

1. Ensure all glassware is clean and dry before use.
2 Accurate weighing is crucial for the preparation of a precise solution.
3. Take care when adding water to the volumetric flask to reach the mark precisely.

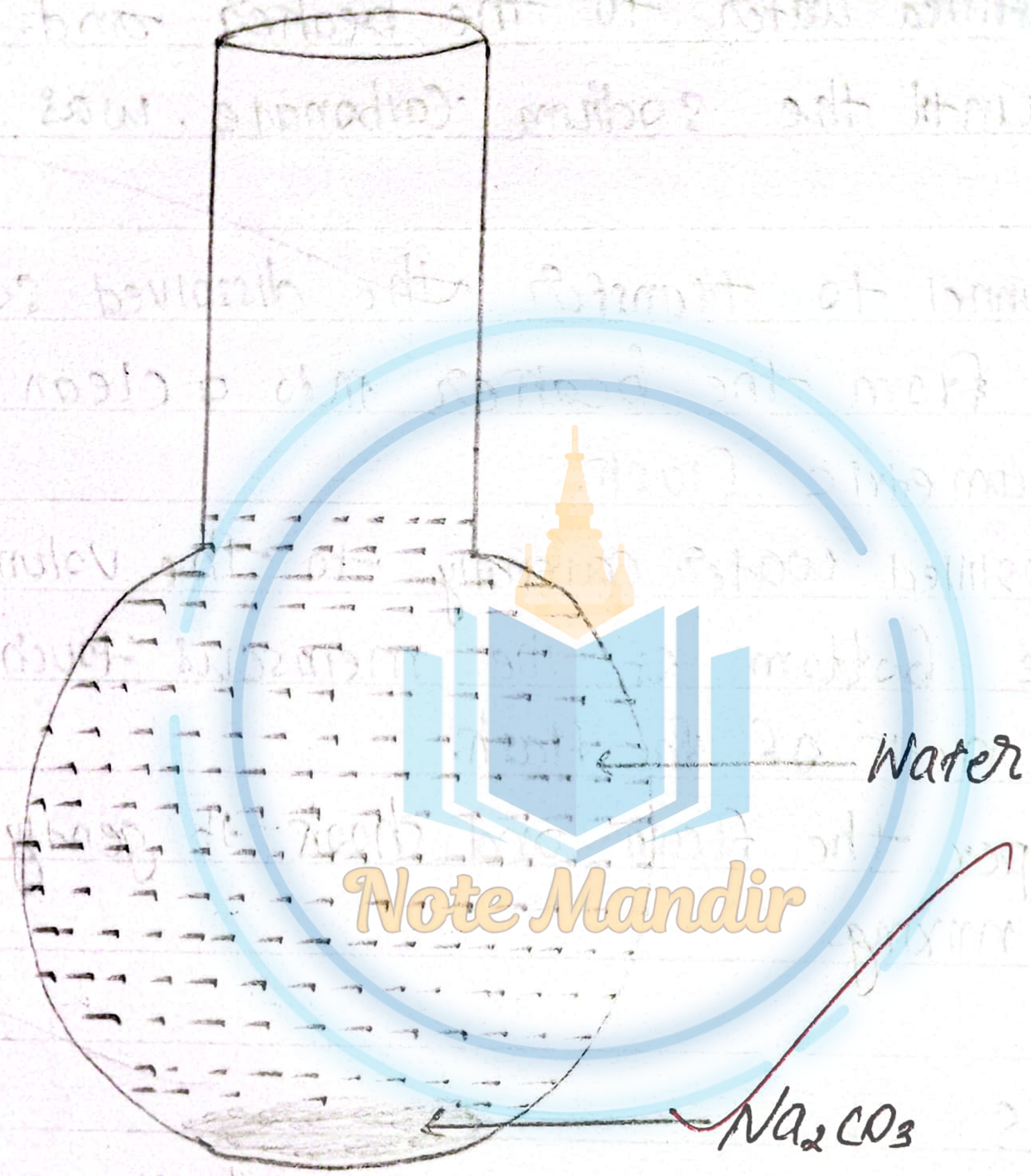

Fig:- Dissolving Na_2CO_3 in volumetric flask

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EXPERIMENT NO:-04

NAME OF EXPERIMENT:- TO STANDARIZE THE GIVEN HCL SOLUTION BY THE HELP OF STANDARD $\frac{N}{10}$ SODIUM CARBONATE SOLUTION

APPARATUS REQUIRED

i Burette
ii Conical flask
iii Pipette
iv. Stand with clamp
v. Funnel
vi Wash bottle

CHEMICAL REQUIRED

i. Methyl Orange Indicator
ii HCl Solution
iii ($\frac{N}{10}$ Na_2CO_3 Solution)

PRINCIPLE

The process of determining the strength / concentration of an unknown solution by titration is called Standarizati-on. It is an acid base titration of a strong acid with a weak base. At the equivalent point, the solution is slightly acidic due to H_2CO_3. So, methyl orange is a suitable indicator. This is because of the working PH range of the methyl orange indicator (3.1-4.4) lies in the PH range for the endpoint of this titration (3.5-7).

~~The strength of~~
Reaction,

$$Na_2CO_3 + 2HCl \longrightarrow 2NaCl + CO_2 + H_2O$$

The strength of uniform Na_2CO_3 can be determine by using normality equation.

Molecular weight of sodium carbonate solution = 106

∴ equivalent weight of sodium carbonate = $\frac{106}{2}$

= 53gm

Calculation of the amount of Na_2CO_3 required preparing 250 ml decinormal.

Soln,

Normality (N) = N/10 = 0.1

Volume (v) = 250 = 2.25 ltr

Equivalent weight (E) = 53 gm

Now,

Amount of Na_2CO_3 required: N x V x E

= 0.1 x 0.25 x 53

= 1.32 gm

Hence, 1.325 gm of pure Na_2CO_3 is required to prepare 250 ml of decinormal solution. While doing Experiment No.3 we ~~used~~ took 1.325 gm of pure Na_2CO_3

CALCULATION OF FACTOR (F) AND CONCENTRATION OF

SOLUTION

Wt. of Na_2CO_3 taken = 1.3gm

Theoretical Wt = 1.325 gm

Now,

$$\text{Normality factor (F)} = \frac{\text{weight taken}}{\text{weight to be taken}}$$

$$= \frac{1.3}{1.325}$$

$$= 0.961$$

SO the solution is not exactly decinormal but 0.961 times N/10

Reaction,

$$Na_2CO_3 + 2HCl \longrightarrow 2NaCl + CO_2 + H_2O$$

PROCEDURE

i. All the apparatus was washed with water and clean the burette with distilled water then rinse it with the hydrochloric acid.

ii. The burette stand was clamped it vertically and filled it with the given acid solution up to zero marks.

iii. The pipette was cleaned with distilled water then rinse it with standard Na_2CO_3 solution.

iv Pipette out 10 ml was given sodium carbonate solution into a conical flask.

v. 1,2 drops of methyl orange was added into the flask and shake it gently

vi. The acid solution was allowed to run into the ~~coto~~ conical flask dropwise with continuous shaking till the colour of the solution changes from yellow to pink red. Again the burette reading to find the volume of acid consumed.

vii The titration process was repeated, until two concurrent readings are obtained.

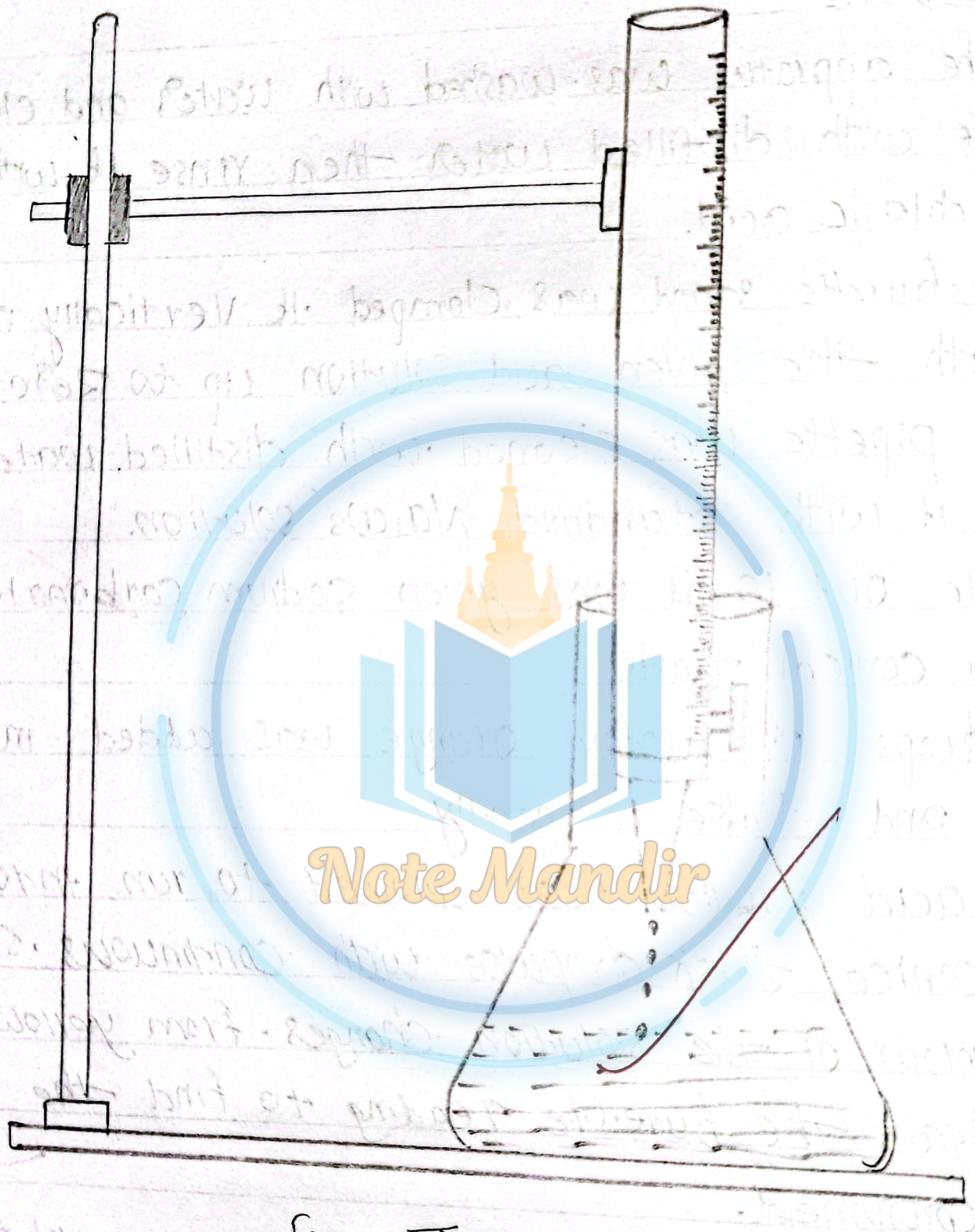

Fig:- Titration method

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OBSERVATION TABLE

No of Obs.	The volume of Na_2CO_3	Burette reading volume of HCL			Concurrent volume of Na_2CO_3
		Initial	Final	Difference	
1	10	0	23	23	
2	10	23	40.5	17.5	17.5
3	10	0	20	20	
4	10	20	37.5	17.5	

CALCUATION

Here

Volume of sodium carbonate (V_1) = 10 ml

Normality of Sodium Carbonate (N_1) = 0.961

Volume of HCl (V_2) = 17.5

Normality of HCL (N_2) = ?

Using normality equation.

$$N_1V_1 = N_2V_2$$

$$\text{or, } N_2 = \frac{N_1V_1}{V_2}$$

$$\text{or } N_2 = \frac{0.961 \times 10}{17.5}$$

$$\therefore N_2 = 0.549$$

RESULT

Hence, the strength of the given HCl solution was determined by using Standard Na_2CO_3 solution and Normality found to be 0.0549

CONCLUSION

In this way, The Concentration of HCl can be determined by using Standard ~~Carbonate~~ Sodium Carbonate Solution

PRECAUTIONS

i. Apparatus should be thoroughly washed with water and rinsed with a concentration solution

ii. The air bubble should be removed from the nozzle of the burette

iii. Conical flask should never be rinsed

iv. Excess indicator should not be used. as methyl orange is a basic indicator.

8/2080/9/17

EXPERIMENT NO:- 5

NAME OF EXPERIMENT :- TO STANDARIZE THE GIVEN APPROXIMATE N/10 $KMnO_4$ SOLUTION WITH THE HELP OF PRIMARY STANDARD OXALIC ACID

APPARATUS REQUIRED

i. Burette
ii Conical flask
iii Clamp with burette Stand
iv Pipette
v Burner
vi Wire guaze

CHEMICAL REQUIRED

i N/10 Oxalic acid Solution
ii Dil. H_2SO_4
iii Potassium permaganate Solution ($KMnO_4$)

PRINCIPLE

Redox titration :- The titration in which the strength of oxidizing agent is determined by the help of standard solution of reducing agent of vice versa is called redox titration.

$KMnO_4$ as an oxidizing agent

a) Acidic medium :- In an acid medium, 1 mol of $KMnO_4$ always gains 5 mole of electron and is reduced to Mn^{++} ions.

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$$2\overset{+7}{K}\overset{+7}{Mn}O_4 + 3H_2SO_4 \longrightarrow K_2SO_4 + 2\overset{+2}{Mn}SO_4 + 3H_2O + 5[O]$$

b) In alkaline medium :- In alkaline medium, 1 mol of $KMnO_4$ gains 1 mole of electron and is reduced to MnO_4^{--}.

$$2\overset{+7}{K}\overset{+7}{Mn}O_4 + 2KOH \longrightarrow 2\overset{+6}{K_2}\overset{+6}{Mn}O_4 + H_2O + [O]$$

c) In a neutral medium :- In a neutral medium, 1 mole of $KMnO_4$ always gain 3 mole of electron and is reduced to MnO_2

$$2\overset{+7}{K}\overset{+7}{Mn}O_4 + H_2O \longrightarrow 2\overset{+4}{Mn}O_2 + 2KOH + 3[O]$$

Oxalic acid as a reducing agent:- Oxalic acid is a reducing agent because it reduces $KMnO_4$ into $MnSO_4$

• Self indicator :- The titrants or titrand which works as an indicator itself for the titration known as a self indicator Eg. $KMnO_4$.

PROCEDURE

i. All the apparatus was washed with water

ii The burette with the given $KMnO_4$ was rinsed it up to zero marks ~~according~~ avoiding parallax (read the upper meniscus in case of coloured solution). Then clamp it on the burette stand.

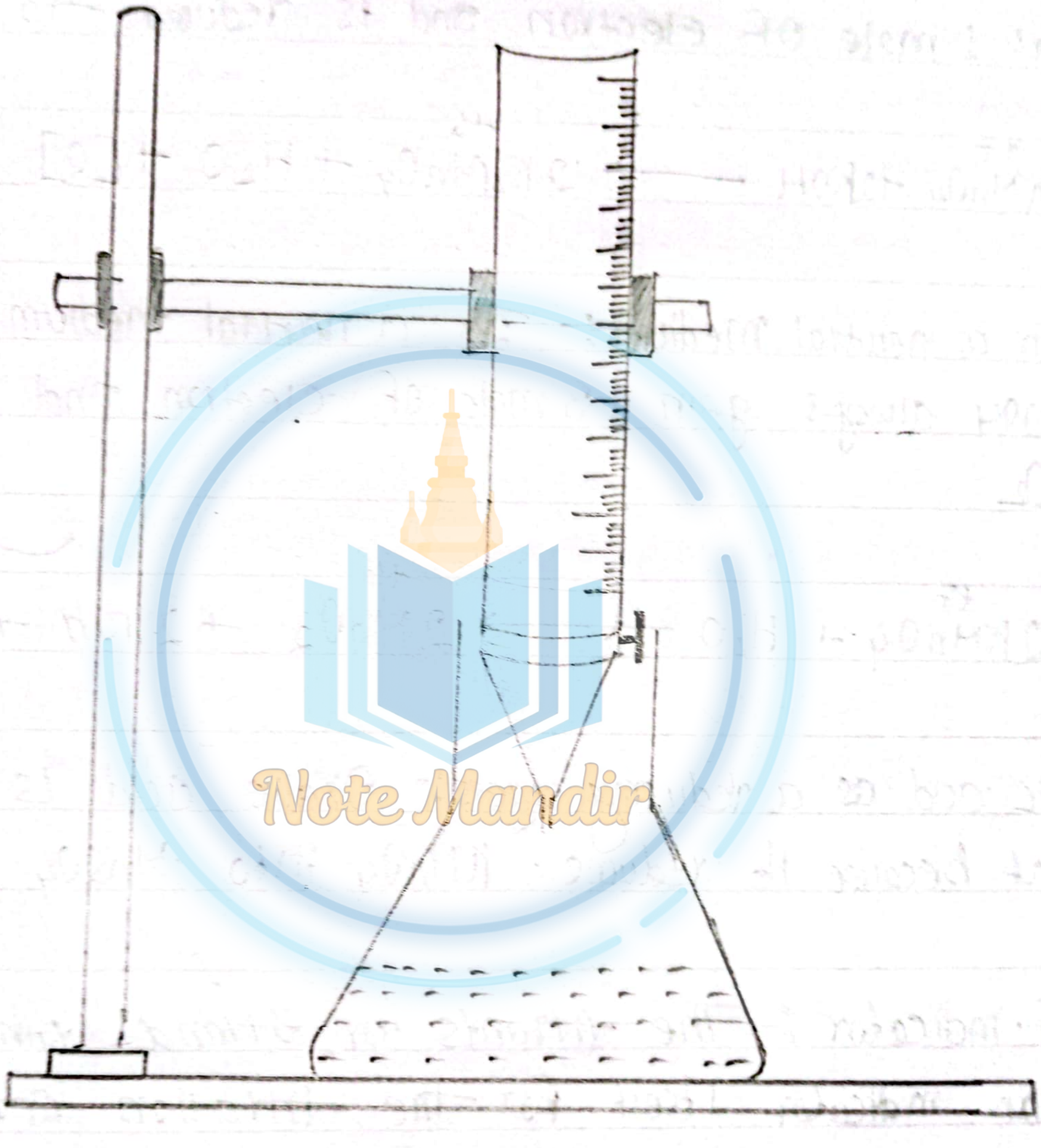

Fig:- Titration

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iii Test tube full of H_2SO_4 and oxalic acid was added into a conical flask and heat about 60°C to 70°C. Then, remove the conical flask and place it on white paper under the burette

iv Now the drop of $KMnO_4$ was added while the colour reappear.

v. Repeat the titration till two concurrent readings.

OBSERVATION TABLE

NO OF Obs	The Volume OF $(COOH)_2$	Burette reading of $KMnO_4$			concurrent
		Initial	Final	Difference	Volume of ~~$(COOH)_2$~~
1	10	0	10	10	
2	10	10	20.5	10.5	10
3	10	20.5	31.5	11	
4	10	31.5	41.5	10	

CALCULATION

Here

Volume OF Oxalic acid (V_1) = 10 mL

Normality of Oxalic acid (N_1) = 0.1

Volume of $KMnO_4$ (V_2) = 10

Normality OF $KMnO_4$ (N_2) = ?

Using normality equation

$$N_1 \times V_1 = N_2 \times V_2$$

$$0.1 \times 10 = N_2 \times 10$$

$$N_2 = \frac{.1}{10} = 0.1N$$

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RESULT

Hence, The strength of given $KMnO_4$ was found to be 0.1 N

CONCLUSION

In this way, it can be measured or concluded that the given $KMnO_4$ solution can be standardized with the help of Oxalic acid.

PRECAUTIONS

i The reading of the burette taken should be from the upper meniscus.

ii Titration should be done in hot condition

iii Conical flask never be rinsed with oxalic acid

iv Apparatus should be washed, rinsed and handled with care

v. The endpoint & colour should be light pink.

3/06/2080/9/25

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EXPERIMENT NO:- 6

NAME OF EXPERIMENT :- TO DETECT THE ~~FUNCTIONAL GROUP~~ FOREIGN ELEMENT PRESENT IN THE ORGANIC COMPOUND (N, S AND X) AND IDENTIFICATION OF FUNCTIONAL GROUP PRESENT IN ORGANIC COMPOUND

APPARATUS REQUIRED

i Test tube
ii Test tube holder
iii Funnel
iv Fusion tube
v. Motar and pestle
vi Beaker

CHEMICAL REQUIRED

i Given organic compound
ii Dil. NaOH
iii Conc. HNO_3
iv. $AgNO_3$
v. Conc. HCl or Conc. H_2SO_4
vi $FeCl_3$

THEORY

Functional group :- A functional group is the reactive part of an organic ~~compound~~ molecule which takes part in chemical reaction and determines the chemical behaviour of the compound.

Foreign element :- The occasionally present organic compound like nitrogen, suipher and halogen that forms basic constituent of organic compounds are called foreign element or hetero element.

1 PRELIMINARY TESTS

Physical properties sometimes may give some idea about the function group present in the compound

i. Physical state :- The given organic compound is liquid.

ii. Colour :- The given organic compound is radish brown in colour.

iii. Odour :- The given organic compound have irritating smell

iv. Solubility.

H_2O	NaOH	$NaHCO_3$	HCl
(−)	(−)	(−)	(−)

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SODIUM EXTRACTION

PROCEDUR.

When an organic compound is fused with Sodium metal, The different elements present in the Compound combine with Sodium as.

$Na + C + N \longrightarrow NaCN$ (if nitrogen present)

$Na + S \longrightarrow Na_2S$ (if sulphur present)

$Na + C + N + S \longrightarrow NaCNS$ (if both nitrogen and sulphur present)

$2Na + 2X \longrightarrow 2NaX$ (if halogens present)
(X = Cl, Br, I)

PROCEDURE TO PREPARE Na-EXTRACT

→ Small pea size piece of Sodium metal was taken. The Kerosene oil was + soaked by passing the Sodium metal between the folds or either paper and was put into the clean and dry ignition tube. The ignition tube was holded with the help of tong and it was heated gently just to melt the sodium piece. It was cooled and then small amount of organic compound was added. After that, the tube was heated, slowly and-

then Strongly until the entire lower end of the tube become dull and red hot. The hot tube was plunged into a motar containing 1 test tube water. The tube was broken into small pieces in the motar with the help of pestle. In the same way two or three ignition tube was plunged and was grinded with pestle. It was warmed and filtered. The filtrate was called Fassaigne's solution or Sodium extract or test solution. ~~The So obt~~ This solution was taken and test were performed.

OBSERVATION TABLE

SN	Experiment	Observation	Inference
i.	2 ml Sodium extract + few drop NaOH + 1ml Freshly prepare $FeSO_4$ then boil it and cool, added few drop of $FeCl_3$ & also added 1-2 drop of Conc. HCl.	Presence of bluish green colouration	Presence of Nitrogen
ii.	• 1 ml Sodium extract + few drop sodium nitroprusside • 1ml Sodium extract + few drop acetic acid + 1ml lead acetate	~~No~~ Violet colour is not Obtained No black ppt is Obtained.	Absence of Sulphur
iii.	2ml Sodium extract + few drop conc. HNO_3 + boil + cool + few drop $AgNO_3$.	No ppt formed.	Absence of Halogen

CONCERNED REACTION

$Na + C + N \longrightarrow NaCN$

$NaOH + FeSO_4 \longrightarrow Fe(OH)_2 + Na_2SO_4$

$Fe(OH)_2 + NaCN \longrightarrow Fe(CN)_2 + NaOH$

$Fe(CN)_2 + 4NaCN \longrightarrow Na_4[Fe(CN)_6]$

$3Na_4[Fe(CN)_6] + 4FeCl_3 \longrightarrow Fe_4[Fe(CN)_6]$

$Fe(OH)_2 + 2HCl \longrightarrow FeS : FeCl_2 + 2H_2O$

ppt ppt. dissolved

RESULT

The foreign element present in the given organic compound is nitrogen.

PRECAUTION

1 Experiment should be done properly.
2 Fusion tube should be heated carefully.

2. ELEMENT DETECTION

Lassainge's test is performed for detection of foreign element mainly for nitrogen

3 UNSATURATION TEST

SN	Experiment	Observation	Inference
i	Original solution + water or acetone + 2 drop of $KMnO_4$ + NaOH solution and shaken	The purple colour of $KMnO_4$ gets disappeared	The compound is unsaturated

4 PRELIMINARY TEST FOR FUNCTIONAL GROUP

SN	Experiment	Observation	Inference
i.	Ignition Test:- A little of the compound is taken on a nickel spatula and heated First gently then strongly.	Burns with sooty flame.	The compound is aromatic.
ii.	Litmus Test:- The aqueous solution or Suspension of the compound is brought in contact of blue and red litmus paper.	NO change in litmus occurs	The compound may be alcohol aldehyde, ketone or ester
iii	$NaHCO_3$ test:- Aq. solution + little of solid $NaHCO_3$.	NO evolution of gas	Absence of Carboxylic acid
iv.	$FeCl_3$ Test:- Aq. solution + Few drop of neutral $FeCl_3$ solution	NO any colour occurs	Absence of phenol

v.	2,4-DNP Test:- 1 ml of 2,4-DNP + ~~Pinch of~~ few drop of original solution and shaken well then allowed to stand for few minutes.	No yellow or orange red crystalline ppt. appears.	Absence of aldehyde and ketone
vi	Dil HCl Test:- Original Solution + Dil. HCl and shaken well.	The compound gets dissolved.	Compound may be amine ($-NH_2$) group
vii	NaOH Test: Original solution + NaOH Solution and warm.	No yellow, orange or red colouration appears	Absence of nitro compound.

Reaction Involved.

Dil. HCl test:

$$C_6H_5NH_2 + HCl \longrightarrow C_6H_5NH_3Cl$$

(water soluble)

Test of amino group ($-NH_2$ group)

→ If elements detection indicates the presence of nitrogen as foreign element. While doing some test ~~thee~~ we ~~find~~ found that there may be the presence of $-NH_2$ group which is confirmed by following tests.

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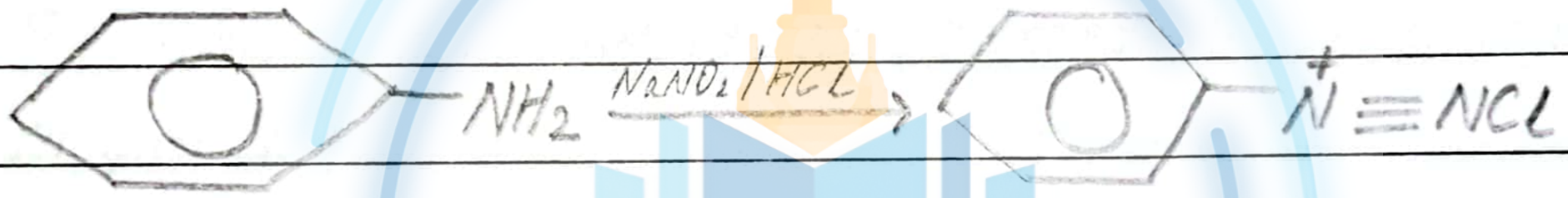
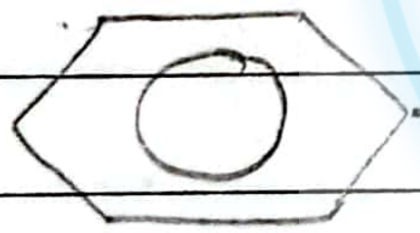
	Experiment	Observation	Inference
1.	~~Carbylamine~~ Azo dye test:- Original solution + ~~few drop of~~ ~~alc. KOH + few drops of~~ dil. HCl & cooled in ice water + $NaNO_2$ solution & shaking + cool β-napthol in NaOH solution	Orange-red azo dye appears.	Presence of aromatic primary amine.

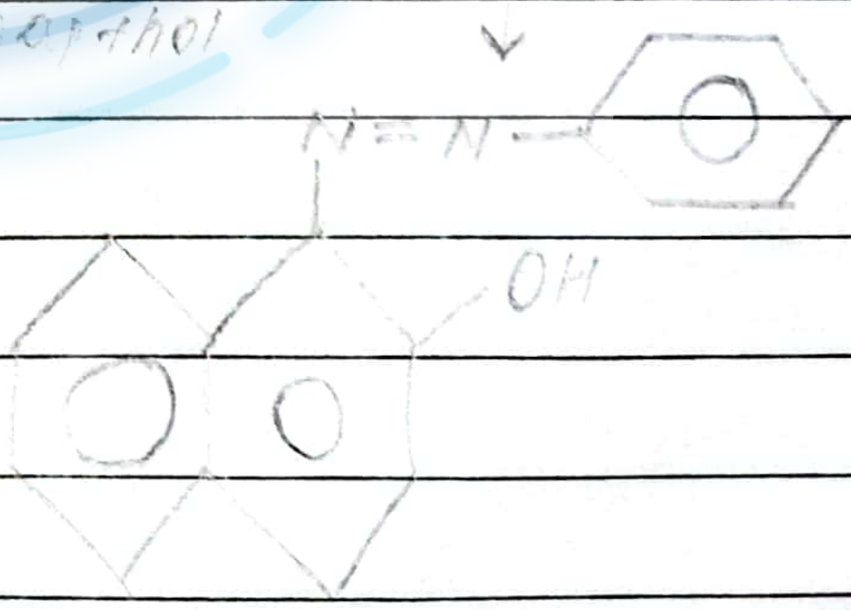
Reaction involved





Benzene diazonium chloride

β-napthol



Red dye

RESULT

Hence, Foreign element and functional group was identified Nitrogen is present as foreign element and ($-NH_2$) group (Amine group) was present as functional group.

PRECAUTION

1. We need to be careful while heating sodium metal.
2. Attention should be given while handling conc. acids.
3. Freshly prepared solutions should only be used.
4. The fusion tube should be covered while plunging in water.
5. The apparatus should be handled carefully.

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EXPERIMENT NO:- 7

NAME OF EXPERIMENT:- TO DETECT THE FOREIGN ELEMENT PRESENT IN THE GIVEN ORGANIC COMPOUND.

APPARATUS REQUIRED

1. Beaker
2. Funnel
3. Test tube
4. Test tube holder
5. Fusion tube
6. Tong
7. Motar and pestle

CHEMICAL REQUIRED

1. Given organic compound
2. Dil. $NaOH$
3. Conc. HNO_3
4. NH_4OH
5. $AgNO_3$
6. Conc. HCl or Conc. H_2SO_4
7. $FeCl_3$

THEORY

Organic compounds are covalent in nature. Foreign element present in organic compounds are also bonded covalently. Therefore, the laboratory reagents cannot be used for detection. Hence first these elements are converted from-

- covalent to ionic compounds. These compounds undergo ionic reaction with laboratory reagents. This conversion can be done easily and effectively by fusing the organic compounds with sodium metal.

When an organic compound is fused with sodium metal the different elements present in the compound combine with sodium as.

$Na + C + N \longrightarrow NaCN$ (if nitrogen present)

$2Na + S \longrightarrow Na_2S$ (if sulphur present)

$2Na + S + C + N \longrightarrow NaCNS$ (if both nitrogen and sulphur present)

$Na + X \longrightarrow NaX$ (if halogen present, X = Cl, Br or I)

PROCEDURE

Small pea size piece of sodium metal was taken. The kerosene oil was soaked by passing the sodium metal between the folds of filter paper and was put into the clean and dry ignition (fusion) tube. The ignition tube was holded with the help of tong and it was heated gently just to melt the sodium-

the sodium piece. It was cooled and then small amount of organic compound was added. After that the tube was heated first slowly and then strongly until the entire lower end of the tube become dull red hot. The hot tube was plunged into a motar containing 1 test tube water. The tube was broken ~~into~~ into small pieces in the motar. with ~~the~~ help of ~~the~~ pestle. ~~In the~~ It was warmed and filtered. The filtrate was called Lassaigners solution or sodium extract or test solution. This solution was taken and ~~the~~ tests as follow were performed.

OBSERVATION TABLE

S/N	Experiment	Observation	Inference
i	Detection of nitrogen:- 2ml sodium extract + few drops of NaOH + $FeSO_4$ ~~+ boiled~~ boiled then cooled and few drops of $FeCl_3$ & conc. HCl was added.	No bluish green colour was seen	Absence of nitrogen.
ii.	Detection of sulphur:-	Black ppt was	Present of
a)	2ml sodium extract + few drops of sodium nitro-prusside	seen.	sulphur

	b	2ml sodium extract + few drops of lead acetate and acetic acid.	Again black ppt was seen.	Presence of sulphur
	iii	Detection of both sulphur and nitrogen:- 2ml sodium extract + few drops of neutral $FeCl_3$	No anything change	Both sulphur and nitrogen are absence together.
	iv.	Detection of halogens:- 2ml sodium extract + conc. HNO_3 and boiled as well as cooled, few drops of $AgNO_3$ was added.	No any ppt was seen.	Absence of halogens.

RESULT

Hence, the ~~pre~~ sulphur is presence as the foreign element in the given organic ~~co~~ compound.

PRECAUTIONS

1. The apparatus should be handled carefully.
2. We need to be more careful while heating sodium metal.
3. Attention should be given while handling conc. acids.
4. The fusion tube should be covered while plunging in water

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EXPERIMENT NO:- 8

NAME OF EXPERIMENT:- TO IDENTIFY ACID AND BASIC RADICAL PRESENT IN THE GIVEN SALT.

APPARATUS REQUIRED

i Test tube
ii Test tube holder

CHEMICAL REQUIRED

i dil. HCl
ii Conc. HCl
iii Conc. H_2SO_4
iv $FeSO_4$

THEORY

Salt :- Salt is a chemical compound consisting of an ionic assembly of positively charged cations and negatively charged anions, which results in a neutral compound with no net electric charge.

Acid radical :- The ionic part in an inorganic salt that comes from the acid during the neutralisation reaction is called acid radical.

Basic radical :- The ionic part of an inorganic salt that comes from the base during the neutralisation reaction is called basic radical.

1 ~~PRELIMINARY TESTS~~

PHYSICAL CHARACTERISTICS

~~i) Physical~~

i) Colour :- White

ii) Odour :- no ~~out~~ odour

iii) State :- Solid

iv) Solubility

H_2O	Hot H_2O	dil. HCl	$NaHCO_3$	NaOH
+	+	+	−	−

DRY TEST FOR ACID RADICAL

SN	Experiment	Observation	Inference
1.	dil. HCl test: Added salt in dry test tube + 1ml dil. HCl	NO gas seen	Absence of NO_2^- SO_3^-, S^{--}, CO_3^{--}
2	A pinch of salt was taken in clean and dry test tube and conc H_2SO_4 was added.	Colour gas not seen	Absence of halogen(Cl^-, Br^- I^-)
3.	A pinch of salt was taken in a test tube and conc. H_2SO_4 was added and copper turnings was added and heated.	NO brown colour ring was seen	Absence of NO_3^-

WET TEST FOR ACID RADICAL

SN.	Experiment	Observation	Inference
1.	$AgNO_3$ test: Salt solution was taken in a test tube and dil. HNO_3 was added, solution was warmed and cooled and $AgNO_3$ was added.	NO ppt seen	absence of Cl^-, Br^-, I^-
2.	2ml Salt solution was taken and $FeSO_4$ & and conc. H_2SO_4 was added.	NO brown colour ring was seen	Absence of NO_3^-
3.	2ml solution was taken and $BaCl_2$ was added in it (if ppt was appeared dil. HCl was added.	White ppt seen ↓ + HCl → Soluble in HCl	presence of SO_4^{--}

RESULT

From the given sample, presence of SO_4^{--} was found

PRECAUTIONS

1 All the glasswares should be handled carefully.
2 The process of drying test tube should be done carefully
3 The chemicals should be used carefully.

DRY TEST FOR BASIC RADICAL

SN	Experiment	Observation	Inference
1.	A pinch of salt was taken in a clean and dry test tube then heated it.	Cracking sound occured.	Salt doesn't contain water of crystallization (May be presence of NaCl, $Pb.(NO_3)_2$ etc

Charcol cavity test

→ In this test, metallic salt and sodium carbonate react together and give metallic character. The carbonate is decomposed to metallic oxide. The metallic oxide is reduced by reducing flame and carbonate. Charcol black to metallic bend or scales.

Charcol black was taken and was made small cavity with the help of borer. 1 part of ~~the~~ salt sample and 2 part of Na_2CO_3 was mixed ~~and~~ and put the mixture in cavity of chorcol. The mixture was heated strongly by deflection the reducing flame of the burner with the help of blow pipe.

Experiment	Observation	Inference
Charcol cavity test was performed.	Red metallic bend was seen	Presence of Cu^{++}.

WET TEST FOR BASIC RADICAL

SN	Experiment	Observation	Inference
i.	1 ml of salt solution was ~~added~~ taken in test tube and few drop of HCl was added.	NO any ppt seen	Absence of group-I metal ions
ii	1ml of salt solution was taken in test tube and few drop of HCl and H_2S was added.	black ppt was seen.	Presence of group II metal ions.
iii	1 ml of salt solution was taken in test tube, few drop of NH_4Cl and excess amount of NH_4OH was added as shake it well	No ppt was seen	Absence of group III A metal.
iv.	Above exp-(iii) solution was taken and added few H_2S	No ppt was seen	Absence of group III B metal ions.
v.	Again exp (iii) solution was taken and added few drop $(NH_4)_2CO_3$	No ppt was seen.	Absence of group IV Metal ions.

CONFIRMATION TEST

SN	Experiment	Observation	Inference
i	Salt solution + $K_4[Fe(CN)_6]$ Solution	Chocolate colour ppt was seen.	Cu^{++} presence
ii	Salt solution + NaOH solution	blue ppt was turns black on heating	

RESULT

Hence, From the given Salt presence of Cu^{++} was ~~found~~ found while doing basic radical test.

PRECAUTION

1 Apparatus must be handled properly
2 Conc acid must be used carefully
3 The process of drying should be done properly
4 Burner should be used carefully.

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EXPERIMENT NO:-9

NAME OF EXPERIMENT:- TO IDENTIFY ACID AND BASIC RADICAL PRESENT IN THE GIVEN SAMPLE OF SALT

APPARATUS REQUIRED

i. Test tube
ii Test tube holder

CHEMICAL PROPERTIES

i dil. HCl
ii Conc. HCl
iii Conc H_2SO_4
iv $FeSO_4$

THEORY

Salt:- Salt is a chemical compound consisting of an ionic assembly of positively charged cations and negatively charged anions, which results in a neutral compound with no net electric charge.

Acid radical:- The ionic part in an inorganic salt that comes from the acid during the neutralisation reaction is called acid radical.

Basic radical:- The ionic part of of an inorganic salt that comes from the base during the neutralisation reaction is called basic radical.

PHYSICAL CHARACTERISTICS

i. Colour :- White

ii Odour :- no odour

iii State :- Solid

iv. Solubility :-

H_2O	Hot H_2O	dil. HCl	$NaHCO_3$	NaOH
+	+	+	+	+

DRY TEST FOR ACID RADICAL

SN	EXPERIMENT	OBSERVATION	INFERENCE
I	dil. HCl test:		
	Added salt in dry test tube + 1ml dil. HCl.	No gas seen	Absence of NO_2^-, SO_3^-, S^{--}, CO_3^{--}
2.	A pinch of salt was taken in clean and dry test tube and conc. H_2SO_4 was added.	Colour gas seen (Turbid light yellow colour)	HBr from Br salt.
3.	A pinch of salt was taken in a test tube and conc. H_2SO_4 was added and copper turning was added and heated.	~~No brown colour ring was seen~~ Brown colour gas was seen	~~Absence of NO_3^-~~ Presence of NO_2

* R Involved reaction is written on next page.

WET TEST FOR ACID RACICAL

SN	Experiment	Observation	Inference
1	$AgNO_3$ test :- Salt solution was taken in a test tube and dil conc. HNO_3 was added, Solution was warmed and cooled and $AgNO_3$ was added.	No. ppt seen	Absence of haide
2.	2ml ~~Salt~~ Salt solution was ~~added~~ taken and $FeSO_4$ and Conc. H_2SO_4 was added	Brown ring was seen	Presence of NO_3^-
3.	2ml Salt solution was taken and $BaCl_2$ was added in it.	No ppt seen	Absence of SO_4^{--}, SO_3^{--} & CO_3^{--}

Reaction involved

$$2NO_3^- + 5H_2SO_4 + 3Cu \longrightarrow 3CuSO_4 + 2HSO_4^- + 4H_2O + 2NO$$

$$FeSO_4 + NO \longrightarrow FeSO_4NO$$

Brown solution

$$2NO + O_2 \longrightarrow 2NO_2$$

Brown gas

* The above reaction is for NO_2. ~~test~~ on dry test.

RESULT:- From the given salt, presence of NO_2 was found.

DRY TEST FOR BASIC RADICAL

Sn	Experiment	Observation	Inference
1.	A pinch of salt was taken in a clean and dry test tube then heated it	Salt melts	—

Filter Ash test

→ When charcol reduction test is not performed, then this test can be done. This test is also based on the fact that on heating cobalt nitrate is converted to cobalt oxide

Salt solution was taken and added few drop of cobalt nitrate solution. The solution was ~~shacke~~ shaked. Piece of filter paper was dipped in the solution and ignited the paper completely.

S	Experiment	Observation	Inference
	Filter Ash test was performed	Colour of ash was blue	Presence of Al^{+++}

Reaction involved

~~$Al^{++} + 3NaOH \longrightarrow$~~

$2C(NO_3)_2 \xrightarrow{\Delta} 2CoO + 4NO_2 + O_2$

$MgCO_3 \xrightarrow{\Delta} MgO + CO_2$

$Al_2O_3 \xrightarrow{\Delta} CoOAl_2O_3$

(Blue cobalt aluminate)

WET TEST FOR BASIC RADICAL

SN	Experiment	Observation	Inference
1.	Few ml of salt solution was taken and added few drop of dil. HCl	No ppt was seen	Absence of Pb^{++}, Ag^{+}, Hg^{+}, etc.
2	Warmed exp-1 and passed H_2S gas for few seconds	No ppt was seen	Absence of Cu^{++}, Pb^{++}, Ag^{+}
3	Few ml of salt solution was taken and added NH_4OH and NH_4Cl.	ppt was seen	Presence of group III A.

CONFIRMATION TEST

Experiment	Observation	Inference
Salt solution was taken and few drop of NaOH was added	White gelatinous ppt was seen	Presence of Al^{+++}.

Reaction

$$Al^{+++} + 3NaOH \longrightarrow Al(OH)_3 \downarrow + 3Na^{+}$$

(white ppt)

$$Al(OH)_3 + NaOH \longrightarrow NaAlO_2 + 2H_2O$$

Rx

$$NaAlO_2 + NH_4Cl + H_2O \longrightarrow Al(OH)_3 \downarrow + NaCl + NH_3$$

white ppt

Date
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RESULT

Hence, The acidic radical in the given sample salt is NO_2 and basic radical is Al^{+++}.

PRECAUTION

1. All the glass wares should be handled carefully
2. The process of drying test should be done properly
3. The conc. acids should used carefully.

Sign:
2080/11/23