A NEW PRESENTATION OF

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CHEMISTRY

Practical Note Book

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CHEMISTRY

Practical Note Book

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Class 12 Sec. Platinum

Name _____ Roll No. _____

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EXPERIMENT NO : 1

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. Mortar and Pestle

CHEMICALS REQUIRED

1. Sodium extract solution
2. Dil. NaOH
3. Conc. HNO_3
4. $AgNO_3$
5. NH_4OH
6. Conc. HCl or Conc H_2SO_4
7. $FeCl_3$

THEORY

Organic compounds are covalent in nature. Foreign elements present in organic compounds are also bonded covalently. Therefore, the laboratory reagents cannot be used for direction. Hence, first these elements are converted from the covalent to ionic compounds. These compounds undergo ionic reactions 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 metal sodium, the different elements present in the compound combine with sodium as:

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

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

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

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

PROCEDURE

Small pea size piece of sodium metal was taken. The kerosene oil was soaked by passing the sodium metal between the folds of either paper and was put it 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 mortar containing 10 cc of distilled water. The tube was broken into small pieces in the mortar 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 Lassaigne's solution or sodium extract or test solution. This solution was taken and tested ~~as follow~~ were performed.

OBSERVATION TABLE

Experiment	Observation	Inference
i) ~~To study~~ 2ml of extract ~~extract few ml~~ + NaOH ~~was~~ added. Then $FeSO_4$ ~~was~~ added and boiled then the solvent ~~was~~ cooled and $FeCl_3$ ~~and~~ conc. H_2SO_4 ~~was~~ added.	Presence of bluish green colouration.	Presence of Nitrogen.
ii) Sulphur:		
a) ~~a~~ 1ml extract + ~~sodium~~ nitroprysside.	Violet colour is not obtained.	Absence of sulphur.
b) 1ml extract + acetic	No black ppt	

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	acid + lead acetate.	is obtained	
iii)	Halogen: 2ml extract + dil. HNO_3 + boil + cool + $AgNO_3$	No ppt formed.	Absence of Halogen.

CONCERNED REACTION

$Na + C + N \longrightarrow NaCN$

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

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

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

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

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

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

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.

EXPERIMENT NO. 2

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. Mortar and Pestle.

CHEMICALS REQUIRED

1. Sodium extract solution
2. Dil. NaOH
3. Conc. HNO_3
4. $AgNO_3$
5. NH_4OH
6. $FeCl_3$
7. Conc. HCl or Conc. H_2SO_4

THEORY

Organic compounds are covalent in nature. Foreign elements present in organic compounds are also bonded covalently. Therefore, the laboratory reagents cannot be used for detection. Hence, first these element are converted from the covalent to ionic compounds. These compounds undergo ionic reactions with laboratory reagents. This conversion can be done easily and

effectively by fusing the organic compound with sodium metal.

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

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

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

~~$2Na + S \longrightarrow Na_2S$~~

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

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

PROCEDURE

Small pea size piece of sodium metal was taken. The kerosene oil was soaked by passing the sodium metal ~~in~~ between the folds of filter 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 first slowly and then strongly until the entire lower end of the tube become dull red hot. The hot tube was plunged into a mortar

containing 10 cc of distilled water. The tube was broken into small pieces in the mortar with the help of the 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 Lassaigne's solution or sodium extract or test solution. This solution was taken and the tests as follows were performed.

OBSERVATION TABLE

Experiment	Observation	Interference
1. Few ml of NaOH was added in 2ml of extract. Then $FeSO_4$ was added and boiled. Then the solution was cooled and $FeCl_3$ and conc. H_2SO_4 was added.	1. Green colour was obtained.	1. Presence of nitrogen
2. Sodium nitroprusside was added in 1 ml of extract.	2. Violet colour was obtained.	2. Presence of sulphur.
3. $FeCl_3$ was added in 2ml of extract.	3. Blood red colour was obtained.	3. Presence of nitrogen and sulphur.

Experiment	Observation	Interference
4. HNO_3 was added in 2ml extract and boiled. Then it was cooled and $AgNO_3$ was added.	4. No ppt was obtained.	4. Absence of Halogens.

REACTIONS INVOLVED

1) Detection of nitrogen

a) While fusing the organic compound with Na metal, no cyanide is produced.

$$Na + C + N \longrightarrow NaCN$$

b) The unreacted or excess of Na react with (water and form sodium hydroxide).

Sodium extract is generally alkaline.

$$2Na + H_2O \longrightarrow 2NaOH + H_2$$

Further, if N or S are present in the sample, Na extract becomes alkaline due to hydrolysis.

$$NaCN + H_2O \longrightarrow NaOH + HCN$$

strong base weak acid

$$Na_2S + 2H_2O \longrightarrow 2NaOH + H_2S$$

c) On addition of the SO_4 solution to the alkaline sodium extract, a green ppt was formed which on boiling converts to the sodium ferrocyanide

$$FeSO_4 + 2NaOH \longrightarrow Fe(OH)_3 + Na_2SO_4$$

green ppt

$$Fe(OH)_2 + 6NaCN \longrightarrow Na_4Fe(CN)_6 + 2NaOH$$

sodium ferrocyanide

d) Sodium ferrocyanide reacts with $FeCl_3$ and gives prussian blue or green coloured compound formed ferroxyanide.

$$3Na_4Fe(CN)_6 + 4FeCl_3 \longrightarrow Fe_4[Fe(CN)_6]_3 + 12NaCl$$

the precipitate of ferrous hydroxide.

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

if sulphur is also present along with nitrogen in the organic compound, a blood red coloured compound, ferric thiocyanate is produced.

$$Na + C + N + S \xrightarrow[\text{Fusion}]{\Delta} NaCNS$$

$$3NaCNS + FeCl_3 \longrightarrow Fe(CN_3)_3 + 3NaCl$$

ferric thiocyanate

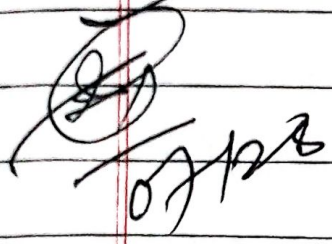
RESULT

Hence, the organic compound was detected and nitrogen ~~was found~~ and sulphur was found as foreign element.

PRECAUTIONS

1. The apparatus should be handled carefully.

2. The fusion tube should be covered while plunging in water.



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EXPERIMENT NO. 3

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. Mortar and Pestle

CHEMICALS REQUIRED

1. Sodium extract solution.
2. Dil. NaOH
3. Conc. HNO_3
4. $AgNO_3$
5. NH_4OH
6. $FeCl_3$
7. Conc. HCl or conc. H_2SO_4

THEORY

Organic compounds are covalent in nature. Foreign elements 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 reactions 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)

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

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

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

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 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 first slowly and then strongly until the entire lower end of the tube became dull red hot. The hot tube was plunged into a mortar containing 10 cc of distilled water. The tube was broken into

small pieces in the mortar with the help of the 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 Lassaigne's solution or sodium extract or test solution. This solution was ~~&~~ taken and the tests as follows were performed:

OBSERVATION TABLE

Experiment	Observation	Inference
1. Detection of nitrogen: 2ml of extract was taken and few drops of NaOH was added and then 1 cc of $FeSO_4$ solution. It was boiled and 2-3 drops of $FeCl_3$ solution was added along with conc. HCl.	1. No ~~bluish~~ bluish green colour was seen.	1. Absence of nitrogen.
2. Detection of sulphur.		
i) A few ~~drops~~ of sodium nitroprusside solution was added to about 1cc of	i) No violet colouration was seen.	i) Absence of sulphur.

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Experiment	Observation	Inference
sodium extract.		
ii) A few drops of each acetic acid and lead acetate soln were added to about 1cc sodium extract.	ii) No black ppt was seen.	ii) Absence of sulphur.
3. Detection of Halogens: Few drops of conc. HNO_3 was added to about 1cc of sodium extract in a test tube and boiled. The solution was cooled ~~and~~ and few drops of $AgNO_3$ was added.	3. Curdy white ppt was seen which was soluble on adding NH_4OH and reappeared on adding HNO_3	3. Presence of Cl.

REACTIONS INVOLVED

$$Na + Cl \rightarrow NaCl$$

$$NaCl + AgNO_3 \rightarrow \underset{\text{white ppt.}}{AgCl\downarrow} + NaNO_3$$

$$AgCl + 2NH_4OH \rightarrow \underset{\text{soluble}}{Ag(NH_3)_2Cl} + 2H_2O$$

$$Ag(NH_3)_2Cl + 2HNO_3 \rightarrow AgCl\downarrow + 2NH_4NO_3$$

RESULT

Hence, the presence of halogen (Cl) was detected.

PRECAUTIONS

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.

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EXPERIMENT NO. 4

NAME OF EXPERIMENT: TO DETERMINE THE STRENGTH OF SUPPLIED H_2SO_4 ~~by~~ BY TITRATING WITH STANDARD N/10 Na_2CO_3 SOLUTION

APPARATUS REQUIRED

1. Volumetric flask
2. Beaker
3. Conical flask
4. Burette
5. Burette stand
6. Funnel
7. Pipette

CHEMICALS REQUIRED

1. Methyl orange
2. Na_2CO_3
3. Sulphuric acid

THEORY

Molecular weight of anhydrous $Na_2CO_3 = 106$

$\therefore$ Equivalent weight of $Na_2CO_3 = \frac{\text{Molecular weight}}{2}$

$= 53$

Now,

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

or, $\frac{N}{10} = \frac{\text{Weight in gm} \times 1000}{52 \times 100}$

$\therefore$ Weight of Na_2CO_3 to be taken $= 0.53$ gm

Titration is the technique of determining the strength of unknown solution by reacting it with the standard solution by means of volume measurement normally in presence 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.

REACTION

$Na_2CO_3 + H_2SO_4 \longrightarrow Na_2SO_4 + H_2O + CO_2$

The unknown strength is calculated using the normality equation. $N_1V_1 = N_2V_2$.

Where, V_1 = Volume of acid N_1 = Normality of acid

V_2 = Volume of alkali N_2 = Normality of alkali

PROCEDURE

1. The whole apparatus was cleaned with water.
2. The burette was cleaned with distilled water and rinsed with the given acid.
3. The burette was clamped vertically to the stand so that the jet of the burette remained 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 standard Na_2CO_3 solution.

5. 10 ml of standard alkali was added into a clean conical flask with pipette. 2-3 drops of methyl orange was added and shaked gently.
6. The first reading was taken by running out 1ml of the 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. Slight permanent pink colour was appeared in the solution that indicated the solution has acquired the end point of the titration. The volume of the acid in the burette was noted.
8. The conical flask was washed with distilled water. Pipette was used to put 10 ml of the alkali into the conical flask.
9. The alkali was titrated against H_2SO_4 solution as before.
10. During the process of titration, a state will come when you cannot say definitely whether the solution in the conical flask is colourless or very faint yellow.
11. If the solution has already attained the end point, the solution turns slightly pink by the

addition of one drop of the acid.

12. The procedue was repeated and some more readings were taken.

OBSERVATION TABLE

No. of Obs.	Vol. of alkali Na_2CO_3	Burette readings ml			Concurrent Vol. of alkali
		Initial	Final	Difference	
1.	10ml	0	6	6	
2.	10ml	6	12	6	6
3.	10ml	12	17.9	5.9	

CALCULATION

Vol. of Na_2CO_3 (V_1) = 10ml

Strength of Na_2CO_3 (N_1) = 0.1N

Vol. of H_2SO_4 (V_2) = 6ml

Strength of H_2SO_4 (N_2) = ?

We have,

$$N_1V_1 = N_2V_2$$

or, $0.1 \times 10 = N_2 \times 6$

$\therefore N_2 = 0.17N$

Now, Normality = Molarity $\times$ n

or, 0.17 = Molarity $\times$ 2

$\therefore$ Molarity = 0.09M

Again,

Gram/litre = Normality × Equivalent weight
= 0.17 × 49
= 8.33

Again,

Purity percentage (%) = $\frac{g/l}{10} = \frac{8.33}{10}$
= 0.83 %.

RESULT

Hence, the strength, ~~normality~~ molarity, g/ltr and % purity are 0.17N, 0.09M, 8.33 and 0.83% respectively.

PRECAUTIONS

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

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EXPERIMENT NO. 5

NAME OF EXPERIMENT: TO PREPARE N/10 STANDARD SOLUTION OF OXALIC ACID AND TO DETERMINE THE STRENGTH OF GIVEN NaOH SOLUTION BY USING STANDARD SOLUTION OF OXALIC ACID.

APPARATUS REQUIRED

1. Volumetric flask
2. Beaker
3. Conical flask
4. Burette
5. Burette stand
6. Funnel
7. Pipette

CHEMICALS REQUIRED

1. Standard oxalic acid solution
2. Phenolphthalein
3. Bench NaOH

THEORY

Molecular weight of oxalic acid solution ($C_2H_2O_4 . 2H_2O$) = 126

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

Now,

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

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

∴ Weight of oxalic acid to be taken = 0.63 gm

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

$= \frac{10 \text{ gm}}{0.63 \text{ gm}}$

$= 0.063$ gm

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

Titration is the technique of determining the strength of unknown solution by reacting it with the standard solution by means of volume measurement normally in presence of third chemical substance.

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.

$$\begin{matrix} COOH \\ | \\ COOH \end{matrix} + 2NaOH \longrightarrow \begin{matrix} COONa \\ | \\ COONa \end{matrix} + 2H_2O$$

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 the 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. 10 ml of standard alkali was added into a clean conical flask with pipette. 2-3 drops of phenolphthalein was added and shaked gently.
6. The first reading was taken by running ~~of~~

out 1 ml 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 procedure was repeated and some more reading was taken till we get at least two concurrent reading.

OBSERVATION TABLE

Indicator used : Phenolphthalein

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) = 10 ml

Strength of alkali (S_2) = ?

We have,

$V_1S_1 = V_2S_2$

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

$\therefore S_2 = 0.11$

Again, Normality = Molarity $\times n$

or, 0.11 = Molarity $\times 1$

$\therefore$ Molarity $= 0.11$ M

Again, g/L = N x Equivalent weight of NaOH

$= 0.11 \times 40$

$= 4.4$ g/L

Again, 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 0.11N.

PRECAUTIONS

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

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EXPERIMENT NO. 6

NAME OF EXPERIMENT: TO DETERMINE THE STRENGTH OF SUPPLIED $KMnO_4$ SOLUTION BY USING STANDARD N/10 OXALIC ACID

APPARATUS REQUIRED

1. Volumetric flask
2. Beaker
3. Conical flask
4. Burette
5. Burette stand
6. Funnel
7. Pipette

CHEMICALS REQUIRED

1. $KMnO_4$
2. H_2SO_4
3. Oxalic acid

THEORY

The unknow solution of potassium permanganate can be standardized by titrating it against standard oxalic acid solution. It's a redox titration. Redox titration can be defined as the titration in which the redox reaction takes place completely at the end point. Here, potassium permanganate, in acidic medium, acts as an oxidizing agent and oxalic acid acts as a reducing agent. $KMnO_4$ solution owing to its pink colour acts as a self indicator. Titration in which potassium permanganate is

used is called permanganometric titration.

$$2KMnO_4 + 3H_2SO_4 + 5H_2C_2O_4 \rightarrow K_2SO_4 + 2MnSO_4 + 8H_2O + 10CO_2$$

Pink → colourless

Equivalent mass of $KMnO_4 = \frac{158}{5} = 31.6$

Now,
To prepare 1000 ml of N - $KMnO_4$ solution,
31.6 gm of solute is needed.
∴ To prepare 100 ml of $\frac{N}{10}$ - $KMnO_4$ solution,
0.316 gm of the solute is needed.

Molecular weight of oxalic acid $(H_2C_2O_4 \cdot 2H_2O)$ = 126

∴ Equivalent wt. of oxalic acid = $\frac{\text{Molecular wt.}}{2}$

$= \frac{126}{2}$

$= 63$

Now,
To prepare 1000 ml of N - oxalic acid solution,
63 gm of crystals are required.
∴ To prepare 100 ml of $\frac{N}{10}$ oxalic acid solution,
0.63 gm of crystals
are required.

The unknown strength is calculated by using normality equation;

$$N_1V_1 = N_2V_2$$

Where.

N_1 = Strength of $KMnO_4$ solution (say)
V_1 = Volume of $KMnO_4$ solution
N_2 = Strength of oxalic acid solution
V_2 = Volume of oxalic acid solution

PROCEDURE

1. The whole apparatus was washed with water.
2. The burette was cleaned with distilled water and it was rinsed with the given $KMnO_4$ solution.
3. The burette was clamped to the stand and it was filled with the $KMnO_4$ solution upto the zero mark.
4. The pipette was cleaned with distilled water and it was rinsed with standard oxalic acid solution.
5. 10 ml of the acid solution was pipette out into a conical flask. A test tubeful of bench H_2SO_4 was added to the flask and it was heated to about 60-70°C.
6. The hot oxalic acid solution was titrated by adding $KMnO_4$ solution from the burette dropwisely, swirling the flask continuously.

7. $KMnO_4$ solution was added continuously untill a light pink colour was seen permanently.
8. The volume of the $KMnO_4$ solution in the burette was read by observing the upper meniscus of the solution.
9. The titration was repeated to get at least two concurrent readings.

OBSERVATION TABLE

Indicator: $KMnO_4$ acts as a self indicator.

No of Obs.	Vol. of acid	Burette reading		Difference	Concurrent vol. of alkali ($KMnO_4$)
		Initial	Final		
1	10ml	0	10.1	10.1	
2	10ml	10.1	21.2	11.1	10.1
3	10ml	21.2	33	11.8	
4	10ml	33	43.1	10.1	

CALCULATION

Vol. of $KMnO_4$ (V_1) = 10.1 ml

Strength of $KMnO_4$ (N_1) = 0.1N

Vol. of oxalic acid (V_2) = 10ml

Strength of oxalic acid (N_2) = ?

Now,

$$N_1V_1 = N_2V_2$$

or, $$10 \times N_2 = 0.1 \times 10.1$$

$$\therefore N_2 = 0.101N$$

Now,

Normality = Molarity × n

Or, 0.101 = M × 5

∴ M = 0.02M

Then,

Gram/litre = Normality × Eq. wt of $KMnO_4$

= 0.101 × 31.6

= 3.1916 g/l

Again,

% purity = $\frac{g/l}{10} = \frac{3.1916}{10}$ = 0.319%

RESULT

Hence, the strength (N_2), Molarity, g/l, % purity are 0.101 N, 0.02M, 3.1916 g/l and 0.319% respectively.

PRECAUTIONS

1. All the glasswares should be handled with care.
2. Conical flask should never be rinsed with chemicals.
3. $KMnO_4$ solution should never be taken in conical flask.
4. $KMnO_4$ solution should not be added rapidly at beginning.

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EXPERIMENT NO. 7

NAME OF EXPERIMENT: TO IDENTIFY ACID RADICAL FROM THE GIVEN SAMPLE OF SALT BY DRY AND WET METHOD (SL).

APPARATUS REQUIRED

1. Test tube
2. Test tube holder
3. Burner

CHEMICALS REQUIRED

1. Salt sample
2. Dil. HCl
3. Conc. H_2SO_4
4. $AgNO_3$
5. $BaCl_2$
6. $FeSO_4$

THEORY

A radical may be defined as a group of atom having positive or negative charge and behave as a single unit in chemical changes. The electronegative radical which comes from an acid is called acid radical. In ether the radical of the acid other than H^+ ion is called acid radical.
Eg:- Cl^-, Br^-, I^-, etc.

The chemical substance which is formed by the partial or complete displacement of hydrogen with metal is called salt. For eg:- NaCl, KCl, etc.

OBSERVATION TABLE

(i) Dry Test

Experiment	Observation	Inference
1. A pinch of salt was taken in clean and dry test tube and HCl was added and warmed.	1. No gas was seen.	1. Absence of NO_2^-, CO_3^{--}, SO_3^{--}
2. A pinch of salt was taken in clean and dry test tube and conc. H_2SO_4 was added.	2. No gas was evolved.	2. Absence of halogen.
3. Copper turning was added to exp. (2) and warmed.	3. No brown fume was evolved.	3. Absence of NO_3^-

(ii) Wet Test

Experiment	Observation	Inference
1. Salt solution was taken in clean test tube and $BaCl_2$ was added. (if ppt appeared excess HCl was added)	1. White ppt was formed which was insoluble in excess dil. HCl	1. Presence of SO_4^{--}.
2. Salt solution was	2. No brown ring	2. Absence of

TEST REACTION

$Na_2SO_4 + BaCl_2 \longrightarrow BaSO_4 \downarrow + 2NaCl$

$BaSO_4 + HCl \longrightarrow$ No reaction

The ppt. doesn't dissolve even in conc. HCl

taken and $FeSO_4$ and conc H_2SO_4 was added.	was seen.	NO_3^-.
3. Salt solution was taken in clean test tube and few drops of dil. HNO_3 was added. Sol^n was warmed and cooled and $AgNO_3$ was added	3. No ppt was formed	3. Absence of halogen.

RESULT

Hence, we identify the presence of SO_4^{--} in the given salt sample (S_1).

PRECAUTIONS

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

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EXPERIMENT NO. 8

NAME OF EXPERIMENT: TO IDENTIFY ACID RADICAL PRESENT IN GIVEN SALT SAMPLE (S_2).

APPARATUS REQUIRED

1. Test tube
2. Test tube holder
3. Burner

CHEMICALS REQUIRED

1. Salt sample
2. Dil. HCl
3. Conc. H_2SO_4
4. HNO_3
5. $BaCl_2$
6. $AgNO_3$
7. $FeSO_4$

THEORY

A radical may be defined as a group of atom having positive or negative charge and behave as a single unit in chemical changes. The electronegative radical which comes from an acid is called acid radical. In ether the radical of the acid other than H^+ ion is called acid radical. Eg: Cl^-, Br^-, etc.

The chemical substances which is formed by the partial or complete displacement of hydrogen with metal is salt. Eg: NaCl, KCl, etc.

OBSERVATION TABLE

(i) Dry Test

~~OB~~ Experiment	Observation	Inference
1. A pinch of salt was taken in clean and dry test tube and HCl was added and warmed.	1. No gas was seen.	1. Absence of CO_3^{--}, SO_3^{--}
2. A pinch of salt was taken in clean and dry test tube and conc. H_2SO_4 was added.	2. Gas was seen.	2. Presence of halogen.
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.	3. No brown ring was seen.	3. Absence of NO_3^-

(ii) Wet Test

~~Observation~~ Observation	~~Inference~~ Inference
Experiment	
1. Salt sol^n was taken and $BaCl_2$ was added in it (if ppt was appeared dil. HCl was added).	1. No ppt was formed.	1. Absence of SO_4^{--}, CO_3^{--}.
2. Salt sol^n was taken	2. White ppt was	2. Presence of

TEST REACTION

$AgNO_3 + NaCl \longrightarrow AgCl\downarrow + NaNO_3$

$AgCl + 2NH_4OH \longrightarrow [Ag(NH_3)_2]Cl + 2H_2O$

$[Ag(NH_3)_2]Cl + 2HNO_3 \longrightarrow AgCl\downarrow + 2NH_4NO_3$

in a test tube and dil. HNO_3 was added. Soln was warmed and cooled and $AgNO_3$ was added.	formed.	Cl^-
3. Salt solution was taken and $FeSO_4$ and conc. H_2SO_4 was added.	3. No brown ring was seen.	3. Absence of NO_3^-.

RESULT

From the given sample (S_2), ~~presence~~ of halogen (Cl) 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.

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EXPERIMENT NO. 9

NAME OF EXPERIMENT: TO IDENTIFY BASIC RADICAL PRESENT IN THE GIVEN SALT SAMPLE.

APPARATUS REQUIRED

1. Test tube
2. Test tube holder

CHEMICALS REQUIRED

1. dil. HCl
2. conc. HCl
3. NH_2OH
4. NH_4Cl

THEORY

The electropositive radical which comes from base is called basic radical. In other words, the radical of the basic other than the OH^- ions is called basic radical.

OBSERVATION

(i) Dry Test

Experiment	Observation	Inference
In a dry test tube a pinch of salt was taken and heated.	Presence of cracking sound.	May be presence of Na^+, K^+

Flame Test

This test is based on the principle that certain salt mostly chlorides are volatile in the oxidizing (non-luminous) flame and impart characteristic colour to the flame. Given salt was first treated with conc. HCl to convert into chloride salt. Platinum wire was taken and small circular loop was made at the tip of wire. Conc. HCl was taken in watch glass. The wire was cleaned and the loop was dipped in conc. HCl and heated. The process was repeated till wire imparts colour to flame. Then, the loop was dipped in the paste of conc. HCl and salt and introduced into oxidizing flame. The colour was noted by blue glass and naked eye.

Experiment	Observation		Inference
	Colour flame with naked eye	Colour flame with blue glass	
Flame test was performed.	Brilliant golden yellow.	Colourless	Na salt

Wet Test

Experiment	Observation	Inference
1. 1ml of salt solution was taken in test tube and dil. HCl was added.	1. White ppt was seen.	1. Absence of Group-I
2. Warmed exp.(1) and	2. No white ppt.	2. Absence of

Experiment	Observation	Inference
H_2S gas was passed for 20 sec.	was seen.	Group - II
3. Salt solution was taken in test tube and few drop of NH_4OH and NH_4Cl was added.	3. No white ppt was seen.	3. Absence of Group III A
4. Above exp(3) soln was warmed and H_2S gas was passed.	4. No white ppt was seen.	4. Absence of group III B
5. Salt solution was taken and added NH_4OH, NH_4Cl and $(NH_4)_2CO_3$	5. No white ppt was seen.	5. Absence of group IV
6. Salt solution was taken and added NH_4OH, NH_4Cl and Na_2PO_4	6. No white ppt was seen.	6. Absence of group V

Since ppt was not obtained from above reaction so basic radical must be group VI

Confirm test

Experiment	Observation	Inference
1. Flame test was performed.	1. Golden yellow flame through	1. Presence of Na^+

	naked eye.	
2. Salt solution was taken and Nessley's reagent was added.	2. No brown ppt was seen.	2. Absence of NH_4^+
3. Flame test was performed.	3. Violet flame was not seen.	3. Absence of K^+

RESULT

Hence, the basic radical in the given salt sample was presence of Na^+

PRECAUTIONS

1. All the glasswares should be handled with care.
2. The process of drying test tube should be done carefully.

EXPERIMENT NO. 10

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

APPARATUS REQUIRED

1. Test tube
2. Test tube holder

CHEMICALS REQUIRED

1. dil. HCl
2. conc. HCl
3. NH_4OH
4. NH_4Cl

THEORY

The electropositive radical which comes from a base is called basic radical. In other words, the radical of the base other than the OH^- ion is called basic radical. For eg: Na^+ is a basic radical because it is the radical in NaOH other than OH^- ion.

OBSERVATION

Dry test

Experiment	Observation	Inference
In dry test tube, a pinch of salt was taken and heated.	Salt was turned into solid form.	May be presence of Al^+

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 ~~an~~ few drops of cobalt nitrate solution was added. The solution was shaked. Piece of filter paper was dipped in this solution and the paper was ignited completely.

Experiment	Observation	Inference
Filter ash test was performed.	Colour of ash was blue.	Presence of Al salt.

Reaction

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

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

1) $Al_2O_3 + CoO \xrightarrow{\Delta} CoO + Al_2O_3$

blue cobalt aluminate

Wet Test

Experiment	Observation	Inference
1. 1 ml of salt solution was taken in test tube and dil. HCl was added.	1. No ppt was seen.	1. Absence of Group-I
2. Exp. (1) was warmed	2. No ppt was	2. Absence of

Experiment	Observation	Inference
and H_2S gas was passed for 20 sec.	seen.	Group II.
3. Salt solution was taken in test tube and few drops of NH_4OH and NH_4Cl was added.	3. ppt was formed.	3. Presence of Group IIIA.

Confirm Test

Experiment	Observation	Inference
1. 1 ml of salt solution was taken and NaOH was added.	1. White ppt was seen which was soluble in excess of NaOH soln. i.e. precipitated by NH_4Cl	1. Presence of Al^{++}
2. 1 ml of salt soln was taken and NH_4OH soln was added.	2. White ppt was seen.	2. Presence of Al^{++}

Reaction

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

$$Al(OH)_3 + NaOH \longrightarrow \underset{\text{soluble}}{NaAlO_2} + 2H_2O$$

$NaAlO_2 + NH_4Cl + 2H_2O \longrightarrow Al(OH)_3\downarrow + NH_4OH + NaCl$

white ppt

2. $Al^{+++} + 3NH_4OH \longrightarrow Al(OH)_3\downarrow + 3NH_4^+$

RESULT

Hence the basic radical in the given salt sample was presence of Al^{++}

PRECAUTION

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

9/28

EXPERIMENT NO. 11

NAME OF EXPERIMENT: TO IDENTIFY ACIDIC AND BASIC RADICAL PRESENT IN GIVEN SALT SAMPLE

APPARATUS REQUIRED

1. Test tube
2. Test tube holder

CHEMICALS REQUIRED

1. Conc. H_2SO_4
2. NH_4OH
3. $AgNO_3$
4. NH_4Cl
5. Cu-turning
6. dil. HCl
7. $BaCl_2$

THEORY

The electronegative radical which comes from an acid is called acidic radical. In other words, the radical of the acid other than H^+ ions is called acid radical. For eg: Cl^-, Br^-, I^-, etc.

The electropositive radical which comes from base is called basic radical. In other words, the radical of bases other than the OH^- ions is called basic radical. For eg: Na^+

OBSERVATION

To identify acidic radical

Dry test:

Experiment	Observation	Inference
1. A pinch of salt was taken in clean and dry test tube and dil. HCl was added.	1. No gas was seen.	1. Absence of SO_3, CO_3
2. A pinch of salt was taken in clean and dry test tube and conc. H_2SO_4 was added.	2 Gas was ~~evolved~~ not evolved.	2. Absence of halogen.
3. Cu-turning was added in exp. (2).	3. Brown fume was seen.	3. Presence of NO_3^{--}

Wet test

Experiment	Observation	Inference
1. Salt solution was taken in test tube and $BaCl_2$ was added. (If ppt was appeared, dil. HCl was added.)	1. No ppt was dissolved in HCl.	1. Absence of SO_4^{--}, CO_3^{--}
2. Salt solution was taken in test tube and dil. HNO_3 was added and boiled	2. Brown ring was formed.	2. Presence of NO_3^{--}

Sagarmatha

Experiment	Observation	Inference
Then it was cooled and $AgNO_3$ was added.		
3. Salt solution was taken and $FeSO_4$ was added and conc. H_2SO_4 was added.	3. No ppt was formed.	3. Absence of halogen.

REACTIONS

$KNO_3 + H_2SO_4 \longrightarrow H_2SO_4 + 2HNO_3$

$6FeSO_4 + 3H_2SO_4 + 2HNO_3 \longrightarrow 3Fe_2(SO_4)_3 + 4H_2O + 2NO$

$FeSO_4 + NO \longrightarrow FeSO_4NO$ (brown ring)

To identify basic radical

Wet test

Experiment	Observation	Inference
1. 1 ml of salt solution was taken in test tube and dil. HCl was added.	1. Blue ppt was turned black when boiled.	1. Presence of Cu^{++}
2. 2ml of salt solution was taken in test tube and few drop of NH_4OH was added.	2. Deep blue colour was formed.	2. Presence of Cu^{++}.

REACTION INVOLVED

i) $Cu^{++} + 2NaOH \longrightarrow Cu(OH)_2 \downarrow + 2Na^{+}$

blaish white ppt

$Cu(OH)_2 \xrightarrow{\Delta} CuO \downarrow + H_2O$

black ppt

ii) $Cu + 2NH_4OH \longrightarrow Cu(OH)_2 \downarrow + 2NH_4$

blaish white ppt

$Cu(OH)_2 + 2NH_4OH + 2NH_4 \longrightarrow (Cu(NH_3)_4) + 4H$

Dry test

Experiment	Observation	Inference
A pinch of salt was taken in a clean, dry test tube and then was heated (salt turned to white again to blue on added water.	Black ppt was seen.	May be presence of Cu^{++}.

Charcoal cavity test

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

Charcoal black was taken and was made small

cavity with the help of barer. 1 part of the sample was taken and then mixed it with 1 part of charcoal and 2 part of Na_2CO_3. This mixture was moistured with few drops of water and was placed in its cavity. This mixture was heated strongly by deflecting the reducing flame of the burner with the help of blow pipe.

Experiment	Observation	Inference
Charcoal cavity test was performed	Reametallic bead was seen.	Presence of Cu^{++}.

RESULT

Hence, acidic and basic radical in the given sample salts were detected i.e. NO_3^{--} and Cu^{++}.

PRECAUTION

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

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EXPERIMENT NO. 12

NAME OF EXPERIMENT: TO IDENTIFY ACIDIC AND BASIC RADICAL FROM THE GIVEN SAMPLE OF SALT

APPARATUS REQUIRED

1. Test tube
2. Test tube holder

CHEMICALS REQUIRED

1. Dil. HCl
2. Conc. H_2SO_4
3. $FeSO_4$
4. Cu turning
5. $AgNO_3$
6. $AgNO_3$
7. Dil. HNO_3

THEORY

The electropositive radical which comes from base is called basic radical. In other words, the radical of bases other than OH^- ion is called basic radical. For example: Na^+

The electronegative radical which comes from an acid is called acidic radical. In other words, the radical of the acid other than H^+ ion is called acid radical. For example: Cl^-, Br^-, I^-, etc.

OBSERVATION (For Acidic radical)

Dry test

Experiment	Observation	Inference
1. A pinch of salt was taken in clean and dry test tube and dil. HCl was added.	1. No gas was evolved.	1. Absence of CO_3^{--}, SO_3^{--}.
2. A pinch of salt was taken in clean and dry test tube and conc. H_2SO_4 was added.	2. No gas was evolved.	2. Absence of halogen.
3. Cu turning was added in exp. (2).	3. No brown fume was evolved.	3. Absence of NO_3^-

Wet test

Experiment	Observation	Inference
1. Salt solution was taken in test tube and $BaCl_2$ was added (If ppt was appeared, excess dil. HCl was added.).	1. White ppt was formed which was insoluble in excess dil. HCl.	1. Presence of SO_4^{--}.
2. Salt solution was taken in test tube and conc. H_2SO_4 was added and $FeSO_4$ was added.	2. No brown ring was formed.	2. Absence of NO_3^-

3. Salt solution was taken in test tube and dil. HNO_3 was added and boiled then cooled and $AgNO_3$ was added.	3. No ppt was formed.	3. Absence of Cl^-

REACTION INVOLVED

$$Na_2SO_4 + BaCl_2 \longrightarrow BaSO_4\downarrow + 2NaCl$$

white ppt

$$BaSO_4 + HCl \longrightarrow \text{No reaction}$$

OBSERVATION (For basic radical)

Experiment	Observation	Inference
A pinch of salt was taken in clean and dry test tube then heated (moisture condenses on the upper part of test tube.)	Salt having water of crystallization.	May be presence of Zn.

Filter Ash Test

When charcoal 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 few drop of cobalt nitrate solution was added. The solution was shaked.

Piece of filter paper was dipped in the solution and the paper was ignited completely.

Experiment	Observation	Inference
Filter ash test was performed.	Colour of ash was green.	Presence of Zn^{2+} salt.

REACTION INVOLVED

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

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

i) $ZnO + CoO \xrightarrow{\Delta} CoO\,ZnO$ (Cobalt zincate)
green

Wet test

Experiment	Observation	Inference
1. 1 ml of salt solution was taken in test tube and dil. HCl was added.	1. No ppt was seen.	1. Absence of group I.
2. Exp. (1) was warmed and H_2S gas was passed for 20 seconds.	2. No white ppt was seen.	2. Absence of group II.
3. 1 ml of salt solution was taken in test tube and NH_4OH and NH_4Cl was added.	3. No white ppt was seen.	3. Absence of group IIIA
4. Above exp (3) was warmed and H_2S gas was passed.	4. White ppt was seen.	4. Presence of group IIIB

Confirm Test

Experiment	Observation	Inference
1 ml of salt solution was taken and NaOH was added.	White ppt was seen.	Presence of Zn salt.

REACTION INVOLVED

$Zn^{++} + 2NaOH \longrightarrow Zn(OH)_2 \downarrow + 2Na^{+}$

white ppt

$Zn(OH)_2 + 2NaOH \longrightarrow Na_2ZnO_2 + H_2O$

sodium zincate soluble

RESULT

Hence, acidic and basic radical in the given sample salt was detected i.e. SO_4^{--} and Zn^{++}.

PRECAUTION

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

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EXPERIMENT NO. 13

NAME OF EXPERIMENT: TO IDENTIFY ACIDIC AND BASIC RADICAL FROM THE GIVEN SAMPLE OF SALT

APPARATUS REQUIRED

1. Test tube
2. Test tube holder

CHEMICALS REQUIRED

1. Conc. H_2SO_4
2. $BaCl_2$
3. dil. HCl
4. NH_4OH
5. Cu-turning
6. $AgNO_3$

THEORY

The electronegative radical which comes from an acid is called acidic radical. In other words, the radical of the acid other than H^+ ions is called acid radical. For eg: Cl^-, Br^-, I^-, etc.

The electropositive radical which come from base is called basic radical. In other words, the radical of the bases other than the OH^- ions is called basic radical. For eg: Na^+.

OBSERVATION (For acidic radical)

Dry test

Experiment	Observation	Inference
1. In clean test tube a pinch of salt was taken and dil. was added.	1. No gas was seen.	1. Absence of NO_2^-, SO_3^-, CO_3^-
2. In clean test tube a pinch of salt was taken and conc. H_2SO_4 was added.	2. Gas was seen.	2. Presence of Cl^-.
3. Copper turning was added in exp. (2) and boiled.	3. No brown fume was seen	3. Absence of NO_3^-.

Wet test

Experiment	Observation	Inference
1. Salt solution was taken in test tube and $BaCl_2$ was added.	1. No ppt was seen.	1. Absence of SO_4^{--}
2. Salt solution was taken in test tube and dil. HNO_3 was added and boiled then it was cooled and $AgNO_3$ was added.	2. White ppt was seen.	2. Presence of Cl^-
3. Salt solution was taken in test tube. $FeSO_4$ was added and conc. H_2SO_4 was added.	3. No brown ring was seen.	3. Absence of NO_3^-

Reaction

$AgNO_3 + NaCl \longrightarrow AgCl\downarrow + NaNO_3$

white ppt

$AgCl + NH_4OH \longrightarrow [Ag(NH_3)_2]Cl + 2H_2O$

white ppt

OBSERVATION

Dry test

Experiment	Observation	Inference
In dry test tube a pinch of salt was taken and heated	Presence of crackling sound.	~~May be~~ presence of Na^+, Ag^+

Flame test

This test is based on the principle that certain salt, mostly chlorides are volatile in the oxidizing (non-luminous) flame and impart characteristic colour to the flame. Given salt was first treated with conc. HCl to convert into chloride salt.

Platinum wire was taken and small circular loop at the tip of wire. Conc. HCl was taken in watch glass. The wire was cleaned and dipped the loop in conc. HCl and heated. The process was repeated till wire imparts colour to flame. Paste was made by conc. HCl and salt and loop was dipped there.

The loop was introduced into oxidizing flame. The colour was noted by blue glass and naked eye.

Experiment	Observation		Inference
	Flame colour with naked eye	Flame colour with blue glass	
Flame test was performed.	Brilliant golden yellow.	Colourless.	No salt

Wet Test

Experiment	Observation	Inference
1. 1ml of salt solution was taken in test tube and dil. HCl was added.	1. No ppt was seen.	1. Absence of group IA.
2. Exp. (1) was warmed and H_2S gas was passed for 20 seconds.	2. No white ppt was seen.	2. Absence of group II
3. 1ml of salt solution was taken in test tube. NH_4OH and NH_4Cl was added.	3. No white ppt was seen.	3. Absence of group IIIA
4. Exp. (3) solution was warmed and H_2S gas was passed.	4. No white ppt was seen.	4. Absence of group IIIB.
5. Salt solution was taken and NH_4OH, NH_4Cl, $(NH_4)_2CO_3$ was added.	5. No white ppt was seen.	5. Absence of group IV.
6. Salt solution was taken and NH_4OH, NH_4Cl, Na_2PO_4 was added.	6. No white ppt was seen.	6. Absence of group V.

Since ppt wasn't obtained from above reaction so basic radical must be group VI.

Confirm test

Experiment	Observation	Inference
1. Flame test was performed.	1. Golden yellow flame.	1. Presence of Na^+
2. Salt solution was taken and Nessler's reagent was added.	2. No brown ppt was seen.	2. Absence of NH_4^+.
3. Flame test was performed.	3. Violet flame was not seen.	3. Absence of K^+.

RESULT

Hence, acidic and basic radical in the given salt was detected i.e. Na^+ and Cl^-

PRECAUTIONS

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

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EXPERIMENT NO. 14

NAME OF EXPERIMENT: TO IDENTIFY ACIDIC AND BASIC RADICAL PRESENT IN GIVEN SAMPLE SALT.

APPARATUS REQUIRED

1. Test tube
2. Test tube holder.

CHEMICALS REQUIRED

1. HCl
2. H_2SO_4
3. HNO_3
4. $AgNO_3$
5. $BaCl_2$
6. $FeSO_4$
7. H_2S gas
8. NH_4OH
9. NH_4Cl
10. NaOH
11. $CONO_2$

THEORY

The electronegative radical which comes from an acid is called acidic radical. In other word, the radical of acid other than H^+ ion is called acidic radical. For eg: Cl^-, Br^-, I^-, etc.

The electropositive radical which comes from base is called basic radical. In other word, the radical of base other than OH^- ion is called basic radical. For eg: Na^+, Ag^{++}, Zn^+, Cu^{++}, etc.

OBSERVATION (For acidic radical)

Dry Test

Experiment	Observation	Inference
1. A pinch of salt was taken in the test tube and few drops of HCl was added.	1. No gas was seen.	1. Absence of SO_3^{--}, CO_3^{--}.
2. A pinch of salt was taken and few drops of H_2SO_4 was added.	2. No gas was seen.	2. Absence of halogen.
3. In exp-2, Cu-turning was added.	3. No brown fume was seen.	3. Absence of NO_3^{--}

Wet Test

Experiment	Observation	Inference
1. 2ml of salt sol^n was taken and added HNO_3, boiled & cooled and again $AgNO_3$ was added.	1. ppt was not seen.	1. Absence of halogen
2. 2ml of salt sol^n was taken & few drops of $BaCl_2$ was added. (If ppt seen add HCl)	2. ppt was seen.	2. Presence of SO_4^{--}
3. 2ml of salt sol^n was taken and few drops of $FeSO_4$ was added & conc. H_2SO_4 too.	3. No ring was seen.	3. Absence of NO_3^{--}

Reactions:

1. $ZnSO_4 + Na_2CO_3 \longrightarrow ZnCO_3 + Na_2SO_4$
2. $Na_2SO_4 + BaCl_2 \longrightarrow BaSO_4\downarrow + 2NaCl$ (white ppt)
3. $BaSO_4 + HCl \longrightarrow$ No reaction.

For Basic radical

Dry Test

Experiment	Observation	Inference
A pinch of salt was taken in test tube and heated.	Salt was original but infusible.	May be presence of Al, Mg, Ba, Ca, etc.

Filter Ash Test

When ~~car~~ charcoal 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 drops of cobalt nitrate solution. The solution was shaked. Piece of filter paper was dipped in the solution and ignited the paper completely.

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

Reactions:

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

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

$Al_2O_3 \xrightarrow{\Delta} CoOAl_2O_3$

(Blue cobalt aluminate)

Wet Test

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

Confirm Test

Experiment	Observation	Inference
1. Salt sol^n was taken and few drops of NaOH was added.	1. White gelatinous ppt was seen (soluble in excess NaOH.)	1. Presence of Al^{+++}.
2. Salt sol^n was taken and few drop of NH_4OH was added.	2. White gelatinous ppt was seen.	2. Presence of Al^{+++}.

Reactions:

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

(white ppt)

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

(excess) (soluble)

$Al^{+++} + 3NH_4OH \longrightarrow Al(OH)_3 \downarrow + 3NH_4^+$

RESULT

Hence, the acidic radical in the given sample salt is SO_4^{--} and in basic radical is Al^{+++}.

PRECAUTION

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

Date: .....

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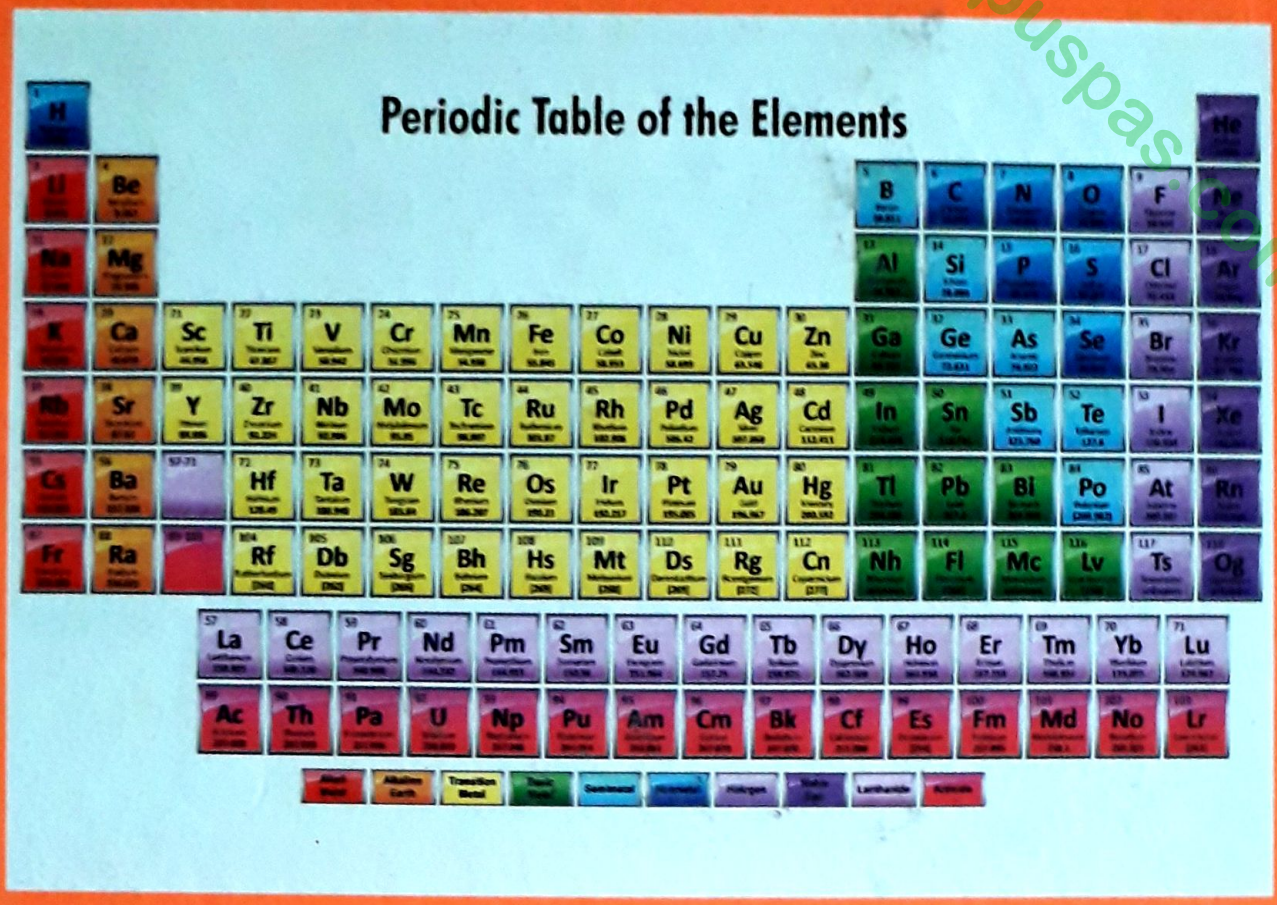

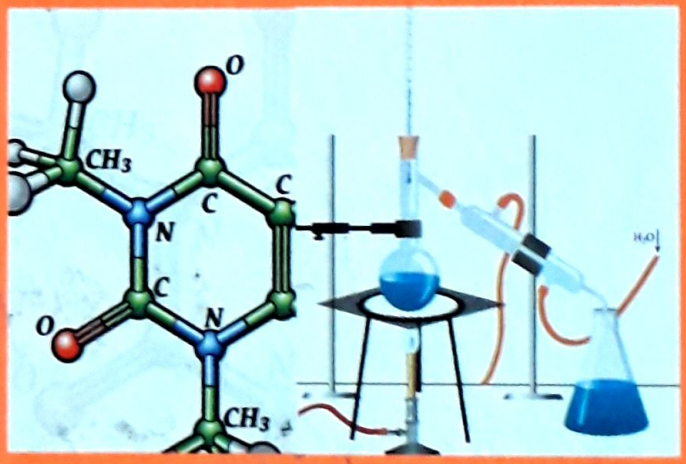

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