Certificate

* * * * * * * * * * * *

Name SAKSHAM MITTAL

Class XII-F Roll No. _____ Exam No. _____

Institution OXFORD PUBLIC SCHOOL

This is certified to be the bonafide work of the student in the

_____ *Laboratory during the academic*

year 20 /20 .

No. of practicals certified _____ *out of* _____ *in the*

subject of _____

_____
Teacher In-charge

_____ _____
Examiner's Signature *Principal*

Date : _____ *Institution Rubber Stamp*

(N.B. : The candidate is expected to retain his/her journal till he/she passes in the subject.)

Index of The Experiments Performed

Name SAKSHAM MITTAL Std. _____

Sr. No.	Name of the Experiment	Page No.	Date of Experiment	Date of Submission	Remarks
1.	Chromatography	1	19/4/17		
2	Preparation of colloidal solution of starch	3	26/4/17		
3.	Preparation of ferric hydroxide solution	4	3/5/17		
4.	Functional Group : Alcohol	5	4/7/17		
5.	Functional Group : Phenol	7	4/7/17		
6.	Carboxylic Acid	9	11/7/17		
7.	Aldehyde	11	11/7/17		
8.	Ketone	12	19/8/17		
9.	Amine	13	19/8/17		
10.	Preparation of Potash Alum	15	26/8/17		
11.	Preparation of crystals of ferrous Ammonium sulphate hexahydrate	17	26/8/17		
12.	Presence of carbohydrates fats and Protein	18	25/7/17		
13.	Study of the rate of reaction	20	1/8/17		
14.	Titration (Mohr salt / $KMnO_4$)	22	2/9/17		
15	Titration (oxalic acid / $KMnO_4$)	24	16/9/17		
16.	To analyse given salt systematically $(NH_4)_2CO_3$	26	4/10/17		
17	To analyse given salt	28	18/10/17		

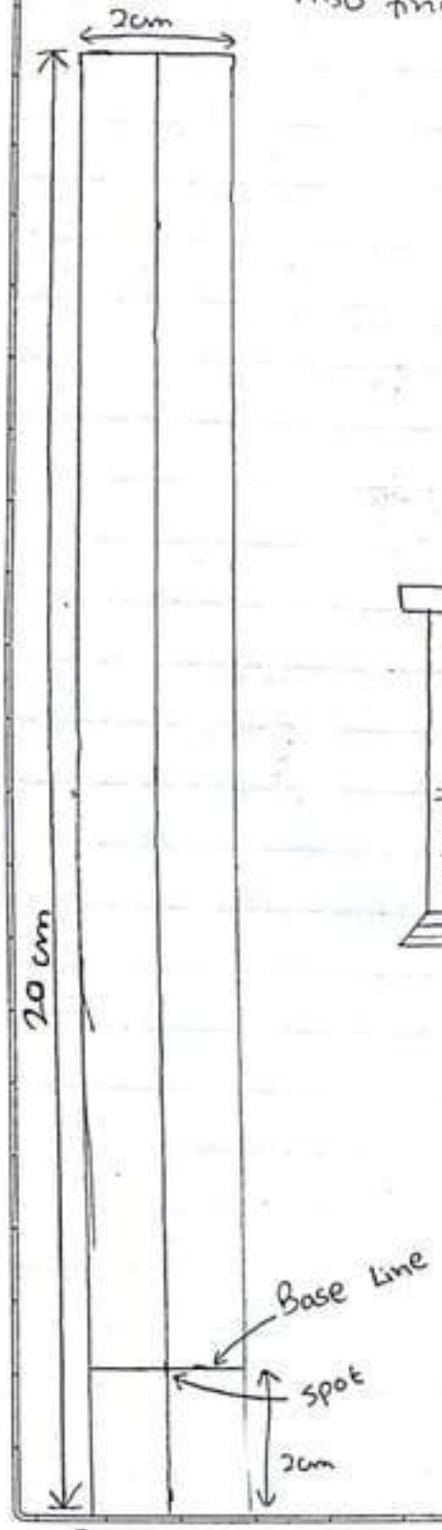
Index of The Experiments Performed

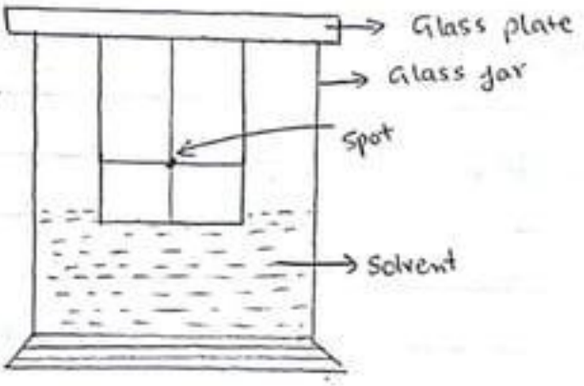
Name _____ Std. _____

Sr. No.	Name of the Experiment	Page No.	Date of Experiment	Date of Submission	Remarks
	systematically $Pb(NO_3)_2$				
18	To analyse given salt systematically $CuSO_4$	30	25/10/17		
19	To analyse given salt systematically $FeCl_3$	32	1/11/17		
20	To analyse given salt systematically $Al_2(SO_4)_3$	34	8/11/17		
21	To analyse given salt systematically $Zn(Cl_2)$	36	13/11/17		
22	To analyse given salt systematically $CaBr_2$	38	17/11/17		
23	To analyse given salt systematically $BaCl_2$	40	22/11/17		
24	To analyse given salt systematically $Sr(NO_3)_2$	42	27/11/17		
25	To analyse given salt systematically $Mg(NO_3)_2$	44	30/11/17		

22/04/2017

Aim :- To separate the coloured component present in the mixture of red and blue ink by ascending paper chromatography
Also find R_f factor.





Date 19/04/17

Expt. No. 1 Page No. 1 to 17

Aim :- To separate the coloured component present in the mixture of red and blue inK by ascending paper chromatography
Also find R_f factor

Material Required - Gas jar, Glass rod, whatman filter paper (20×2) cm, fine capillary tube, 50% ethyl alcohol.

Principle -
Chromatography is the rapid and efficient technique for separation of coloured components. It is based on differential migration of individual component of a mixture through a stationary phase under the influence of moving phase.

Procedure -
Take strip of chromatography, draw a line above 3cm from one end. Also draw a line length wise from the centre of paper with the help of capillary tube put a drop of mix red and blue at a point, dry it and repeat 2-3 times so that spot become rich in mixture. Suspend the filter paper vertically in the gas jar 2cm above solvent level. When solvent travelled 15 cm take out filter paper and mark the solvent point also put pencil mark on red and blue spot.

Teacher's Signature :

Observation Table –

S No.	substance	Distance travelled by each	Distance by solvent	R_f = Distance by solute / Distance by solvent
1.	Mix of red and blue ink	Red (A cm) = 11.7	X = 13.6	$R_f = \frac{A}{X} = 0.86$
2.	Mix of red and blue ink	Blue (B cm) = 12.5	X = 13.6	$R_f = \frac{B}{X} = 0.92$

Calculation –

$$R_f = \frac{\text{Distance travelled by blue/red ink}}{\text{Distance travelled by the solvent}}$$

$$R_f \text{ red} = \frac{11.7}{13.6} = 0.86$$

$$R_f \text{ blue} = \frac{12.5}{13.6} = 0.92$$

Date

Expt. No. Page No. 2

Precautions -

1. Use good quality of pencil so that reference line doesn't dissolve in the solvent
2. Dry the spot before putting the strip in jar
3. Don't allow the spot to dip in solvent

Result -

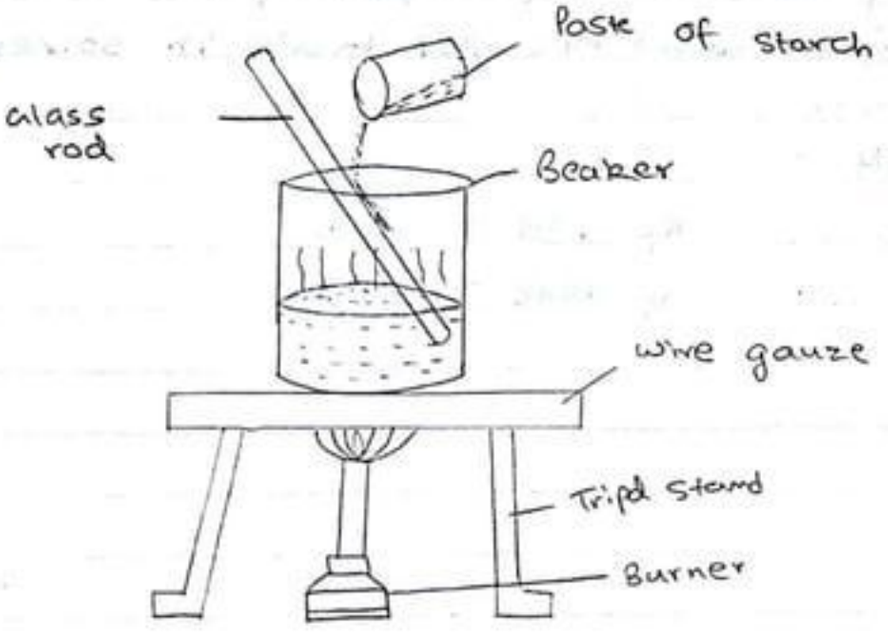
R_f red - 0.86

R_f blue - 0.92

Teacher's Signature :

03/05/17

Aim :- To prepare colloidal solution of starch.



Preparation of starch sdn.

Result - The required starch solution is prepared.

Date 26/04/17

Expt. No. 2 Page No. 3

Aim :- To prepare colloidal solution of starch

Apparatus - 250 ml Beaker, Glass rod, funnel, filter paper Mortel pastel, 1g soluble starch

Procedure -

Take 1gm of starch in mortal add a few ml of warm distill water make a thin paste. Transfer the paste to 50 ml beaker. Take another 250 ml beaker boil about 100 ml water pore the paste slowly in beaker with boiling water with constant stirring. Continue the boiling for about 10 min Allow the beaker to cool. Then filter it and label it as starch solution.

Precaution -

1. Apparatus should be cleared throughly
2. Distill water should be used.
3. Starch to be converted to thin paste before adding it to boiling water.
4. Constant stirring is necessary.

Principle -

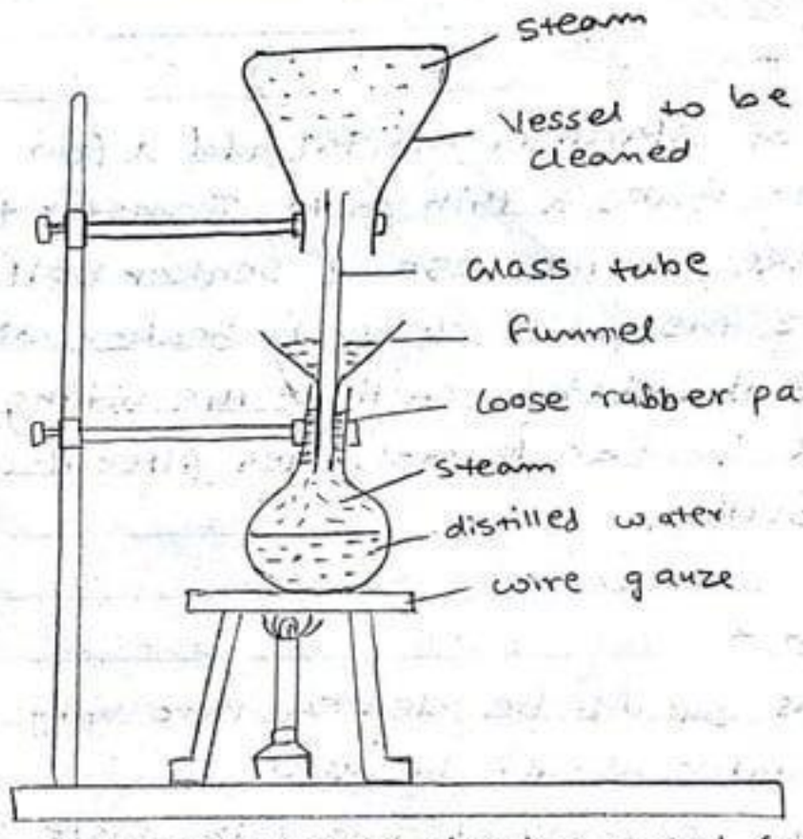
Starch form lyophobic solution when water is used as dispersion medium. The formation of solution is accelerated by heating. The solution is stable and not affected by electrolytic impurities

Result - The required starch solution is prepared.

Teacher's Signature : _____

03/05/17

Aim :- To prepare ferric hydroxide solution.



Steaming out process for cleaning conical flask

Reaction -

$$FeCl_3\ (aq.) + 3H_2O\ (l) \xrightarrow{\text{Boil}} Fe(OH)_3\ (s) + 3HCl\ (aq)$$

Ferric chloride — Red sol.

Result - $Fe(OH)_3$ solution is prepared.

Date 03/03/17

Expt. No. 3 Page No. 4

Aim - To prepare ferric hydroxide solution.

Material Required - 2% $FeCl_3$, conical flask, beaker glass rod

Principle -

Substances such as metal hydroxide or sulphide are insoluble in water do not readily give colloidal solution so they are called hydrophobic colloids.

$$FeCl_3 + 3\,H_2O \xrightarrow{\text{boil}} Fe(OH)_3 + 3HCl$$

Procedure -

Take conical flask add 100mL water heat it to boil add 2% $FeCl_3$ solution dropwise to boiling water. Continue heating till deep red colour appears. Keep the content undisturbed in conical flask.

Precaution -

1) $Fe(OH)_3$ is affected by impurities. So apparatus should be cleared
2) Add $FeCl_3$ dropwise.

Result - $Fe(OH)_3$ solution is prepared.

Teacher's Signature :

Aim:- To test the presence of alcoholic group in the given sample of alcohol.

Reactions - Sodium Metal Test

$$2ROH + 2Na \longrightarrow 2R-ONa + H_2\uparrow$$

Ester Test -

$$R-OH + R-\overset{O}{\overset{\|}{C}}-OH \overset{H^+}{\rightleftharpoons} R-\overset{O}{\overset{\|}{C}}-OR + H_2O$$

Cerric Ammonium nitrate Test -

$$2R-OH + (NH_4)_2 Ce(NO_3)_6 \longrightarrow (ROH)_2 Ce(NO_3)_4 + 2NH_4NO_3$$

(Red complex)

Observation Table

S.No	Experiment	Observation	Inference
1.	Sodium Metal test. 1ml organic compound add 1g $CaSO_4$ shake well Filter it, then add small piece of sodium metal	Brisk effervence due to evolution of H_2 (gas)	Alcohol group is present.
2.	Ester test 1ml organic compound + 1ml CH_3COOH + 3-4 drops H_2SO_4. Mix in water bath. Pour the liquid in 20ml cold water	fruity smell is discovered.	-OH (Alcohol) group is present).
3.	Ceric Ammonium nitrate test 1ml. o.c + 2-3 drops of cerric ammonium Nitrate. Shake well	Deep Red colour indicates presence of alcohol	Alcohol is present.

Date

Expt. No. 41 Page No. 5

Aim :- To test the presence of alcoholic group in the given sample of alcohol.

Material Required - organic liquid, dry test tubes, anhydrous calcium sulphate, sodium metal, Acetic acid, sulphuric acid (conc.) waterbath ceric ammonium Nitrate.

Observations

I^st Test - Sodium Metal Test

- Experiment -

1ml organic compound and add 1 gm of $CaSO_4$ shake well. Then filter the mixture and add a small piece of Na in it.

- Observation -

Brisk effervence due to evolution of H_2 (gas).

- Inference -

Alcohol group is present.

II^nd Test - Ester Test

- Experiment -

1ml of organic compound + 1ml CH_3COOH + 3 to 4 drops H_2SO_4 water and mix in water bath. Pour the liquid in 20 ml cold water.

- Observation -

fruity smell is discovered

Teacher's Signature :

- Inference -
  Alcohol group is present.

IIIrd Test - Ceric Ammonium nitrate Test

- Experiment -
  1ml organic compound + 2 to 3 drops of cerric ammonium nitrate & shake well.
- observation -
  Deep red colour appears
- Inference -
  Alcohol group is present.

Result
The given sample has alcohol group in it.

Aim :- To test the presence of phenolic group in the given sample of alcohol.

Reaction :-

Ferric Chloride Test

$$FeCl_3 + 6C_6H_5OH \longrightarrow [Fe(OC_6H_5)_6]^{3-} + HCl$$

Date _____

Expt. No. 5 Page No. 7

Aim :- To test the presence of phenolic group in the given sample of alcohol

Material Required.

organic liquid, dry test tubes, neutral $FeCl_3$, Br_2 water, litmus paper.

Observation Table

S.No.	Experiment	Observation	Inference
Phen 1.	Litmus paper test -	The colour of blue	Phenolic
1.	place the substance	litmus changes	group is
	on moist blue litmus	to red	present
	paper		
2.	Ferric Chloride Test :-	change in colour	phenolic
	1 mL neutral $FeCl_3$, add	is observed	group is
	the organic compound	(α- napthol-	present
		pink, phend-violet)	
3.	Bromine water test :-		
	aq. solution of	white ppt.	phenolic group
	organic compound		is present
	add Br_2 (l)		

Precautions :- 1) use reagents economically
2) Avoid overheating of mixture

Teacher's Signature : _____

Date

Expt. No.

Page No. 8

Result - The given organic substance has phenolic group in it.

Teacher's Signature :

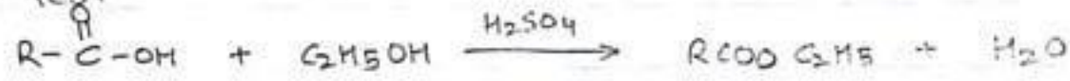
Aim:- To test the presence of carboxylic group in the given compound.

Reactions -

1. Sodium Carbonate Test

$$R-\overset{O}{\overset{\|}{C}}-OH + NaHCO_3 \longrightarrow R-\overset{O}{\overset{\|}{C}}-OONa + CO_2\uparrow + H_2O$$

2. Ester Test



$$R-\overset{O}{\overset{\|}{C}}-OH + C_2H_5OH \xrightarrow{H_2SO_4} RCOO\,C_2H_5 + H_2O$$

$$R-\overset{O}{\overset{\|}{C}}-OH + H_2O \rightleftharpoons R-\overset{R}{C}-O^- + H_3O^+$$

Date _____

Expt. No. 6 Page No. 9

Aim :- To test the presence of carboxylic group in the given compound

Material Required - Blue litmus paper, sodium carbonate, ethyl alcohol and sample compound.

Observation Table

S. No.	Experiment	Observation	Inference
1.	litmus paper test :- place a drop of liquid on moist blue litmus paper	colour change to red.	-COOH group may be present
2.	Sodium bicarbonate test :- to the given sample add $NaHCO_3$	Brisk effervesence appear	-COOH is confirmed
3.	Ester test :- to the given sample add 1mL C_2H_5OH + 3-4 drops H_2SO_4 warm mix in water bath pour the liquid in 2mL cold water	fruity smell is discovered	-COOH is present.

Teacher's Signature : _____

Date _____

Expt. No. _____ Page No. 10

Precautions - 1. Use reagents economically
2. Avoid overheating of mixture

Result - The given organic substance has carboxylic group in it.

Teacher's Signature : _____

Aim :- To test the presence of aldehyde in the given sample.

Reactions -

1. Tollen's Test

$$2Ag(NH_3)_2 + RCHO + 3OH^- \longrightarrow RCOO^- + 2Ag\downarrow + 4NH_3 + 2H_2O$$

2. Fehling Solution Test

$$RCHO + 2Cu^{2+} + 5OH^- \longrightarrow Cu_2O + RCOO^- + H_2O$$

(Red ppt.)

Result - The given organic substance has carboxylic group in it.

Date _____

Expt. No. 7 Page No. 11

Aim :- To test the presence of aldehyde in the given sample

Material Required :- 0.5 g organic compound, schiff reagent $AgNO_3$, NaOH, Fehling solution.

Observation Table -

S. No.	Experiment	Observation	Inference
1.	Sniff's Test	Appearance of pink, red colour	-CHO group is present
2.	Tollen's Test - 1ml $AgNO_3$ + 2ml dil. NaOH, Add NH_3 (sol.) drop wise, Until brown ppt. dissolve warm test tube on water bath (5 min).	Brown ppt. formed Silver mirror is formed	-CHO group is confirmed
3.	Fehling Solution Test 1ml A+B solution. Add 0.2g organic compound warm test tube on water bath	Reddish yellow ppt. formed	-CHO group is confirmed

Precautions - 1. Use reagents economically.
2. Avoid overheating of mixture.

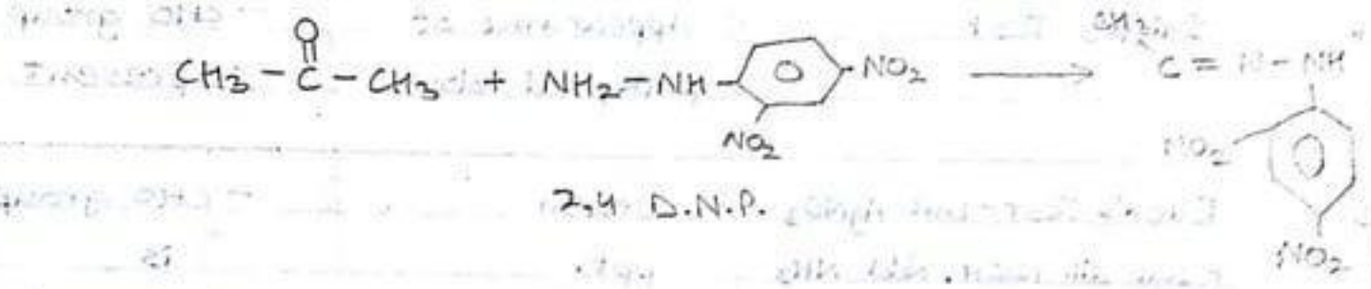
Result - The given organic substance has carboxylic group in it.

Teacher's Signature : _____

Aim :- To test the presence ketone group in the given organic compound.

Reactions -

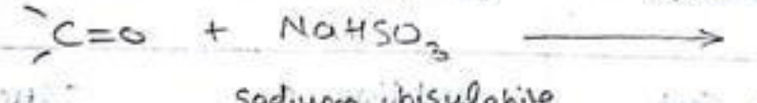
1. 2,4 dinitrophenyl hydrazine Test



2,4 D.N.P.

Yellow or Orange

2. Sodium Bisulphite Test



sodium bisulphite

Addition product (crystalline ppt.)

Date _____

Expt. No. 08 Page No. 12

Aim - To test the presence of ketone group in the given organic compound.

Material Required - 0.5 g organic compound, sodium bisulphite, test tube, water bath.

Observation Table -

S.No.	Experiment	observation	Inference
1.	0.5g organic compound add rectified spirit dissolve it, Now add 2,4 DNP shake well (5 min)	Yellow orange crystals formed	$R-\overset{O}{\overset{\|\|}{C}}-R$ group is confirmed
2.	2mL saturated solution of $NaHSO_3$ then add 1g compound shake well leave for 20 min	formation of crystalline ppt.	$R-\overset{O}{\overset{\|\|}{C}}-R$ group is confirmed

Precautions :- 1. Use reagents economically
2. Avoid overheating of mixture

Result :- The given organic substance has ketone group in it.

Teacher's Signature : _____

Aim - To test the Amino group ($-NH_2$) in the given sample of organic compound.

Reaction :-

1. isocyanide Test

$$\underset{\text{Amine}}{-NH_2} + \underset{\text{chloroform}}{CHCl_3} + 3KOH(alc.) \longrightarrow -NC + 3KCl + 3H_2O$$
isocyanide

2. azodye Test

$$C_6H_5\cdot NH_2 + NaNO_2 + 2HCl \longrightarrow \underset{\text{benzene diazonium chloride}}{C_6H_5N^{+}\equiv NCl^{-}} + 2H_2O + NaCl$$

$$C_6H_5N\equiv NCl^{-} + \underset{\beta\text{-naphthol}}{C_{10}H_7OH} \longrightarrow \underset{\text{orange-red dye}}{C_6H_5N=N-C_{10}H_6OH}$$

Date _____

Expt. No. 9 Page No. 13

Aim - To Test the Amino group ($-NH_2$) in the given sample of organic compound.

Apparatus :- Litmus paper, chloroform, KOH (alc.), sodium nitrate, β-naphthol, NaOH, conc. HCl

Test :-

S.N.	Experiment	Observation	Inference
1.	Litmus Test Place a drop of comp. on almost Red Litmus Paper	red litmus turns blue	may be amine group
2.	Carbylamine or Isocyanide Test Organic compound add 1mL of conc H_2SO_4 + few drops of chloroform. Add 2mL of 10% alc. KOH and warm	Unpleasant or obnoxious smell of iso-cyanide comes.	indicates the presence of amino group.
3.	Azodye Di-test 1mL of substance in 3mL conc. HCl and 5mL of water & cool the sol into ice. Add cold sol. of 1g of sodium nitrite in 5mL water with shaking. add	formation of orange-red dye	indicates the presence of amines

Teacher's Signature : _____

Date _____

Expt. No. _____ Page No. 14

	cold sol. of β-naphthal in 4mL of 5% of sodium hydroxide solution.		

Result :- The given sample of organic compound contain amino group.

Teacher's Signature : _____

Aim :- To prepare pure sample of Potash Alum $[K_2SO_4 \cdot Al_2(SO_4)_3] \cdot 24H_2O$

Reaction-

$$K_2SO_4 + Al_2(SO_4)_3 \cdot 18H_2O + 6H_2O \longrightarrow K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$$

Date

Expt. No. 109 Page No. 15

Aim :- To prepare pure sample of Potash Alum $[K_2SO_4 \cdot Al_2(SO_4)_3] \cdot 24 H_2O$

Material Required :-

250 mL beaker, china dish, glass rod, watch glass, Potassium sulphate, Aluminium sulphate, dil. H_2SO_4

Procedure -

1) Take 3g K_2SO_4 in 250 mL beaker, dissolve it in minimum amount of water. warm if required

2) Take another 250 mL beaker add 10g $Al_2(SO_4)_3$, add dil H_2SO_4 to prevent hydrolysis, then add 20 mL of water, heat for 2-5 min, if milkiness appear filter the solution.

3) After preparing both the solution, filter them one by one in a china dish.

4) Heat the china dish until crystallisation point is achieved.

5) Allow it to cool, decant the mother liquor, wash the obtained potash alum crystals with water.

Teacher's Signature : _____

Date

Expt. No. Page No. 16

Precautions

1) Colour of the filterate should be clear, dry crystals by placing them between filter paper.

2) Conc. H_2SO_4 should be mixed to $Al_2(SO_4)_3$. $Al_2(SO_4)_3$ solution should be clear.

3) Cool slowly, Rapid disturbance change the shape, size and number of crystals.

Result -

Yield - 12 - 15 g

Colour - white transparent

Shape - Octahedral

Teacher's Signature :

Aim - To prepare crystals of ferrous ammonium sulphate hexahydrate [$FeSO_4(NH_4)_2SO_4 \cdot 6H_2O$]

Reaction -

$FeSO_4.7H_2O + (NH_4)_2SO_4 \longrightarrow FeSO_4(NH_4)_2SO_4.6H_2O + H_2O$

Result - Yield - 12.14g
Colour - Light Green
Shape - Monoclinic

Date

Expt. No. 110

Page No. 17

Aim - To prepare crystals of ferrous ammonium sulphate hexahydrate [$FeSO_4(NH_4)_2SO_4.6H_2O$]

Material Required -

250 mL beaker, china dish, glass rod, filtering paper, ferrous sulphate, ammonium sulphate, distill water, dil. H_2SO_4.

Procedure -

1) Dissolve equimolar amount of ammonium sulphate (3.5 g) and ferrous sulphate (7g) in distill water.

2) The resultant solution is mixed and filtered in the china dish till crystallisation point is reached. Cool the mixture and decant the mother liquor, weigh the crystals.

Precautions -

1) Add dil. H_2SO_4 to ammonium sulphate
2) The filterate must be transparent.
3) Cover the filterate and allow it to cool slowly

Result -

Yield - 12.14 g

Colour - Light Green

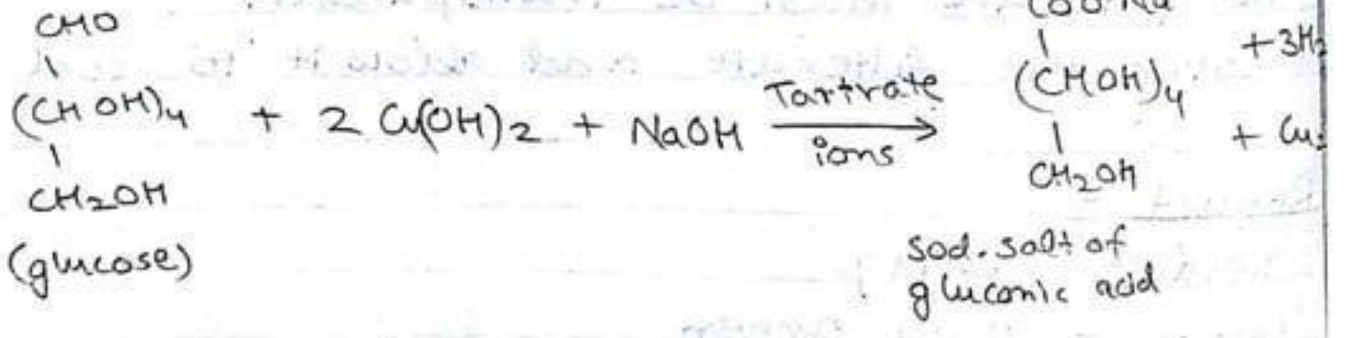
Shape - Monoclinic

Teacher's Signature : _____

Aim - To detect the presence of carbohydrates fats and protein in the given food sample

Reactions -

Fehling's Test -



Date _____

Expt. No. 18 Page No. 18

Aim :- To detect the presence of carbohydrates fats and protein in the given food sample

Material Required -
Molish reagent (10% alcohol in α - naphthol), Fehling solution, Tollen's reagent, conc. HNO_3, conc. H_2SO_4, $CuSO_4$ sol., NaOH sol., Ninhydrin solution, burner etc.

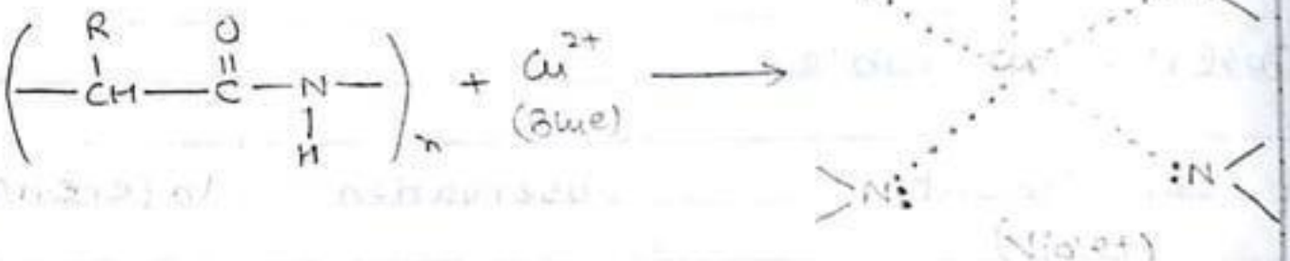
Observation Table -

S.No.	Experiment	Observation	Inference
1.	Molish test take 2mL of food sample add 5 drops of Molish reagent add 1mL conc. H_2SO_4 byside of test tube	Reddish-violet ring is produced at the junction of two layers	Carbohydrate is present
2.	2mL food sample add 2mL each of fehling solution A and B, keep in boiling water bath.	Red ppt. is formed	Indicate the presence of reducing sugar
3.	Iodine Test	Blue colouration	Indicate the presence of starch

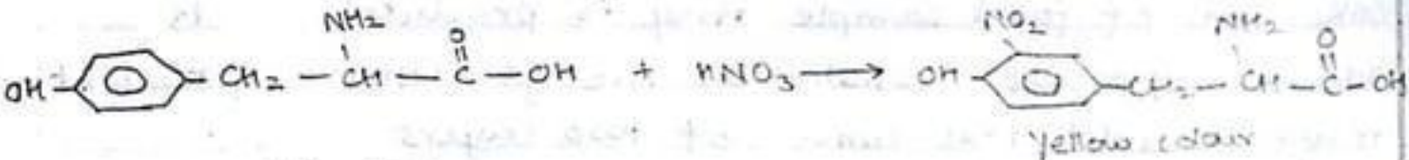
Teacher's Signature : _____

Reactions –

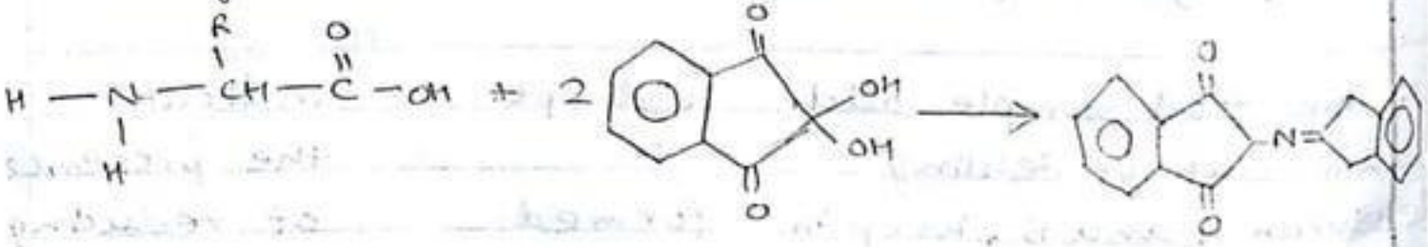
Biuret test –



Xanthoproteic test –



Ninhydrin test –



Result – The given food sample contain carbohydrates, fats and proteins

Date

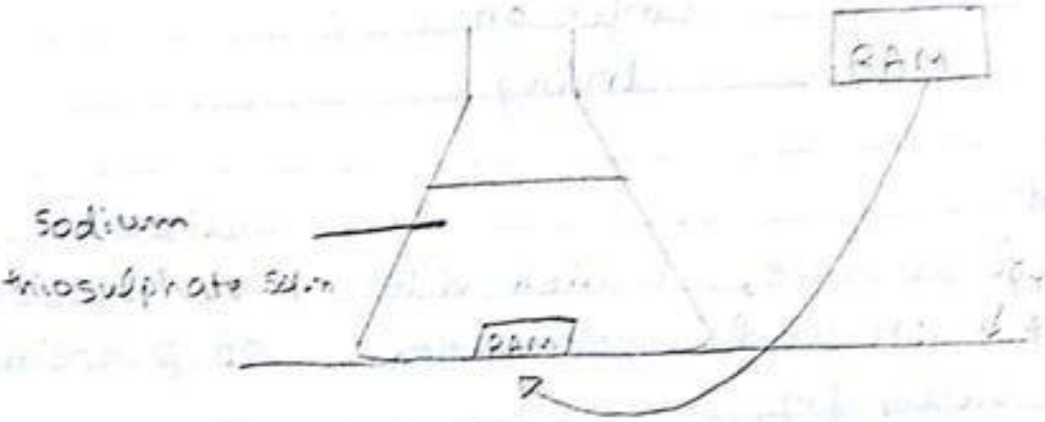
Expt. No.

SNo	Experiment	Observation	Inference
4.	Translucent spot test Put a drop of sample on filter paper.	Appearance of greasy spot that grows larger on drying	Confirms the presence of fats.
5.	Biuret test 2mL of food sample, add 2mL of NaOH and 5 drops of $CuSO_4$ (1%) solution	Bluish violet colouration	Indicates the presence of protein
6.	Xanthoproteic test, take 2mL of sample add 5 drops of HNO_3	Yellow ppt	Confirms the presence of protein
7.	Ninhydrin test 2mL of food sample add 2mL ninhydrin solution, heat.	Intense Blue Colouration	Confirms the presence of protein

Result - The given food sample contain carbohydrates, fats and proteins.

Teacher's Signature :

Aim- To study the effect of concentration on the rate of reaction between sodium Thio-sulphate and HCl.



$$Na_2S_2O_3\,(aq) + 2HCl\,(aq) \longrightarrow S(s) + 2NaCl + SO_2 + H_2O$$

$$S_2O_3^{2-} + 2H^+ \longrightarrow S(s) + SO_2\uparrow(g) + H_2O$$

Date

Expt. No. 13 Page No. 20

Aim - To study the effect of concentration on the rate of reaction between sodium Thiosulphate and HCl.

Material Required -

250 mL conical flask, burettes, 10mL pipette, test tube stopwatch, 0.1M ~~solution~~ sodium Thiosulphate solution 1M HCl and distill water.

Theory

Sodium Thiosulphate react with HCl to form colloidal solution (sulphur), along with evolution of SO_2 (g). Rate of reaction is directly proportional to product of molar concentration of reactant.

Procedure

1) Take five conical flasks, label them A, B, C, D and E. with the help of burette add 10, 20, 30, 40 and 50 mL of 0.1M $Na_2S_2O_3$ in conical flasks

2) Now add 40, 30, 20, 10, 0 mL of distill water to the five conical flasks respectively

3) Add 10 mL 1M HCl solution to conical flask A, which has 10 mL $Na_2S_2O_3$, 40mL distill water.

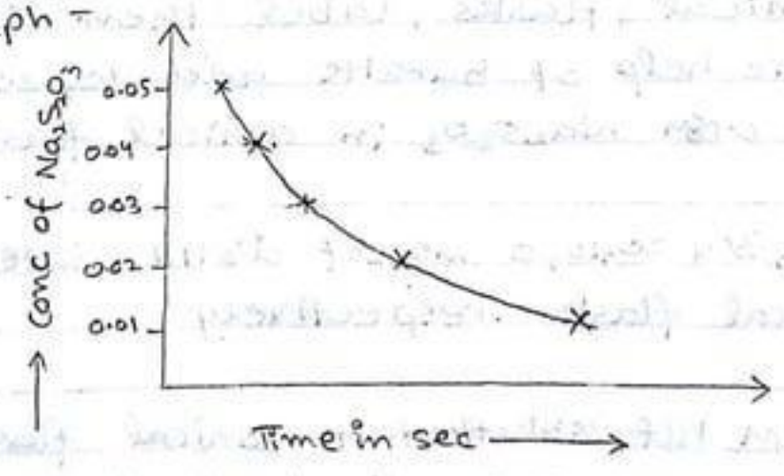
4) Start stopwatch when half of HCl is added,

Teacher's Signature : _____

Observation Table

S. No	Vol. of 0.05M $Na_2S_2O_3$	Vol. of distill water	Vol. of 1M HCl	Conc. of $Na_2S_2O_3$	Time (sec)	1/t
1	10 mL	40 mL	10 mL	0.01 M	12.5	0.08
2	20 mL	30 mL	10 mL	0.02 M	27.3	0.036
3	30 mL	20 mL	10 mL	0.03 M	35.1	0.028
4	40 mL	10 mL	10 mL	0.04 M	60	0.0167
5	50 mL	0 mL	10 mL	0.05 M	153	0.006

Graph -



⇒ $\frac{1}{t}$ = direct measure of rate of reaction

shake the content. Place a (X) mark below the conical flask. Observe downward.

5) When (X) mark become invisible record the time Repeat the experiment for five times.

Observation – Volume of 0.05 M HCl added in each flask = 10 mL

Result :– Rate of reaction b/w sodium thiosulphate and Hydrochloric acid decreases with the decrease in concentration of sodium thiosulphate

Precautions – Use same paper in every observation
Use same measuring cylinder each time

Aim - To prepare M/40 solution of Mohr's salt and using that find out the molarity and strength of $KMnO_4$ solution.

Molecular reactions

$$2KMnO_4 + 3H_2SO_4 \longrightarrow K_2SO_4 + 2MnSO_4 + 3H_2O + 5[O]$$

$$5 \times [2FeSO_4(NH_4)_2SO_4 \cdot 6H_2O + H_2SO_4 \longrightarrow Fe_2(SO_4)_3 + 13H_2O + 2(NH_4)_2SO_4 + [O]]$$

$$2KMnO_4 + 8H_2SO_4 + 10FeSO_4(NH_4)_2SO_4 \cdot 6H_2O \longrightarrow K_2SO_4 + 2MnSO_4 + 5Fe_2(SO_4)_3 + 10(NH_4)_2SO_4 + 68H_2O$$

Ionic Reactions

$$MnO_4^- + 8H^+ + 5e^- \longrightarrow Mn^{+2} + 4H_2O$$

$$[Fe^{2+} \longrightarrow Fe^{3+} + e^-] \times 5$$

$$MnO_4^- + 8H^+ + 5Fe^{2+} \longrightarrow 5Fe^{3+} + Mn^{2+} + 4H_2O$$

Date

Expt. No. 14 Page No. 22

Aim - To prepare M/40 solution of Mohr's salt and using that find out the molarity and strength of $KMnO_4$ solution.

Material Required -

Burette, pipette, Beaker, volumetric flask, test tube stand, $KMnO_4$, H_2SO_4, Mohr's salt.

Procedure -

1) Prepare 250 ml of M/40 Mohr's salt solution

2) Rinse and fill the burette with the $KMnO_4$ solution

3) Add one test tube full of dilute sulphuric acid to the solution.

4) Note the initial reading of burette.

5) Now add $KMnO_4$ solution from the burette till a permanent light pink colour is imparted to the solution in the titration flask on addition of last single drop of $KMnO_4$ solution

6) Note the final reading.

7) Repeat the above steps five times to get a set of concordant readings.

Teacher's Signature : _____

Observation Table

S.No.	Initial Reading	final Reading	Volume of $KMnO_4$ used
1	0	6.5	6.5
2	6.5	13.1	6.6
3.	13.1	19.8	6.7
4	19.8	26.2	6.4

concordant volume = 6.5 mL

Calculations -

$$\frac{M_{KMnO_4} \times V_{KMnO_4}}{M_{mohr's\ salt} \times V_{mohr's\ salt}} = \frac{2}{10}$$

$$M_{KMnO_4} = \frac{2}{10} \times \frac{1}{40} \times \frac{10}{6.5} = 0.0077\ M$$

Strength = M_{KMnO_4} × Molar mass (158 g)

= 1.22

Date

Expt. No.

Page No. 23

Observations

weight of watch glass = 19.7 gm

weight of watch glass + Mohr's salt = 22.15 gm

weight of Mohr's salt = 2.45 gm

Volume of mohr's salt solution prepared = 100 mL

Molarity of Mohr's salt solution = M/40

Volume of Mohr's salt solution taken for each titration = 10 mL

Result :- Molarity of $KMnO_4$ solution - 0.0077 M

Strength of $KMnO_4$ solution - 01.22

Teacher's Signature :

Date

Expt. No.

Page No. 24

Aim :- To prepare sol. of N/50 oxalic acid. Using this solution find out molarity and strength of given unknown $KMnO_4$ solution

Apparatus - Burette pippette, flask, watch glass, weight box, chemical balance, 100 mL measuring flask oxalic acid crystals, $KMnO_4$ sol-, Conc. H_2SO_4.

Procedure -

i. Rinse and fill the burette with given $KMnO_4$ sol.n
ii. Note initial burette reading and pipette out. 10 mL of oxalic acid solution in titration flask and then add half test tube dilute H_2SO_4 to it. Shake contents of flask and heat them to 50°-60° C
iii. Now add $KMnO_4$ solution from burrette while shaking the contents in flask till a permanent light pink colour is just obtained in solution.
iv. Note down the final burette readings.
v. Repeat above steps 2-3 time to get concordant readings.

I Determination of Molarity of $KMnO_4$ solution.

$$\frac{M_{KMnO_4} \times V_{KMnO_4}}{M_{oxalic\ acid} \times V_{oxalic\ acid}} = \frac{2}{5}$$

$$M_{KMnO_4} = \frac{2 \times 1 \times}{5 \times 50 \times 4.4}$$

Teacher's Signature :

Observation –

Weight of oxalic acid :
Vol of sol.n prepared :
Molarity of oxalic acid sol.n :
Vol. of oxalic acid sol.n taken for each titration :

Initial Reading	final Reading	Vol. of $KMnO_4$ used
0	11.5	11.5
11.5	23.2	11.7
23.2	34.6	11.4
34.6	46.1	11.5

$$M_{KMnO_4} = \frac{2 \times 1 \times \quad}{5 \times 40 \times 4.4} =$$

Strength = Molarity × Molecular mass

Result – The molarity of given $KMnO_4$ sol.n =
Strength of given $KMnO_4$ sol.n =

Expt. No. _____ Date _____

II Determination of strength of $KMnO_4$ solution.

Strength = Molarity x Molecular Mass

Result - The molarity of given $KMnO_4$ sol.n. =
Strength of given $KMnO_4$ soln. =

Precautions -

1. Transfer crystalls carefully
2. Read upper miniscus in burette
3. Don't rinse titration flask with oxalic acid
4. Oxalic acid solution should keep warm during titration.

Teacher's Signature : _____

Aim – To analyse the given salt systematically

Reaction –

$$CO_3^{2-} + H_2SO_4 \longrightarrow SO_4^{2-} + H_2O + CO_2 \uparrow$$

Expt. No. 15 Date

Page No. 26

Aim - To analyse the given salt systematically

SNo	Experiment	Observation	Inference
	I) Physical Examination		
	i) Colour	White	Cu^{2+}, Fe^{3+}, Ni^{2+}, Co^{2+}, Mn^{2+} absent
	ii) Odour	Ammonical	NH_4^+ may be
	iii) Solubility		
	→ In water	Soluble	Soluble salt ie. Pb^{2+} absent
	→ In dil. HCl	Soluble	Soluble salt ie. Pb^{2+} absent
	Test for anion		
	II) Test with dil. H_2SO_4		
→	Salt + dil. H_2SO_4	Brisk effervescence	CO_3^{2-} may be
→	Salt + dil. H_2SO_4 + pass the evolved gas through lime water	lime water turns milky	CO_3^{2-} present
→	evolved gas + acidified $KMnO_4$(aq.)	$KMnO_4$ does not decolurised	CO_3^{2-} confirmed

Teacher's Signature : _____

Reaction -

$$NH_3(g) + HCl \longrightarrow NH_4Cl$$

$$2.\ K_2[HgI_4] + 4NH_3 + H_2O \longrightarrow \underset{\text{Reddish brown ppt.}}{NH_2 \cdot HgO \cdot HgI} + 4KI + 3NH_4I$$

Result - The given salt contains

1. Anion - CO_3^{2-}
2. Cation - NH_4^+

Date

Expt. No.

SNo.	Experiment	Observation	Inference
	Test for cation		
1)	Salt + NaOH + Δ	Ammonical colour	NH_4^+ may be
2)	Bring a glass rod dipped in conc. HCl near the mouth of test tube.	white dense fumes	NH_4^+ present
3)	Pass the evolved gas through Nesseler's Reagent K_2HgI_4 (aq.)	Reddish Brown ppt.	NH_4^+ confirmed

Result -

The given salt contains :-

- Anion - CO_3^{2-}
- Cation - NH_4^+

Teacher's Signature :

Aim:- To analyse the given salt systematically

Reactions -

$$NO_3^- + H_2SO_4 \longrightarrow HSO_4^- + HNO_3$$

$$HNO_3 + C \xrightarrow[\text{a- turning}]{} HNO_2 + CO_2 + 2H_2O$$

Date

Expt. No. 16 Page No. 28

Aim :- To analyse the given salt systematically.

S.No	Experiment	Observation	Inference
I	Physical Examination		
1)	Colour	White	Cu^{2+} Fe^{3+} Ni^{2+} Co^{2+} Mn^{2+} absent
2)	Odour	odourless	NH_4^+, CH_3COO^-, S^{-2} absent
3)	Solubility		
	→ In water		
	→ In dil. HCl		
	Test for anion		
II	Test with dil. H_2SO_4	No characteristic	CO_3^{2-} S^{2-} SO_3^{2-}
	Salt + dil. H_2SO_4	odour	NO_2^- absent
III	Test with conc. H_2SO_4		
→	Salt + conc. H_2SO_4 + Heat		
		Pungent / Brown gas	Br^- or NO_2^- may be
→	Above solution + Cu-turning + heat	Intensity of brown gas increases	NO_3^- may be
IV	Salt solution + freshly prepared $FeSO_4$ solution	Dark brown ring appears	NO_3^- confirmed

Teacher's Signature :

Expt. No. _____ Date _____

Page No. 29

S.No.	Experiment	Observation	Inference
	+ conc. H_2SO_4 by the sides of the tube		
V	Test for cation		
	→ Salt + NaOH + Δ	no NH_3 odour	NH_4^+ absent
1.	Test for 1st group		
	→ Salt soln + dil. HCl	white ppt.	Pb^{2+} may be
	→ ppt + H_2O + Δ	ppt. soluble	make its two parts
	1st + K_2CrO_4 (aq.)	Yellow ppt.	Pb^{2+} confirmed
	IInd + KI (aq.)	Yellow ppt.	Pb^{2+} confirmed

Result - The given salt contains

1) Anion - NO_3^-

2) Cation - Pb^{2+}

Teacher's Signature : _____

Aim :- To analyse the given salt systematically

Reactions :-

$$Ba^{2+}(aq.) + SO_4^{2-}(aq.) \longrightarrow \underset{\text{white}}{BaSO_4(s)}$$

Date _____

Expt. No. 17 Page No. 30

Aim :- To analyse the given salt systematically

S.No.	Experiment	observation	Inference
I	Physical Examination		
	1) Colour	Blue	Cu^{2+} may be
	2) Odour	odourless	NH_4^+, CH_3COO^-, S^{2-} absent
	3) Solubility		
	→ In water		
	→ In dil HCl		
	Test for anion		
II	Test with dil. H_2SO_4	No gas	CO_3^{2-}, S^{2-}, SO_3^{2-}, NO_2^- absent
	salt + dil. H_2SO_4		
III	Test with conc. H_2SO_4	No gas	Cl^-, Br^-, I^- and NO_3^- absent.
	salt + conc. H_2SO_4		
IV	Test for sulphate	white ppt.	SO_4^{2-} confirmed
	WF or SE + $BaCl_2$ (aq.) + conc HCl + HNO_3		
V	Test for cation		
	→ salt + NaOH + Δ	no NH_3 odour	NH_4^+ atom.

Teacher's Signature : _____

Reactions -

$$Cu^{2+}(aq.) + 2OH^-(aq.) \longrightarrow \underset{\text{blue}}{Cu(OH)_2(s)}$$

$$Cu(OH)_2(s) + 4NH_3 \longrightarrow \underset{\text{Blue}}{[Cu(NH_3)_4]^{2+}} + 2OH^-(aq.)$$

Result -; The given salt contains

i) Anion :- SO_4^{2-}

ii) Cation :- Cu^{2+}

Date _____

Expt. No. _____ Page No. 31

S.No	Experiment	Observation	Inference
1.	Test for 1st group → salt solution + dil. HCl	No ppt.	Pb^{2+} is absent
2	Test for 2nd group → salt sol.n + dil HCl + pass H_2S gas	black ppt.	Pb^{2+} Hg^{2+} Cu^{2+} may be
	→ salt sol.n + $K_2Cr_2O_4$(aq.)	No ppt.	Pb^{2+} absent
	→ salt sol.n + NH_4OH	A bluish white ppt.	Cu^{2+} may be
	→ salt sol.n + excess NH_4OH	deep blue solution	Cu^{2+} may be
	→ Blue solution + acetic acid + Potassium ferro cyanide solution	A chocolate red ppt.	Cu^{2+} is confirmed

Result :- The given salt contains

1) Anion :- SO_4^{2-}

2) Cation :- Cu^{2+}

Teacher's Signature : _____

Aim - To analyse the given salt systematically

Reactions -

$$AgNO_3 + Cl^- \longrightarrow \underset{\text{white}}{AgCl} + NO_3^-$$

$$AgCl + 2NH_3 \longrightarrow Ag(NH_3)_2 \quad (aq.)$$

Date

Expt. No. 18 Page No. 32

Aim - To analyse the given salt systematically

S.No.	Experiment	Observation	Inference
I)	Physical Examination		
	1) colour	Dark brown	Fe^{3+} may be
	2) odour	odourless	NH_4^+, CH_3COO^-, S^{2-} absent
	3) solubility		
	→ In water	soluble	Pb^{2+} absent
	→ In dil HCl	soluble	Pb^{2+} absent
	Test for anion		
II)	Test with conc. dil. H_2SO_4		CO_3^{2-}, S^{2-}, SO_3^{2-}
	Salt + dil H_2SO_4	No gas	NO_2^- absent
III)	Test with conc. H_2SO_4		
1)	Salt + conc H_2SO_4	colourless gas with a pungent smell	Cl^- may be
2)	Above solution + bring a glass rod dipped in NH_4OH	dense white fumes	Cl^- may be
3)	salt solution + $AgNO_3$ sol.n + dil. HNO_3	white ppt.	Cl^- confirmed
	Above sol.n + NH_4OH	ppt. is soluble	Cl^- confirmed

Teacher's Signature :

Reactions –

$$2Cl\,(s) + K_2Cr_2O_7\,(s) + H_2SO_4 \longrightarrow K_2SO_4\,(aq.) + 2CrO_2Cl_2$$

Chromyl chloride

$$CrO_2Cl_2\,(s) + NaOH\,(aq) \longrightarrow Na_2CrO_4\,(aq) + 2NaCl\,(aq.)$$

Yellow sol.n

$$Na_2CrO_4\,(aq.) + (CH_3COO)_2Pb\,(aq.) \longrightarrow PbCrO_4 + 2CH_3COONa$$

Yellow ppt of lead chromate

$$Fe^{3+}\,(aq.) + 3OH^-\,(aq.) \longrightarrow Fe(OH)_3\,(s)$$

$$Fe(OH)_3\,(s) + CaCl_2\,(aq.) \longrightarrow FeCl_3\,(aq.) + 3H_2O\,(l)$$

$$FeCl_3\,(aq.) + K_4[Fe(CN)_6]\,(aq) \longrightarrow KFe[Fe(CN)_6] + 3KCl$$

Result – The given salt contains

1) Anion – Cl^-
2) Cation – Fe^{3+}

Date

Expt. No. _____ Page No. 33

S.No	Experiment	Observation	Inference
IV)	Test for cation → salt + NaOH + Δ	no NH_3 odour	NH_4^+ absent
1.	Test for 1st group → salt sol.n + dil HCl	No ppt	Pb^{2+} is absent
2.	Test for IInd group → salt sol.n + dil. HCl + pass H_2S gas	No ppt.	Pb^{2+} Hg^{2+} Cu^{2+} As^{2+} absent
3.	Test for IIIrd group → salt sol.n + NH_4Cl(s) + NH_4OH in excess	A reddish brown ppt.	Fe^{3+} may be
	→ salt sol.n + acidified $KMnO_4$ soln added dropwise	pink colour of $KMnO_4$ does not discharged	Fe^{3+} confirmed

Result :- The given salt contains :-

1) Anion - Cl^-
2) cation - Fe^{3+}

Teacher's Signature : _____

Aim :- To analyse the given salt systematicaly.

Reaction:

SO_4^{-} (aq.) + Ba^{2+} ⟶ $BaSO_4$ (s)
white.

Date _____

Expt. No. 19 Page No. 34

Aim – To analyse the given salt systematically

S.No.	Experiment	Observation	Inference
I)	Physical Examination		
1)	Colour	Colourless	Cu^{2+}, Fe^{3+}, Ni^{2+}, Co^{2+} Mn^{2+} absent
2)	Odour	odourless	NH_4^+, CH_3COO^-, S^{2-} absent
3)	Solubility		
	→ In water	soluble	Pb^{2+} absent
	→ In dil. HCl		
	Test for anion		
II)	Test with dil. H_2SO_4 salt + dil H_2SO_4	No gas	CO_3^{2-} S^{2-} SO_3^{2-} NO_2^- absent
III	Test with conc. H_2SO_4 Salt + conc H_2SO_4	No gas	Cl^-, Br^-, I^- and NO_3^- absent
IV	Test for sulphate WE or SE + $BaCl_2$(aq.) + conc. HCl + HNO_3	white ppt.	SO_4^{2-} confirmed
V)	Test for cation → Salt + NaOH + Δ	no NH_3 odour	NH_4^+ absent

Teacher's Signature : _____

Reaction

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

Result :- The given salt contains :-

1) Anion - SO_4^{2-}
2) Cation - Al^{3+}

Date _____

Expt. No. _____ Page No. 35

1. Test for 1st group		
→ Salt sol.n + dil HCl	No ppt.	Pb^{2+} is absent
2. Test for IInd group		
→ salt sol.n + dil HCl + pass H_2S gas	No ppt.	Pb^{2+}, Hg^{2+} Cu^{2+} As^{2+} absent
3. Test for IIIrd group		
→ salt sol.n + NH_4Cl (s) + NH_4OH in excess	A white gelatinous ppt.	Al^{3+} may be
→ salt sol.n + NaOH sol.n	white gelatinous ppt. soluble in excess of NaOH	Al^{3+} may be
→ Above clear solution + NH_4Cl (s) + Heat	white gelatinous ppt. reappears	Al^{3+} confirmed

Result :- The given salt contains :-

1) Anion - SO_4^{2-}

2) Cation - Al^{3+}

Teacher's Signature : _____

Aim - To analyse the given salt systematically

Reaction

$$AgNO_3 + Cl^- \longrightarrow AgCl\ (s) + NO_3^-\ (aq)$$

$$AgCl\ (s) + 2NH_3 \longrightarrow Ag(NH_3)_2Cl\ (aq.)$$

Date

Expt. No. 20 Page No. 36

Aim – To analyse the given salt systematically

Materials Required – Test tube, Test tube stand, watch glass, glass rod, burner, dropper.

Chemicals required – dil. H_2SO_4, conc. H_2SO_4, dil HCl, conc. HCl, NaOH, NH_4Cl, NH_4OH

S.N.	Experiment	Observation	Inference
1.	Physical Examination		
	i) colour	off white	Zn^{2+} may be
	ii) odour	odourless	NH_4^+, S^{2-}, CH_3COO^- SO_4^{2-} absent
	iii) Solubility in H_2O	soluble	Pb^{2+} absent
2.	Test for anion		
	i) Salt soln. + dil H_2SO_4	No characteristic odour	CO_3^{2-}, NO_2^-, S^{2-} absent
	ii) Salt soln + conc. H_2SO_4 + Δ.	colourless pungent smell	Cl^- may be
3.	$AgNO_3$ test		
	i) Salt soln + dil HNO_3 + $AgNO_3$	white curdy ppt.	Cl^- confirm
	ii) ppt. + NH_4OH	ppt. soluble	Cl^- confirm

Teacher's Signature : _____

Reactions –

$$Zn^{2+}(aq) + 2OH^- \longrightarrow Zn(OH)_2\ (s)$$

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

$$ZnCl_2 + K_4[Fe(CN)_6] \longrightarrow Zn[Fe(CN)_6] + 4KCl$$

Result :- The given salt contains

1) Anion – Zn^{2+} (zinc)
2) Cation – Cl^- (chloride)

Date _____

Expt. No. _____ Page No. 37

	Test for cation		
i)	salt + NaOCl + Δ	No NH_3 odour	NH_4 absent
ii)	salt sol.n + dil. HCl	No white ppt.	Ist group absent ie. Pb^{2+}, Cu^{2+}
iii)	salt sol.n + dil HCl + H_2S (g)	No black / yellow ppt.	Cu^{2+}, Pb^{2+}, Hg^{2+} Ca^{2+} absent
iv)	salt sol.n + NH_4Cl + NH_4OH	No white / brown ppt.	IIIrd group absent
v)	Salt sol.n (above) + H_2S (g)	white ppt	IV group may be present
vi)	white ppt + dil. HCl	ppt soluble	make it 2 parts
	I + NaOH	ppt. soluble	Zn^{2+} confirm
	II + $K_4[Fe(CN)_6]$	Bluish white ppt	Zn^{2+} confirms

Result :- The given salt contains :-

i) Anion - Zn^{2+} (zinc)

ii) Cation - Cl^- (chloride)

Teacher's Signature : _____

Aim - To analyse the given salt systematically.

Reactions Involved -

$$NaBr + H_2SO_4 \longrightarrow NaHSO_4 + HBr$$

$$H_2SO_4 + 2HBr \longrightarrow SO_2 + Br_2 + H_2O$$

$$Br^- + Ag^- \longrightarrow AgBr$$

Pale Yellow

Date

Expt. No.

Aim :- To analyse the given salt systematically

Materials Required :- Test tube, test tube holder, watch glass, glass rod, burner, dropper

Chemical Required :- Distilled water, dil. H_2SO_4, conc. H_2SO_4, dil HCl, conc. HCl, NaOH, NH_4Cl, NH_4OH $(NH)_2CO_3$

S.No	Experiment	Observation	Inference
1.	Physical Examination		
	i) colour	white	Cu^{2+}, Fe^{3+}, Ni^{2+}, Ca^{2+} abs
	ii) Odour	odourless	NH_4^+, CH_3COO^-, S^{2-} absent
	iii) Solubility in H_2O	soluble	CH_3COO^- absent
	iv) Solubility in HCl	soluble	Pb^{2+} absent
2	Test for Anion		
i)	Salt + dil. H_2SO_4	No characteristic odour	NO_2^-, CO_3^{2-}, S^{2-} absent
ii)	Salt + conc. H_2SO_4	Reddish Brown vapour	Br^- may be
iii)	Put starch paper on reddish vapour	starch paper turns orange yellow	Br^- may be
3.	$AgNO_3$ test		
i)	S.S. + dil HNO_3 + $AgNO_3$ + Δ	Pale yellow ppt of AgBr	Br^- confirm

Teacher's Signature :

Reaction Involved

i) $Ca^{2+} + CO_3^{2-} \longrightarrow CaCO_3\ (s)$

ii) $CaCO_3\ (s) + CH_3COOH \longrightarrow Ca(CH_3COO)_2 + H_2O$
$CO_2\ (g)$

iii) $Ca(CH_3COO)_2 + (NH_4)_2C_2O_4 \longrightarrow CaC_2O_4 +$
$2\ CH_3COO^-$
white ppt.

Result :- The given salt contains -

1) Anion - Br^-
2) Cation - Ca^{2+}

Expt. No. _____ Date _____

Page No. 39

	Test for cation		
i)	salt + NaOH + Δ	No NH_3 smell	NH_4^+ absent
ii)	salt soln + dil. HCl	No white ppt.	1st group absent
iii)	Test for IInd group salt sol.n (above) + $H_2S(g)$	No black/yellow ppt.	IInd group absent
iv)	Test for IIIrd group salt + NH_4Cl + NH_4OH	No white/brown ppt.	IIIrd group i.e. Fe^{3+} Al^{3+} absent
	Test for IV group Ammonical soln + $(NH_4)_2CO_3$	white ppt.	Ba^{2+}, Sr^{2+}, Ca^{2+} may be
	white ppt + CH_3COOH	White ppt soluble	___, Ca^{2+} may be
	above sol.n + $(NH_4)_2SO_4$	white ppt.	Ca^{2+} confirm

Result :- The given salt contains :-

i) Anion - Br^- (bromide)

ii) Cation - Ca^{2+} (calcium)

Teacher's Signature : _____

Aim :- To analyse the given salt systematically

Reactions -

$$AgNO_3 + Cl^- (aq.) \longrightarrow AgCl + NO_3^-$$

$$AgCl + 2NH_3 \longrightarrow Ag(NH_3)_2Cl (aq.)$$

Date

Expt. No. 22 Page No. 40

Aim :- To analyse the given salt systematically

Materials Required - Test tube, test tube holder, watch glass, glass, burner, dropper.

Chemicals Required - dil. H_2SO_4, conc. H_2SO_4, dil. HCl, conc. HCl, NaOH, NH_4Cl, $(NH_4)_2CO_3$

S.No.	Experiment	Observation	Inference
1.	Physical Examination		
i)	Colour	white	Ca^{2+}, Cu^{2+}, Fe^{3+}, Ni^{2+} absent
ii)	odour	odourless	NH_4^+, S^{2-}, CH_3COO^- absent
iii)	Solubility in H_2O	soluble	
	Solubility in HCl	soluble	
2	Test for anion		
i)	salt + dil H_2SO_4	No characteristic odour	CO_3^{2-}, NO_2^- absent
ii)	salt + conc. H_2SO_4 + Δ	colourless pungent smell	Cl^- may be
3.	$AgNO_3$ test		
i)	Salt sol.n + dil HNO_3 + $AgNO_3$	white curdy ppt.	Cl^- confirm

Teacher's Signature :

Reactions –

i) $Ba^{2+}(aq.) + CO_3^{2-} \longrightarrow BaCO_3$

ii) $BaCO_3 + CH_3COOH \longrightarrow Ba(CH_3COO)_2 + H_2O + CO_2$

iii) $Ba(CH_3COO)_2 + K_2Cr_2O_7 \longrightarrow BaCr_2O_7\ (s) + CH_3COOK$

Yellow ppt.

Result – The given salt contains –

Anion – Chloride (Cl^-)

Cation – Barium (Ba^{2+})

Date _____

Expt. No. _____ Page No. 41

ii)	ppt + NaOH	ppt soluble	Cl^- confirm
	Test for cation		
i)	Salt sol.n + NaOH + Δ	No NH_3 odour	NH_4 absent
	Test for 1st Group		
ii)	Salt sol.n + dil. HCl	No white ppt	1st group Pb^{2+} absent
	Test for II nd Group		
iii)	salt. sol.n + dil HCl + H_2S (g)	No black / yellow ppt.	II nd group absent
	Test for III rd group		
iv)	Salt sol.n + NH_4OH + NH_4Cl	No white / brown ppt.	III rd group absent
	Test for IV th group		
v)	ammonical sol.n + H_2S (g)	No white ppt	IV group absent
	Test for V group		
vi)	ammonical sol.n + $(NH_4)_2CO_3$	white ppt.	V group present
vii)	ppt (w) + CH_3COOH	ppt soluble	Ba^{2+} may be
viii)	ppt + $K_2Cr_2O_7$	yellow ppt.	Ba^{2+} confirm

Result :- The given salt contains :-

Anion - Chloride (Cl^-)

Cation - Barium (Ba^{2+})

Teacher's Signature : _____

Aim :- To analyse the given salt systematically

Reactions -

$KNO_3 + H_2SO_4 \longrightarrow KHSO_4 + HNO_3(g)$

$4HNO_3 + C \longrightarrow \uparrow 4NO_2 + CO_2(g) + 2H_2O$

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

Date

Expt. No. 23 Page No. 42

Aim :- To analyse the given salt systematically

Materials Required - Test tube, test tube holder, watch glass, glass rod, dropper, burner

Chemical Required - Distilled water, dil H_2SO_4, conc H_2SO_4, dil. HCl, conc. HCl, NH_4Cl, NH_4OH, NaOH, $(NH_4)_2CO_3$.

S.No	Experiment	Observation	Inference
1.	Physical examination		
	i) Colour	white	Cu^{2+}, Fe^{3+}, Ni^{2+}, Ca^{2+} absent
	ii) Odour	odourless	NH_4^+, CH_3COO^-, S^{2-} absent
	iii) Solubility in H_2O	soluble	
	Solubility in HCl	soluble	
2.	Test for anion		
i)	Salt + dil. H_2SO_4	No characteristic odour	CO_3^{2-}, NO_2^- absent
ii)	Salt + conc. H_2SO_4	colourless gas with HNO_3 vapour	NO_3^- may be present
3.	Ring Test		
i)	Salt soln + $FeSO_4$ + H_2SO_4 from side	Brown ring of $FeSO_4NO$	NO_3^- confirm

Teacher's Signature : _____

Reactions :-

$$Sr^{2+} + CO_3^{2-} \longrightarrow SrCO_3 \downarrow$$

white ppt.

$$SrCO_3 + 2CH_3COOH \longrightarrow Sr(CH_3COO)_2 + H_2O(l) + CO_2(g)\uparrow$$

$$Sr(CH_3COO)_2 + (NH_4)_2SO_4 \longrightarrow SrSO_4 + 2CH_3COOH$$

white ppt.

Date

Expt. No. Page No. 43

	of test tube		
	Test for Cation		
i)	Salt + NaOH + Δ	No NH_3 odour	NH_4^+ absent
ii)	Salt sol.n + dil HCl +	No white ppt.	1st group absent
iii)	Salt sol.n + dil. HCl + H_2S (g)	No black/Yellow ppt	IInd group absent
iv)	Salt sol.n + NH_4OH + NH_4Cl	No white/Brown ppt.	IIIrd group absent
v)	above sol.n + H_2S (g)	No white ppt	IV group absent
vi)	ammonical sol.n + $(NH_4)_2CO_3$	white ppt.	V group present
	white ppt + CH_3COOH	ppt. soluble	Ba^{2+}, Sr^{2+}, Ca^{2+} may be
	Make its 2 Parts		
	I + $K_2Cr_2O_4$	No Yellow ppt	Ba^{2+} absent
	II + $(NH_4)_2SO_4$	White ppt	Sr^{2+} confirm

Result :- The given salt contains :-

Anion - NO_3^- (Nitrate)

Cation - Sr^{2+} (Strontium)

Teacher's Signature :

Aim - To analyse the given salt systematically

Reactions -

$$NO_3^- + H_2SO_4 \longrightarrow HSO_4^- + HNO_3$$

$$HNO_3 + C \longrightarrow 4NO_2 + CO_2 + 2H_2O$$

(a brown fuming)

Date

Expt. No. Page No. 44

Aim:- To analyse the given salt systematically

	Experiment	Observation	Inference
1.	Physical Examination		
	i) Colour	white	Cu^{2+}, Fe^{3+}, Ni^{2+}, Ca^{2+} absent
	ii) Odour	Odourless	NH_4^+, CH_3COO^-, S^{2-} absent
	iii) Solubility in H_2O	soluble	
	solubility in HCl	soluble	
2.	Test for anion		
	i) salt + dil. H_2SO_4	No characteristic odour	CO_3^{2-}, S^{2-}, SO_3^{2-}, NO_2^- absent
	ii) salt + conc. H_2SO_4 + Δ	Pungent / Brown gas	Br^- or NO_3^- may be
	iii) Above solution + Cu turning + heat	Intensity of brown gas increases	NO_3^- may be
	iv) Salt sol.n + freshly prepared $FeSO_4$ sol.n + conc H_2SO_4 by the sides of the tube	Dark brown ring appears	NO_3^- confirmed

Teacher's Signature :

Reactions -

a) Ammonium Phosphate test

$$MgCl_2 + NH_4OH + (NH_4)_2HPO_4 \longrightarrow Mg(NH_4)PO_4 \downarrow + 2NH_4Cl + H_2O$$

b). Charcoal cavity / Cobalt nitrate test

$$MgO + CoO \longrightarrow MgO.CoO \text{ (Pink mass)}$$

Date

Expt. No.

3.	Test for cation		
i.	salt soln + Nessler's reagent	No reddish brown ppt. formed	Group 0 absent
2.	salt sol.n + add dil. HCl	No white ppt.	Group 1 absent
3.	Salt sol.n + dil. HCl + H_2S gas passed	No ppt formed	Group 2 absent
4.	salt sol.n + add NH_4Cl and NH_4OH	No gelatinous ppt. formed	Group 3 absent
5.	To the salt solution, NH_4OH and NH_4Cl were added and H_2S gas was passed	No ppt formed	Group 4 absent
6	Salt soln + NH_4Cl, NH_4OH and $(NH_4)_2SO_3$	No white ppt	Group 5 absent
7.	Salt sol.n + NH_4Cl, NH_4OH and Na_2HPO_4 (Disodium hydrogen-phosphate) were added and test tube crashed from inside	white ppt.	Mg^{2+} confirmed

Teacher's Signature :

Date

Expt. No.

Page No. 46

	with glass rod		

Result - The given salt contains

Anion - NO_3^-

Cation - Mg^{2+}

Teacher's Signature :