

**R. S. M. PUBLIC SCHOOL, SUPAUL**

**CHEMISTRY (043)**

**PRACTICAL FILE**

**SESSION (-----)**

**NAME:-**

**CLASS:-**

**ROLL NO:-**

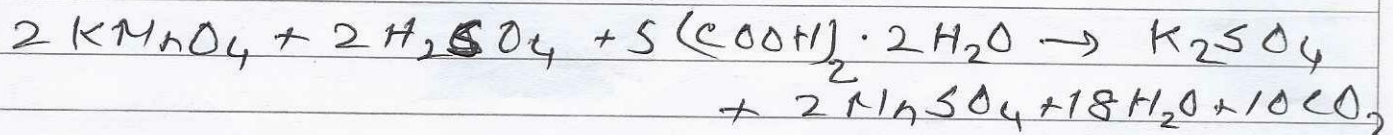
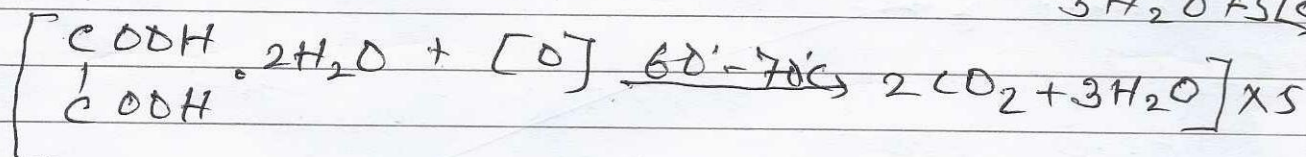
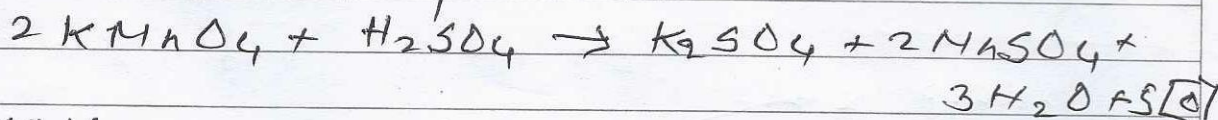
# INDEX

SN.	Name of experiment	Page No	Part of exp.	Date of Submission	Remarks
1.	To Prepare $N/20$ solution on all acid and with its help find out the molarity of the given salt.	01-03			
2.	Preparation of $N/20$ soln of Mohr's salt. Find out the molarity of $KMnO_4$	04-06			
3.	Test for Carboxylic acid	07-08			
4.	Preparation of Potash alum	09-10			
5.	Preparation of Mohr's Salt	11-12			
6.	To analyse the given inorganic salt into cation and anion.	13-14			
7.	To analyse the presence of Bromide ( $Br^-$ ) ion in the given salt.	15-16			

AIM - To prepare M/20 solution of oxalic acid and with its help find out the molarity of the given  $KMnO_4$  solution.

Theory -

chemical equation -



Indicator  $\rightarrow$   $KMnO_4$  is itself an indicator

End point  $\rightarrow$  Colourless to permanent pink colour.

Procedure -

We weight 126 gm of oxalic acid crystals and dissolve it in 250 ml water to prepare M/20 oxalic acid solution in 500ml measuring flask.

We take a burette and rinse it with  $KMnO_4$  solution after cleaning.

Add 25 ml dilute  $H_2SO_4$  to the solution.

Now we note the initial point of burette and perform titration for the purpose and note the end point after getting end point.

∴ we repeat the process 3-4 times to get correct reading.

Calculation -

∴ 1000 ml of (M) oxalic acid = 126 gm of oxalic acid crystals

∴ 1000 ml of 0.05 oxalic acid =  $126 \times 0.05$  gm of oxalic acid

∴ 250 ml of 0.05 oxalic acid =  $\frac{126 \times 0.05 \times 250}{1000}$   
= 1.575 gm of oxalic acid.

Observation -

No. of reading	Vol. of $H_2O$ oxalic acid	Burette reading in ml.			concurrent reading
		Initial	Final	Difference	
01	25 ml	1.0	25.9	24.9	
02	25 ml	5.0	29.7	24.7	24.7
03	25 ml	0.0	24.7	24.7	
04	25 ml.	5.8	30.5	24.7	

Calculation

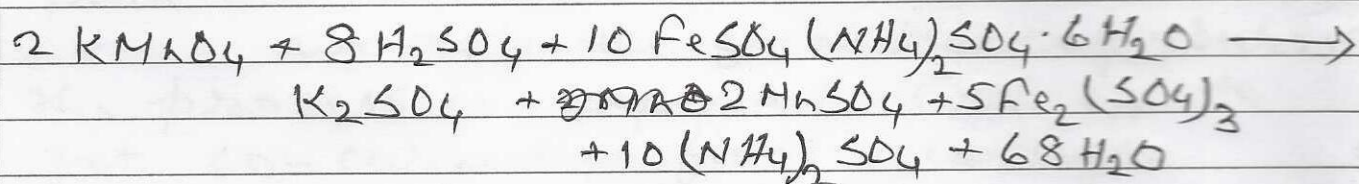
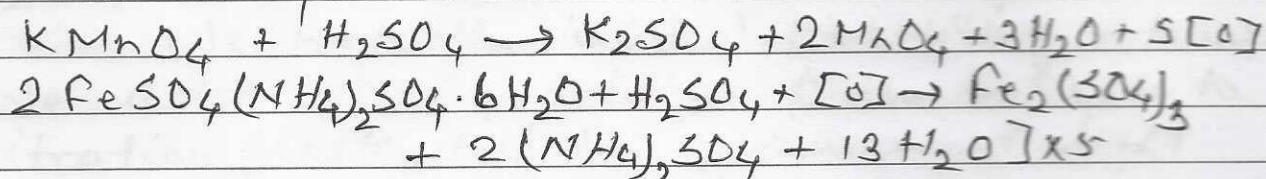
Molarity of  $KMnO_4$  solution  
From the over all balanced chemical equation, it is clear that 2 moles of  $KMnO_4$  reacts with 5 moles of oxalic acid.

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

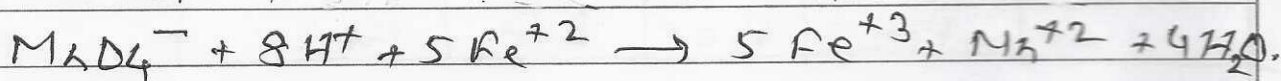
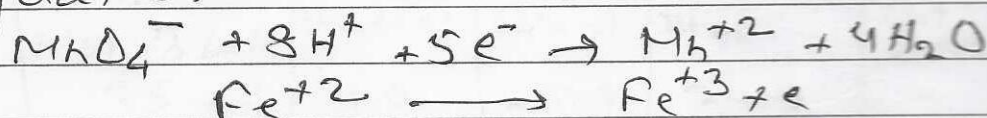


AIM:- Preparation of  $M/20$  solution of ferrous ammonium sulphate (Mohr's salt). Find out the molarity and strength of given  $KMnO_4$  solution.

Chemical equation -



Ionic equation -



Indicator -  $KMnO_4$  is itself an indicator.

End point - Colourless to permanent pink colour. ( $KMnO_4$  in burette).

Apparatus - Measuring flask, burette, pipette, stand, ...

Procedure - 250 ml of  $M/20$  Mohr's salt solution is prepared, by dissolving 4.9 gm

of Mohr's salt in 250 ml water.

Now we rinse a burette with  $\text{KMnO}_4$  solution and filled it with  $\text{KMnO}_4$  solution. We add one test tube about 25 ml dilute  $\text{H}_2\text{SO}_4$  to the solution in titration flask.

We note the initial reading of burette. We add  $\text{KMnO}_4$  solution from burette to titration flask, till the permanent light pink coloured solution is obtained.

We note the final reading of burette. The process is repeated 4 times to get concordant final readings.

No. of experiment	Vol. of $\text{M}/20$ Mohr's salt	Burette reading (ml)			Concordant reading
		Initial	Final	Diff.	
01	25 ml	1.0	25.9	24.9	24.7 ml
02	25 ml	5.0	29.7	24.7	
03	25 ml	0.0	24.7	24.7	
04	25 ml	5.8	30.7	24.9	

Calculation -

Molarity of  $\text{KMnO}_4$

From chemical equation it is clear that 2 moles of  $\text{KMnO}_4$  reacts with 10 moles of Mohr's salt.

$$\therefore \frac{M_{\text{KMnO}_4} \times V_{\text{KMnO}_4}}{M_{\text{Mohr's salt}} \times V_{\text{Mohr's salt}}} = \frac{2}{10}$$

$$\Rightarrow \frac{M_{\text{KMnO}_4} \times 24.7}{\frac{1}{20} \times 25} = \frac{2}{10}$$

$$\Rightarrow M_{\text{KMnO}_4} = \frac{\frac{2}{5 \times 10} \times \frac{1}{20} \times 25}{24.7}$$

$$= \frac{1}{4 \times 24.7} = \frac{1}{98.8} = 0.01 \text{ M.}$$

Precautions -

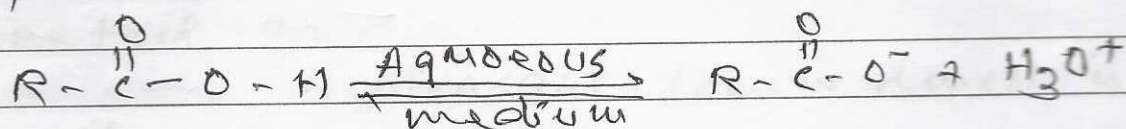
- (i)  $\text{KMnO}_4$  solution should be prepared carefully.
- (ii) Readings should be taken properly.
- (iii) Apparatus should be rinsed properly.



AIM — Test for Carboxylic acid.

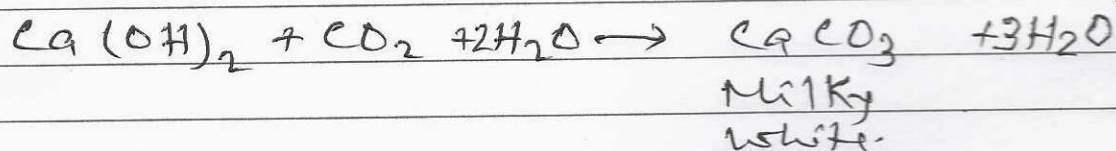
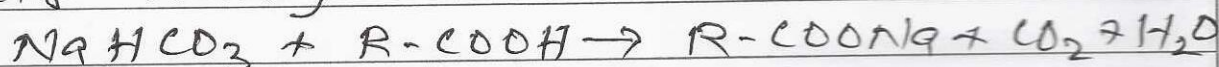
Theory — Carboxylic acid turns blue litmus to red. Carboxylic acid reacts with  $\text{NaHCO}_3$  to give  $\text{CO}_2$  gas with effervescence.

Litmus Test — Carboxylic acid turns blue litmus to red. We add some drops of acid on blue litmus paper, it turns red. The hydroxyl group in  $-\text{COOH}$  is more acidic, it has replaceable  $\text{H}^+$  in aqueous medium.



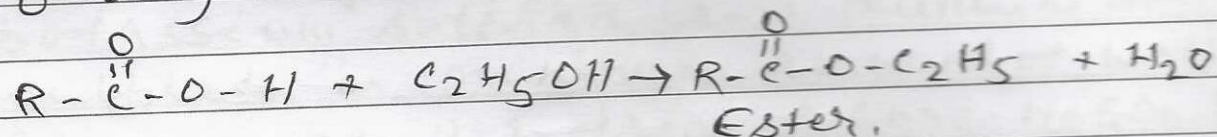
Result — Red colour of litmus paper shows that the given sample is an acid.

2.  $\text{NaHCO}_3$  Test — We take small amount of  $\text{NaHCO}_3$  in a test tube and add the given sample in it. A gas is evolved with effervescence, which turns lime water milky.



ESTER TEST:-

Theory - Carboxylic acid reacts with alcohol in presence of  $H_2SO_4$  to give ester which is recognised by pleasant fruity smell.



Procedure:- A small quantity of organic acid is taken in a test tube and 5 drops of  $C_2H_5OH$  is added to it along with 1-2 drops of conc.  $H_2SO_4$ . Test tube is heated gently.

A pleasant fruity smell is produced.

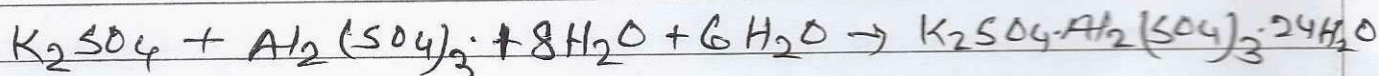
Result - Fruity smell confirms that the given sample is carboxylic acid.

---

---

AIM - Preparation of Potash alum  
 $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$ .

Theory - Potash alum is prepared by dissolving equimolar amount of potassium sulphate and aluminium sulphate in minimum amount of water containing 2-3 drops of conc.  $H_2SO_4$ . The solution thus obtained is subjected to crystallization which yields the crystals of potash alum.



174 gm

↓

1.74 × 4

↓

6.98

≈ 7 gm

666 gm

↓

6.66 × 4

↓

26.63

≈ 26.6 gm

948 gm

↓

9.48 × 4

↓

37.92

≈ 38 gm

Materials required

Two beakers of 250 ml, china dish, funnel, stand, tripod, wire gauze, a glass rod, filter paper.

Procedure - we take 7 gm of  $K_2SO_4$  in a clean test tube and ~~we~~ add minimum amount of distilled water to dissolve it.

Teacher's Signature \_\_\_\_\_

In another test tube we take 26.6 gm of  $Al_2(SO_4)_3 \cdot 24H_2O$  and dissolve it in minimum amount of distilled water. Also add 2-3 drops of conc.  $H_2SO_4$ . Now we take both the solutions in a beaker.

Now we heat the mixture of solutions to crystallization point.

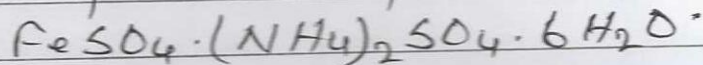
Now, the hot solution is allowed to cool to minimum temp. As the solution cools down, crystals of Potash alum separates out.

### Observation -

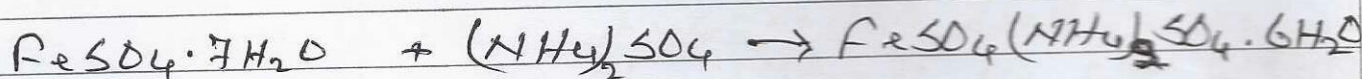
- \* Colour of crystals - colourless
- \* Shape of crystals - octahedral
- \* Weight of crystals - 38 gm.

### Precautions:

- \*  $K_2SO_4$  and  $Al_2(SO_4)_3$  should be dissolved in minimum volume of distilled water.
- \* Few drops of conc.  $H_2SO_4$  should be added.
- \* Wash the crystals with ice cold water.

Expt. No. 05AIM - Preparation of Mohr's salt.

Theory - Mohr's salt is prepared by dissolving equimolar mixture of  $\text{FeSO}_4$  and  $(\text{NH}_4)_2\text{SO}_4$  in water containing a few drops of conc.  $\text{H}_2\text{SO}_4$ . The resulting solution is then subjected to crystallization, a light green crystal is obtained.



277.85	132	391.85
= 13.89	= 6.6	= 19.59
= 0.05 mole	= 0.05 mole	= 19.6 gm

Materials required - Two beakers, glass rod, funnel, wire gauze, filter paper, stand -

chemicals -

Ferrous sulphate - 13.9 gm  
 Ammonium sulphate - 6.6 gm  
 $\text{H}_2\text{SO}_4$  - 2 ml  
 $\text{C}_2\text{H}_5\text{OH}$  - 5 ml

Teacher's Signature \_\_\_\_\_

Procedure - we take 13.9 gm ferrous sulphate and 6.6 gm ammonium sulphate in a clean 250 ml beaker.

N. we take 50 ml distilled water in a 250 ml beaker and add 2 ml  $H_2SO_4$  in it slowly, and heat it.

We pour the boiled acidic water into 250 ml beaker containing ferrous sulphate and ammonium sulphate. with stirring. we filter the solution to remove any suspended impurity.

We take the filtrate on china dish and heat it on wire gauze placed on tripod, with a burner. to concentrate the solution, when crystallization point is reached. we cool the saturated solution obtained with the help of ice cold water. On cooling crystals of Mohr's salt are obtained.

Observation - weight of crystal = 1.9 gm app.  
colour = light green  
shape - Monoclinic.

### Precaution

- \* Apparatus should be cleaned properly
- \* Adding of  $H_2SO_4$  should be slow.
- \* Chemicals should be weighed carefully.

Aim:- To analyse the given inorganic salt into cation and anion.

Theory- The identification of radicals present in a given inorganic salt, inorganic salts consist of two parts cations and anions, i.e.

- \* Acidic radicals (anions)
- \* Basic radicals (cations)

Experiment	Observation	Inference
1. Physical examination	White powder with smell of ammonia	Ammonium salt is present
2. A pinch of salt is heated with NaOH	Gas is evolved with smell of ammonia and turns moist litmus blue.	$\text{NH}_4^+$ is present.
3. A pinch of salt is taken in test tube and add dil HCl Gas is passed through lime water	A colourless and odourless gas is evolved It turns milky white	Gas is $\text{CO}_2$

	Experiment	Observation	Inference
4.	When excess of gas is passed through milky solution	Milky colour disappears	$\text{CO}_3^{2-}$ Confirmed.

Result - Given salt is  $(\text{NH}_4)_2\text{CO}_3$

Cation -  $\text{NH}_4^+$   
Anion -  $\text{CO}_3^{2-}$



Aim - To analyse the presence of  $\text{Br}^-$  in the given salt.

Experiment	Observation	Inference
1. A small quantity of solid is taken in a dry test tube and equal amount of $\text{HNO}_3$ is added. Then a drop of conc. $\text{H}_2\text{SO}_4$ is added and mixture is heated.	Brown coloured gas with pungent smell is evolved	$\text{Br}^-$ may be
2. A strip paper is <del>not</del> soaked in the iodine and put near the mouth of test tube	Blue colour is developed on strip paper.	$\text{Br}^-$ may be
3. Small quantity of $\text{H}_2\text{SO}_4$ is taken in the test tube and solid sample is added with $\text{HNO}_3$ . After that $\text{AgNO}_3$ is added.	A cream precipitate is ( $\text{AgNO}_3$ ) formed	$\text{Br}^-$ Confirmed

Result —Bromide ion is present  
in the salt.

R. S. M. PUBLIC SCHOOL, SUPAUL

CHEMISTRY (043)

PROJECT FILE

SESSION (—————)

NAME:-

CLASS:-

ROLL NO:-

## Project Work-01

Topic:- Study of diffusion of a solid into a liquid.

Introduction:- In a liquid, a molecule is surrounded by its neighbours and it can travel only a fraction of diameter. It is because of the fact that its neighbours move aside for a moment before colliding.

If there is an initial concentration gradient in the liquid, then the rate at which the molecules of the liquid spread and the solution becomes homogeneous, is proportional to the concentration gradient.

Rate of diffusion  $\propto$  Concentration gradient

Rate of diffusion =  $D \times$  Concentration gradient

$D$  = Diffusion coefficient

If the value of  $D$  is larger than the molecules, diffusion will be fast and if the value of  $D$  is less than molecules then diffusion is slow.

When a substance is brought in contact with other, they intermix. This property of a substance is called diffusion.

The process of diffusion takes place fastly in gases, to a lesser extent in liquids. In solids ~~it~~ diffusion does not take place. ~~but~~ when we observe diffusion ~~of~~ solid in liquid is slow.

If a solid is placed in contact with a solvent in which it is soluble, some portion of solid gets dissolved.

The molecules of solute are in random motion due to collision between them and with solvent molecules.

### Objective

Rate of diffusion depends on -

- \* Temperature - As temperature increase kinetic energy of particles increases, so that rate of diffusion increases.
- \* Size of particles - As the size of particles increases, rate of diffusion decreases.
- \* Mass of particles -

As the mass of particles increases, rate of diffusion decreases.

### \* EXPERIMENT

Diffusion of  $\text{CuSO}_4$  in water.

#### Requirements

- \*  $\text{CuSO}_4$  crystals
- \* 100 ml beaker
- \* Distilled water

Procedure

2 gm of  $\text{CuSO}_4$  crystals are taken in 100 ml beaker. 50 ml of water is added to the beaker and is allowed to stand for few minutes.

The colouration water is observed. Now, it is ~~is~~ allowed to stand till all the crystals of  $\text{CuSO}_4$  get dissolved.

After some times colour of water turns ~~is~~ blue.

Conclusion -

When a soluble solid like  $\text{CuSO}_4$  crystals,  $\text{KMnO}_4$ , sugar, salt ( $\text{NaCl}$ ) are brought in contact with water (liquid), intermixing of substances take place.

## EXPERIMENT - 02

To study the effect of temp. on rate of diffusion.

Requirements -  $\text{CuSO}_4$  crystals, 200ml beaker, watch glass, wire gauze, burner, tripod, thermometer, stop watch

### Procedure:-

Take 5gm of  $\text{CuSO}_4$  crystals in three separate beakers. Pour 100ml distilled water in one beaker, cover this beaker with watch glass.

Pour 100ml of cold water in second beaker slowly.

Place the third beaker containing 100ml of water on a tripod stand for heating.

Now, observe diffusion process taken place in each beaker.

Record the time taken for the diffusion of  $\text{CuSO}_4$  crystals in all the beakers.

EXPERIMENT - 02

To study the effect of temp. on rate of diffusion.

Requirements -  $\text{CuSO}_4$  crystals, 200ml beaker, watch glass, wire gauze, burner, tripod, thermometer, stop watch

Procedure:-

Take 5gm of  $\text{CuSO}_4$  crystals in three separate beakers. Pour 100ml distilled water in one beaker, cover this beaker with watch glass.

Pour 100ml of cold water in second beaker slowly.

Place the third beaker containing 100ml of water on a tripod stand for heating.

Now, observe diffusion process taken place in each beaker.

Record the time taken for the diffusion of  $\text{CuSO}_4$  crystals in all the beakers.



Observation

S.N	Temp. of water	Time taken in minutes.
01	25°C	15
02	10°C	20
03	70°C	10

Conclusion:-

The rate of diffusion of  $\text{CuSO}_4$  crystals in water is in the order

Beaker-3 > beaker-1 > beaker-2

Thus, rate of diffusion increases with increase in temp.

---