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## Experiment-1 Chemistry

Ch-3 Determination of Melting Point of Ice and Boiling Point of water.

### Aim

To determine the melting point of ice and the boiling point of water.

(A) To Determine the melting point of Ice

### Materials Required

Ice cubes, filter paper, beaker, wire gauze, tripod stand, burner, thermometer, stirrer, clamp stand.

### Theory

Ice is a solid form of water. Melting point of a solid is fixed temperature at which a solid changes into its liquid state.

$$\text{Ice} \rightleftharpoons \underset{\text{cool}}{\overset{\text{heat}}{}} \text{Water}$$

### Procedure

1. Take a beaker and fill it upto half with ice cubes formed from distilled water.
2. Place the beaker on a wire gauze kept over a tripod stand.
3. Heat the ice cubes and stir it for uniform heating.

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Observations:-

Melting point of ice = $\frac{t_1 + t_2}{2}$

1. Temperature when ice starts melting = $t_1$.
2. Temperature when ice completely melts = $t_2$.

Result

The melting point of ice = ..... °C

Precautions

1. Ice should not contain water before using for melting point measurement.
2. Maintain uniform temperature by continuous stirring.
3. Temperature should be measured by keeping check on the level of mercury.

(B) To Determine the Boiling Point of water.

Materials Required

A Round bottom flask (250 ml) fitted with two holded stopper, glass beaker (100 ml), a wire gauze, a tripod stand;

Theory

The fixed temperature at which a liquid changes into its vapour state is known as its boiling point. Once a liquid attains its boiling point.

$$\text{Liquid} \underset{\text{Cool}}{\overset{\text{Heat}}{\rightleftharpoons}} \text{Vapour}$$

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Procedure

1. Take approximately 125-150 ml of distilled water in the round bottom flask and close its mouth by using a two holed stopped.
2. Fix the thermometer in one of the hole of the stopper and fix a glass tube in other hole of the stopper.
3. Record your observations.
4. Note the temperature when water starts boiling.

Observations

1. Temperature when water starts boiling = $t_3$.
2. Temperature when water continues to boil = $t_4$.

Boiling point of water $\Rightarrow \frac{t_3 + t_4}{2}$

Result

The boiling point of water = ..... °C.

Precautions

1. Use distilled water only. Impure water and hard water have the boiling point greater than 100°C.
2. The bulb of the thermometer should be slightly above the liquid.
3. Heat water by rotating the flame.
4. Add pumice stone pieces before heating to avoid bumping.

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Chapter - 4 Experiment. - 2

# Chemistry

## Nature and Behaviour : Mixture and Compound

### Aim

To prepare (a) a mixture (b) a compound using iron filings and Sulphur powder and distinguish between these on the basis of:

(i) Appearance, i.e. homogeneity and heterogeneity.
(ii) Behaviour towards a magnet.
(iii) Effect of heat.

### Materials Required

A hard glass test tube, test tube holder, pestle and mortar two watch glasses, hand lens, a magnet, iron filings, Sulphur powder and carbon disulphide.

### Theory

#### Compound

A Compound is a pure substance which is formed when two or more elements, combine chemically in a fixed ratio mass.

### Properties of a Compound

1. The Components of a Compound loose their individual properties and the properties of Compound are different from its individual components.

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2. The Component of a Compound can be separated by physical Methods
3. Compounds are homogenous and have fixed melting and boiling points.

Mixture

When two or more substances (elements, Compounds or both) mixed together in any proportion do not undergo any chemical change but retain their individual properties:, the resulting mass is called mixture.

Properties of a Mixture.

1. A mixture is an aggregate of two or more pure substance that do not combine chemically
2. The Ratio of components mixed is not certain

Procedure

1. Preparation of Mixture of Iron and Sulphur:
Take few iron filings and some sulphur. and put them in a pestle and grind the Constituents thoroughly.

2. Preparation of Compound iron and Sulphur (Iron Sulphide):
Transfer half of the mixture from water glass B to a hard test tube. Hold the test tube with a tube holder.

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Observations

1. Appearance - Homogeneous or Heterogenous Nature

| Sample | Experiment | Observation | Inference |
|---|---|---|---|
| A | Check the appearance of sample A with naked eye. | Heterogeneous | Sample A is mixture |
| B | Check the apperance of sample B with naked eye | Homogeneous | Sample B is compound |

2. Effect of moving a through a sample a and sample B

| Sample | Experiment | Observation |
|---|---|---|
| A. | Move a magnet through sample A | Iron filings cling to the magnet |
| B. | Move a magnet through the sample B | No component gets attracted towards the magnet. |

Inference

A Sample a is a mixture as components retain their properties.

B Sample B is a Compound.

3. Effect of shaking the sample a and B with Carbon disulphide Solvent

| Sample | Experiment | Observations | Inference |
|---|---|---|---|
| A | Shake a pinch of Sample A with Carbon disulphide | A part of the Sample dissolve in Carbon disulphide. | Sample A is a mixture as its components retain their properties. |
| B. | Shake a pinch of Sample B with Carbon disulphide. | No part of the sample dissolves. | Sample B is a Compound. |

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4. Effect of Heat on Sample A and B

| Sample | Experiment | Observation | Inference |
|---|---|---|---|
| A. | Heat Sample A in a test tube | The mixture starts glowing and a chemical takes place. | Components of a mixture may react under certain condition and form of a compound on heating. |
| B. | Heat Sample B in a test tube | No reaction takes place | No effect of heating on the compound formed. |

Result

Sample A is a mixture of Iron and sulphur while Sample B is a compound (iron sulphide).

Precautions

1. The mixture should be heated strongly and with great care.
2. Carbon disulphide is highly volatile and its vapours are combustible. Thus, it should be handled with a great care.
3. Use minimum amount of mixture or its compound.
4. The chemicals should be handled carefully and hands must be washed properly after completion of the Experiment.

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Experiment No. 3 Date

## Chapter # 5 Separation of the Components of a Mixture

## Experiment - 3

**Aim**

To separate the components of a mixture, of sand, common salt and ammonium chloride (or camphor) by sublimation.

**Material Required**

Sand, Common Salt ($NaCl$), ammonium chloride ($NH_4Cl$) or Camphor, filter paper, funnel, china dish, beaker, glass rod, burner, cotton plug.

**Theory**

In a mixture, the components retain their properties and can therefore be separated by physical methods. based upon their properties.

1. Camphor or ammonium chloride on heating directly convert into vapour. This is called Sublimation.
2. Common salt is soluble in water but sand is not soluble in water.
3. From a solution of common salt in water, common salt can be obtained by evaporation.

**Procedure**

(A) Steps for seperation of Ammonium chloride

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1. Take the mixture of sand, ammonium chloride and common salt in a china dish and cover it with an inverted funnel.

2. Plug the end of the funnel with cotton.

3. Place the china dish over a tripod stand and heat it gently.

(B) Steps for seperation of Sand.

1. To non Sublimate the mixture, add water.

2. Stir the glass with mixture

(C) Steps for Separation of Common Salt (Sodium chloride)

1. Take the filtrate in a china dish.

2. Evaporate the filtrate to dryness, where water evaporates leaving behind sodium chloride in the china dish.

Result

Sand, Common salt and ammonium chloride mixture is seperated by sublimation, filtration and evaporation.

Precautions

1. All glass apparatus should be clean and dry.

2. Do not heat contents on high flame.

3. Heat ammonium chloride carefully as it is volatile.

4. Moisten the filter paper bfore filtering.

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Experiment No. 4 Date

## Chapter 6 Nature of Matter: Solution, Suspension, and Colloid

## Experiment -4

Aim

To prepare

(a) a true solution of common salt, sugar and alum.

(b) a suspension of soil, chalk powder and fine in water.

(i) transparency, (ii) Filtration,

(iii) Stability.

Materials Required

Test tube, beaker, water, common salt, sugar, alum, soil chalk powder, fine sand, starch, glass rod and filter paper.

Theory

1. A true solution is homogeneous transparent solution in which solute completely dissolves in the solvent and cannot be separated from solvent by filtration. It has a particle size less than $10^{-9}$ m.

2. A colloidal solution is a heterogeneous mixture and is translucent. It has a particle size which ranges between $10^{-8}$ m to $10^{-6}$ m. It can pass through filter paper and is stable.

Procedure

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Preparations of Solution / Mixtures:-

1. Take 8 beaker and label them as: A, B, C, D, E, F, G, H and add 50 ml of water to each beaker.
2. Add sample of NACL, sugar and alum to beakers A, B and C; stir to make clear solution.
3. Add soil, chalk powder and fine sand to beakers D, E and F stir for some time.
4. In beaker H, G, add egg albumin and stir vigorously (This should not be heated).
5. Observe the mixture and record observations:

| Test Samples Beaker A, B, C | Observation. Observe the solution and note down their transparency Solution are clear and transparent (as the labels are clearly seen from opposite side) and Particles are not visible. | Stability Keep the solutions undisturbed for some time and observe. The Particles do not settle down as sediments. The solutions are therefore stable. |
|---|---|---|

| | Filtration Filter the solutions through filter paper. Salt solutions can easily pass through filter paper and no residue is seen on filter paper. | Classify on the basis of these properties. Solutions A, B, C, are true solutions. |
|---|---|---|

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| | |
|---|---|
| Beaker D, E, F | Solutions are opaque the particles are visible by naked eyes and labels are not visible from other side. |
| | The particles settle down on standing undisturbed and the solutions are therefore unstable. |
| | The Particles do not pass through filter paper and residue is seen on Filter paper. |
| | Solutions D, E, F are suspension solutions. |
| Beaker G, H | The solution are turbid but the particles are not visible. The labels are dimly visible and solutions are translucent. |
| | The particles do not settle down as sediments. The Solutions are therefore stable. |
| | The Particles pass through Filter paper and no residue is seen on filter paper. |
| | Solution G and H are Colloidal Solutions. |

Result

1. Beaker A: Common salt from true solution in water.
2. Beaker B: Sugar from true solition in water.
3. Beaker C: Alum forms a true solution in water.

Precautions:

1. Distilled water should Be used.
2. The Components should Be mixed in small amounts.
3. Fold the filter paper properly and moisten it before use.
4. Glass rod should be taken.

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Experiment No. 5

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Chapter 7 Chemical reaction and its type

## Experiment - 5

**Aim** To Carry out the following chemical reactions and Classify them as physical or chemical change.

(a) Iron and copper sulphate solution in water.

(b) Burning of magnesium ribbon in air.

(c) Zinc with dilute sulphate crystals.

**Materials Required**

Test tube, iron nails, copper sulphate and test tube stand.

**Theory**

Pure iron is greyish in colour and pure copper is reddish brown in colour. Due to presence of $Fe^{2+}$ ions, aqueous solution of ferrous sulphate is pale green.

$$Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4(aq) + Cu(s)$$

Iron (Grey) — Copper sulphate (Blue) — Ferrous sulphate (Pale green)

**Procedure**

1. Rub the iron nail with a sand Paper to get a shining apperance.
2. Dissolve 2.0g of Copper sulphate in 20 ml of water to



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form Copper Sulphate Solutions:

Observations:

| S.No | Observation | Inference |
|---|---|---|
| 1. | The Colour of the solution turn pale green. | Iron displace copper sulphate solution has been displaced by iron |
| 2. | A reddish brown coating is seen on the nail. | $Fe(s) + Cu^{2+}(aq) \rightarrow Fe^{2+}(aq) + Cu(s)$ (Grey, Blue; Pale green, Reddish Brown.) |

Result

1. The Reaction Between Fe and $CuSO_4$ shows that Fe is more reactive than Cu and the reaction is a single displacement reaction.
2. It is chemical change and is irreversible.

Precautions

1. Clean the iron nail properly by rubbing with Sand paper.
2. Copper sulphate solution is Poisonous, so handle it with care.
3. During the experiment, the test tubes should not be disturbed.
4. After completing the experiment, the iron nail coated with Copper should not be touched.

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## (B) Burning of Magnesium in Air

Materials Required

Magnesium ribbon, burner, china dish, red litmus paper / PH paper strip, tongs and sand paper.

Theory

Magnesium is a very active metal. It reacts with oxygen to form magnesium oxide.

$$2Mg(s) + O_2(g) \longrightarrow 2MgO(s)$$

Magnesium — Oxygen — Magnesium oxide

In this process, two elements magnesium and oxygen combine together to form a single compound magnesium oxide. Such type of reactions are called combination reactions.

$$MgO + H_2O \longrightarrow Mg(OH)_2$$

Magnesium Oxide — Water — Magnesium Hydroxide.

Procedure

1. Take a piece of Magnesium ribbon (about 5cm long).
2. Heat one end of this ribbon in tongs.
3. When the ribbon starts burnings hold it over an empty china dish so that the ash formed falls in china dish

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Observations :-

| S. No | Observation | Inference |
|---|---|---|
| 1. | Magnesium burns giving out a brillant white light and a white and a white powder of MgO is formed. | Mg burns in the presence of air and combin with oxygen to form MgO MgO is a basic in nature. |

Result

Mg burns in air, giving out a flash of bright white light and combines with oxygen to form basic magnesium oxide.

Precautions

1. Clean the magnesium ribbon thoroughly with the sand paper by rubbing.
2. Hold magnesium ribbon using tongs while burning it.
3. White powder or magnesium oxide should not be touched.

(C) Reaction of Zn with Dil. Sulphoric Acid

Materials Required

Zinc granules, dil $H_2SO_4$, Conical flask, candle, cork fixed with a fine capillary tube.

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## Theory

Zinc being more reactive or lying above hydrogen in the reactivity series, displace hydrogen from dil, acids.

$Zn(s) + H_2SO_4(aq) \longrightarrow ZnSO_4(aq) + H_2(g)$

$2H_2(g) + O_2(g) \longrightarrow 2H_2O(g) + Heat$

## Procedure

1. Take about 20ml of dilute $H_2SO_4$ in a conical flask.
2. Put some pieces of granulated zinc in the conical flask.
3. Note the colour and odour of the gas evolved.

## Observed

| No. | Observation | Inference |
|---|---|---|
| 1. | A brisk effervescence occurs and gas bubble evolve. | The gas produced a hydrogen which is displaced by zinc. This is called displacement reaction. |
| 2. | The gas evolved burns with clean blue flame | The gas is $H_2$. |

## Result

1. Zinc reacts with dilute solution Sulphuric acid to produce hydrogen gas. $Zn(s) + H_2SO_4(aq) \longrightarrow ZnSO_4(aq) + H_2(g)$

## Precautions:

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1. Handle the chemical with care.
2. Use a small jet to test hydrogen gas, as hydrogen gas burns instantaneously with an examples.

(D) : Heating of copper sulphate

Materials Required

Hydrate copper sulphate, test tube, test holder, Bunsen burner, PH Paper or blue litmus paper.

Theory

1. Blue Crystals of copper sulphate contains water of crystallisation.
2. On heating, the crystals of copper suphate dehydrates, lose water of crystallisation.

$CuSO_4 \cdot 5H_2O \xrightarrow{100^\circ C} CuSO_4 \cdot H_2O \xrightarrow{250^\circ C} CuSO_4$

Blue Burish White White

3. On adding a few drops of water to anhydrous copper sulphate.

$CuSO_4 + 5H_2O \longrightarrow CuSO_4 \cdot 5H_2O$

Anhydrous Copper suffphate — From atmosphere — Blue

4. On heating strongly, the decomposition of anhydrous copper sulphate.

$CuSO_4 \longrightarrow CuO(s) + SO_3(g)$

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## Procedure

1. Take small quanitity of hydrated copper sulphate. Is a poisonous substance. Do not touch or taste it.
2. Sulphur take half amount of Anhydrous copper sulphate in another test tube. and a few drop of water.

## Observations

| S. No. | Observations | Inference |
|---|---|---|
| 1. | Blue Coloured copper Sulphate crystals changes to dirty white Powder. | Hydrated copper sulphate loses water of crystallition on heating and becomes anhydrous. |
| 2. | White anhydrous copper sulphate turns blue. | Copper sulphate pentahydrate is regained. |
| 3. | Moist litmus Paper turn red | $SO_3$ gas is acidic in nature. |

## Result

The hydrated copper sulphate loses water of crystallization of gentle heating and becomes dirty white.

## Precautions:

1. Copper sulphate is a poisonous substances.
2. Sulphur toxide come in Contact with atmospheric moisture from sulpheric acid.
3. In the beginning of experiment, Copper sulphate, should be heated gently.

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(E) Reaction of Sodium Sulphate with Barium chloride in the form their Aqueous solutions.

Materials Required:
Test tubes, test tube holder, aqueous solutions of Sodium Sulphate and barium chloride.

Theory
1. Sodium sulphate solution is a colourless solution.
2. on mixing the solution of sodium Sulphate and barium chloride a white precipitate of barium sulphate is formed which is insoluble in water.

$Na_2SO_4(aq) + BaCl_2(aq) \rightarrow BaSO_4(s) + 2NaCl(aq)$

Sodium Sulphate Barium chloride Barium Sulphate Sodium chloride.

Procedure
1. Take 10 ml of Sodium sulphate solution in one test tube and 10 ml of barium chloride solution in another test tube.

Observations:
A white precipitate is formed which settles down at the bottom of test tube.

Result
In this chemical reaction, a white precipitate of barium sulphate and a clear solution of sodium chloride is formed

Precautions
1. Use the chemicals in small amount.
2. Mix the solutions properly.

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## Experiment - 6

**Aim**

To verify the law of conservation of mass in a case of a chemical change.

**Material Required.**

$BaCl_2 \cdot 2H_2O$ (barium chloride), sodium sulphate ($Na_2SO_4 \cdot 10H_2O$), distilled water., two beakers (100 ml), two beakers (150 ml), two beakers (250 ml).

**Theory**

1. During a chemical change, the mass of the reactants is equal to the mass of the Products.

2. Mass can neither be created nor be destroyed.

3. The reaction involved is

$$BaCl_2(aq) + Na_2SO_4(aq) \longrightarrow BaSO_4(s) + 2NaCl(aq)$$

colourless . colourless white PPt

The iconic equation is

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

white PPt

**Procedure**

1. With the help of a measuring cylinder pour 100 ml distilled water in two beakers (150 ml)

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2. Using the Physical balance, weigh two watch glasses

Observations

1. Mass of 100 ml distilled water = 100.0g.
2. Mass of $BaCl_2 \cdot 2H_2O$ = 7.2g.
3. Mass of $BaCl_2$ Solution = 107.2g
4. Mass of $Na_2SO_4 \cdot 10H_2O$ = 16.1g.
5. Mass of $Na_2SO_4$ solution = 223.3g.

Result

1. On comparing the mass of reactants ($m_2$) with the mass of products ($m_3$); we find $m_2$ is equal to $m_3$ (within a reasonable limit).
2. The Proves the law of conservation of mass.

Precautions:

1. Accurate measurement of the masses should be ensured.
2. The spring balance should be held vertical while taking measurements.
3. Before taking readings, ensure that the Pointer of the spring balance is at zero mark.
4. The reading of spring balance should be noticed when its pointer comes to rest.
5. Use only small amount of chemical for the experiment.
6. Mix Solution of $BaCl_2$ and $Na_2SO_4$ Slowly with a Constant stirring

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