MATRIX OLYMPIAD

The Most Innovative Talent Recognition Exam

CHEMISTRY

Class - VI

MATRIX

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Few words for the Readers

Dear Reader,

"*Matrix Olympiad is established to encourage school students to go a step further than their regular studies, and get a chance and exposure to competition on a wide scale. It also helps students enhance their learning of basic cognitive skills and deeper knowledge of subjects like Science, Mathematics, English, Mental Ability, Social Studies.“Matrix Olympiad helps students nurture their minds for higher targets of tomorrow and enables them to study School for JEE, NEET, CLAT, NDA, Olympiads , NSEJS, NTSE , STSE etc.*"

The above thought has been our guiding principle while designing and collating the study material for **Matrix Olympiad** . And hence, we hope that this particular material will be helpful towards your preparation for **Matrix Olympiad**.

Our team at **MATRIX** has put in their best efforts for making this particular module interesting and relevant for you. Additional efforts have been made to ensure that the content is easy to understand and error free to the extent possible. However, there might remain some inadvertent errors in answer keys and theoretical portion and we would welcome your valuable feedback regarding the same.

If there are any suggestions for corrections, please write to us at **smd@matrixacademy.co.in** and we would be highly grateful.

Finally, we would like to end this message by a famous quote by Ernest Hemingway - "*There is no friend as loyal as a book*." So, please give your study material the time and attention it deserves, and it will surely help you reach newer heights in your fight with competition examinations.

With love and best wishes !

Team MATRIX

CONTENTS

SORTING MATERIALS INTO GROUPS
(MATERIAL AROUND US)

1

Concepts

INTRODUCTION

We use several objects in our day-to-day lives. Pencils, erasers, books, notebooks, etc., are objects that you must be using a lot. All objects are made of substances called materials. It is very important to use the right material for making each object. For example, a chalk made of materials like wood or plastic would be useless because it cannot be used to write on the blackboard. Therefore, it is important for us know the properties of different kinds of materials. Let us start by learning more about objects.

Figure : Different kinds of materials

1. OBJECTS AND GROUPINGS

(a) Objects Around Us

There is such a vast variety of objects everywhere. We see around us a chair, a bullock cart, a cycle, cooking utensils, books, clothes, toys, water, stones and many other objects. All these objects have different shapes, colours and uses. All objects around us are made of one or more materials. These materials may be glass, metal, plastics, wood, cotton, paper, mud or soil.

(b) Importance of Grouping Things

Virat has a Science test tomorrow. He searched his room for hours but cannot find his Science textbook. This is because his room is in a mess. Clothes, toys, and other objects are scattered all over the place. This situation could have been avoided if the objects had been grouped properly.

"Placing similar things together is called grouping."

Grouping makes it easier for us to find things when we need them. If all textbooks had been kept at the same place it would have been very easy to find the Science textbook. Similarly, it would be easy to find a particular shirt if all clothes are kept together. Also, grouping things would make the room look much better.

Have you ever been to a supermarket ? Grouping is done in a supermarket by keeping similar items on the same shelf, which makes it easier for us to find the items we need. If things are not grouped, chances are that you will never find your favourite chocolate in a large supermarket.

2. PROPERTIES OF MATERIALS

Grouping is done based on certain similarities between objects.

The process of grouping things on the basis of some similarities and dissimilarities is called classification. Various objects around us are made up of different kinds of materials. These materials have different properties. The classification or grouping of things can be done on the basis of similarities and dissimilarities in their properties. Let us first study the properties of various materials.

2.1 APPEARANCE

Materials usually look different from each other. Wood looks very different from iron. Iron appears different from copper or aluminium. At the same time, there may be some similarities between iron, copper and aluminium that are not there in wood.

Some materials have lustre. These are usually metals. Iron, copper, aluminium and gold are examples of metals. Some metals often lose their shine and appear dull, because of the action of air and moisture on them.

Figure : Gold

Figure : Copper

LAB TIME
Let's Do & Learn

- **Objective : To show that certain materials have lustre**
- **Material required :** Small pieces of (i) paper (ii) cardboard, a thin piece of wood, a small strip of plastic, thin wires of copper, aluminium and iron, heavy scissors or a metal cutter, sand paper.
- **Procedure :**

(a) Cut each of the materials with heavy scissors or metal cutter. Carefully observe the cut surface of each material.

- **Conclusion :**

(a) We will notice that in case of paper, cardboard, wood, plastic, etc., the cut surface is not shining. However, in case of thin wires of copper, aluminium and iron, the cut surface is shining.
(b) Rub each of the material with sand paper. Carefully observe the sand papered surface of the material.

(b) We will notice that in case of paper, cardboard, plastic and wool, the sand papered surface is not shining.
However, in case of thin wires of copper, aluminium and iron, the sand papered surface is shining.

2.2 HARDNESS

When we press different materials with our hands, some of them may be hard to compress while others can be easily compressed.

We can easily scratch some materials, while some cannot be scratched so easily. Materials which can be compressed or scratched easily are called soft while some other materials which are difficult to compress are called hard. For example, cotton or sponge is soft while iron is hard.

2.3 SOLUBILITY

Some substances like sugar, salt etc. completely disappear or dissolve in water. These substances are soluble in water. Other substances like sand, chalk powder etc. do not mix with water and do not disappear even after we stir for long time. These substances are insoluble in water. Water plays an important role in the functioning of our body because it can dissolve a large number of substances.

When two liquids dissolve in one another such as water and milk, they are known as miscible liquids. Liquids such as mustard oil and kerosene do not dissolve in water but form separate layers. Such liquids are known as immiscible liquids.

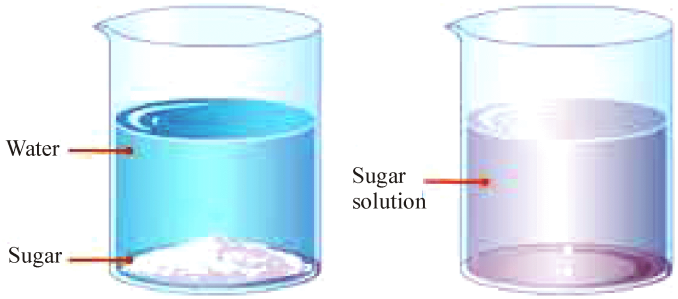
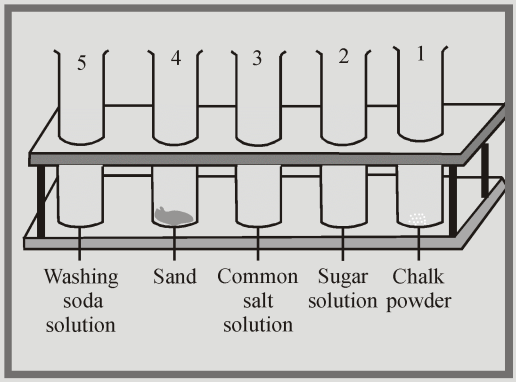


Figure : Dissolving sugar in water

LAB TIME
Let's Do & Learn

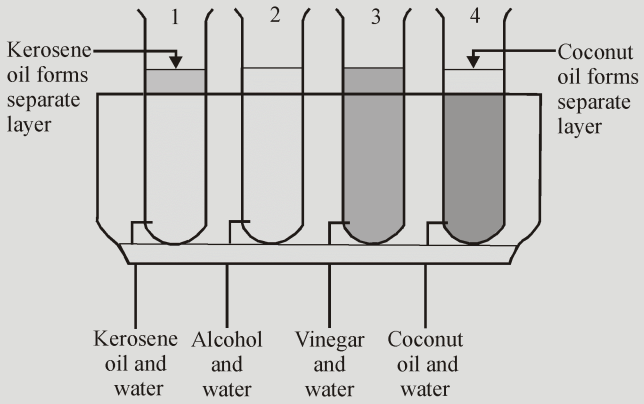
- **Objective : To prove that some solids are soluble in water.**
- **Material required :** (i) A rack of test tubes, (ii) water, (iii) common salt, (iv) washing soda, (v) chalk powder and sand.



- **Procedure :** Add a pinch of chalk powder in the first test tube, add a pinch of sugar in second test tube, a pinch of common salt in the third test tube, a pinch of sand in the fourth test tube and a pinch of washing soda in the fifth test tube. Pour water into each test tube such that half of each test tube is filled with water. Shake each test tube vigorously and replace in the rack.
- **Conclusion :** We will notice that sugar, common salt and washing soda disappear in water, and hence are soluble substances. Sand and chalk powder do not dissolve in water, and hence are insoluble substances.

LAB TIME
Let's Do & Learn

- **Objective : To prove that some liquids are miscible in water.**
- **Material required :** (i) A rack of test tubes, (ii) water, (iii) alcohol, (iv) kerosene oil, (v) vinegar and coconut oil.



- **Procedure :** Fill each of the test tubes half with water and place them in the test tube rack. Add a few drops of kerosene oil in the first test tube, a few drops of alcohol in the second test tube, a few drops of vinegar in the third test tube and few drops of coconut oil in the fourth test tube. Shake each test tube vigorously and replace it in the test tube rack. Wait for 10 minutes and you will notice that kerosene oil and coconut oil float upon the surface of water and form separate layers. No separate layer is formed in case of vinegar and alcohol.
- **Conclusion :** The activity proves that vinegar and alcohol are soluble in water, and hence are miscible liquids, but kerosene oil and coconut oil are insoluble in water and hence are immiscible liquids.

2.4 TEXTURE

The feel of any material is known as its texture. All materials do not feel the same when they are touched. They have different textures. They may be rough or smooth. The surface of paper or a glass tumbler feel smooth since there are no uneven surfaces. The bark of a tree, an unfinished wall, or sand paper are rough to touch since their surfaces are uneven and bumpy.

Figure : Rough substance

Figure : Smooth substance

2.5 FLOATATION

Substance that are less dense than water or are lighter than water will float in water. For example, paper boats, feather, and wooden cork float in water. Substances heavier than water such as iron nail or metal coins, however, sink in water.

Figure : Sinking and Floating substances

2.6 TRANSPARENCY

Material can be classified into three groups depending on the amount of light that can pass through them- transparent, opaque, and translucent.

Material such as air, water and clear glass are called transparent. They allow light to pass through and as a result, you can see clearly through them. The property of a material through which one can see clearly is called transparency.

Materials that do not allow light to pass through them and block the light are called opaque. Wood, stone and metal are some examples of opaque materials. When light is blocked by an object, a shadow is formed. The shadow appears on the side of the object that is away from the light source.

Translucent materials allow only some part of light to pass through. We can see through these materials but not clearly. Eg. oiled paper, ground glass, etc.

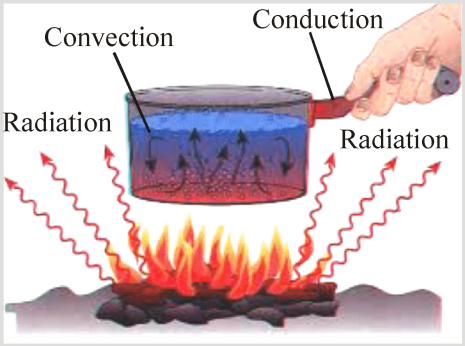
Transparent **Opaque** **Translucent**

Figure : Transparency

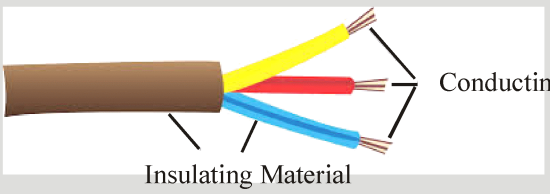
Figure : Light can passs through transparent material

Focus Point

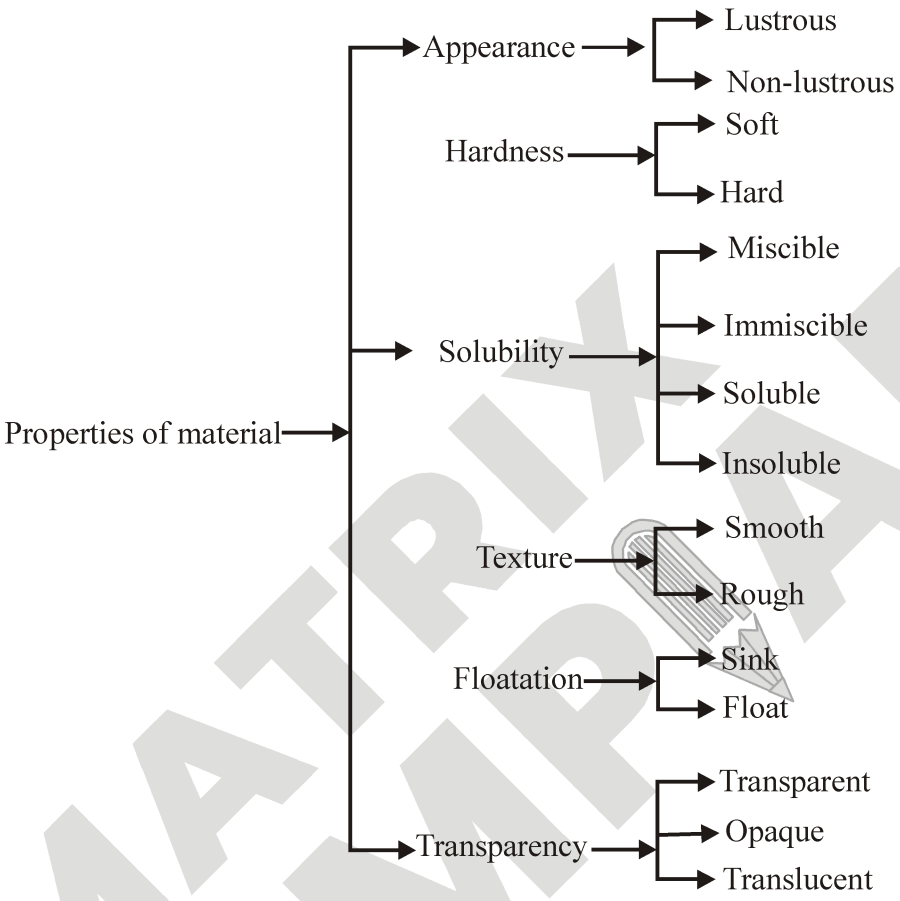
- **Attraction towards a magnet :** Materials that are attracted to a magnet are called magnetic materials. This property is called magnetism. Objects made of iron are attracted to a magnet. In addition to iron, nickel and cobalt are also attracted to a magnet.
- **Conduction of heat :** If you observe the utensils kept in your kitchen, you will notice that though most of them are made of metals, their handles are made of plastic or wood. Why are not the handles made of metal as well ? This is because metals get heated whereas materials such as plastic and wood do not. It would be difficult to handle metal utensil after cooking if the handles were made of metal.
  Materials that allow heat to flow through them are called good conductors of heat whereas those that do not allow heat to flow through them are called bad conductors of heat.
  Generally, metals are good conductors of heat whereas non-metals such as wood, plastic, glass, bamboo, air and paper are bad conductors of heat.



- **Conduction of electricity :** We get electricity in our homes through cables and wires. An electric cable consist of a number of metal with or without a plastic covering as shown in Fig. The substances that conduct electricity are called good conductors of electricity or conductors whereas substances that do not conduct electricity are called bad conductors of electricity or insulators. For example, metals are good conductors of electricity. Wood, air, and plastic are insulators.



• **Concept Map :**



SOLVED EXAMPLES

SE. 1

Write any four properties of materials.

Ans. (a) Appearance (b) Hardness
(c) Solubility (d) Float or sink in water
(e) Transparency

SE. 2

Why is a tumbler not made with a piece of cloth?

Ans. We use tumblers made of glass, plastic and metal to keep a liquid. These substances can hold a liquid.
A tumbler made of cloth cannot hold a liquid because:
(i) Cloth piece is not hard enough to hold liquids and (ii) Cloth piece has very minute pores through which the liquid comes out.

SE. 3

What are the similarities between iron, copper and aluminium?

Ans. (a) They all have lustre
(b) They are all metals
(c) They are hard

SE. 4

Mention some materials which are made up of paper.

Ans. Books, notebooks, newspapers, toys, calendars, etc.

SE. 5

Why is water important for our body?

Ans. Water can dissolve a large number of substances, so it is needed by the body. It is also major part of our body cells.

SE. 6

What is the basis for sorting materials?

Ans. Materials are grouped on the basis of similarities or dissimilarities in their properties.

SE. 7

What is the reason for grouping materials?

Ans. Materials are grouped for our convenience to study their properties and also observe any patterns in these properties.

SE. 8

Make a table of different types of objects that are made from the same material.

Ans.

S.No.	Material	Objects made of these materials
1.	Wood	Chair, table, plough, bullock cart and its wheels
2.	Paper	Books, notebooks, newspaper, toys, calendars
3.	Leather	Shoes, belts, purses, jackets, suitcase, bags
4.	Plastics	Buckets, chairs, tables, bags, briefcase, lunch box
5.	Cotton	Clothes, bandage, bed sheets, cushions, bags
6.	Iron	Chairs, tables, doors, bathroom fittings, mesh, wheels and other railway goods.

SE. 9

Make a table and find out whether the following materials mix with water: Vinegar, Lemon juice, Mustard oil, Coconut oil, Kerosene.

Ans.

S.No.	Liquid	Mixes well/ Does not mix
1.	Vinegar	Mixes well
2.	Lemon juice	Mixes well
3.	Mustard oil	Does not mix
4.	Coconut oil	Does not mix
5.	Kerosene	Does not mix

SE. 10

Metals have lustre (shine). Give reason why some metal articles become dull and loose their shine.

Ans. Metals when exposed to air react with moisture and gases present in it, thereby forming a dull layer of some other compound on it.

SE. 11

Kerosene, coconut oil, mustard oil do not dissolve in water, even on shaking. They separate after sometime forming two different layer. Explain why.

Ans. The molecules of water do not intermingle (mix) with the molecules of oil. The space between the molecules of water is not taken by oil, so they are immiscible in water.

SE. 12

Metals generally occur in solid state and are hard. Name a metal that exists in liquid state and a metal that is soft and can be cut with knife.

Ans. Mercury is a metal that exists in liquid state. Sodium and Potassium are soft metals and can be cut with knife.

SE. 13

'Grouping of objects helps the shopkeeper.' Justify the statement.

Ans. Proper grouping of objects helps shopkeeper in the following ways:

(i) He can locate the required object easily and quickly.

(ii) He can easily come to know what stocks are going to finish and he should purchase them for his customers.

Space for Notes :

NS. 1

Name five objects which can be made from wood.

Ans. (i) Table (ii) Chair (iii) Doors
(iv) Boat (v) Bed

NS. 2

Select those objects from the following which shine:
Glass bowl, plastic toy, steel spoon, cotton shirt

Ans. Glass bowl and steel spoon are shining objects.

NS. 3

Match the objects given below with the materials from which they could be made. Remember, an object could be made from more than one material and a given material could be used for making many objects.

Objects	Materials
Book	Glass
Tumbler	Wood
Chair	Paper
Toy	Leather
Shoes	Plastic

Ans.

Objects	Materials
Book	Paper
Tumbler	Glass and plastic
Chair	Wood and plastic
Toy	Plastic and wood
Shoes	Leather

NS. 4

State whether the statements given below are 'true' or 'false'.
(i) Stone is transparent, while glass is opaque.
(ii) A notebook has lustre while eraser does not
(iii) Chalk dissolves in water.
(iv) A piece of wood floats on water.
(v) Sugar does not dissolve in water.
(vi) Oil mixes with water.
(vii) Sand settles down in water.
(viii) Vinegar dissolves in water.

Ans. (i) False (ii) False (iii) False
(iv) True (v) False (vi) False
(vii) True (viii) True

NS. 5

Given below are the names of some objects and materials:
Water, basket ball, orange, sugar, globe, apple and earthen pitcher. Group them as:
(a) Round shaped and other shapes
(b) Eatables and non-eatables

Ans. (a) (i) Round shaped: Basket ball, apple, orange, globe, earthen pitcher.
(ii) Other shapes: Water, sugar.
(b) (i) Eatables: Water, orange, sugar and apple.
(ii) Non-eatables: Basket ball, globe and earthen pitcher.

NS. 6

List all the items known to you that float on water. Check and see if they will float on an oil or kerosene.

Ans. (A) List of some items that float on water:
1. Paper 2. Wood
3. Thin plastic sheets 4. Wax
5. Ice 6. Thermocol
7. Oil

(B) List of items that float on an oil:
1. Paper 2. Plastic sheet
3. Wax 4. Thermocol
5. Wood

(C) List of items that float on kerosene:
1. Paper 2. Thermocol
3. Thin plastic sheet

NS. 7

Find the odd one out from the following:
(a) Chair, Bed, Table, Baby, Cupboard
(b) Rose, Jasmine, Boat, Marigold, Lotus
(c) Aluminium, Iron, Copper, Silver, Sand
(d) Sugar, Salt, Sand, Copper sulphate

Ans. (a) Baby (all others are non-living)
(b) Boat (all others are flowers)
(c) Sand (all others are metals)
(d) Sand (all others are soluble in water)

EXERCISE – I

ONLY ONE CORRECT TYPE

1. Sorting of materials is useful as -
(A) It makes their study convenient
(B) Any pattern in their properties can be observed
(C) Properties of a substance can be predicted
(D) All of these

2. The property that we use for classifying things depends on the _____ of the classification
(A) Grouping (B) Purpose
(C) Information (D) System

3. Which of the following is lustrous?
(A) Iron (B) Paper
(C) Wood (D) Glass

4. Metals can be identified as :
(A) Hard (B) Lustrous
(C) Sonorous (D) All of above

5. A substance is called hard when -
(A) It is easy to scratch and compress
(B) It is difficult to scratch and compress
(C) It is shiny and opaque
(D) It is insoluble in water

6. One of the following liquids is immiscible with water. This one is
(A) Kerosene (B) Vinegar
(C) Glycerine (D) Lemon juice

7. Which of the following is insoluble in water?
(A) Sugar (B) Salt
(C) Kerosene (D) Oxygen

8. Objects which sink in water are :
(A) Insoluble and heavier than water
(B) Insoluble and lighter than water
(C) Soluble and lighter than water
(D) Soluble and heavier than water

9. ____ sinks in the water, while _____ floats on the water.
(A) Oil, mercury (B) Oil, petroleum
(C) Mercury, oil (D) Mercury, alcohol

10. When petroleum is mixed with water, it will-
(A) Float (B) Sink
(C) Explode (D) Dissolve

11. Which of the following allow/s light to pass through it ?
(A) Transparent (B) Translucent
(C) A & B both (D) Opaque

12. One of the following object is not opaque. This one is
(A) Ground glass (B) Brick
(C) Book (D) Wood

13. Milk and water dissolve in each other. They are -
(A) Immiscible liquids
(B) Solvent and solution
(C) Solute and solution
(D) Miscible liquids

14. Clay is used for making pots and bricks because it is :
(A) Opaque
(B) Non-magnetic
(C) Easily moulded into different shapes
(D) Good conductor of heat

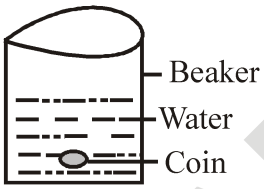
15. What are the characteristic of metals ?
(A) Good conductors of electricity and heat ; solid at room temperature ; transparent, shine brightly when polished
(B) Good conductors of electricity and heat ; solid at room temperature ; opaque, except in extremely thin films ; do not shine at all when polished
(C) Bad conductors of electricity and heat ; solid at room temperature ; opaque, except in extremely thin films
(D) Good conductors of electricity and heat ; solid at room temperature; opaque, except in extremely thin films ; shine brightly when polished

16. Metals lose their shine due to action of :
(A) Other metal (B) Water
(C) Air (D) Both (B) and (C)

17. Wood is different from iron in :
(A) Transparency & lustre
(B) Hardness & solubility
(C) Smoothness & solubility
(D) Hardness and lustre

18. We can see objects through transparent substances because -
(A) Transparent substances are hollow
(B) Transparent substances are lustrous
(C) Transparent substances allow light to pass
(D) Transparent substances are colorless

19. Sonal took a glass beaker and filled it with clean water. She put a silver coin in it and looked the coin from the top of the beaker. What would be her observation ?



(A) She could not see the coin properly because water is translucent
(B) She could see the coin clearly because water is opaque
(C) She could see the coin clearly because water is transparent
(D) She could not see the coin clearly because the coin is transparent

20. We should choose a material to make an object depending on its properties and the purpose for which object is to be used. Based on this knowledge, Ankita made a few choices. Select the incorrect choice made by her.
(A) A windowpane made up of glass to look through
(B) A pan made up of steel to cook food
(C) A bucket made up of plastic to fill water
(D) A tumbler made up of cotton cloth to drink water

21. Pick one material from the following which is completely soluble in water.
(A) Chalk powder (B) Tea leaves
(C) Glucose (D) Saw dust

22. Boojho found a bag containing the following materials
(i) Mirror (ii) Paper stained with oil
(iii) Magnet (iv) Glass spectacles
Help Boojho in finding out the material(s) which is/are opaque.
(A) (i) only (B) (iv) only
(C) (i) and (iii) (D) (ii) and (iv)

23. Which pair of substances among the following would float in a tumbler half filled with water?
(A) Iron ball, thermocol
(B) Feather, plastic ball
(C) Pin, oil drops
(D) Rubber band, coin

24. Which of the following materials is not lustrous?
(A) Gold (B) Silver
(C) Wood (d) Diamond

25. Which type of the following materials is used for making the front glass (wind screen) of a car?
(A) Transparent (B) Translucent
(C) Opaque (D) All the above

PARAGRAPH TYPE QUESTION

PARAGRAPH # 1

If you observe the utensils kept in your kitchen, you will notice that though most of them are made of metals, their handles are made of plastic or wood. It would be difficult to handle metal utensil after cooking if the handles were made of metal.

Materials that allow heat to flow through them are called good conductors of heat whereas those that do not allow heat to flow through them are called bad conductors of heat. Generally, metals are good conductors of heat whereas non-metals such as wood, plastic, glass, bamboo, air and paper are bad conductors of heat.

26. Materials that allow heat to flow through them are_____ conductors of heat.
(A) Good (B) Bad
(C) Stable (D) Weak

27. Which of the following is not a non metal ?
(A) Wood (B) Plastic
(C) Glass (D) Gold

28. Handles of utensils are made up of-
(A) Non metal (B) Metal
(C) Wires (D) Silver

PARAGRAPH # 2

Material such as air, water and clear glass are called transparent. They allow light to pass through and as a result, you can see clearly through them. The property of a material through which one can see clearly is called transparency. Materials that do not allow light to pass through them and block the light are called opaque. Translucent materials allow only some part of light to pass through. We can see through these materials but not clearly.

29. Materials that do not allow light to pass through them are called____.
(A) Transparent (B) Translucent
(C) Opaque (D) Rough

30. Which of following is a translucent material ?
(A) Oiled paper (B) Glass
(C) Wood (D) Stone

31. Which property of a material through which one can see clearly ?
(A) Transparency (B) Occupancy
(C) Transpiration (D) Condensation

MATCH THE COLUMN TYPE

32. Match the objects given Column-I with the given in Column-II.

Column-I	Column-II
(P) Surgical instruments	(i) Plastic
(Q) Newspaper	(ii) Animal product
(R) Electrical switches	(iii) Steel
(S) Wool	(iv) Plant product

(A) P → iii, Q → iv, R → i, S → ii
(B) P → i, Q → ii, R → iii, S → iv
(C) P → iv, Q → iii, R → ii, S → i
(D) P → iv, Q → iii, R → i, S → ii

33.

Column-I	Column-II
(P) Soluble in water	(i) Silver
(Q) Lustrous substance	(ii) Brick
(R) Opaque material	(iii) Common salt
(S) Float in water	(iv) Ice cubes

(A) P → iii, Q → iv, R → i, S → ii
(B) P → iii, Q → i, R → ii, S → iv
(C) P → i, Q → iii, R → ii, S → iv
(D) P → iv, Q → iii, R → ii, S → i

EXERCISE – II

VERY SHORT ANSWER TYPE

1. Why do we need to group materials ?
2. Group these materials as eatables and non eatables-water, apple, wood, sugar, balls, pen.
3. Why is gold used in making ornaments ?
4. If a material 'A' scratches material 'B', which is more hard ?
5. Mention any two materials that are soft.
6. Name any two liquids that are miscible with each other.
7. Why does oil float on water ?
8. Give an example each of an opaque and a transparent material ?
9. What is sorting material into group ?
10. What is common between salt and sand ?

SHORT ANSWER TYPE

1. What do you mean by classification ? Give three examples from everyday life.
2. When do we say that two liquids are immiscible ? Explain taking a suitable example.
3. Differentiate between :
   a. Miscible and immiscible substances
   b. Transparent and translucent substances.
   c. Hard and soft materials.
4. Explain the types of materials on the basis of hardness.
5. A piece of wood float on surface of water. Why ?

LONG ANSWER TYPE

1. Why is sponge labelled as a soft material ?
2. List five examples of object that float on water.
3. Mention three properties of the following substances : honey, ice and iron nail.
4. Explain the types of substances on the basis of transparency with example.
5. Write the different benefits of classification ?

TRUE / FALSE TYPE

1. Substances that can be dissolved in a liquid are called soluble substance.
2. Liquids that dissolve in one another are called immiscible liquids.
3. Substance that are less dense than water or are lighter than water will float on water.
4. Materials that do not allow light to pass through them are called transparent material.
5. Materials that allow only some part of light to pass through them are called translucent material.

FILL IN THE BLANKS

1. The object must be _____or _____ to make a shadow.
2. Materials can be classified as _____ and _____ on the basis of their texture.
3. Liquids which are soluble in one another are called _____ liquids.
4. Substances which are less _____ than water can float on water.
5. _____ have no definite shape or volume.

Answer Key

EXERCISE–I														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
D	A	A	D	B	A	C	A	C	A	C	A	D	C	D
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
D	D	C	C	D	C	C	B	C	A	A	D	A	C	A
31	32	33												
A	A	B												

EXERCISE – II

TRUE / FALSE

1. T 2. F 3. T 4. F 5. T

FILL IN THE BLANKS

1. opaque, translucent 2. rough, smooth 3. miscible 4. dense 5. gases

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : SORTING MATERIALS INTO GROUPS)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
In-Text Examples			
Solved Examples			
NCERT Exercises			
Exercise I			
Exercise II			
Short Note-1			
Revision - 1			
Revision - 2			
Revision - 3			
Remark			

NOTES :

1. In the status, put "completed" only when you have thoroughly worked through this particular section.
2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

Space for Notes :

SEPARATION OF SUBSTANCES (METHODS OF SEPARATION IN EVERYDAY LIFE)

2

Concepts

INTRODUCTION

There are a large number of things around us which we see and feel. For example, we can see a book in front of us. A book occupies some space. The space occupied by the book is called its volume. If we pick up the book, we can also feel its weight. So, we conclude that the book has some mass. We cannot see the air around us, yet if we fill a balloon with air and then weigh it carefully, we will find that not only does air occupy space (bounded by the balloon), but it also has mass.

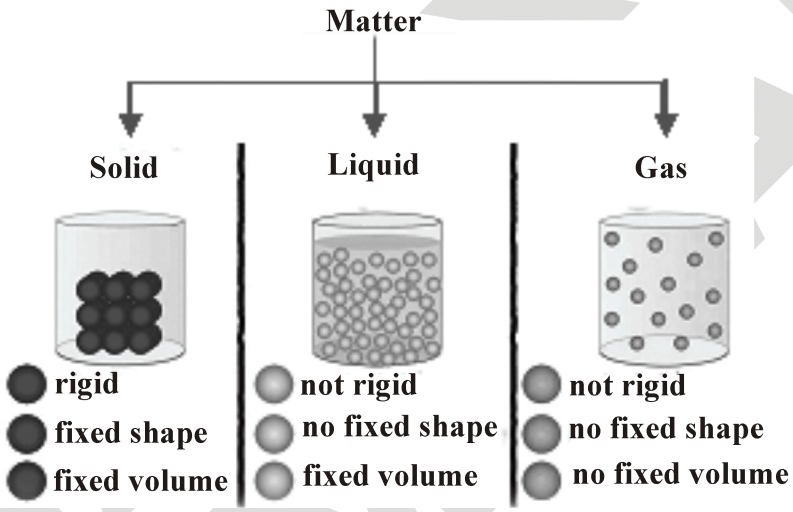
1. MATTER AND ITS CLASSIFICATION

Matter :Anything that has mass and occupies space is called matter.

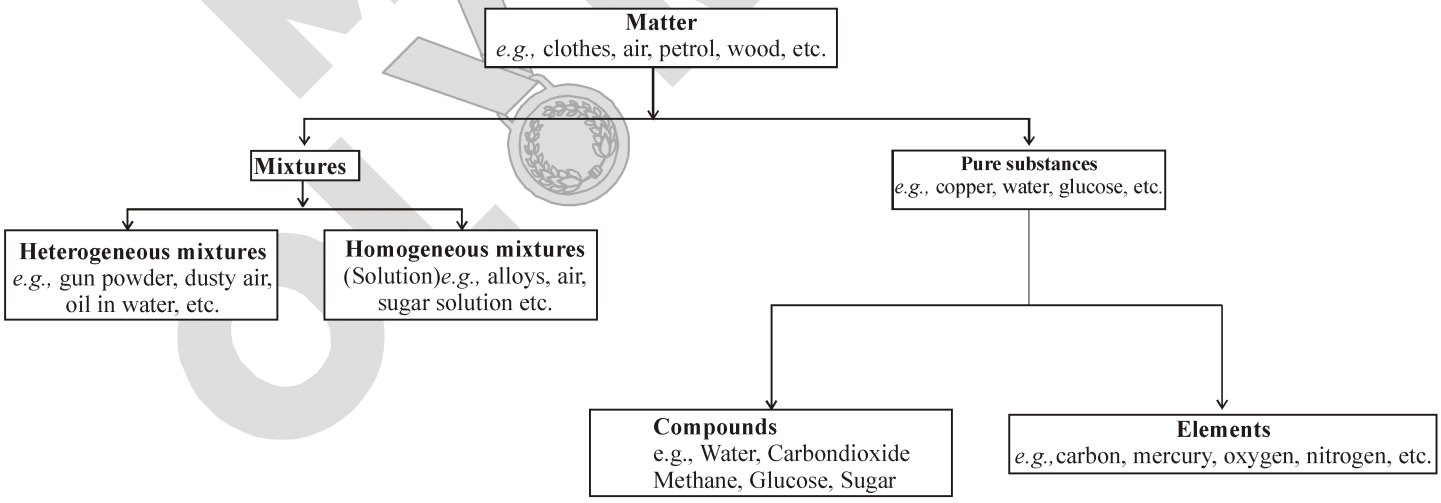
(i) Making it simpler, all materials or substances are made up of matter.

(ii) All matter is made up of tiny particles like atoms or molecules.

♦**States of matter :**



♦**Classification of matter :**



Focus Point

Pure substances : Substances in which all the molecules are of same kind.

- Its either an element or a compound.
- Each pure substance has its own characteristic properties like melting point and boiling point.

Elements : Substances which are containing only one kind of atoms.

E.g. : gold, silver, O_2, N_2, P_4, S_8 etc.

Compound : When two or more different elements chemically combined together, they form compounds.

E.g. : water, carbondioxide, glucose, sugar, laughing gas.

2. MIXTURES OR IMPURE SUBSTANCES

An impure substance, or a mixture, contains two or more substances in any proportion. Also, these substances can be separated from one another. A mixture may contain elements, compounds, or elements and compounds. A mixture should not be confused with a compound. The proportion of the constituent elements in a compound is fixed. But that of the components of a mixture is not. For example, any amount of salt or sugar can be mixed with any amount of water to form a mixture.

Most materials that we use or come across are mixtures. Some of them are useful and others need purification (i.e., separation) before use.

Some examples of naturally occurring and man-made useful mixtures are given below.

(1) Air

Air contains the elements nitrogen and oxygen, and the compounds carbon dioxide and moisture (water vapour).

(2) Natural water

Natural water contains dissolved air, which is essential for aquatic animals,

(3) Sugar solution and soft drinks

A solution of sugar or glucose in water is a mixture. Soft drinks (or fizzy drinks) contain carbon dioxide dissolved in water and some sweetening and flavouring agents are also present. They are highly refreshing.

(4) Medicines

Most medicines are mixtures. On the label of a medicine bottle, you will find the substances or ingredients it contains.

(5) Alloys

An alloy is a metal mixed with other metal(s) or nonmetal(s). The components are so thoroughly mixed that the whole thing appears to be a single substance. They are usually made by melting the components together and allowing the melt to solidify. Alloys are generally stronger than the metals they contain. **Steel**, the most common alloy, contains iron with small amounts of carbon and manganese, **Stainless steel** is a special steel containing some chromium and nickel also.

Brass contains copper and zinc, whereas bronze contains copper and tin. Pure gold is not suitable for making jewellery. Pure gold is soft and gets deshaped by small pressures. So, the gold used for making jewellery is made stronger by alloying it with silver and copper.

♦**Types of mixtures :** There are essentially two types of mixture- Homogeneous and Heterogeneous

(i) Homogeneous mixture :

If we mix a spoonful of salt in a glass of water, we cannot see the particles of salt with our naked eye as they get uniformly dissolved in water. The first sip taste as salty as the last sip.

"Mixtures that have the same uniform composition throughout are called homogeneous mixtures. Some examples of homogeneous mixture are salt mixed in water, juice, tea, and air.

(ii) Heterogeneous mixture :

If you take a spoonful of sand and mix it in one glass of water, the particles are visible and settle down when left undisturbed for some time. "Mixtures are called heterogeneous mixtures as they do not have a uniform composition throughout". Some examples of heterogeneous mixture are mud mixed in water, mixture of oil and water, and soil.

Focus Point

- Alloys are the homogeneous mixture of two or more metals.
- Most of the things around us are not pure, but are mixture. We can use different components of mixture by separating them.
- Definition of pure is different for a chemist and for a common man.
- Atom is the fundamental unit of which elements are made.

3. SEPARATION OF THE COMPONENTS OF A MIXTURE

It is sometimes essential to separate the constituents of a mixture. For example, one has to remove impurities from water, to make it fit for drinking. Tea leaves are separated from tea by using a strainer. Gardeners remove stones from the soil. Stones and husk are removed from rice before cooking.

♦**Need of Separation :**

(i) To obtain two different but useful components of a mixture (e.g., butter is a useful component which is separated from milk by churning).

(ii) To remove harmful components or impurities of a mixture (e.g., small pieces of stones and husk are separated from rice or dal before cooking).

(iii)To remove useless components of a mixture (e.g., tea leaves are separated from tea).

3.1 METHOD OF SEPARATION

Large number of substances available in nature are mixed with certain other substances. Thus, in order to use them we separate them by various methods. Separation can be done on the basis of difference in physical properties like weight, size, magnetic property, solubility, melting point & boiling point.

(A) Separation of Two or More Solid Mixture

Solid constituents of a mixture can be easily separated if there is a marked difference in their size or colour. Other physical properties such as magnetic nature or solubility in a particular solvent are also helpful. The following techniques can be used to separate the constituents of a mixture of solid.

(i) Handpicking :

This method can be used when the components of the mixture differ in size, shape, or colour and are present in small quantities. In this method, the components of the mixture are separated by hand. For example, stones can be removed from rice by handpicking.

Figure : Hand picking

LAB TIME
Let's Do & Learn

- **Object :**Take some dal in plate and see the small pieces of stones or pebbles in it. Handpick stones to get pure dal.
- **Observations :** Since the size and colour of small pebbles are different from rest of dal, they can be hand picked and removed.

(ii) Threshing :

The process that is used to separate grain from stalks is threshing. In this process, the stalks are beaten to free the grain seeds. Sometimes, threshing is done with the help of bullocks. Machines are also used to thresh larger quantities of grain.

Figure : Threshing

(iii) Winnowing :

Winnowing is used to separate heavier and lighter components of a mixture by wind or by blowing air. This method is commonly used by farmers to separate lighter husk particles from heavier seeds of grain. The husk particles are carried away by the wind. The seeds of grain get separated and form a heap near the platform for winnowing. The separated husk is used for many purpose such as fodder for cattle.

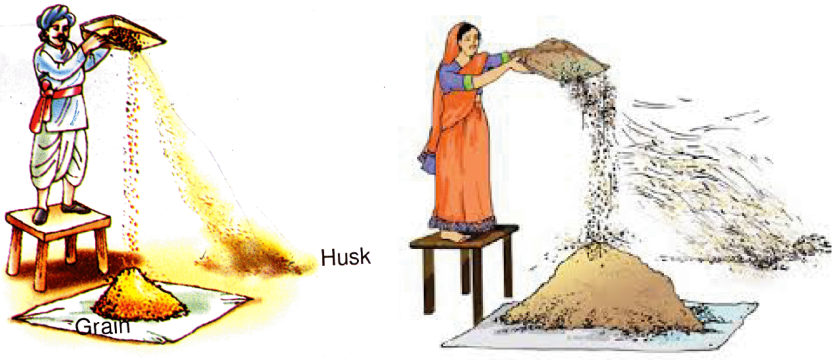


Figure : Winnowing

LAB TIME
Let's Do & Learn

- **Object :**Take a mixture of grain (wheat) and husk in a winnow and make the husk fall from a height by shaking it in the air.
- **Observations :** Wheat, the heavier of the two falls down to a side, forming a heap a largely of its own. The husk, being lighter in weight blows away easily due to air and forms a separate heap away from wheat.

(iv) Sieving :

In a flour mill, impurities like husk and stones are removed from wheat before grinding it. Usually, a bagful of wheat is poured on slanting sieve. Sieving removes pieces of stones, stalk and husk that may still remain with wheat after threshing and winnowing.

Similar sieves are used at construction sites to separate pebbles and stones from sand.

Figure : Sieving

LAB TIME
Let's Do & Learn

- **Object :**Take a mixture of wheat flour containing husk in a sieve with small pores. Shake the sieve to separate bigger particles of husk
- **Observations :** Finner particles of wheat flour pass through the sieve and drop down. The bigger particles of husk are left behind on the sieve.

(v) Magnetic Separation :

A mixture of solid can be separated by magnetic separation if one of the constituents of the mixture is a magnetic substance, that is it can be attracted by a magnet.

In an iron ore, iron metal is separated from the non-magnetic impurities using the method of magnetic separation. Since iron particles are magnetic in nature, they are attracted by a magnet and collected on one side. The impurities are left behind and form a separate pile. Let us perform the following activity to separate a mixture of iron filings and sand using a magnet.

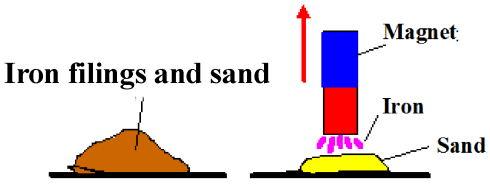


Figure : Magnetic separation

LAB TIME
Let's Do & Learn

- **Object :** Take a mixture of sand and alpins in a bowl and run a magnet over it.
- **Observations :** When the magnet is run over the mixture, alpins get attracted to it and sand is left behind in the bowl.

Focus Point

Sublimation :

This technique of separation of a mixture of solids can be used if one of the constituents of the mixture sublimes, that is, on heating, it changes directly to gaseous state without passing through the liquid state. Substances that sublime are iodine, camphor, naphthalene, ammonium chloride and dry ice. A mixture of ammonium chloride and sodium chloride can be separated by sublimation.

Example : Camphor is a solid which is directly converted to vapours on heating without coming to liquid state. This process is known as sublimation. Camphor can be separated from a mixture of sand and camphor by heating. Camphor changes to vapours which can be collected and sand is left behind.

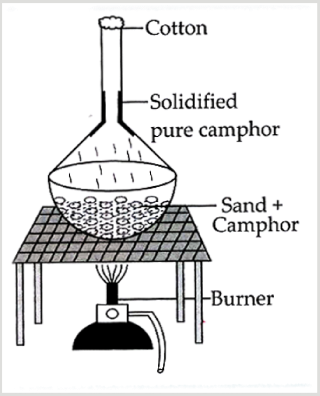


Figure : Separation by sublimation

(B) Separation of Insoluble Solid in Liquids

Solids such as chalk powder, sand and dust particles are insoluble in water. Particles of such type can be separated from their solutions using one of the following methods- i) sedimentation and decantation, ii) filtration, and iii) loading.

(i) Sedimentation and Decantation :

Sometimes, it may not be possible to separate components of a mixture by winnowing and handpicking. For example, there may be lighter impurities like dust or soil particles in rice or pulses. Rice or pulses are usually washed before cooking. When you add water to these, the impurities like dust and soil particles get separated. These impurities go into water, which becomes a little muddy.

When the heavier component in a mixture settles after water is added to it, the process is called sedimentation. When the water (along with the dust) is removed, the process is called decantation.

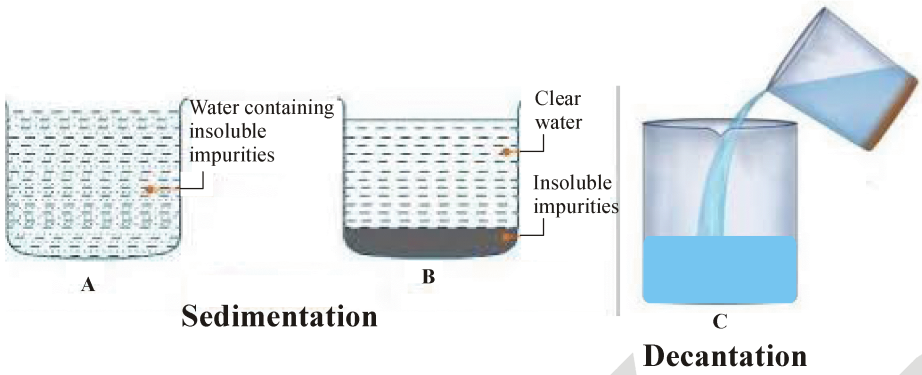


Figure : Sedimentation and Decantation

(ii) Loading :

This method is used to separate very fine particle of an insoluble solid that remains suspended in a liquid. Due to their tiny sizes, their sedimentation takes a very long time. Loading is commonly used to get clear water from such dirty water. Loading is method in which a special substance called alum is used to load the suspended particles to make them heavy and increase their sedimentation speed.

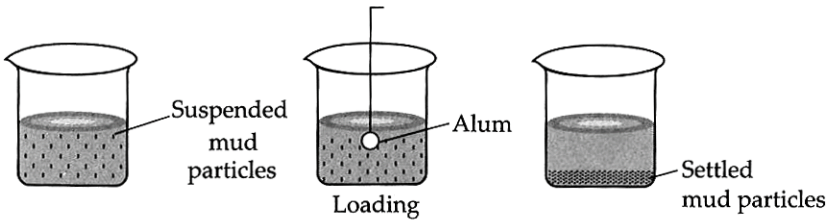


Figure : Loading

(iii) Filtration :

The process of separation of insoluble solids from their solutions using a filter is called filtration. The filter allows the liquid to pass through and retains the solid particles. The filter used may be a filter paper, a fine muslin cloth, or a fine mesh. The solid particles retained by the filter form the residue. The clear liquid collected after the filtering process forms the filtrate. The strainer, used to remove tea leaves from tea, is an example of a filter.

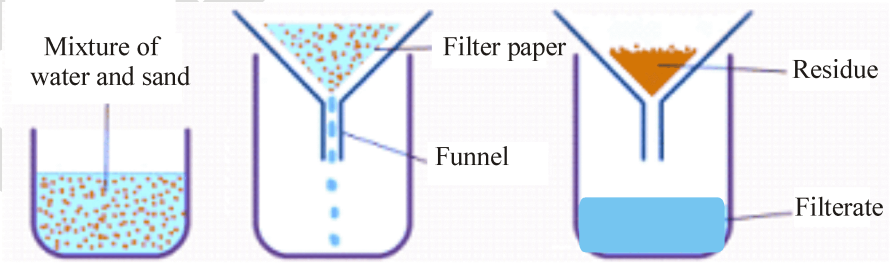


Figure : Filtration

(C) Separation of Soluble Solid in Liquids

(i) Evaporation :

The process of conversion of water into its vapour below its boiling point is called evaporation. The process of evaporation takes place continuously wherever water is present. Sea water contains many salts mixed in it. One of these salts is the common salt. When sea water is allowed to stand in shallow pits, water gets heated by sunlight and slowly turns into water vapour, through evaporation. In a few days, the water evaporates completely leaving behind the solid salts. Common salt is then obtained from this mixture of salts by further purification.

Figure : Evaporation

Focus Point

- Evaporation can take place at any temperature below its boiling point.
- Factors affecting evaporation are :
  (i) Surface Area (ii) Humidity (iii) Temperature (iv) Wind speed

(ii) Condensation :

Have you ever noticed that water drops condense under the metal lid that has been used to cover a vessel containing just boiled vegetables or milk ? It is because the hot milk or vegetables give out water vapour. These vapour on coming in contact with relatively cold metal lid liquify to form droplets of water. This process of changing water vapour into the liquid state on cooling is called condensation.

(iii) Crystallisation : This method is used to get crystals of a pure substance from its solution. This method separates out pure crystals from impurities.

LAB TIME
Let's Do & Learn

- **Object :** Dissolve impure salt in water by heating it. Filter the solution and keep it for some time.

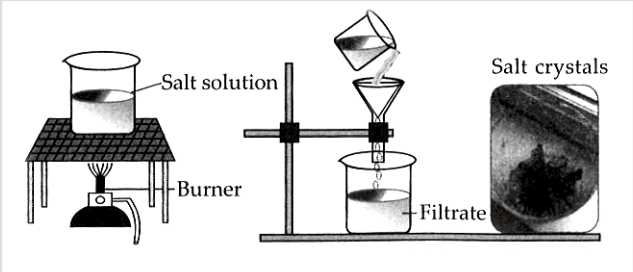


Figure : Crystallisation

- **Observations :** When the filtered solution is kept undisturbed for some time, white crystals of pure salt are separated.

Focus Point

Advantages of crystallisation over evaporation : Crystallisation is a better technique than evaporation to purify a solid because of the following reasons :
(i) During evaporation, the solution is heated to dryness. During this heat treatment, some solids may decompose or some solids, like sugar, may get charred.
(ii) Both for evaporation or crystallisation the solution of the impure solid is prepared in water or any other suitable solvent. This solution is then filtered to remove insoluble and suspended impurities. However some soluble impurities may still be present even after filtration. Therefore, when such a solution is evaporated, the impurities get deposited along with the solid and thus contaminate the solid. In contrast, when the solution is allowed to stand for crystallisation, crystals of the pure solid separate out leaving the impurities in the solution.

4. OTHER SPECIAL TECHNIQUES

(i) Centrifugation :

Centrifugation is a technique used to speed up sedimentation of fine particles suspended in a solid-liquid mixture. The principle of c entrifugation is that an object, when spun at high speed, experiences an outward force away from the centre of rotation.

The mixture is placed in a centrifuge tube. When this tube is rotated at high speed in a centrifuge machine, the solid particles move towards the bottom of the centrifuge tube. The liquid on top (supernatant liquid) can be poured off and in this way the solid particles are separated from the mixture.

Visit a nearby dairy, and observe the process of obtaining cream by churning of milk. The technique of centrifugation is used in this process.

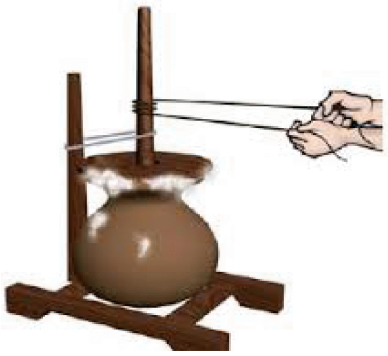


Figure : Centrifugation

(ii) Separating funnel :

The separation of two immiscible liquids is based on the difference in their densities. The apparatus used for separation is separating funnel. It is a long glass tube provided with a tap at its bottom.

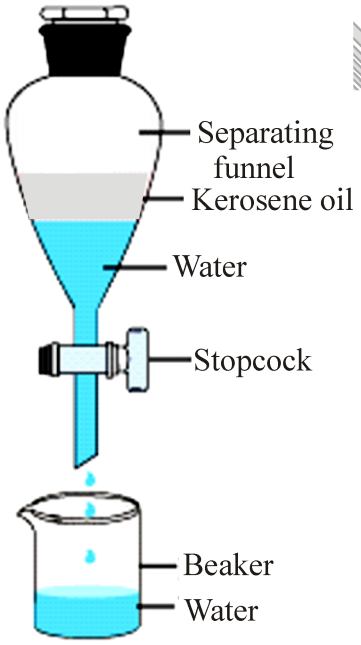


Figure : Separating funnel

5. CAN WATER DISSOLVE ANY AMOUNT OF A SUBSTANCE

Solutions : Mixtures in which the components dissolve in each other completely are called solutions. Each solution has two parts: a solute and a solvent. The substance that dissolves is called the solute, and the substance into which it dissolves is called the solvent. For example, in a salt-water solution, salt dissolves in water, so salt is the solute, and water is the solvent.

- **An unsaturated solution** is one in which more solute can be dissolved in the given amount of solvent.
- On the other hand, a solution in which no more solute can be dissolved in the given amount of solvent, is called a **saturated solution.**

• Many substances dissolve in water and form a solution. The solution made in water, are called aqueous **solutions**.

• Such solution which contains more amount of substances dissolved in it than required to form a saturated solution, is called **super saturated solution**.

BUILD THE CONCEPT

SOLUBILITY

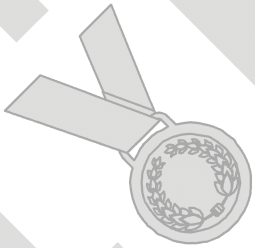
Solubility is defined as the amount of solute that can be dissolved in a given amount of solvent.

Factors Affecting Solubility :

1. Temperature
2. Particle size

Focus Point

- Liquids may be miscible or immiscible with each other. If two liquids mix with each other and they cannot be seen separately, they are called miscible liquids e.g., milk and water.
- If two liquids do not mix and can be seen as separate layers, they are called immiscible liquids e.g., oil and water.
- Oil and water are immiscible liquids but if a little soap solution or detergent is added to the mixture, the mixture becomes milky. Oil and water not separated, it becomes a stable mixture which is called emulsion.



SOLVED EXAMPLES

SE. 1

What is a saturated solution? How is it different from unsaturated solution?

Ans. A solution is said to be saturated if it has maximum amount of solute dissolved in it at a given temperature and no more solute can be dissolved in it. If the solution contains lesser amount than the maximum amount that can be dissolved in it and some more solute can be dissolved in it, the solution is called unsaturated solution.

SE. 2

What type of mixtures can be separated by the process of sublimation?

Ans. The process of sublimation is used to separate those solids from their mixtures which directly pass to vapour state upon heating without passing through the liquid state and the vapours on cooling give back the solid again. Solids like camphor, naphthalene, iodine, etc. undergo sublimation.

SE. 3

How will you separate a mixture of sugar and chalk powder? Explain the procedure and the processes involved.

Ans. Dissolve the mixture in water by stirring. Filter the solution through a funnel with the help of a filter paper. Chalk powder is left on the filter paper as residue. The filtrate contains sugar solution. Sugar can be recovered from this solution by evaporating the solution in a China dish. The two processes involved are filtration and evaporation.

SE. 4

What should be the difference in boiling points of the liquids of a mixture to be separated by distillation?

Ans. Constituents differing in boiling points by more than 20-25°C can be separated by distillation.

SE. 5

Name the process by which following can be separated.

(i) Common salt and water
(ii) Iodine and sand
(iii) Kerosene oil and water
(iv) Saw dust and iron nails

Ans. (i) Evaporation (ii) Sublimation
(iii) Separating funnel (iv) Magnetic separation

SE. 6

Describe the method to obtain salt from sea water.

Ans. Sea water is allowed to stand in shallow pits. With the heat of sunlight, water gets evaporated in the form of vapours. After a few days water is completely evaporated and the solid salt is left behind. This impure salt contains many salts mixed in it. Common salt is then obtained from this impure salt mixture by further purification.

SE. 7

What is the principle used in the process of churning?

Ans. Centrifugation is the principle used in the process of churning. Whenever a liquid is rotated at high speed, the lighter component is collected towards the centre. This process is used in separating cream from milk. When milk is rotated at high speed, cream being lighter collects towards the centre and floats on milk.

SE. 8

Sand required for construction purposes is mixed with small pebbles and stones. Which method can be used to separate pebbles from sand?

Ans. The process of sieving can be used to separate sand from pebbles and stones. A big sieve with the smaller size through which only sand can pass but pebbles and stones cannot pass, is used.

SE. 9

Define the terms solute, solvent and solution. Can solute particles be distinguished from solvent in a solution?

Ans. **Solute** - The substance which is dissolved in a solvent to produce a solution is called solute. It is present in smaller amount in the solution.

Solvent - The substance in which the solute is dissolved to produce a solution is called solvent. It is present in larger amount.

Solution - Solution is made by dissolving solute into solvent.

Solute particles are so small that they disappear in the solvent and cannot be distinguished in the solution.

SE. 10

In a mixture of alcohol and water the two liquids cannot be seen separately while in a mixture of oil and water, both the liquids can be seen separately. Why?

Ans. Alcohol and water are miscible in each other hence, they form a homogeneous mixture. Since, they mix into each other so they cannot be seen separately. Oil and water are immiscible liquids, hence, they form a heterogeneous mixture. Since, they do not mix into each other and form separate layers so they can be seen separately.

SE. 11

How do we separate wheat grains from chaff after harvesting?

Ans. To separate the grains from chaff, the stalks are threshed by hitting the stalks with wood or by hitting them on the ground. It is also done by the help of big machines called threshers. It separates the grains from stalks. Winnowing is done to separate the chaff from the wheat grains.

SE. 12

What is desalination? Why is it done?

Ans. Desalination is a process of removing salt from saline water. It is done to purify salted water or to remove salt from sea water.

Space for Notes :

NS. 1

Why do we need to separate different components of a mixture? Give two examples.

Ans. A mixture is separated into different components to remove harmful or unuseful components and to separate the pure components.
(i) Removal of husk from grains of wheat.
(ii) Tea leaves are separated from tea after preparing it.

NS. 2

What is winnowing? Where is it used?

Ans. Winnowing is used to separate heavier components from the lighter components by blowing air. It is used to separate lighter husk from heavier grains of wheat and rice.

NS. 3

How will you separate husk or dirt particles from a given sample of pulses before cooking?

Ans. Husk or dirt particles can be separated from pulses by winnowing. Husk or dirt particles being lighter can be separated from pulses which are heavier.

NS. 4

What is sieving? Where can it be used?

Ans. Sieving is a process in which small particles are separated from bigger particles by using a sieve. It is used for removing husk from wheat flour. It is also used for separating pebbles and stones from sand.

NS. 5

How will you separate sand and water from their mixture?

Ans. Sand and water can be separated by sedimentation and then removing the water by decantation.

NS. 6

Is it possible to separate sugar mixed with wheat flour? If yes, how will you do it?

Ans. Sugar can be separated from wheat flour by sieving. Flour will pass through the sieve while sugar will be retained on the sieve due to bigger size.

NS. 7

How would you obtain clear water from a sample of muddy water?

Ans. Mud can be separated from water by filtration. Fold a filter paper and keep it in a funnel and pour the muddy water on it. Mud remains on the filter paper while clear water comes through the filter paper and gets collected in the beaker.

NS. 8

Fill in the blanks.
(a) The method of separating seeds of paddy from its stalks is called ..... .
(b) When milk, cooled after boiling is poured into a piece of cloth, the cream (malai) is left behind on it. This process of separating cream from milk is an example of ..... .
(c) Salt is obtained from sea water by the process of ..... .
(d) Impurities settled at the bottom when muddy water was kept overnight in a bucket. The clear water was then poured off from the top. The process of separation used in this example is called ..... .

Ans. (a) Threshing, (b) Filtration, (c) Evaporation, (d) Sedimentation and decantation

NS. 9

True or False?
(a) A mixture of milk and water can be separated by filtration.
(b) A mixture of powdered salt and sugar can be separated by the process of winnowing.
(c) Separation of sugar from tea can be done with filtration.
(d) Grain and husk can be separated by the process of decantation.

Ans. (a) False
Since milk and water are miscible, the mixture cannot be separated by filtration.
(b) False
Since salt and powdered sugar are of same size and weight they cannot be separated by winnowing.

(c) False
Since sugar is soluble in tea, it cannot be separated by fitration.
(d) False
Grain and husk can be separated by winnowing, not by decantation.

NS. 10

Lemonade is prepared by mixing lemon juice and sugar in water. Your wish to add ice to cool it. Should you add ice to the lemonade before or after dissolving sugar?

Ans. We should add ice after dissolving the sugar. Solubility of sugar increases with increase in temperature. Hence, more sugar can be dissolved in water before adding ice.

Space for Notes :

EXERCISE – I

ONLY ONE CORRECT TYPE

1. Which of the following is/are element -
(A) Iron (B) Silver
(C) Oxygen (D) All of these

2. Which among the following is homogeneous mixture -
(A) Sand and water
(B) Chalk powder and water
(C) Oil and water
(D) None of these

3. Homogeneous mixture -
(A) Have uniform composition
(B) Do not have uniform composition
(C) May or may not have uniform composition (D) None of these

4. Pure substance are those substances -
(A) Made of only one kind of particles
(B) Cannot be separated by physical process
(C) Can be separated by physical process
(D) Both (A) and (B)

5. Handpicking method can be used for separating mixture of -
(A) Sugar powder and salt
(B) Red and blue coloured balls of different size
(C) Oil and water
(D) Milk and cream

6. Technique used to separate grains from stalks is-
(A) Hand picking
(B) Threshing
(C) Winnowing
(D) Sieving

7. The method used to separate heavier and lighter components of a mixture is -
(A) Hand picking (B) Threshing
(C) Winnowing (D) Sieving

8. Grain and husk can be separated by -
(A) Hand picking (B) Threshing
(C) Winnowing (D) Sieving

9. Sieving is used to -
(A) Separate impurities from wheat
(B) Separate pebbles and stones from sand
(C) Separate impurities from flour
(D) All of these

10. Mixture of salt and iron powder is separated by-
(A) Hand picking (B) Magnetic separation
(C) Sieving (D) Churning

11. Alum is used in-
(A) Loading (B) Filtration
(C) Evaporation (D) Distillation

12. The process used for separating constituents while preparing fruit juice is -
(A) Condensation (B) Evaporation
(C) Threshing (D) Filtration

13. During filtration the substance left behind on the filter paper is called :
(A) Distillate (B) Filtrate
(C) Sublimate (D) Residue

14. We can obtain sugar from sugar solution by -
(A) Sedimentation (B) Evaporation
(C) Filtration (D) Decantation

15. Salt is obtained from sea water by the process of -
(A) Filtration (B) Winnowing
(C) Evaporation (D) Decantation

16. The steam when comes in contact with cold surface, converts in water. The process is called -
(A) Evaporation (B) Condensation
(C) Sublimation (D) Melting

17. Loading is a process in which :
(A) Impurities become heavy and sink to the bottom
(B) Impurities float on the top
(C) Impurities vaporize
(D) None of these

18. The mixture of sand, salt and water can be separated by-
(A) Sublimation
(B) Filtration
(C) Distillation
(D) (B) followed by (C)

19. The spinner in washing machine dries clothes works on the principle of :
(A) Evaporation (B) Sedimentation
(C) Filtration (D) Centrifugation

20. Two immiscible liquids are separated by :
(A) Evaporation (B) Winnowing
(C) Filtration (D) Separating funnel

21. Pickout the mixtures from the following list :
(A) Gold (B) A salt solution
(C) Silver (D) Copper

22. A solution is prepared by dissolving sodium chloride in water. It is called -
(A) Non-aqueous solution
(B) Aqueous solution
(C) Alcoholic solution
(D) Heterogeneous solution

23. When more quantity of salt is added to saturated solution of salt, then it :
(A) Settles down at the bottom of the container (B) Remains suspended in the solution
(C) Starts evaporating
(D) Reacts with the solvent (water)

24. Solubility depends on:
(A) Temperature
(B) Solute
(C) Both (A) and (B)
(D) None of these

25. Winnowing is the method used to separate :
(A) Chaff from grain (B) Stones from rice
(C) Oil from water (D) Salt from sand

PARAGRAPH TYPE QUESTION

PARAGRAPH # 1

Sometimes, it may not be possible to separate components of a mixture by winnowing and handpicking. For example, there may be lighter impurities like dust or soil particles in rice or pulses. Rice or pulses are usually washed before cooking. When you add water to these, the impurities like dust and soil particles get separated. These impurities go into water, which becomes a little muddy.

When the heavier component in a mixture settles after water is added to it, the process is called sedimentation. When the water (along with the dust) is removed, the process is called decantation.

26. From which process stones can be removed from rice ?
(A) Handpicking
(B) Filtration
(C) Evaporation
(D) Condensation

27. The process in which heavier component in a mixture settles after water is added to it is-
(A) Decantation
(B) Sedimentation
(C) Magnetic separation
(D) Threshing

28. Due to their _____ sizes, sedimentation takes long time.
(A) Bulky
(B) Tiny
(C) Extra large
(D) None of these

PARAGRAPH # 2

Each solution has two parts: a solute and a solvent. The substance that dissolves is called the solute, and the substance into which it dissolves is called the solvent. For example, in a salt-water solution, salt dissolves in water, so salt is the solute, and water is the solvent. Liquids may be miscible or immiscible with each other. If two liquids mix with each other and they cannot be seen separately, they are called miscible liquids. If two liquids do not mix and can be seen as separate layers, they are called immiscible liquids.

29. Oil and water are example of_____ liquids.
(A) Miscible
(B) Solution
(C) Immiscible
(D) Solute

30. In salt-water solution, salt is _____.
(A) Solute
(B) Solvent
(C) Solution
(D) None of these

31. When two liquids mix with each other completely is called-
(A) Immiscible (B) Miscible
(C) Solvent (D) Solute

MATCH THE COLUMN

32.

Column A	Column B
(P) Separation of mixture of sand and water	(i) sieving
(Q) Rice and suji	(ii) loading
(R) Two immiscible liquid water	(iii) oil and
(S) Process of making sedimentation of dust particles faster.	(iv) filtration

(A) P → (iv), Q → (i), R → (iii), S → (ii)
(B) P → (i), Q → (iv), R → (iii), S → (ii)
(C) P → (iv), Q → (iii), R → (i), S → (ii)
(D) P → (iv), Q → (i), R → (ii), S → (iii)

33.

Column A	Column B
(P) Stone and rice	(i) Separating Funnel
(Q) Water and rice	(ii) Hand picking
(R) Water and oil	(iii) Magnetic Separation
(S) Sand and iron nails	(iv) Filtration

(A) P → (iv), Q → (i), R → (iii), S → (ii)
(B) P → (ii), Q → (iv), R → (i), S → (iii)
(C) P → (iv), Q → (iii), R → (i), S → (ii)
(D) P → (iv), Q → (i), R → (ii), S → (iii)

Space for Notes :

EXERCISE – II

VERY SHORT ANSWER TYPE

1. How can you decide whether a substance is pure or not ?
2. What type of mixtures can be separated by filtration ?
3. Can a mixture of salt and sugar be separated by filtration ?
4. Name the apparatus that can be used to separate a mixture of mustard oil and water ?
5. What are aqueous solutions ?
6. Define condensation.
7. What is evaporation?
8. Name the process used to separate an insoluble solid from a liquid.
9. Name two liquids which are insoluble in water.
10. Name the method by which cream can be separated from milk.

SHORT ANSWER TYPE

1. Explain the process of sedimentation and decantation.
2. What is handpicking? Give two examples in which handpicking is used.
3. How will you separate a mixture of sand and salt?
4. Why do wet clothes dry up when they are spread in air?
5. Name any two methods, which are used to separate:
   (a) Solid-solid mixtures
   (b) Liquid-solid mixtures

LONG ANSWER TYPE

1. Why is salt a pure substance whereas salt solution is considered to be a mixture ?
2. Name and describe briefly a method which can be helpful in separating a mixture of husk from grains. What is the principle of this method?
3. Draw a well-labelled diagram for the setup used for filtration. Explain its working.
4. Name the method of separation that can be used in the following situations.
   (a) Accidental mixing of mustard oil and water.
   (b) Adulterated urad dal having papaya seeds in it.
   (c) You visit a village were the water drawn from the well is not transparent.
   (d) If you find that your bhel puri has large number of cut green chilies.
5. Differentiate between each of the following pairs :
   (a) Homogeneous and heterogeneous solutions (b) Pure and mixed substances
   (c) Solute and solvent
   (d) Sedimentation and decantation

TRUE / FALSE

1. When two or more substances are mixed together in any ratio it is called a mixture.
2. The process of conversion of water vapours into liquid is called evaporation.
3. Winnowing can be used to remove pebbles from sand.
4. A mixture of salt and sand can be separated by handpicking.
5. Strainer is kind of sieve which is used to separate liquid from solid.

FILL IN THE BLANK TYPE

1. Chalk powder added in water is an example of a _____ .
2. When the heavier component in a mixture settles after water is added to it, the process is called _____.
3. Camphor is separated from common salt by _____
4. Simplest way of separating broken rice from whole rice is _____ .
5. A _____ cannot dissolve more amount of a given substance at a given temperature.

Answer Key

EXERCISE–I														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
D	D	A	D	B	B	C	C	D	B	A	D	D	B	C
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
B	A	D	D	D	B	B	A	C	A	A	B	B	C	A
31	32	33												
B	A	B												

EXERCISE – II

TRUE / FALSE

1. T 2. F 3. F 4. F 5. T

FILL IN THE BLANKS

1. Heterogeneous mixture
2. Sedimentation
3. Sublimation
4. Sieving
5. Saturated solution

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : SEPARATION OF SUBSTANCES)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
In-Text Examples			
Solved Examples			
NCERT Exercises			
Exercise I			
Exercise II			
Short Note-1			
Revision - 1			
Revision - 2			
Revision - 3			
Remark			

NOTES :

1. In the status, put “completed” only when you have thoroughly worked through this particular section.
2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

Space for Notes :