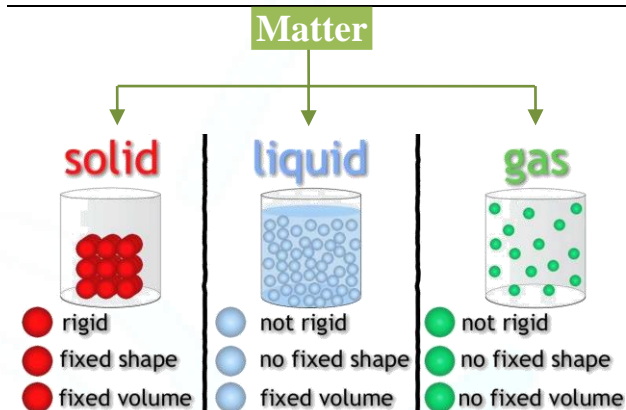


MATTER & ITS SEGERAGATION

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.

Classification of Matter



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.

- **Mixture:** Substances in which all the molecules are not of same kind.
- Most naturally occurring substances are mixtures.

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

- Making it simpler, all materials or substances are made up of matter.
- All matter is made up of tiny particles like atoms or molecules.

Classification is the grouping together of things that are similar to each other in some of their properties. For instance, if we are given some items like pencil, chalk, skirt, blouse, ink, shirt, pen, trousers, we would group or classify the similar items as follows.

Types of mixtures :

There are essentially two types of mixture- Homogeneous and Heterogeneous

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.

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.



Particles are uniformly dissolved in water

Homogeneous mixture-tea

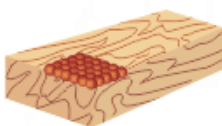


Particles are not uniformly dissolved in water

Heterogeneous mixture-mud in water

Interesting Facts : Alloys are the homogeneous mixture of two or more metals.

- All matter is made of tiny particles called **atoms**.
- Two or more atoms combine to form **molecules**.
- A molecule is the smallest piece of substance that has the same property as the entire substance.

There are three states of matter**Solid state**

- Atoms are tightly packed and have little space to move.
- Solids have fixed shape and do not flow.

Liquid state

- Atoms are more loosely packed and have more space to move.
- Liquids flow, hence they don't have fixed shape.

Gaseous state

- The atoms are far from each other and move very freely.
- Gases don't have fixed shape.

FUNDAMENTAL UNLOCKED- (FU#1)

- Q.1** How can we conclude that air is a matter?
- Q.2** Explain why cold cannot be considered as matter?
- Q.3** What do you mean by pure substance?
- Q.4** Explain how mixture of salt and water is homogeneous mixture.
- Q.5** Explain heterogeneous mixture with two examples.

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 :

- To obtain two different but useful components of a mixture (e.g., butter is a useful component which is separated from milk by churning).
- 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).
- To remove useless components of a mixture (e.g., tea leaves are separated from tea).


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.



Handpicking

(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.


KEY POINT

Aim : To separate components of a mixture of two or more solids

Materials required : Dals of different colours.

Procedure : Bring about one tablespoonful each of different dals (yellow, green, black, pink, etc.) to the class. Mix them in bowl. Now, try to separate the different dals. Were you able to separate them ? How did you do that ?

Conclusion : We can separate a mixture of different coloured dals by hand.

(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.


(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.

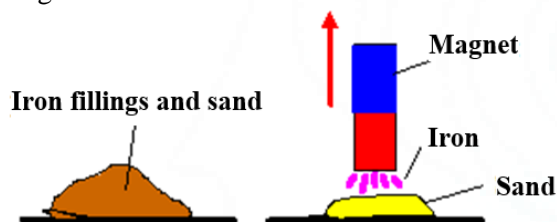
Similar sieves are used at construction sites to separate pebbles and stones from sand.



**(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.

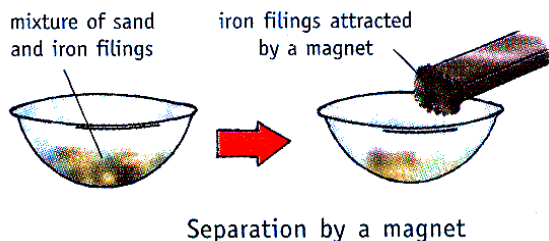
In an iron ore, iron metal is separated from the non-magnetic impurities using the method of magnetic separation. Since iron particles are magnetic in nature, they are attracted by a magnet and collected on one side. The impurities are left behind and form a separate pile. Let us perform the following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

**KEY POINT**

Aim : To separate components of a mixture of two or more solids

Material required : Bowl, iron filling, sand, magnet bar.

Procedure : Take a bowl and mix some sand and iron filings in it. Now take a magnet bar and roll it gently over the mixture. The iron filing will be attracted by the magnet. Brush the iron filings off the magnet and collect them separately. Repeat this procedure several times till there are no more iron filing left in the original mixture



Separation by a magnet

Conclusion : We can separate a mixture of different magnetic element.

(vi) Sublimation :

This technique of separation of a mixture of solids can be used if one of the constituents of the mixture sublimates, 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.

**Process of sublimation of ice and water****(b) Separation of Insoluble Solid in Liquids**

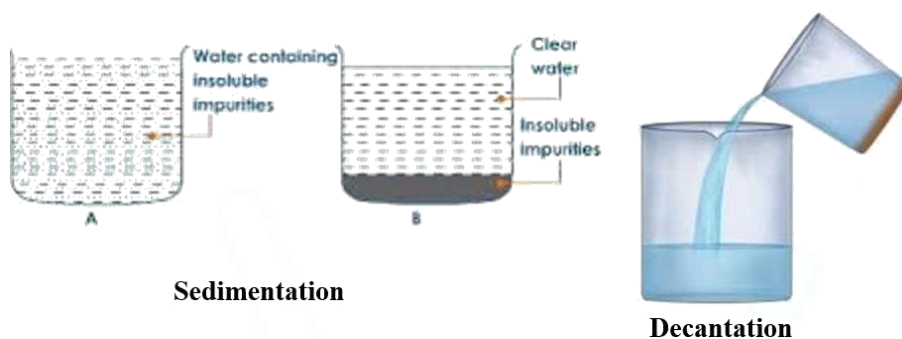
Solids such as chalk powder, sand and dust particles are insoluble in water. Particles of such type can be separated from their solutions using one of the following methods– i) sedimentation and decantation, ii) filtration, and iii) loading.

(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.



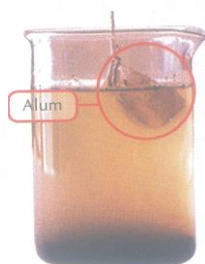


Sedimentation

Decantation

(ii) Loading :

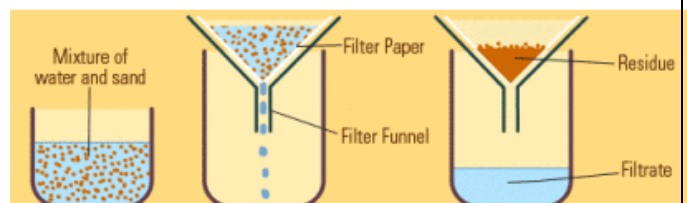
This method is used to separate very fine particle of an insoluble solid that remains suspended in a liquid. Due to their tiny sizes, their sedimentation takes a very long time. Loading is commonly used to get clear water from such dirty water. Loading is method in which a special substance called alum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



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.



Filtration

KEY POINT

Aim : To separate the mixture of insoluble solids in liquids by sedimentation and decantation.

Materials Required : Six test tubes, sand, rice, dal, water, test tube stand.

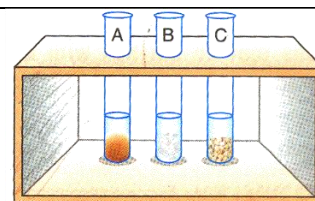
Procedure : Take three test tubes and make these mixtures.

- Mixture of sand in water (Test tube A)
- Mixture of rice in water (Test tube B)
- Mixture of dal in water (Test tube C)

Observe whether sand, rice and dal have settled down in the respective test tubes. Now, separate sand from water by slowly tilting test tube A and pouring the water into another test tube, without disturbing the sand. Repeat the activity with test tubes B and C.

Observation : The three mixtures obtained are mixtures of insoluble solids in liquids. Sand, rice and dal settle down in the respective test tubes. They are separated from water by slowly tilting the test tube. The water obtained by separating the mixture of sand and water is not absolutely clear. Small particles of sand can be seen floating in it.

Conclusion : A mixture of insoluble solid in a liquid can be separated by sedimentation and decantation.



(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

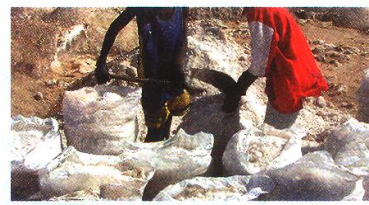
completely leaving behind the solid salts. Common salt is then obtained from this mixture of salts by further purification.



The story of salt
Seawater has salt dissolved in it.



To obtain salt, seawater is collected in shallow pits and allowed to stand.



Sun's heat evaporates the water. Salt, which is left behind, is collected.



Interesting Facts :

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.

Types of Changes

Physical Change: Any change that is reversible is physical change.

e.g. Changing water to ice or vapor, making a sugar solution.

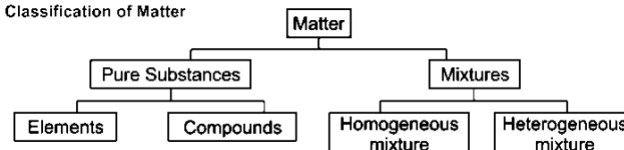


Chemical Change: A change in which a new substance is formed.

e.g. cooking food, burning of wood.



Classification of Matter



Pure substances	Mixtures
<ul style="list-style-type: none"> • Atoms combine in fixed quantities • Atoms can be separated only by destroying the substance 	<ul style="list-style-type: none"> • Substances combine in different quantities • Mixtures can be separated easily by physical methods



FUNDAMENTAL UNLOCKED- (FU#2)

- Q.1 Define the terms handpicking and threshing by giving examples.
- Q.2 How a mixture of iron filling and sulphur powder can be separated?
- Q.3 Which property among ammonium chloride and sodium chloride is different?
- Q.4 Give two examples of solids which are soluble and insoluble in water.
- Q.5 Why water droplets are seen on the surface of water bottle containing cold water?

Other Special Techniques

Centrifugation :

Centrifugation is a technique used to speed up sedimentation of fine particles suspended in a solid-liquid mixture.

The principle of centrifugation 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.



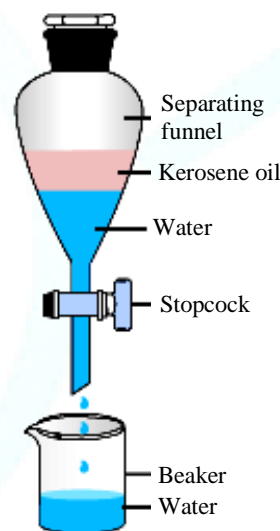
Centrifugation

Interesting Facts : The supernatant liquid may be centrifuged again at greater speeds to extract less dense fractions.



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.



Separating funnel

FUNDAMENTAL UNLOCKED- (FU#3)

- Q.1 Define the principle of centrifugation technique.
- Q.2 Write two application of centrifugation technique.
- Q.3 Why separating funnel is not implemented for separation of two miscible liquid?
- Q.4 Among mixture of benzene and water identify the bottom layer and top layer in separating funnel.
- Q.5 How the mixture of benzene, water and mercury can be separated?



Can Water Dissolve any amount of a substance

Mixtures in which the components dissolve in each other completely are called solutions.

Saturated & Unsaturated 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

FUNDAMENTAL UNLOCKED- (FU#4)

- Q.1 Explain the term solute and solvent.
- Q.2 Give an example of non-aqueous solution.
- Q.3 What is difference between unsaturated and super saturated solution ?
- Q.4 Write the difference between saturated and unsaturated solution.
- Q.5 How will you find that the solution is super saturated ?

Add to Your Knowledge

• 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

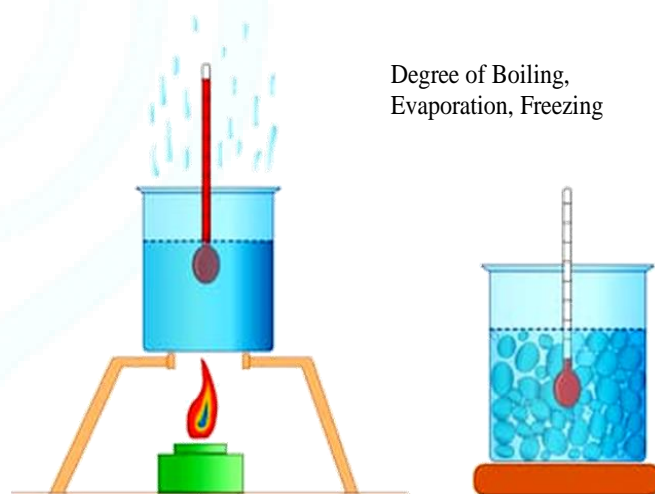
• Crystallisation

The process by which an impure compound is converted into its crystals is known as crystallisation. This is based upon the principle that when a crystal is formed, it tends to exclude the impurities which remain in the solution.

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.

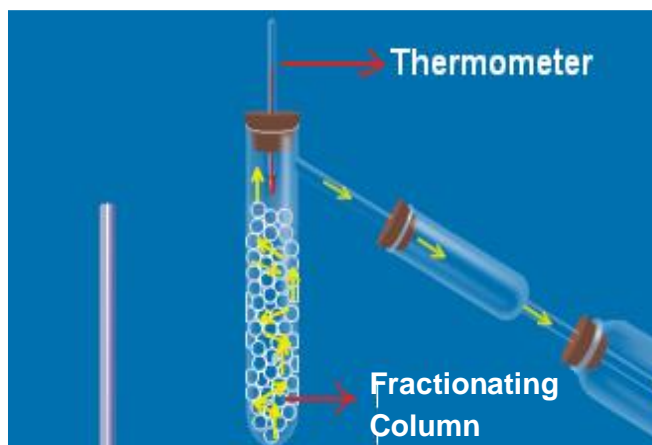


• Fractional Distillation

The process of separating two miscible liquids from one another by heating them at controlled temperature. Petrol, diesel, kerosene etc., are obtained by this process from petroleum which is a mixture of all these constituents.

The difference in boiling points of liquids should be less than 25° C.





Crude oil is a mixture of many useful things. Petroleum and other substances like diesel and kerosene can be extracted from crude oil with the help of fractional distillation.

Knowledge Point

Fractional distillation is the separation of a mixture into its component parts, or fractions. Chemical compounds are separated by heating them to a temperature at which one or more fractions of the mixture will vaporize. It uses distillation to fractionate.

The overall process of alcohol distillation can be summed up into 3 parts: Fermentation, Distillation, and Finishing.

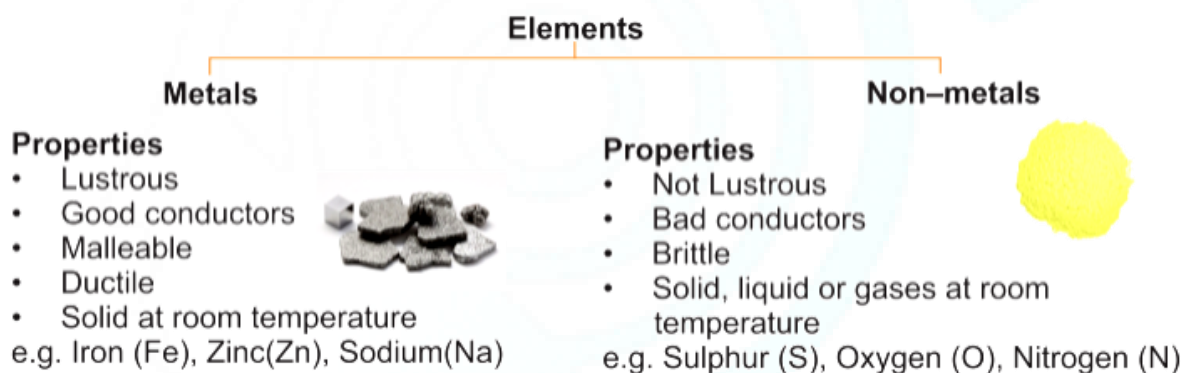
Matter: Anything that has mass and occupies space.

Mass: Amount of matter in a substance.

Volume: Space occupied by a substance.

Element: A pure substance, that cannot be broken down by chemical means.

Atom: The smallest particle of an element that retains the properties of the element.



Summary/What we learned so far?

- Mixtures that have the uniform composition throughout are called homogeneous mixtures.
- Mixtures that have non-uniform composition throughout are called heterogeneous mixtures.
- Difference in size, colour, magnetic nature or solubility in a particular solvent are used for separation.
- Handpicking is the process of separating solids by hand. Stones can be removed from rice by handpicking.
- Threshing is the process of separating grains from stalks by hitting them against hard surface. Machines are also used to thresh larger quantities of grain.

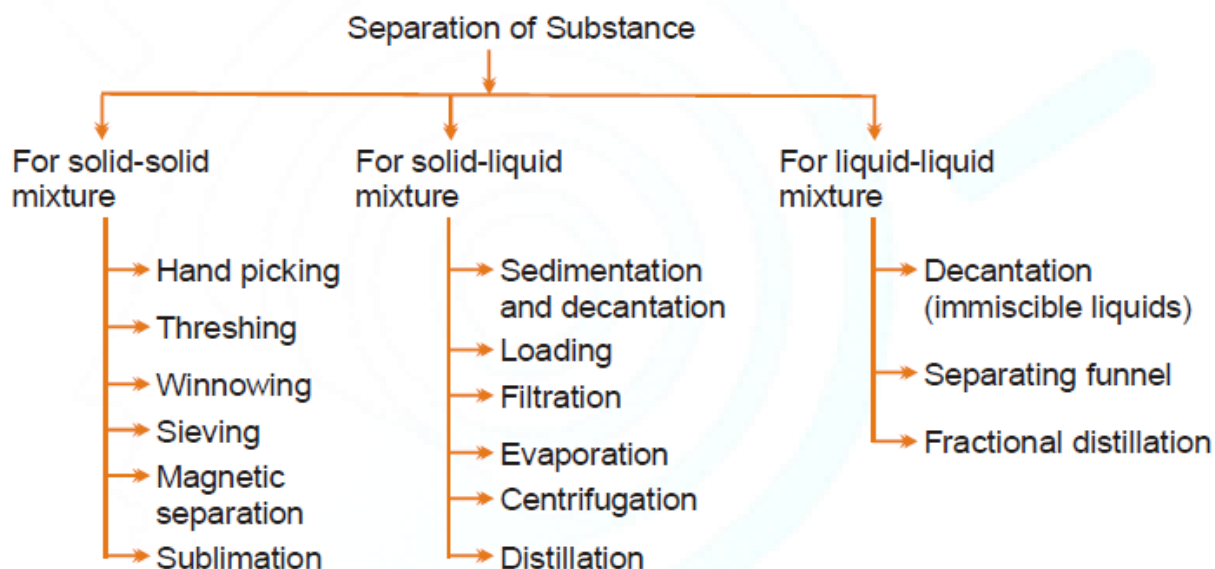
- Winnowing is the process of separating grain from the husk.
- Sieve is a metal plate with holes, used for removing solid particles of different sizes. Sieves are used at construction sites to separate pebbles and stones from sand.
- Substances that sublime are iodine, camphor, naphthalene, ammonium chloride and dry ice (solid CO_2).
- Decantation is the process of transferring (pouring out) a clear liquid (after sedimentation), without disturbing the sediment (insoluble heavy particles).
- Loading is the process of increasing the rate of sedimentation in a suspension, by adding chemicals, such as alum. Loading is commonly used to get clear water from dirty water.



- Filtration is the process of separating the insoluble suspended solids of various sizes from a suspension by using a filter. The strainer used to remove tea leaves from tea, is an example of a filter.
- Evaporation is the process of converting a liquid into its vapour, by heating it below the boiling point of the liquid.
- Condensation is the process by which water vapour change into the liquid state on cooling.
- The technique of centrifugation is used to obtain cream from milk.

- Separating funnel is a type of funnel provided with a tap, used for separating two immiscible liquids.
- A solution in which no more amount of solute can be dissolved is called a saturated solution.
- A solution that contains less amount of solute than required to form a saturated solution is called an unsaturated solution.
- A solution that contains more amount of solute than required to form a saturated solution is called a super saturated solution.

Chapter Map





ANSWER KEY

FUNDAMENTAL UNLOCKED- (FU#1)

Q.1 (C)

Q.2 (C)

Q.3 (D)

Q.4 (D)

Q.5 (B)





EXERCISE - I

SINGLE CORRECT TYPE QUESTIONS

- Which of the following is/are element -
(A) Iron (B) Silver
(C) Oxygen (D) All of these
- Which among the following is homogeneous mixture -
(A) Sand and water
(B) Chalk powder and water
(C) Oil and water
(D) None of these
- Homogeneous mixture -
(A) Have uniform composition
(B) Do not have uniform composition
(C) May or may not have uniform composition
(D) None of these
- 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)
- 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
- Technique used to separate grains from stalks is -
(A) hand picking (B) threshing
(C) winnowing (D) sieving
- The method used to separate heavier and lighter components of a mixture is -
(A) hand picking (B) threshing
(C) winnowing (D) sieving
- Grain and husk can be separated by -
(A) hand picking (B) threshing
(C) winnowing (D) sieving
- 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
- Mixture of salt and iron powder is separated by-
(A) hand picking
(B) magnetic separation
(C) sieving
(D) churning
- Alum is used in-
(A) loading (B) filtration
(C) evaporation (D) distillation
- The process used for separating constituents while preparing fruit juice is -
(A) condensation (B) evaporation
(C) threshing (D) filtration
- The difference between sieving and filtration is of -
(A) size of particles (B) phase of particles
(C) density (D) None of these
- We can obtain sugar from sugar solution by -
(A) sedimentation (B) evaporation
(C) filtration (D) decantation
- Salt is obtained from sea water by the process of -
(A) filtration (B) winnowing
(C) evaporation (D) decantation
- The steam when comes in contact with cold surface, converts in water. The process is called-
(A) evaporation (B) condensation
(C) sublimation (D) melting
- Cream is separated from milk by _____ and tea leaves are separated from tea by _____
(A) filtration, decantation
(B) winnowing, filtration
(C) decantation, filtration
(D) decantation, decantation
- 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.** After centrifugation when sublimate settles clear liquid
(A) can be allowed to rest
(B) can be allowed to form crystals
(C) can be decanted off
(D) can be evaporated
- 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.** Solutions are :
(A) heterogeneous mixtures
(B) compounds
(C) homogeneous mixtures
(D) elements
- 26.** Winnowing is the method used to separate :
(A) chaff from grain (B) stones from rice
(C) oil from water (D) salt from sand
- 27.** During filtration the substance left behind on the filter paper is called :
(A) distillate (B) filtrate
(C) sublimate (D) residue
- 28.** A mixture of sand and water can be separated using :
(A) threshing (B) sedimentation
(C) winnowing (D) sieving
- 29.** 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
- 30.** Fractional distillation is used to separate liquids having an appreciable difference in their:
(A) size and shape (B) solubility
(C) boiling points (D) none of these
- 31.** The constituents of a mixture are present in :
(A) a fixed ratio (B) a variable ratio
(C) the ratio of 2 : 1 (D) none of these
- 32.** How can a saturated solution be made unsaturated?
(A) by increasing temperature
(B) by adding more amount of solvent
(C) Both (A) and (B)
(D) by decreasing temperature
- 33.** The methods of separating components of a given mixture are based on the :
(A) physical properties and state of the components
(B) colour of the components only
(C) state of the components
(D) none of these
- 34.** Pickout the mixtures from the following list :
(A) gold (B) a salt solution
(C) silver (D) copper

FILL IN THE BLANKS

- A _____ substance has only one kind of matter.
- The composition and properties of a _____ mixture is uniform throughout.
- An _____ is a homogeneous mixture of two or more metals.





4. Chalk powder added in water is an example of a _____.
5. When the heavier component in a mixture settles after water is added to it, the process is called _____.
6. Camphor is separated from common salt by _____.
7. _____ (Grains/Leaves) can be separated from stalk using threshing.
8. Corn is separated from husk by the process _____.
9. Simplest way of separating broken rice from whole rice is _____.
10. A _____ cannot dissolve more of a given substance at a given temperature.

TRUE/FALSE

1. A mixture of milk and water can be separated by filtration.
2. A mixture of powdered salt and sugar can be separated by the process of winnowing.
3. Separation of sugar from tea can be done with filtration.
4. Grain and husk can be separated with the process of decantation.




EXERCISE - I
VERY SHORT ANSWER TYPE QUESTIONS

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 ?

SHORT ANSWER TYPE QUESTIONS

6. Give any four example of mixtures found on a kitchen shelf.
7. Why do we need to separate different components of a mixture ?
8. Why is loading used to separate suspended impurities ?
9. What is evaporation ? How is it useful to us ?
10. Name any two methods, which are used to separate:
 - (a) Solid-solid mixtures
 - (b) Liquid-solid mixtures

LONG ANSWER TYPE QUESTIONS

11. Why is salt a pure substance whereas salt solution is considered to be a mixture ?
12. 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?
13. Draw a well-labelled diagram for the setup used for filtration. Explain its working.
14. 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 where the water drawn from the well is not transparent.
 - (d) If you find that your bhel puri has large number of cut green chilies.
15. 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
16. Lemonade is prepared by mixing lemon juice and sugar in water. You wish to add ice to cool it. Should you add ice to the lemonade before or after dissolving sugar ? In which case would it be possible to dissolve more sugar ?





EXERCISE - III

PREVIOUS YEAR QUESTIONS

1. Observe the given figures carefully.

[NSO 2013]



Process X



Process Y

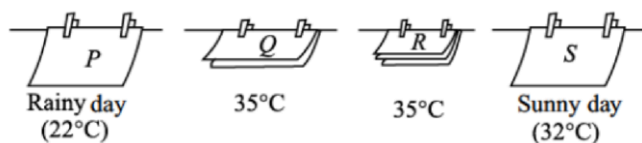
Identify X and Y respectively.

- (A) Decantation, Sieving
(B) Sieving, Decantation
(C) Winnowing, Threshing
(D) Threshing, Winnowing
2. Kanya has a material X whose molecules are separated by large distances or spaces. Nidhi has a material Y which takes the shape of its container. Gagan has a material Z which has no definite volume. Which of the three materials is/are in gaseous state ? [NSO 2013]
- (A) X (B) Y
(C) Both X and Y (D) Both X and Z
3. When a block of ice is dropped gently into a glass of juice, the liquid level in the glass rises. We can conclude from this observation that the block of ice _____. [NSO 2013]
- (A) Occupies space
(B) Has a fixed mass
(C) Can be compressed
(D) Has a definite shape
4. Ritika mixed lemon juice with water to prepare lemonade. She added ice to cool it. After adding a few spoons of sugar to this solution, she found that _____ sugar can be dissolved. The solution is now said to be _____. This is because _____ amount of sugar dissolves in water on _____. [NSO 2013]

- (A) More, pure, high, heating
(B) Less, saturated, low, heating
(C) Large, impure, more, cooling
(D) No more, saturated, less, cooling

5. Ravi wrote two terms 'X' and 'Y' about a solution. [NSO 2013]
'X' means 'no more will dissolve'.
'Y' means 'how much will dissolve'
- (A) Insoluble, Amount
(B) Saturated, Solubility
(C) Solubility, Volume
(D) Insolubility, Saturated
6. Heat from the Sun changes water from liquid to gas. This change of state is called _____. [NSO 2013]
- (A) Evaporation (B) Saturation
(C) Distillation (D) Condensation
7. Fill in the blanks by choosing the correct option. A mixture contains different substances P, Q and R, P is a liquid which is insoluble in water. Q particles are small and soluble while R particles are small, heavy and insoluble in water. Substance P is separated from the mixture by _____. Substance R is separated from the mixture by _____. Substance Q is recovered from water by _____. [NSO 2013]
- (A) Hand picking, magnetic separation, decantation
(B) Decantation, filtration, evaporation
(C) Winnowing, decantation, filtration
(D) Sieving, hand picking, decantation
8. Which of the following mixtures cannot be separated by the method of winnowing ? [NSO 2014]
- (A) Kidney beans and chick peas
(B) Potato wafers and biscuits
(C) Rice flakes and corns
(D) Sawdust and sand
9. Four identical towels were hung out to dry under different conditions. [NSO 2014]





Arrange them in order, beginning with the towel that would take the longest time to dry.

- (A) P, Q, R, S (B) P, R, Q, S
(C) R, P, Q, S (D) S, Q, R, P

10. Ritu has 500 cm^3 of oxygen in a small tank and she wants to transfer all of it to another container. Which of the following containers would be able to hold all the oxygen gas ?

[NSO 2014]



Volume = 250 cm^3 Volume = 400 cm^3 Volume = 550 cm^3

- (A) R only (B) Q and R
(C) P, Q and R (D) None of these

11. A mixture of four different powders is taken in a petri dish. The properties of the powders are listed below in the table. [NSO 2014]

Powder	Colour	Soluble in water	Magnetic in nature	Conductor of electricity
1	Grey	No	Yes	Yes
2	Blue	Yes	No	Yes
3	White	Yes	No	No
4	White	No	No	No

Which pair of substances would be most difficult to separate ?

- (A) 2 and 4 (B) 2 and 3
(C) 3 and 4 (D) 1 and 2

12. Match the Column-I with Column-II and select the correct option from the codes given below:

[NSO 2014]

Column-I
(Mixture)

- a. Flour and Iron powder
b. Pulses and Rice flour
c. Kidney bean and Lady's fingers
d. Coconut oil and water
e. Sugar dissolved in water

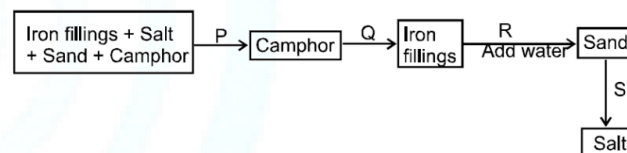
Column-II
(Method)

- i. Decantation
ii. Evaporation
iii. Hand picking
iv. Sieving
v. Magnet
(A) a-iv, b-i, c-ii, d-iii, e-v
(B) a-i, b-ii, c-iv, d-v, e-iii
(C) a-v, b-iii, c-iv, d-ii, e-i
(D) a-v, b-iv, c-iii, d-i, e-ii

13. Identify the incorrect statements from the following : [NSO 2014]

- (A) Interparticle distance is more in gas
(B) Solid has definite shape and volume
(C) Ice is heavier than water
(D) Matter can be changed from one form to another

14. Study the given flowchart and identify the processes P, Q, R and S involved in the separation of the mixture : [NSO 2015]



- (A) P-Sublimation; Q-Magnetic separation; R-Filtration; S-Evaporation
(B) P-Magnetic separation; Q-Filtration; R-Sublimation; S-Evaporation
(C) P-Evaporation; Q-Magnetic separation; R-Filtration; S-Sublimation
(D) P-Sublimation; Q-Magnetic separation; R-Evaporation; S-Filtration

15. A mixture contains three different substances X, Y and Z. They are of same size and colour. X particles are heavy and nonmagnetic, Y particles are light and nonmagnetic while Z particles are magnetic. Which of the following methods can be used to separate these particles? [NSO 2015]

- (A) Handpicking followed by filtration
(B) Winnowing followed by magnetic separation
(C) Magnetic separation followed by sieving
(D) Sublimation followed by distillation



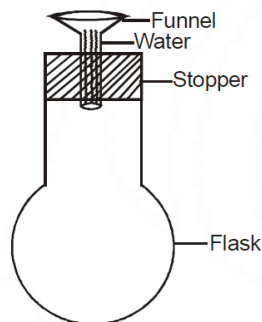
16. Which of the following is correctly matched ?

[NSO 2015]

- No more salt can be dissolved -Saturated solution.
 - Milk and water can be separated by-Filtration.
 - To separate heavier and lighter components-Winnowing
 - To obtain butter from milk- Sieving
- (A) i and iii (B) ii and iv
(C) i, iii, and iv (D) All of these

17. A funnel is fitted into a stopper that closes the mouth of a flask as shown in the given diagram. Virag wants to fill the flask with water but water does not flow in when it is poured into the funnel. This is because

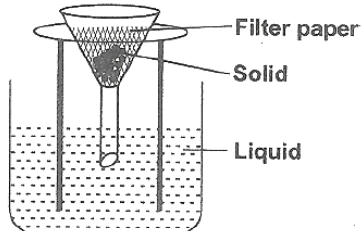
[NSO 2015]



- (A) The air pressure inside the flask is lower than the pressure of water in funnel.
(B) The space in the flask is occupied by air.
(C) The funnel is too small for water to flow through.
(D) The mouth of the flask is not sealed tightly enough.

18. The given diagram shows a method by which a solid can be separated from solid-water mixture. Which one of the following could be that solid ?

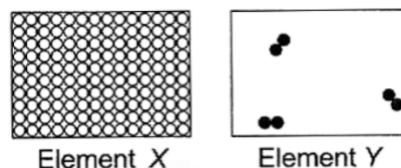
[NSO 2015]



- (A) Salt (B) Sugar
(C) Sand (D) Ice crystals

19. The given diagrams represent two elements:

[NSO 2016]

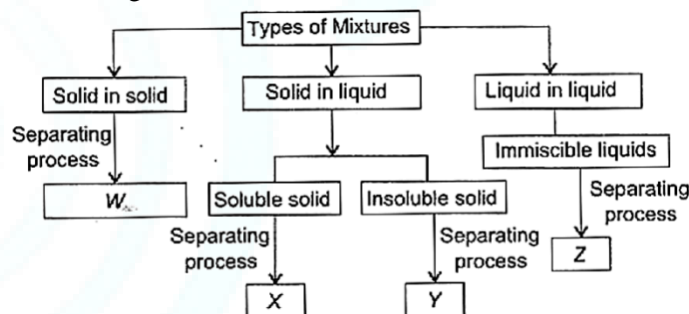


Which of the following statements is true about X and Y?

- (A) Particles of element X can move freely in all directions.
(B) Element Y is incompressible in nature.
(C) Element X is a solid and element Y is a gas.
(D) Element X is less denser than element Y

20. Substances W, X, Y and Z are obtained from different types of mixtures by using appropriate separating processes as shown in the given flowchart :

[NSO 2016]

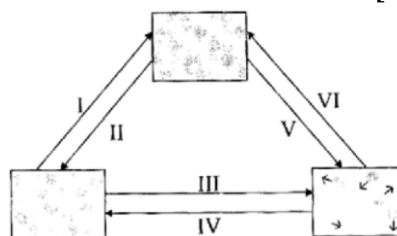


Separating processes used to obtain W, X, Y and Z respectively are

- (A) Winnowing, filtration, sedimentation and evaporation
(B) Sedimentation, winnowing, filtration and separating funnel
(C) Handpicking, sedimentation, winnowing and evaporation
(D) Sieving, evaporation, filtration and separating funnel.

21. The given diagram describes the changes that take place between different states of matter :

[NSO 2016]





The processes in which energy is given out are

- (A) I and III only (B) I, IV and V only
(C) I, II and IV only (D) None of these

22. Sonali mixed a packet of salt in a small amount of sand and then tried to recover the salt by the usual processes of sedimentation, decantation or filtration followed by evaporation. To her surprise, she could recover only a small part of the salt that she had taken. The possible reasons could be **[NSO 2016]**

- I. Salt also got evaporated along with water.
II. The quantity of salt was much more than that required to form a saturated solution.
III. The undissolved salt remained mixed with sand
IV. The quantity of water taken was insufficient to dissolve all the salt.
(A) II and III only (B) I and IV only
(C) II, III and IV only (D) All of these

23. Fill in the blanks in the given table by choosing an appropriate option. **[NSO 2017]**

Type of mixture	Method of Separation	Example
A heterogeneous solid-liquid mixture in which solid is lighter than liquid	Filtration	<u>P</u>
<u>Q</u>	Sieving	Bran and Flour
A heterogeneous solid-solid mixture containing one soluble component	<u>R</u>	Sand and Salt
A heterogeneous liquid-liquid mixture	<u>S</u>	Water and mustard oil

- (A) (P) Husk and water
(Q) Heterogeneous solid-solid mixture
(R) Filtration and evaporation
(S) Separating funnel
(B) (P) Sand and water
(Q) Heterogeneous solid-liquid mixture
(R) Hand picking
(S) Decantation
(C) (P) Water and oil
(Q) Homogeneous solid-solid mixture
(R) Winnowing
(S) Sieving
(D) (P) Sawdust and water
(Q) Heterogeneous solid-solid mixture
(R) Distillation
(S) Separating funnel

24. The table given below shows the amount of water in five identical beakers at the start of an experiment. It also shows the time required for the water in each beaker to go down by 20 mL.

Beaker	Amount of water at beginning (mL)	Time taken for water to reduce by 20 mL (min)
P	60	50
Q	60	30
R	80	60
S	90	60
T	100	70

What can we conclude from the table?

[NSO 2017]

- (A) Water in beaker Q evaporates faster than in beaker P.
(B) Water in beaker T evaporates faster than in beaker Q.
(C) Water in beaker T evaporates faster than in beaker P.
(D) Beakers R and S will have the same amount of water after 60 min.

25. Which of the following statements are incorrect? **[NSO 2017]**

- I. Evaporation of water at ordinary temperature is a physical and slow change.
II. Germination of seeds is a chemical and fast change.





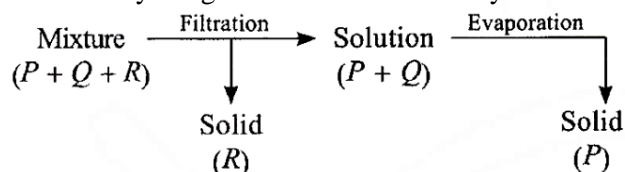
III. Bursting of balloon is a chemical and fast change.

IV. Glowing of a bulb is a physical and fast change.

V. Digestion of food is a physical and slow change.

- (A) II and III only (B) IV and V only
(C) I and IV only (D) II, III and V only

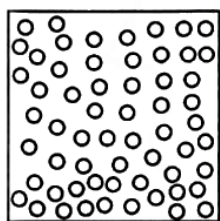
26. Study the given flow chart carefully.



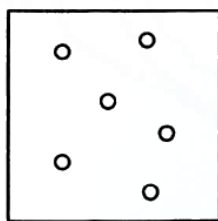
P, Q and R could be respectively [NSO 2017]

- (A) Chalk powder, water and sawdust
(B) Salt, water and sugar
(C) Sugar, water and sawdust
(D) Sawdust, water and sugar.

27. The given figures show arrangement of particles of a substance X at different temperatures.



At 75 °C



At 125 °C

Which of the following statements is correct?

[NSO 2017]

- (A) The boiling point of the substance X is between 75°C and 125°C.
(B) The melting point of the substance X is below 75°C.
(C) Particles of substance X at 125°C have more kinetic energy than at 75°C.
(D) All of these

28. Which of the following statements are incorrect? [NSO 2018]

- I. Mixture of kidney beans and chick peas can be separated by winnowing.
II. Salt from sea water can be obtained on a large scale by evaporation.

III. An alloy is a homogeneous mixture of a metal with another metal or non-metals.

IV. Seeds of wheat can be separated from a bundle of wheat stalks by sieving.

- (A) II and III only (B) I and IV only
(C) I, III and IV only (D) None of these

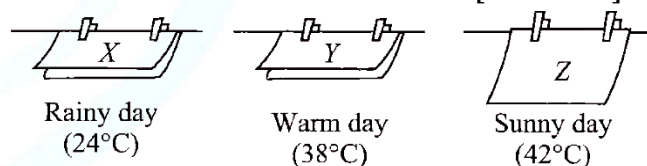
29. Read the given statements and select the correct option. [NSO 2018]

Statement 1 : When sea water is allowed to stand in shallow pits, water gets heated by sunlight and slowly turns into water vapour through evaporation.

Statement 2 : Boiling takes place at all temperatures.

- (A) Both statements 1 and 2 are true and statement 2 is correct explanation of statement 1.
(B) Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.
(C) Statement 1 is true but statement 2 is false.
(D) Both statements 1 and 2 are false.

30. Three identical towels were hung out to dry under different conditions. [NSO 2018]



Arrange them in order, beginning with the towel that would take the shortest time to dry.

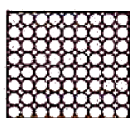
- (A) X, Y, Z (B) Z, X, Y
(C) Z, Y, X (D) Y, X, Z

31. Identify the incorrect statement from the following. [NSO 2018]

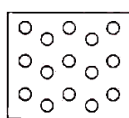
- (A) Interparticle distance is more in helium than in gold.
(B) Nitrogen has no definite shape as well as no definite volume.
(C) Mercury is lighter than water.
(D) Potassium is a reactive metal.

32. The given figures show arrangement of particles of a substance 'P' at different temperatures :

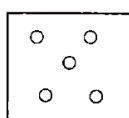




At 42°C



At 65°C



At 115°C

Which of the following statements is correct?

[NSO 2018]

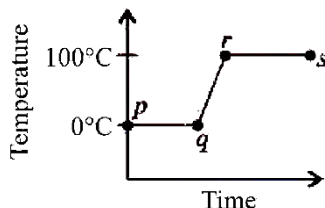
- (A) Melting point of the substance 'P' is below 42°C.
- (B) Particles of the substance 'P' at 115°C have less kinetic energy than at 65°C.
- (C) Boiling point of the substance 'P' is between 65°C and 115°C.
- (D) All of these

33. Rashu deliberately mixed rice, all pins, biscuits, pebbles and powdered sugar into a bowl in equal proportions and gave the mixture to her brother Kunal. She asked him to separate each component of the mixture without using water. Select the correct sequence of the methods of separation that you think Kunal should use.

[NSO 2018]

- (A) Sieving, threshing and then handpicking
- (B) Magnetic separation, handpicking, filtration and then sieving
- (C) Handpicking, centrifugation and then winnowing
- (D) Handpicking, magnetic separation and then sieving

34. Observe the given heating curve of ice carefully and select the correct statement(s) about it.



- (i) Point p is the freezing point of water.
- (ii) Between the points q and r water exists in liquid state.
- (iii) After points, water vapours condense back to liquid water on further increasing the temperature.
- (iv) Point r is the boiling point of water.

- (A) (ii) and (iii) only
- (B) (iii) only
- (C) (i) and (iv) only
- (D) (i), (ii) and (iv) only

35. Match column I with column II and select the correct option from the given codes.

[NSO 2018]

Column I

- P. Milk
- Q. Air
- R. Ammonium chloride
- S. Brick

Column II

- (i) Has definite shape and volume
- (ii) Undergoes sublimation
- (iii) Has definite volume
- (iv) Homogeneous mixture
- (A) P-(iii); Q- (iv); R- (i), (ii); S- (i)
- (B) P-(iii); Q-(ii); R-(i); S-(iv)
- (C) P-(i); Q-(ii), (iii); R-(iv); S-(ii)
- (D) P-(iv); Q-(i), (iii); R-(iii); S-(ii)

36. Read the given passage and fill in the blanks by selecting an appropriate option. [NSO 2018]
Change in temperature and pressure plays a very important role in changing the state of matter. A gas gets liquefied with (i) and (ii) while camphor undergoes sublimation with (iii) and (iv).

- (A) (I) Increase in pressure
(II) Decrease in temperature
(III) Decrease in temperature
(IV) Decrease in pressure
- (B) (I) Increase in pressure
(II) Decrease in temperature
(III) Increase in pressure
(IV) Decrease in temperature
- (C) (I) Decrease in temperature
(II) Increase in pressure
(III) Increase in temperature
(IV) Decrease in pressure
- (D) (I) Decrease in pressure
(II) Increase in temperature
(III) Increase in pressure
(IV) Decrease in temperature



ANSWER KEY

EXERCISE- I

SINGLE CORRECT TYPE QUESTIONS

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	D	D	A	D	B	B	C	C	D	B	A	D	B	B	C
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	B	C	D	D	D	C	B	A	C	C	A	D	B	A	C
Que.	31	32	33	34											
Ans.	B	C	A	B											

FILL IN THE BLANKS

- | | | |
|--------------------------|------------------|----------------|
| 1. Pure | 2. Homogeneous | 3. Alloy |
| 4. Heterogeneous mixture | 5. Sedimentation | 6. Sublimation |
| 7. Grains | 8. Winnowing | 9. Sieving |
| 10. Saturated solution | | |

TRUE / FALSE

- | | | | |
|----------|----------|----------|----------|
| 1. False | 2. False | 3. False | 4. False |
|----------|----------|----------|----------|

EXERCISE- II

PREVIOUS YEAR QUESTIONS

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	D	D	A	D	B	A	B	A	B	C	B	D	C	A	B
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	A	B	C	C	D	D	C	D	A	D	C	D	B	C	C
Que.	31	32	33	34	35	36									
Ans.	C	C	D	D	A	C									

