

CHAPTER : 1 EXPLORING MIXTURES & THEIR SEPARATION

NCERT FOLDER :

VERY SHORT ANSWER TYPE (2 MARKS)

1. In terms of physical properties why is it possible to separate the components of a mixture by physical means?

BOOK Pg: 1.4

It is possible because

- * the components of a mixture remain separate
- * they are not chemically linked

2. Is ice water homogeneous or heterogeneous substance?
Is it pure or impure substance?

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Ice water is homogeneous and pure substance because it contains only one type of particle i.e. H_2O

3. Explain why filter paper cannot be used to separate colloids?

The particle size of colloids lies between $1\text{ nm} - 1\text{ }\mu\text{m}$. But the pores of the filter paper are much larger than colloidal particles. So it will just pass through the filter paper leaving no residue.

4. What is meant by the terms composition and structure when referring to matter?

Composition refers to the ratio of particles (atoms) and their proportion of mass that make up a matter.

Structure refers to the arrangement of atoms in 3D space.

5. Classify the following elements as metal, non-metal or metalloid:

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aluminium, fluorine, gallium, phosphorus, tellurium,

thorium, barium, strontium, calcium and krypton.

Metals: Aluminium, Gallium, Thorium, Barium, strontium, calcium.

Non-metals:

Fluorine, Phosphorous, Krypton

Metalloids:

Tellurium

6. What type of mixtures can be separated by technique of crystallisation?

Crystallisation is used to separate homogeneous solid-liquid mixture where a solid solute is dissolved in a liquid solvent.

7. How can a saturated solution be made unsaturated?

- Book Pg: 1.7
- (i) By heating the saturated solution: At a higher temperature, the solution can dissolve more solute.
 - (ii) By adding more solvent, which increases the capacity of the solution to dissolve additional solute.

8. Sodium chloride contains two elements, but it is still a pure substance. Assign reason.

Sodium chloride is a pure substance as it has a consistent ratio of sodium and chloride ions by weight [23 : 35.5]

9. Name the methods used for

- (i) Getting pure sugar from impure sample
- (ii) Separating mixtures of components in blue ink

(i) Crystallisation

(ii) Paper chromatography

10. What separation technique should be applied for the separation of iron filings mixed with sand?

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Magnetic separation because iron filings are attracted by the magnet.

11. Give an example of a non-aqueous solution.

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Iodine in alcohol (Tincture of iodine)

Sulphur in Carbon di sulphide.

12. 100mL of alcohol is dissolved in 400mL of water. Calculate the volume percentage of the solute.

Given: Volume of solute = 100mL

Volume of solvent = 400mL

To find:

$$\text{Volume Percentage} = \frac{\text{Volume of solute} \times 100}{\text{Volume of solution}}$$

$$\begin{aligned} \text{Volume of solution} &= \text{Volume of solute} + \text{volume of solvent} \\ &= 100 + 400 = 500\text{mL} \end{aligned}$$

$$\text{Volume \%} = \frac{100}{500} \times 100$$

$$\boxed{V\% = 20\%}$$

13. Particle size of a substance in water is 200nm. What is the nature of the solution?

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Colloidal solution. because particle size of colloidal lies between 1nm - 1000 nm.

14. How will you bring about the following separations.

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(i) Fine mud particles suspended in water.

(ii) Carbon particles suspended in smoke.

(i) Sedimentation followed by decantation

(ii) Adsorption (using Activated carbon filters) (or)
Electrostatic precipitation.

15. What is mother liquor?

It is the Residual solution left after a crystallisation process.

SHORT ANSWER TYPE (3 MARKS)

1. Which type of solution is aerated water?

Gas in Liquid solution

Solute : CO_2 (Gas)

Solvent : H_2O (Liquid)

2. What type of a change is rusting of iron?

Rusting of iron is a chemical change

* New substance Formed :

Iron + water + oxygen $\rightarrow$ Hydrated iron(III) oxide
 $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$

* Irreversible : This change can not be reversed

* Property change : Iron - Silvery grey, and hard substance

$\text{Fe}_2\text{O}_3 \rightarrow$ Reddish brown flaky substance.

3. By using the words solvent, solute, dissolve, solution, soluble, insoluble, filtrate and residue, explain how you will separate common salt from wheat husk.

1. Take the mixture of common salt and wheat husk in a beaker.

2. Add water and stir it
3. Common salt is soluble in water and it forms a solution.
4. Wheat husk is insoluble in water.
5. Filter the mixture using filter paper.
6. Salt solution passes through the filter paper as filtrate.
7. The wheat husk remains as residue.
8. Heat the filtrate to evaporate. Water and salt is separated.

4. A mixture of ethyl alcohol and water is homogeneous while that of oil and water is heterogeneous why?
Ethyl alcohol and water are miscible liquids. They mix uniformly at the molecular level.

oil and water are immiscible liquids.

Because oil is lighter than water it forms a completely separate layer.

5. Identify the statement which belongs to a mixture and a compound

(a) The properties of the constituents are entirely different from the properties of the product formed by their chemical reaction.

(b) The constituents retain their individual chemical properties in the product formed by mixing them.

(a) Compound : Write any two properties of a compound

(b) Mixture : Write any two properties of a mixture

b. Assign reasons for regarding salt solution as Mixture

BOOK

Pg no : 1.4 In salt solution

Salt and water are not chemically bonded just they are mixed physically

Salt and water are separated by physical process evaporation

During dissolution neither energy released nor absorbed

7. Why do we stir the paint thoroughly before using it?

Paint is a colloid that behaves like a temporary suspension when left undisturbed for a long time. So gravity pulls the heavy solid components like color, pigments and binders to the bottom of the can leaving a thin, clear liquid solvent at the top. To bring these particles evenly throughout the liquid we stir before using.

8. Aluminium metal melts at 660°C and burns in oxygen to form aluminium oxide. Identify the physical and chemical properties and changes involved in the above statement.

Aluminium metal melts at 660°C :- It involves change in

(i) Physical property : Can be measured

without changing its identity

(ii) Physical change : only solid state change into liquid state.

No new substance is formed.

Burns in oxygen : It involves change in

(i) chemical property : the ability of reaction of Al with oxygen can be

observed during change of its identity
(ii) Chemical change: New substance, Al_2O_3 is formed with new properties.

9. Identify the following as either a physical or a chemical property.

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- (i) Soap is slippery (ii) Gold does not rust
(iii) water freezes at 0°C (iv) cooking gas burns in air to give a flame. (v) Ice melts when kept outside the fridge.

Physical property : (i), (iii), (v)

Can be measured or observed without changing their identity.

Chemical property: (ii), (iv)

Gold does not rust - lack of reactivity
cooking gas react with O_2 to form CO_2 , water vapour and heat energy.

10. Explains why colloids can be separated only by special filter papers and not by ordinary filter papers used to separate the solid from liquid.

BOOK

1:15

Very short Answer 3.

LONG ANSWER TYPE [5 MARKS]

1. When 100g of a saturated solution is evaporated at 50°C , 50g of solid is left over. Find the solubility of the substance at 50°C .

Given:

Mass of saturated solution = 100g

Mass of solid left after evaporation } = 50g [Mass of solute]

$$\text{Mass of water [solvent]} = 100\text{g} - 50\text{g} = 50\text{g}$$

To find:

$$\text{Solubility} = \frac{\text{Mass of solute}}{\text{Mass of solvent}} \times 100$$

$$= \frac{50}{50} \times 100$$

$$\boxed{\text{Solubility} = 100\text{g}}$$

2. If solubility of a solute is S. Find its percentage by weight.

Given: Mass of solute = Sg Mass of water = 100g

$$\text{Percentage by weight} = \frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100$$

$$\text{Mass of solution} = S + 100\text{g}$$

$$\therefore \text{by weight} = \frac{S}{S + 100} \times 100$$

3. Why is the product formed on heating 1g of Sulphur powder and 2g of copper turnings called a compound while the product formed by mixing 1g of Sulphur powder and 2g of copper turning is called a mixture? when 1g of Sulphur powder and 2g of Copper turning heated

- * They react chemically to form new substance Copper sulphide
- * Composition is always fixed
- * Compound has properties different from its constituents
- * Constituents can be separated by chemical method.

When 1g of sulphur and copper turnings mixed

- * They mix together physically without forming new substance
- * They retain the properties of their constituent particles
- * Constituents can be separated by physical methods.

4. What is electrophoresis? Explain by an experiment.

It refers to the movement of electrically charged colloidal particles towards an electrode under the influence of an electric field.

Example:

Aim:

To show movement of colloidal particles in an electric field.

Materials Required:

- * Milk, Beaker, Graphite electrodes, Battery connecting wires.

Procedure:

Take some milk in a beaker

Insert two electrodes into the milk and connect the electrodes to a battery.

Pass electric current for a few minutes.

Observation:

The negatively charged particles of milk move towards one of the electrodes (anode).

Particles start to accumulate near anode.

Conclusion:

This movement is known as electrophoresis.

5. List few applications of colloids?

1. Milk is a colloid used as food.
2. Medicines are often prepared in colloidal form for easy adsorption.
3. Soaps and detergents clean cloth by forming colloids to remove dirt.
4. Purification of water is done using alum by coagulation.
5. Colloidal substances are used in leather industry.

COMPETENCY BASED QUESTIONS:

SUBJECTIVE QUESTIONS.

1. A student is given two mixtures: iron filings with sulphur powder, and salt mixed with water. Why can one not use the same separation method for both?

Iron filings and sulphur are separated using a magnet because iron is magnetic while sulphur is not magnetic.

Salt mixed with water cannot be separated using a magnet because neither salt nor water is magnetic. It is separated by evaporation.

2. Why is a pressure cooker able to cook food faster and how is this idea related to gas solubility concepts?

Higher pressure $\rightarrow$ higher boiling point of water — faster cooking

Higher pressure $\rightarrow$ greater solubility of gases in liquids (Henry's law)

3. A student keeps a bottle of soda open for a long time later the drink tastes flat. Explain why.

If the bottle kept open for a long time, most of the CO_2 leaves the drink. As a result the soda loses its fizz and tastes flat.

4. A mixture contains common salt, sand and iron filings. Describe how all three components can be separated.

Bring magnet near mixture, iron is attracted and separated.

Add water to salt and sand.

Salt dissolves in water.

By filtration sand is separated.

By heating the remaining solution water is evaporated and salt is separated.

5. A student says that all mixtures can be separated only by heating. Give one example to prove that the statement is wrong.

Mixtures of iron filings and sand is separated by using magnet without heating.

6. Why is chromatography useful for forensic science on food testing?

It is used to identify inks, drugs, poisons and other chemicals found at a crime scene and compare samples to gather evidence.

It is used to detect food colours, additives, preservatives, and contaminants in food and check the quality to ensure the safety of food.

7. A sample of river water is first allowed to stand, and then the clear upper layer is poured off. Name the processes involved and explain their role.

(i) Sedimentation

(ii) Decantation

Role:

Sedimentation remove heavy suspended impurities.
Decantation separates the clear water from the settled impurities.

8. Why can't we separate alcohol and water using a separating funnel even though both are liquids?

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Because alcohol and water are completely miscible liquids and do not form separate layers. They are separated by distillation because they have different boiling points.

9. A science teacher asks students to classify fog. Is fog a solution, suspension, or colloid? Give reason.

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Marking

Fog is a colloid.

Tiny water droplets dispersed in air.

These particles are tiny but enough to scatter light.

10. A student wants to separate the coloured components of a leaf extract. Which method should be used and what principle is involved?

Method: chromatography

Principle: More soluble dyes dissolve first and travel faster, forming spots higher on the

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paper strip while less soluble dyes moves slower forming spots at lower positions.

OLYMPIAD FOLDER

SUBJECTIVE QUESTIONS

1. Classify the following as pure substances or mixtures
 BOOK Separate the pure substances into elements, compounds
 MARKING and divide the mixtures into homogeneous and heterogeneous
 (i) Air (ii) Milk (iii) Graphite (iv) Gasoline (v) Diamond
 (vi) Tap water (vii) Distilled water (viii) Oxygen (ix) Brass
 (x) 22 carat gold.

	Element	Compounds
Pure Substances	Graphite Diamond Oxygen	Distilled water
	Homogeneous	Heterogeneous
Mixture	Air Gasoline Tap water 22 carat gold Brass	Milk

2. Calculate the concentrations of a solution in volume percent made when 56g of water is mixed with 0.17L of ethanol

Given: Volume of solute = 0.17L = 170 mL

Mass of solvent = 56g

To find:

Volume %

$$\text{Volume \% (V/V)} = \frac{\text{Volume of solute} \times 100}{\text{Total volume of solution}}$$

$$\text{Volume of water} = \frac{\text{Mass}}{\text{Density}} = \frac{56\text{g}}{1\text{g/mL}} = 56\text{ mL}$$

$$\text{Volume of solution} = \text{volume of solute} + \text{volume of Solvent}$$

$$= 170\text{ mL} + 56\text{ mL}$$

$$= 226\text{ mL}$$

$$\text{V/V \%} = \frac{170\text{ mL}}{226\text{ mL}} \times 100$$

$$\approx 75.22\%$$

3. You are given a mixture of sand, water and mustard oil. How will you separate the components of this mixture?

Filtration : Pour the mixture through the filter paper. sand remains in the filter paper and liquid will pass through the filter paper.

Decantation :

Pour the liquid in a separating funnel and let it stand undisturbed for sometime.

Being lighter mustard oil floats on top. By opening the stopcock water will be separated.

- A. If 110 g of salt is present in 550g of solution, calculate the concentration of solution.

Given :

$$\text{Mass of the solute} = 110\text{g}$$

$$\text{Mass of solution} = 550\text{g}$$

To find:

$$\text{Mass \% (w/w)} = \frac{\text{mass of solute}}{\text{Mass of solution}} \times 100$$

$$= \frac{110}{550} \times 100$$

$$= 20\%$$

5. A solution contains 50ml of alcohol mixed with 150ml of water. Calculate the concentration of this solution.

Given :

Volume of Solute = 50ml

Volume of Solvent = 150ml

Volume of Solution = 200ml

$$\text{Volume \%} = \frac{\text{Volume of Solute} \times 100}{\text{Volume of solution}}$$

$$= \frac{50}{200} \times 100$$

$$= 25\%$$

6. List the points of difference between homogeneous and heterogeneous mixture.

Book

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7. How will you separate a mixture containing Kerosene and petrol (difference in their boiling points is more than 25°C) which are miscible with each other?

Method : Simple distillation

Technique : Two miscible liquids have a boiling point difference greater than 25°C

Separation : Pour the mixture into a distillation flask and heat the flask. Petrol has a lower boiling point than kerosene, so it vaporizes first and condensed in a condenser, finally it is collected.

8. Name the technique to separate (i) Butter from curd (ii) Salt from sea water (iii) Camphor from salt.

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(i) Centrifugation

(ii) Evaporation

(iii) Sublimation

9. How would you confirm that a colourless liquid given you is pure water?

If it boils at 100°C and freezes at 0°C and we can confirm it is pure water.

10. Which of the following will show Tyndall effect and why?

I) salt solution

II) Sugar solution

III) copper sulphate solution

(IV) starch solution.

Book

Marking

(IV) starch solution

The particle size is large enough to scatter the beam of light passing through it.

Class work writing:

FA 1 PortionSynopsis 1

VSA : 4

SA : 2, 8

Synopsis : 2

VSA : 3, 12

SA : 7

LA : 1, 2, 4, 5

After FA1

Synopsis : 3

VSA : 6, 15

SA : 3, 4

Book Marking :

Synopsis : 1

VSA : 1, 2, 5, 7, 8, 11

SA : 1, 5, 6, 9

LA : 3 Bm

Synopsis : 2

VSA : 13

SA : 10

Synopsis : 3

VSA : 9, 10, 14