

Exercise 2.1

Question 1.
What is meant by a substance?

Solution:

A substance is matter which has a specific composition and specific properties. A pure element, a pure compound are examples of substance. For ex: Sodium.

Question 2.
List the points of differences between homogeneous and heterogeneous mixtures.

Solution:

	Homogenous mixture	Heterogeneous mixture
Composition	Uniform composition	Non- uniform composition
Boundaries between constituents	No visible boundaries of separation	Visible boundaries of separation
Constituents separation	Constituents cannot be separated easily.	Constituents can be separated easily.
Example	Sugar solution, vinegar etc.	Sugar and salt mixture, paint etc.

Exercise 2.2

Question 1.

Differentiate between homogeneous and heterogeneous mixtures with examples.

Solution:

	Homogenous mixture	Non-homogeneous mixture
Composition	Uniform composition	Non- uniform composition
Boundaries between constituents	No visible boundaries of separation	Visible boundaries of separation
Examples	Sugar in water, copper sulphate in water	Oil and water, milk and water

Question 2.

How are sol, solution and suspension different from each other?

Solution:

Sol	Solution	Suspension
Heterogeneous mixture	Homogeneous mixture	Heterogeneous mixture
Solute particles not visible to naked eye	Solute particles not visible to naked eye	Solute particles not visible to naked eye
Tyndall effect observed	Tyndall effect is not observed	Tyndall effect observed
Ex: Blood, Milk etc.	Ex: Sugar in water etc.	Sand in water etc.

Question 3.

To make a saturated solution, 36 g of sodium chloride is dissolved in 100 g of water at 293 K. Find its concentration at this temperature.

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Solution:

Mass of solute (NaCl) = 36 g

Mass of solvent (H₂O) = 100 g

Hence, mass of solution (NaCl + H₂O) = 136 g

$$\begin{aligned}\text{Concentration} &= \left(\frac{\text{mass of solute}}{\text{mass of solution}} \right) \times 100 \\ &= \left(\frac{36}{136} \right) \times 100\% \\ &= 26.47\%\end{aligned}$$



Exercise 2.3

Question 1.

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?

Solution:

As their boiling points are different, they can be separated by simple distillation.

Question 2.

Name the technique to separate

(i) Butter from curd, (ii) salt from sea-water, (iii) camphor from salt.

Solution:

(i) Butter from curd- centrifugation

(ii) Salt from sea-water – evaporation

(iii) Camphor from salt – sublimation

Question 3:

What type of mixtures are separated by the technique of crystallisation?

Solution:

The crystallisation method is used to purify solids. It separates a pure solid in the form of its crystals from a solution.

Exercise 2.4

Question 1.

Classify the following as chemical or physical changes:

- Cutting of trees,
- Melting of butter in a pan,
- Rusting of almirah,
- Boiling of water to form steam,
- Passing of electric current, through water and the water breaking down into hydrogen and oxygen gases,
- Dissolving common salt in water,
- Making a fruit salad with raw fruits, and
- Burning of paper and wood.

Solution:

- Cutting of trees, - Physical change
- Melting of butter in a pan, - Physical change
- Rusting of almirah - Chemical change
- Boiling of water to form steam, - Physical change
- Passing of electric current, through water and the water breaking down into hydrogen and oxygen gases, - Chemical change
- Dissolving common salt in water, - - Physical change
- Making a fruit salad with raw fruits, - - Physical change
- Burning of paper and wood - Chemical change

Question 2.

Try segregating the things around you as pure substances or mixtures.

Solution:

Pure substances: Sugar, water, salt

Mixture: Food, soil, wood

Exercise

Question 1.

Which separation techniques will you apply for the separation of the following?

- (a) Sodium chloride from its solution in water.
- (b) Ammonium chloride from a mixture containing sodium chloride and ammonium chloride.
- (c) Small pieces of metal in the engine oil of a car.
- (d) Different pigments from an extract of flower petals.
- (e) Butter from curd.
- (f) Oil from water.
- (g) Tea leaves from tea.
- (h) Iron pins from sand.
- (i) Wheat grains from husk.
- (j) Fine mud particles suspended in water.

Solution:

- (a) Evaporation
- (b) Sublimation
- (c) Filtration
- (d) Chromatography
- (e) Centrifugation
- (f) Using separating funnel
- (g) Filtration
- (h) Magnetic separation
- (i) Winnowing
- (j) Filtration

Question 2.

Write the steps you would use for making tea. Use the words solution, solvent, solute, dissolve, soluble, insoluble, filtrate and residue.

Solution:

Step 1: Water is taken as a solvent and boiled in a beaker.

Step 2: Milk and tea are added into it as solutes and a solution is formed.

Step 3: It is filtered through a sieve. The insoluble part remains as the residue.

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Step 4: Sugar is added to the filtrate and being soluble, it dissolves into it.
Serve the tea hot.

Question 3.

Pragya tested the solubility of three different substances at different temperatures and collected the data as given below (results are given in the following table, as grams of substance dissolved in 100 grams of water to form a saturated solution).

Given solubility of different salts at given temperatures.

	283K	293K	313K	333K	353K
Potassium nitrate	21	32	62	106	167
Sodium chloride	36	36	36	37	37
Potassium chloride	35	35	40	46	54
Ammonium chloride	24	37	41	55	66

- (a) What mass of potassium nitrate would be needed to produce a saturated solution of potassium nitrate in 50 grams of water at 313 K?
- (b) Pragya makes a saturated solution of potassium chloride in water at 353 K and leaves the solution to cool at room temperature. What would she observe as the solution cools? Explain.
- (c) Find the solubility of each salt at 293 K. Which salt has the highest solubility at this temperature?
- (d) What is the effect of change of temperature on the solubility of a salt?

Solution:

(a)

Potassium nitrate required at for 100 grams water = 62 g

Potassium nitrate required at for 50 grams water = 31 g

(b)

On cooling of saturated solution, we obtain crystals of potassium chloride.

(c)

As per the given data, the solubility of ammonium chloride is the highest.

(d)

Solubility increases on increasing the temperature and vice versa.

Question 4.

Explain the following giving examples.

(a) **Saturated solution**

(b) **Pure substance**

(c) **Colloid**

(d) **Suspension**

Solution:

(a) **Saturated solution**

A solution which has solute dissolved up to maximum limit at the given temperature. E.g. 36 g of sodium chloride is dissolved in 100 g of water at 293 K

(b) **Pure substance**

A substance made up of one type of particles Ex. Salt

(c) **Colloid**

A heterogeneous mixture whose particles are uniformly distributed throughout the mixture and cannot be seen with naked eye. Ex. milk

(d) **Suspension**

Heterogeneous mixture whose particles remain suspended throughout the bulk of the medium and can be seen with naked eye. Ex. Chalk powder and water.

Question 5.

Classify each of the following as a homogeneous or heterogeneous mixture.

Soda water

Wood

Air

Soil

Vinegar

Filtered tea

Solution:

Soda water- Homogeneous

Wood- Heterogeneous

Air- Homogeneous

Soil- Heterogeneous

Vinegar- Homogeneous

Filtered tea- Homogeneous

Question 6.

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

Solution:

First, check if the liquid is odourless. If yes, boil it.

If the liquid boils at exact 100 degree Celsius then its pure water else the water is impure

Question 7.

Which of the following materials fall in the category of a “pure substance”? (a)

Ice (b) Milk (c) Iron (d) Hydrochloric acid (e) Calcium oxide (f) Mercury (g)

Brick (h) Wood (i) Air

Solution:

Pure substances:

Ice

Iron

Hydrochloric acid

Calcium oxide

Mercury

Question 8.

Identify the solutions among the following mixtures. (a) Soil (b) Sea water (c)

Air (d) Coal (e) Soda water.

Solution:

Sea water, air, soda water

Question 9.

Which of the following will show “Tyndall effect”?

(a) Salt solution (b) Milk (c) Copper sulphate solution (d) Starch solution

Solution:

Milk and starch solutions

Question 10.

Classify the following into elements, compounds and mixtures. (a) Sodium (b) Soil (c) Sugar solution (d) Silver (e) Calcium carbonate (f) Tin (g) Silicon (h) Coal (i) Air (j) Soap (k) Methane (l) Carbon dioxide (m) Blood

Solution:

Elements: Sodium, silver, tin, silicon

Compounds: calcium carbonate, methane, carbon dioxide

Mixtures: soil, sugar solution, coal, air, soap, blood

Question 11.

Which of the following are chemical changes? (a) Growth of a plant (b) Rusting of iron (c) Mixing of iron filings and sand (d) Cooking of food (e) Digestion of food (f) Freezing of water (g) Burning of a candle

Solution:

(a) Growth of a plant – Chemical change

(b) Rusting of iron – Chemical change

(c) Mixing of iron filings and sand – Physical change

(d) Cooking of food – Chemical change

(e) Digestion of food – Chemical change

(f) Freezing of water- – Physical change

(g) Burning of a candle– Chemical change