2 IS MATTER AROUND US PURE

TEXTBOOK QUESTIONS AND THEIR ANSWERS

Q. 1. What is meant by a pure substance.

Ans. A pure substance means that all the constituent particles of the substance are same in their chemical nature.

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

Ans.

Homogeneous Mixture	**Heterogeneous Mixture**
(a) It does not contain physically distinct particles that is why they are not visible to the unaided eye.	(a) It contains physically distinct particles and are visible to the unaided eye.
(b) It has same composition and properties throughout.	(b) It has a variable composition and the properties of its different parts are different.

Q. 3. Differentiate between homogeneous and heterogeneous mixtures with examples.

Ans. **Homogeneous Mixture :** It does not contain physically distinct particles, that is, they are not visible to unaided eye. It has same composition and properties through out.

Heterogeneous Mixture : It contains physically distinct particles and are visible to unaided eye. It has variable composition and property of its different parts.

Examples :

(i) Common salt solution is a homogeneous mixture. The components of common salt solution are not visible to unaided eye.

(ii) Mixture of iron and sulphur is a heterogeneous mixture. The components of this mixture are visible to the unaided eye, as we can see yellow particles of sulphur and the grey particles of iron. Furthermore, its composition is not uniform, i.e., at some places the iron particles are more than the sulphur particles or vice versa.

Q. 4. How are sol, solution and suspension different from each other?

Ans. In a *sol*, the solid particles do not dissolve in a liquid, but remain suspended in it, without settling at the base. The particle size of solid particles is between 10^{-7} cm to 10^{-5} cm. These particles pass through filter paper and scatter visible light. Milk of magnesia, mud, etc., are the examples of sol.

In a *solution*, the solid particles dissolve in the liquid and are not visible to the unaided eye or under the microscope. The size of the solid particles is less than 10^{-7} cm. The solid particles cannot be filtered out and do not cause scattering of visible light.

In a *suspension* , the solid particles do not dissolve in the liquid and settle down, when suspension is kept still for some time. The size of the solid particles is more than 10^{-5} cm. The solid particles can be easily filtered out.

Q. 5. To make a saturated solution, 36 g of sodium chloride is dissolved in 100 g of water at 293 K. Find the concentration at this temperature.

Ans. Mass of sodium chloride (solute) = 36 g

Mass of water (solvent) = 100 g

Concentration of sodium chloride solution

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

$$= \frac{36g \times 100}{(36+100)g} = \frac{3600}{136} = 26.47\%$$

Q. 6. 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.

Ans.

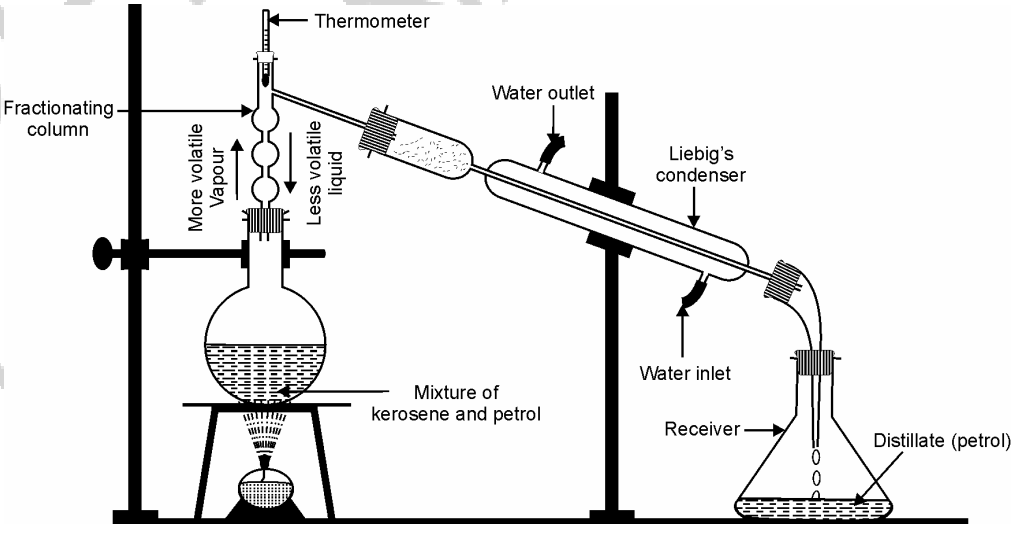

Fig. : Fractional Distillation

(i) The process of fractional distillation is employed in separating petrol from kerosene oil. The petrol has lower boiling point than kerosene. The mixture is poured in a distillation flask and heated on a low flame as shown in the figure above.

(ii) When the boiling point of the petrol is reached, it vapourises rapidly as compared to kerosene. When this mixture of petrol and kerosene vapour passes into fractionating column, the vapour of kerosene oil condense to form liquid kerosene and hence, flow back in the distillation flask. However, the vapour of petrol does not condense, and hence, pass on to Liebig's condenser. Here the petrol vapour liquefy and hence, petrol flows into receiver.

(iii) The thermometer shows a constant temperature as long as the vapour of petrol distil over. As soon as the temperature starts rising, the receiver is replaced by another receiver, so as to collect the kerosene.

Q. 7. Name the technique to separate :

(i) butter from curd

(ii) salt from sea water

(iii) camphor from salt

Ans. (i) In order to separate butter from curd, the technique of churning or centrifugation is applied.

(ii) In order to separate salt from sea water, the technique of evaporation is applied.

(iii) In order to separate camphor from salt, the technique of sublimation is applied.

Q. 8. Try segregating the things around you as pure substances or mixtures.

Ans. Some example are –

1. Water - Pure substance
2. LPG - Mixture
3. Air - Mixture
4. Ice - Pure substance
5. Ice cream - Mixture
6. Lemon juice - Mixture

Q. 9. What type of mixtures are separated by process of crystallisation ?

Ans. Crystallisation is a process of separation of pure soluble substance in the form of crystals, from its hot saturated solution on cooling.

Q. 10. Classify the following as chemical or physical changes.

(i) cutting of trees

(ii) melting of butter in a pan

(iii) rusting of almirah

(iv) boiling of water to form steam

(v) passing of electric current through water

(vi) dissolving of common salt in water

(vii) making fruit salad with raw fruits

(viii) burning of paper and wood

Ans.

Physical changes	Chemical changes

Cutting of trees Melting of butter in a pan Boiling of water to form steam Dissolving of common salt in water Making fruit salad with raw fruits	Rusting of almirah Passing of electric current through water Burning of paper and wood

Q. 11. 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.

Ans. (a) Evaporation (b) Sublimation

(c) Filtration (d) Paper chromatography

(e) Churning (f) Separating funnel method

(g) Straining with a strainer (filtration) (h) Magnetic separation

(i) Winnowing (j) Loading

Q. 12. Write the steps you would use for making tea. Use the words solution, solvent, solute, dissolve, soluble, insoluble, filtrate and residue.

Ans. Water which acts as a solvent poured in a boiling pot. Into it are added tea leaves which are insoluble and the contents are boiled. To this boiling mixture, is added sugar and milk. The sugar and milk dissolve in water and act as **solute**. The boiling mixture is filtered by pouring it through a strainer. The tea leaves are left on the strainer as residue and the tea collects as filtrate. The tea so obtained is a solution of water, sugar, juices of tea leaves.

Q. 13. Pragya tested the solubility of three different substances at different temperatures and collected the data as shown below (results are given in the following table, as grams of substance

dissolved in 100 grams of water to form a saturated solution).

Substance dissolved	Temperature in K				
	283	293	313	333	353
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 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?

Ans. (a) 100 g of water will dissolve potassium nitrate at 313 K = 62 g.

∴ 50 g of water will dissolve potassium nitrate at 313 K = 31 g.

(b) Pragya will observe that crystals of potassium chloride will separate out and settle at the base of beaker.

The solubility of potassium chloride at 353 K is 54 g / 100 g of water.

At room temperature (293 K), the solubility of potassium chloride is 35 g / 100 g of water. Thus, as the solution of potassium chloride cools from 353 K to 293 K, the excess of potassium chloride separates out in the form of crystals.

(c) The solubility at 293 K per 100 grams of water for:

(i) Potassium nitrate = 32 g

(ii) Sodium chloride = 36 g

(iii) Potassium chloride = 35 g

(iv) Ammonium chloride = 37 g

(d) The solubility in general, increases with the increase in temperature and vice-versa.

Q. 14. Explain the following giving examples :

(a) saturated solution (b) pure substance

(c) colloid (d) suspension

Ans. (a) Saturated solution : A solution, which dissolves maximum amount of a solute at given temperature is called saturated solution.

For example, 100 g water at 313 K can dissolve maximum of 62 g of potassium nitrate. Thus, the solution so obtained at 313 K for potassium nitrate is a saturated solution.

(b) Pure substance : A homogeneous material which contains particles of only one kind, such that it has definite set of properties is called pure substance.

For example, iron, gold, distilled water, alcohol, etc., are pure substances.

(c) Colloid : A heterogeneous solution in which particle size is between 10^{-7} cm to 10^{-5} cm, such that the solute particles neither dissolve nor settle down in the solvent is known as colloid.

For example, milk, human blood, soap solution, etc., constitute colloids.

(d) Suspension : A heterogeneous mixture of insoluble particles of a solute, spread throughout a solvent, is known as suspension.

For example, muddy water, paints, etc.

Q. 15. Classify each of the following as homogeneous or heterogeneous mixtures :

soda water, wood, air, soil, vinegar, filtered tea.

Ans. Homogeneous mixtures are : Soda water, vinegar and filtered tea

Heterogeneous mixtures are : Wood, air and soil.

Q. 16. How will you confirm that a colourless liquid given to you is pure water?

Ans. Evaporate the colourless liquid on a low flame. If no residue is left, then the colourless liquid is pure water.

Q. 17. 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.

Ans. Ice, iron, hydrochloric acid, calcium oxide and mercury are pure substances.

Q. 18. Identify the solutions among the following mixtures :

(a) soil, (b) sea water, (c) air, (d) coal, and (e) soda water

Ans. Sea water, air and soda water are solutions.

Q. 19. Which of the following will show "Tyndall effect"?

(a) salt solution, (b) milk, (c) copper sulphate solution, (d) starch solution.

Ans. Milk and starch solution will show Tyndall effect.

Q. 20. 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

Ans. Elements : Sodium, silver, tin and silicon.

Compounds : Calcium carbonate, methane and carbon dioxide.

Mixtures : Soil, sugar solution, coal, air, soap and blood.

Q. 21. 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

Ans. Following are chemical changes.

(a) Growth of a plant (b) Rusting of iron

(c) Cooking of food (d) Digestion of food

(e) Burning of a candle