Exercises

Question 1:

Which separation techniques will 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.

Answer 1:

(a) Crystallization or Evaporation.
(b) Sublimation.
(c) Centrifugation or Sedimentation.
(d) Chromatography.
(e) Centrifugation.
(f) Separating funnel.
(g) Hand-picking.
(h) Magnetic separation.
(i) Winnowing.
(j) Centrifugation.

Question 2:

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

Answer 2:

Take the solvent, water, in a kettle. Heat it. When the solvent boils, add the solute, milk. Milk and water forms a solution. Then pour some tea leaves over a sieve. Pour slowly hot solution of milk over tea leaves. Colour of tea leaves goes into solution as filtrate. The remaining tea leaves being insoluble remains as residue. Add requisite sugar which dissolves and the tea is ready.

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).

www.tiwariacademy.com	Temperature in K				
Substance Dissolved	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 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?

Answer 3:

(a) At 313 K,
Potassium nitrate for saturated solution of 100 grams of water = 62 g
∴ Potassium nitrate for saturated solution of 50 grams of water = 31 g

(b) Some amount of dissolved Potassium Chloride will reappear as undissolved solid as solubility of solute decreases with the decrease of temperature.

(c) Solubility of each salt at 393 K are as follows:

- Potassium nitrate 32
- Sodium chloride 36
- Potassium chloride 35
- Ammonium chloride 37

Ammonium chloride salt has the highest solubility at this temperature.

(d) Solubility of salt increases with the increase in temperature.

Question4:

Explain the following giving examples.

(a) Saturated solution,
(b) Pure substance,
(c) Colloid,
(d) Suspension.

Answer 4:

(a) Saturated Solution: A solution in which no more of the solid (solute) can be dissolved at a given temperature is called a saturated solution. Suppose 50 gm of a solute is the maximum amount that can be dissolved in 100 gm water at 298 K. Then 150 gm of solution so obtained is the saturated solution at 298 K.

(b) Pure Substance: A pure substance consists of a single of matter or particles and cannot be separated into other kind of matter by any physical process. Pure substances always have the same colour, taste and texture at a given temperature and pressure. For example, pure water is always colourless, odorless and tasteless and boils at 373 K at normal atmospheric pressure.

(c) Colloid: Colloids are heterogeneous mixtures the particle size is too small to be seen with a naked eye, but it is big enough to scatter light. The particles are called the dispersed phase and the medium in which they are distributed is called the dispersion medium. Colloids are useful in industry and daily life. A colloid has the following characteristics:

- It is a heterogeneous mixture.
- The size of particles of a colloid lies between 1 - 100 nm and cannot be seen by naked eyes.
- The particles of colloid can scatter a beam of light passing through it and make the path visible.
- The particles of colloid cannot be separated from the mixture by filtration. The process of separation of colloidal particles is known as 'centrifugation'.
- They do not settle down when left undisturbed. In other words colloids are quite stable e.g. smoke, milk, fog, cloud etc.

(d) Suspension: A 'suspension' is a heterogeneous mixture in which the solute particles do not dissolve but remain suspended throughout the bulk of the medium. A suspension has the following characteristics:

- It is a heterogeneous mixture.
- The size of particles of a suspension is greater than 100 nm and is visible to naked eyes.
- The particles of suspension can scatter a beam of light passing through it.
- The particles of a suspension settle down when left undisturbed.
- The particles of a suspension can be separated from its mixture by filtration.

Question 5:

Classify each of the following as a homogeneous or heterogeneous mixture: soda water, wood, air, soil, vinegar, filtrated tea.

Answer 5:

Homogeneous mixture - soda water, air, vinegar, filtered tea.

Heterogeneous mixture - wood, soil.

Question 6:

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

Answer 6:

Every liquid has a characteristic boiling point at 1 atmospheric pressure. If the given colourless liquid boils exactly at 373 K at 1 atmospheric pressure, then it is pure water. If the boiling point is different, then the water is contaminated.

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.

Answer 7:

(a), (c), (d), (e) and (f) are pure substances.

Question 8:

Identify the solutions among the following mixtures.

(a) Soil
(b) Sea water
(c) Air
(d) Coal
(e) Soda water.

Answer 8:

Solutions among the following mixtures.

(b) Sea water

(c) Air

(e) Soda water.

Question 9:

Which of the following will show "Tyndall effect"?

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

Answer 9:

(b) and **(d)** are colloids and will show Tyndall Effect.

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

Answer 10:

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.

Answer 11:

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.