

Is Matter Around Us Pure: Exercise Questions

Q.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.

Sol.

- (a) Sodium chloride from its solution in water: Evaporation
- (b) Ammonium chloride from a mixture containing sodium chloride and ammonium chloride: Sublimation
- (c) Small pieces of metal in the engine oil of a car: filtration or decantation
- (d) Different pigments from an extract of flower petals: Chromatography
- (e) Butter from curd: Centrifugation
- (f) Oil from water: Using separating funnel
- (g) Tea leaves from tea: Filtration
- (h) Iron pins from sand: Magnetic separation
- (i) Wheat grains from husk: Winnowing
- (j) Fine mud particles suspended in water: Centrifugation or filtration

Q.2 Write the steps you would use for making tea. Use the words: solution, solvent, solute, dissolve, soluble, insoluble, filtrate and residue.

Sol. the Steps for making tea:

1. Firstly, water is taken as a solvent in a container and heat it.
2. During heating, add sugar, milk and tea leaves as solute to the solvent.
3. They form a solution. Then, the solution is poured into the cup through a strainer.
4. The insoluble part of the solution remains on the strainer as residue.
5. Finally tea has been made.

Q.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).

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

- What mass of potassium nitrate would be needed to produce a saturated solution of potassium nitrate in 50 grams of water at 313 K?
- 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.
- Find the solubility of each salt at 293 K. Which salt has the highest solubility at this temperature?
- What is the effect of change of temperature on the solubility of a salt?

Sol.

- According to table mass of KNO_3 to produce a saturated solution in 100 gm of water at 313 K = 62 g
So, mass of KNO_3 in 50 gm of water at 313 K = $(62 \times 50)/100 = 31\text{g}$
- We will obtain the crystals of potassium chloride cooling the saturated solution. Because as temperature is decreased the solubility of solution decreases.
- Solubility of each salt at 293 K is :
 - Potassium nitrate: 32g
 - Sodium chloride: 36g
 - Potassium Chloride: 35g
 - Ammonium chloride: 37g
 Ammonium chloride salt has the highest solubility at this temperature.
- As increase the temperature, solubility of a salt solution increases.

Q.4 Explain the following giving examples:

- Saturated solution
- Pure substance
- Colloid
- Suspension

Sol. (a) Saturated solution

The solution in which the no more amount of solute can be dissolved at a given temperature is called saturated solution. Extra solute added will settle down at the bottom of the container as a precipitate. Suppose 100 g of a solvent can dissolve a maximum of 35 g of a particular solute at 27°C . Then, the solution obtained is said to be a saturated solution at 300 K.

(b) Pure substance:

A pure substance is a substance consisting of a single type or same type of particles. All particles of the substance have the same chemical properties. For example, salt, sugar, water etc.

(c) Colloid :

It is a heterogeneous mixture. In this mixture, the size of the solutes is so small that they cannot be seen with naked eyes but seems to be distributed uniformly throughout the mixture. The solute particles do not settle down. So, they are stable. They can be separated by the process centrifugation. Example, milk, butter, foam, fog, smoke, clouds etc.

(d) Suspension :

It is heterogeneous mixture. The solute particles in this mixture remain suspended throughout the medium. The particles can be seen with naked eyes. The solute particles of this mixture settle down when it is left undisturbed. So, suspensions are unstable. It can be separated by the method of filtration. Example- mixtures of chalk powder and water, wheat flour and water.

Q.5 Classify each of the following as a homogeneous or heterogeneous mixture. Soda water, wood, air, soil, vinegar, filtered tea

Sol. Homogeneous mixtures: Soda water, air, vinegar, filtered tea
Heterogeneous mixtures: Wood, soil

Q.6 How would you confirm that a colour less liquid given to you is pure water?

Sol. Every liquid has a fixed boiling point. And pure water has a boiling point of 100°C (373 K) at 1 atmospheric pressure. If the given liquid boils at even slightly above or below 100°C , then the given liquid is not pure water. It should boil at sharp 100°C . So, by this way, we can confirm whether a given colour less liquid is pure water or not.

Q.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

Sol. The following materials fall in the category of a “pure substance”:

- (a) Ice
- (c) Iron
- (d) Hydrochloric acid
- (e) Calcium oxide
- (f) Mercury

Q.8 Identify the solutions among the following mixtures:

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

Sol. The following mixtures are solutions:

- (b) Sea water
- (c) Air
- (e) Soda water

Q.9 Which of the following will show the “Tyndall effect”?

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

Sol. Milk and starch solution

Q.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

Sol. Elements

- (a) Sodium
- (d) Silver
- (f) Tin
- (g) Silicon

Compounds:

- (e) Calcium carbonate
- (k) Methane
- (l) Carbon dioxide
- (j) Soap

Mixtures:

- (b) Soil
- (c) Sugar solution
- (h) Coal
- (i) Air
- (m) Blood

Q.11 Which of the following are chemical changes?

- (a) Growth of a plant
- (b) Rusting of iron
- (c) Mixing of iron fillings and sand
- (d) Cooking of food
- (e) Digestion of food
- (f) Freezing of water
- (g) Burning of candle

Sol. The following changes are chemical changes:

- (a) Growth of a plant
- (b) Rusting of iron
- (d) Cooking of food
- (e) Digestion of food
- (g) Burning of candle