Chapter 2
Is Matter around Us Pure
Intext Questions

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Question 1:What is meant by a pure substance?

Solution:Substance having single type of particles is known as pure substance.
For example:Hydrogen, Water etc., are pure.
Note:All elements and compounds are considered to be pure.

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

Solution:

Homogeneous mixture

Its constituent's particles cannot be seen easily.

There are no visible boundaries of separation in a homogeneous mixture.

Its constituents cannot be easily separated.

Examples: Alloys, solution of salt in water etc.

Heterogeneous mixture

Its constituent particles can be seen easily.

Have visible boundaries of separation between the constituents.

Its constituents can be separated by simple methods.

Examples: Mixture of sand and common salt, mixture of sand and water etc.

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Question 1:Differentiate between homogeneous and heterogeneous mixture with example.

Solution:Same as above answer.

Questions 2:How are sol, solution and suspension different from each other?

Solution:

Solution :

Solution or true solution is homogeneous.

NO Tyndall effect.

Solute particles cannot be filtered by using a filter paper

True solution is transparent.

Examples: Sea water, alloys, solution of lemon juice in water etc.

Sol (colloidal solution) :

Sol or colloidal solution is heterogeneous.

Tyndall effect.

Cannot be separated by ordinary filter paper.

It may be transparent or translucent.

Examples: Milk of magnesia, cough syrup, mist, fog, clouds, smoke, mud etc.

Suspension :

Suspension is also heterogeneous.

Tyndall effect.

It may be transparent or translucent.

Separated easily by filter paper.(because of large particles)

Examples: Mixture of sand in water, mixture of chalk in water.

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.

Solution:
Mass of sodium chloride (solute) = 36 g
Mass of water (solvent) = 100 g
We know that, mass of solution = mass of solute + mass of solvent
= 36 g+ 100 g= 136 g

Concentration (mass percentage) of the solution

$$= \frac{\text{Mass of Solute}}{\text{Mass of Solution}} \times 100$$

$$= \frac{36\text{g}}{136\text{ g}} \times 100 = 26.47\%$$

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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:Simple distillation is the method which can separate the mixture of kerosene and petrol (b.p. differ by more than 25°C).

Method:In a distillation flask, a mixture of kerosene and petrol is taken

as shown in figure. The mixture is heated slowly and the temperature is recorded with the help of thermometer. Petrol
(b.p. = 70° C to 1200 ° C) vaporizes first and the temperature becomes constant for some time (till all petrol evaporates from the mixture). Vapours of petrol are condensed and collected in
another container while the kerosene remains in the distillation flask. As soon as the temperature starts' rising again, the heating is stopped and both the components are collected separately.

Question 2:Name the technique to separate
(i) Butter from curd
(ii) Salt from sea water
(iii) Camphor from salt

Solution:(i) By using centrifugation method, butter can be separated from curd.
(ii) By using evaporation method, salt from sea water can be separated . Water vaporises on evaporation leaving behind the salt.
(iii) Camphor from salt can be separated by sublimation method. On subliming camphor will be converted into vapour leaving behind the salt.

Question 3:What types of mixtures are separated by the technique of crystallisation?

Solution:Crystallisation method can be used for the purification of those mixtures which

Contain insoluble and/or soluble impurities.

Have crystalline nature.

Cannot be separated by filtration as some impurities are soluble.

Question 4:Classify the following as chemical or physical changes

(a) Cutting of trees,
(b) Melting of butter in a pan,
(c) Rusting of almirah,
(d) Boiling of water to form steam,
(e) Passing of electric current, through water and the water breaking down into hydrogen and oxygen gases,
(f) Dissolving common salt in water,
(g) Making a fruit salad with raw fruits, and
(h) Burning of paper and wood

Solution :

Physical Change :

Cutting of trees

Melting of butter in a pan

Boiling of water to form steam

Dissolving common salt in water

Making a fruit salad with raw fruits

Chemical Change :

Rusting of almirah.

Passing of electric current, through water and the water breaking down into hydrogen and oxygen gases.

Burning of paper and wood.

Question 5:Try segregating the things around you as pure substances or mixtures.
(a) Wood
(b) Coal
(c) Milk
(d) Sugar
(e) Common salt
(f) Soap
(g) Soil
(h) Rubber

Solution:

(a) Mixture
(b) Mixture
(c) Mixture
(d) Pure substance
(e) Pure substance
(f) Compound/mixture
(g) Mixture
(h) Pure substance

Exercises

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) centrifugal machine or churning the curd by hand.
(f) Decantation
(g) Filtration.
(h) Magnetic Separation.
(i) Winnowing.
(j) Coagulation and decantation:

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

Solution:Method of preparation of tea

(i) Take some water (solvent) in a pan and heat it.
(ii) Add some sugar (solute) and boil to dissolve the sugar completely the obtained homogeneous mixture is called solution.
(iii) Add tea leaves (or tea) in the solution and boil the mixture.

(iv) Now add milk and boil again.
(v) Filter the mixture through the tea stainer and collect the filtrate or soluble substances, i.e., tea in a cup. The insoluble tea leaves left behind as residue in the 8 trainer.

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).

(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) Mass of potassium nitrate needed to produce its saturated solution in 100 g of water at 313 K = 62 g

Mass of potassium nitrate needed to produce its saturated solution in

50 g of water at 313

$$K = \frac{62}{100} \times 50g = 31g$$

(b) Crystals of potassium chloride are formed. This happens as solubility of solid decreases with decreasing the temperature.

(c) Solubility of each salt at 293 K

Potassium nitrate	32 g per 100 g water
Sodium chloride	36 g per 100 g water
Potassium chloride	35 g per 100 g water
Ammonium chloride	37 g per 100 g water

Note:Solubility of a solid is that amount in gram which can be dissolved in 100 g of water (solvent) to make saturated solution at a particular temperature.

Ammonium chloride has the maximum solubility (37 g per 100 g of water) at 293 K.

(d) Solubility of a (solid) salt decreases with decrease in temperature while it increases with rise in temperature.

Question 4:Explain the following giving examples.
(a) Saturated solution
(b) Pure substance
(c) Colloid
(d) Suspension

Solution:

(a) Saturated solution:A solution in which no more amount of solute can be dissolved at a particular temperature is called saturated solution.
Example: when sugar is dissolved repeatedly in a given amount of water, a condition is reached at which further dissolution of sugar is not possible in that amount of water at room temperature.
(b) Pure substance: A substance made up of single type of particles (atoms and/or molecules) is called pure substance. All elements and compounds are said to be pure,
Example: water, sugar etc.

(c) Colloid:A heterogeneous mixture in which the solute particle size is too small to be seen with the naked eye, but is big enough to scatter light is known as Colloid. There are two phases in colloidal solution
Dispersed phase: solute particles are said to be dispersed phase
Dispersion medium: the medium in which solute particles are spread is called the dispersion medium.

Example: Milk, clouds etc., are the example of colloid.

(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. Particles of suspension are visible to the naked eye.
Example: Mixture of sand, Water and Muddy water etc.

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

Solution:Homogeneous mixtures: Air, soda water, vinegar, filtered tea.

Heterogeneous mixtures: Wood, soil,

Question 6:How would you confirm that a colorless liquid given to you is pure water?

Solution:If the given colorless liquid boils at 100°C sharp, it is pure water, otherwise not.

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:Ice, iron, calcium oxide, mercury are pure substance as they have definite composition.

Milk is a colloid, so it is a heterogeneous mixture.

Hydrochloric acid is also a mixture of hydrogen chloride gas and water.

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 and soda water: Homogeneous mixture
Coal, Soil: Heterogeneous solution.

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 solution will show "Tyndall effect" as both of these are colloids.

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 and silicon
Compounds : Calcium carbonate, methane, and carbon dioxide
Mixtures : Soil, sugar solution, coal, air, soap and 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:Growth of a plant, rusting of iron, cooking of food, digestion of food, burning of a candle are chemical changes, because here the chemical composition of substance changes.