

Class- 9

Chapter-2

Is matter around us pure

NCERT page number 15

Que no.1- what is meant by a substance?

Answer- A pure substance consists of only one type of particles.

Que no.2- List the points of differences between homogeneous and heterogeneous mixtures.

Answer-

Homogeneous mixture	Heterogeneous mixture
<ul style="list-style-type: none">• They are perfectly uniform in their composition throughout the mass.	<ul style="list-style-type: none">• They have different composition and different properties in the different parts of sample.
<ul style="list-style-type: none">• There is no visible boundary of separation.	<ul style="list-style-type: none">• There are visible boundaries of separation.
<ul style="list-style-type: none">• Example- Air, sea water, sugar in water	<ul style="list-style-type: none">• Example- muddy water, sand in water, soil, blood

NCERT page number 18

Que no.1- Differentiate between homogeneous and heterogeneous mixtures with examples.

Answer- see answer of Q.2 on page 15 of NCERT.

Que no.2- How are sol, solution and suspension different from each other?

Answer

Sol	Solution	Suspension
Size of solute particles lies between 10^{-7} and 10^{-5} cm	<ul style="list-style-type: none">• Size of solute particles is of 10^{-8} cm.	<ul style="list-style-type: none">• Size of solute particle is 10^{-5} cm.
<ul style="list-style-type: none">• Stable	<ul style="list-style-type: none">• Stable	<ul style="list-style-type: none">• Unstable
<ul style="list-style-type: none">• Sol scatters a beam of light.	<ul style="list-style-type: none">• Solutions do not scatter light.	<ul style="list-style-type: none">• Suspension scatters beam of light.
<ul style="list-style-type: none">• Solute particles pass through filter paper.	<ul style="list-style-type: none">• Solute particles easily pass through filter paper.	<ul style="list-style-type: none">• In suspension, solute particles do not pass through filter paper.

Que no.3- To make a saturated solution, 36 gram of sodium chloride is dissolved in hundred gram of water at 293 K. Find its concentration at this temperature.

Answer-

Given,

Mass of solute=36g

Mass of solvent= 100g

Mass of solution= Mass of solute + Mass of solvent

$$=36g + 100g =136g$$

$$\begin{aligned} \text{concentration} &= \frac{\text{Mass of solute}}{\text{Mass of solvent} + \text{Mass of solute}} \times 100 \\ &= \frac{36}{136} \times 100 \\ &= 26.47\% \end{aligned}$$

NCERT page number 24

Que no.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?

Answer- A mixture containing kerosene and petrol which are miscible with each other can be easily separated by the technique of distillation.

Que no.2- Name the technique to separate:

- (1) butter from curd
- (2) Salt from seawater
- (3) camphor from Salt

Answer-

- (1) centrifugation technique
- (2) By evaporation
- (3) Sublimation technique

Que no.3- What type of mixtures are separated by the technique of crystallization?

Answer- Solids in which the impurities are less, or either insoluble or more soluble than the solids in a particular solvent it can be separated by crystallization technique. For example - alum, sea salt, impure copper sulphate etc.

NCERT page number 24

Que no.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

Answer- Physical change

- Cutting of trees
- Melting of butter in a pan
- Boiling of water to form steam
- Dissolving common salt in water
- Making 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

Que no.2-Try segregating the things around you as pure substances or mixtures:

Answer- Pure substances :

1. Distilled water
2. Bread
3. Diamond
4. Graphite
5. Sugar
6. Gold gold

Mixtures:

1. Ice cream
2. Steel
3. Paper
4. Talc
5. Kerosene oil
6. Solder wire
7. Curd
8. Air

NCERT exercise

Que no.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 of 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-

- (a) Evaporation
- (b) Sublimation
- (c) Filtration
- (d) Chromatography
- (e) Centrifugation
- (f) Separating funnel
- (g) Filtration
- (h) Magnetic separation
- (i) Sieving
- (j) Sedimentation and then filtration

Que no.2- Write the steps you would use for making tea use the words solution, solvent, solute, dissolved, soluble, insoluble, filtrate and residue.

Answer- First water is taken as a solvent in a saucer pan. This water (solvent) is allowed to boil. During heating, milk and tea leaves are added to the solvent as solutes. They form a solution. Then, the solution is poured through a strainer. The insoluble part of the solution

remains on the strainer as residue. Sugar is added to the filtrate, which dissolves in the filtrate. The resulting solution is the required tea.

Que no.2- Pragma 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 gram 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 Kelvin.
- Pragma makes a saturated solution of potassium chloride in water at 353 Kelvin 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 Kelvin. Which salt has the highest solubility at this temperature?
- What is the effect of change of temperature on the solubility of a salt?

Answer- (a) At 313 Kelvin, the mass of Potassium Nitrate dissolve in 100 gram of water = 62g

At 313 Kelvin the mass of Potassium Nitrate dissolved in 50 gram of water

$$\begin{aligned}
 & 62\text{g} \\
 & = \frac{\text{-----}}{100} \times 50\text{g} \\
 & = 31\text{g}
 \end{aligned}$$

(b) On cooling the solution at room temperature the crystals of potassium chloride will be obtained.

© solubility at 293 Kelvin

- Potassium Nitrate= 32 gram per100 gram of water
- Sodium chloride= 36 gram per100 gram of water
- Potassium chloride= 35 gram per100 gram of water
- Ammonium chloride= 37 gram per100 gram of water

This shows that the ammonium chloride has the maximum solubility(37 gram per 100 gram of water) at 293 Kelvin.

(d) With increase in temperature, the solubility of all salts in water increases and when the temperature is decreased, the solubility of these salts in water decreases.

Que no.4- Explain the following by giving examples:

- Saturated solution-** A saturated solution is a solution in which the maximum amount of solute has been dissolved at a given temperature. The solution cannot dissolve beyond that amount of solute at that temperature. Any more solute added will settle down at the bottom of the container as a precipitate.

Suppose 500 gram of a solvent can dissolve a maximum of 150 gram of a particular solute at 40 °C. Then the solution obtained by dissolving 150 gram of that solute in 500 gram of that solvent at 40°C is said to be a saturated solution at 40°C.

- (b) **Pure substance-** A pure substance is a substance consisting of a single type of particles that is all constituent particles of the substance have the same chemical properties. For example salt, sugar, water are pure substances.
- (c) **Colloid-** A colloid is a heterogeneous mixture. The size of the solutes in this mixture is so small that they cannot be seen individually with naked eyes, and seems to be distributed uniformly throughout the mixture. The solute particles do not settle down when the mixture is left undisturbed. This means that colloids are quite stable. Colloids cannot be separated by the process of filtration. They can be separated by centrifugation. Colloids show the Tyndall effect. For example, milk, butter, foam, fog, smoke, clouds.
- (d) **Suspension-** suspension are are heterogeneous mixtures. The solute particles in this mixture remain suspended throughout the bulk of the medium. The particles can be seen with naked eyes. Suspension shows the Tyndall effect. The solute particles settle down when the mixture is left undisturbed. This means that suspensions are are unstable. Suspensions can be separated by the method of filtration. For example, mixture of chalk powder and water, wheat flour and water.

Que no.5- classify each of the following as a homogeneous or heterogeneous mixture: soda water, wood, air, soil, vinegar, filtered tea.

Answer-

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

Heterogeneous mixture: wood, soil.

Air is a homogeneous mixture of different gases. If some dust or other particles are present, then air becomes a heterogeneous mixture.

Que no.6- How would you confirm that a colourless liquid given to you is a pure water?

Answer- Every liquid has a characteristic boiling point. Pure water has a boiling point of 100°C (373K) at 1 atmospheric pressure. If the given colourless liquid boils at even slightly above or below 100°C , then the given liquid is not pure water. It must boil at Sharp 100°C , Thus by observing the boiling point, we can confirm whether a given colourless liquid is pure water or not.

Que no.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- pure substances

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

Que no.8- Identify the solutions among the following mixtures:

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

Answer- The following mixtures are solutions:

- Sea water
- Air
- Soda water

Que no.9- Which of the following will show 'Tyndall effect':

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

Answer: Milk and starch solution milk and starch solution will show the 'Tyndall effect'.

Que no.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-

Elements- sodium, silver, Tin, silicon

Compounds- calcium carbonate ,methane carbon dioxide

Mixtures- soil, sugar solution, coal,Air, soap, blood

Que no.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- The following changes are chemical changes:

- Growth of a plant
- Rusting of iron
- Cooking of food
- Digestion of food

Burning of a candle.