

Chapter :- Is matter around us pure?

Class :- 9

1. What is meant by a pure substance?

A pure substance is one which is made up of only one kind of atoms or molecules.

Ex: water is made up of only one kind of particles. So water is a pure substance,

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

Homogeneous mixture :- 1. mixture in which different constituents are mixed uniformly

2. . It cannot have physically distinct parts.
3. The constituents cannot be easily seen.
4. The constituents cannot be easily separated.
5. **Examples :** Sugar solution, soda water, soft drinks, vinegar, air etc.

Heterogeneous mixture :- 1. mixture in which different constituents are not mixed uniformly.

2. It has physically distinct parts.
3. The constituents can be easily seen.
4. The constituents can be easily separated.
5. **Examples :** Sugar and sand mixture, milk, ink, paint, wood, blood etc.

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.

Mass of sodium chloride = 36 g Mass of solution = 36 + 100 = 136 g Concentration of solution

$$[\text{latex}]=\cfrac{\text{mass}\quad\text{of}\quad\text{solute}}{\text{mass}\quad\text{of}\quad\text{solution}}\times 100=\cfrac{36}{136}\times 100[\text{latex}]$$

=2.647%(w/w)

4. 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?

The mixture of two miscible liquids such as kerosene and petrol whose boiling points differ by more than 25°C can be easily separated by the technique of simple distillation.

At the boiling point of more volatile (low boiling) liquid of the mixture, the vapours almost exclusively consist of the more volatile liquid. Likewise at the boiling point of the less volatile (high boiling) liquid, vapours almost entirely consist of the less volatile liquid since the more volatile liquid has already distilled over.

5. Name the technique to separate

- (i) butter from curd
- (ii) salt from sea water
- (iii) camphor from salt.

(i) Butter from curd can be separated by the technique of centrifugation.

(ii) Salt from sea water can be separated by the technique of crystallisation or evaporation.

(iii) Camphor is sublimable but salt is not. So, camphor can be separated from salt by sublimation.

6. 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.

(a) **Evaporation** : Water will evaporate leaving behind sodium chloride.

(b) **Sublimation** : Ammonium chloride will be collected as sublimate.

(c) **Filtration** : Pieces of metal can be separated by filtration.

(d) **Chromatography** : Pigments (coloured components) from the extract of flower plants can be separated by chromatography.

(e) **Centrifugation:** Butter will get separated upon centrifugation.

(f) **Separating funnel :** Oil and water can be separated by the use of separating funnel.

(g) **Filtration:** Upon filtration through a sieve, tea leaves will be collected on the sieve.

(h) **Magnetic separation :** A magnet will attract iron pins and not sand particles.

(i) **Sieving :** Wheat grains from husk can be separated with the help of sieves.

(j) **Sedimentation :** As a result of sedimentation, mud particles will settle down and can be separated later on by filtration.

7. Explain the following giving examples.

1. Saturated solution
2. Pure substance
3. Colloid :
4. Suspension

1. **Saturated solution :** A solution in which no more solute can be dissolved in a given amount of solvent at a particular temperature is called saturated solution. For example, if we dissolve 40 g sodium chloride in 100 g of water at 293 K, it will form a saturated solution because the solubility of sodium chloride at 293 K is 36 g per 100 g of water.
2. **Pure substance :** A substance made up of only one kind of atoms or molecules is called a pure substance. A pure substance has the same colour, taste and texture at a given temperature and pressure. A pure substance also has a fixed melting and boiling point at a constant pressure. For example, hydrogen gas, sodium chloride, water, etc.
3. **Colloid :** A substance is said to be a colloid if the particle size lies between 1 to 100 nm. A colloidal solution is heterogeneous and consists of two phases. i.e., dispersed phase (colloidal particles) and dispersion medium in which colloidal particles are suspended
4. **Suspension :** It is a heterogeneous mixture in which the particles of the solute do not dissolve but remain suspended throughout the bulk of the solvent. The size of the suspension particles is more than 10^{-7} m. For example, chalk powder in water is a suspension.

8. Classify each of the following as a homogeneous or heterogeneous mixtures: Soda water, wood, air, soil, vinegar, filtered tea **Solution:**

Homogeneous mixtures : Soda water, vinegar and filtered tea.

Heterogeneous mixtures : Wood and soil. Air is a homogeneous mixture of different gases. However, if some dust or other particles are also present, then air becomes heterogeneous mixture.

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

If the boiling point and freezing point of the given liquid comes out to be 100°C or 373 K and 0°C or 273 K respectively under one atmospheric pressure, it confirms that the given liquid is pure water.

10. Which of the following materials fall in the category of a “pure substance”?

- (a) Ice,
- (b) Milk,
- (c) Iron,
- (d) Hydroelectric acid,
- (e) Calcium oxide,
- (f) Mercury,
- (g) Brick,
- (h) Wood,
- (i) Air

Ice, iron, calcium oxide and mercury are pure substances since they contain particles of only one kind of matter. In contrast, milk, hydroelectric acid (hydrogen chloride gas dissolved in water), brick and air cannot be called pure substances because they consist of particles of more than one kind of matter