04. IS MATTER PURE ?

Questions and Answers

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

A. The separation techniques:

Mixture	Separation techniques
(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.	Filration
(d) Different pigments from an extract of flower petals.	Chromatography
(e) Butter from curd	Centrifugation
(f) Oil from water	Using separating funnel or Distillation
(g) Tea leaves from tea	Filtration
(h) Iron pins from sand	Magnetic separation
(i) Wheat grains from husk	Sieving or winnowing
(j) Fine mud particles suspended in water	Filtration

2. Explain the following giving examples.

(a) saturated solution (b) Pure substance
(c) Colloid (d) Suspension

A. (a) Saturated solution : The uniform mixture formed when a maximum quantity of solute dissolves in solvent is called saturated solution.
Ex: Carbonated water
(b) Pure substance : A pure substance is one that contains particles of only one type of a substance.
Ex: Gold, water
(c) Colloid : A colloid is a heterogeneous mixture with small size particles which are not visible. But the particles can scatter the light.
Ex: Smoke, Blood
(d) Suspension : A suspension is a heterogeneous mixture with big size particles which are visible. And the particles can scatter the light.
Ex: Sandy water, Oil in water

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

A. The given colourless liquid should not have smell. No particles or air babools suspended in it. Also it should not greasy.
If the path of light ray is not visible When we send a light ray through the given colourless liquid, then we decide that it is pure water.

4. Which of the following materials fall in the category of a 'Pure substance'? Give reasons.

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

A. (a) Ice – this is pure substance. Which ever part of Ice consists of Water molecules only.
(b) Milk – this is not pure substance. Milk is a mixture containing cream and milk.

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(c) Iron – this is pure substance. Which ever part of Iron consists of Iron particles only.

(d) Hydrochloric acid – this is not pure substance. It is the mixture of hydrogen chloride gas and water.

(e) Calcium oxide – this is pure substance. Any part of Calcium oxide consists of one type of molecules.

(f) Mercury – this is pure substance. Which ever part of Mercury consists of Mercury molecules only.

(g) Brick – this is not pure substance. It is a mixture of more components like clay, lime, silica and ash.

(h) Wood – this is not pure substance. Wood consists of so many organic matter. It is a mixture.

(i) Air – this is not pure substance. Air is a mixture of so many gases like oxygen, Nitrogen.

5. Identify the solutions among the following mixtures.

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

A.(a) Soil - Not a solution
(b) Sea water - Solution
(c) Air - Solution
(d) Coal - Not a solution
(e) Soda water - Solution

6. Classify each of the following as a homogeneous or heterogeneous mixture. Give reasons.

Soda water Wood Air
Soil Vinegar Filtered tea

A. Classification:

Homogeneous mixture		Heterogeneous mixture
Soda water		Wood
Air	Vinegar	Soil
Filtered tea		
Reason: If the particles of components in a mixture are uniformly distributed, it is called homogeneous mixture.		**Reason:** If the particles of components in a mixture are uniformly distributed, it is called homogeneous mixture.

7. 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

A.(a) Sodium - Element
(b) Soil - Mixture
(c) Sugar solution - Mixture
(d) Silver - Element
(e) Calcium carbonate - Compound
(f) Tin - Element
(g) Silicon - Element
(h) Coal - Mixture
(i) Air - Mixture
(j) Soap - Compound
(k) Methane - Compound
(l) Carbon dioxide - Compound
(m) Blood - Mixture

8. Classify the following substances in the below given table.

Ink Soda water Brass,
Fog Fruit salad Aerosol sprays,
Blood Black coffee Oil and water,
Air Boot polish Nail polish
Milk Starch solution,.

Solution	Suspension	Colloid

A. Classification of substances:

Solution	**Suspension**	**Colloid**
Ink	Fruit salad	Nail polish
Soda water	Aerosal spray	Boot polish
Brass	Fog	Milk
Black coffee	Oil and water	Blood
Air		
Starch solution		

9. Determine the mass by mass percentage concentration of a 100g salt solution which contains 20g salt?

A. Mass of salt (solute) = 20g
Mass of solution = 100g
Mass by mass percentage

$= \frac{Mass\ of\ solute}{Mass\ of\ solution} \times 100 = \frac{20}{100} \times 100 = 20\%$

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10. Calculate the concentration in terms of mass by volume percentage of the solution containing 2.5g potassium chloride in 50ml of potassium chloride (KCl) solution?

A. Mass of KCl (solute) = 2.5g

Volume of solution = 50 ml

Mass by volume percentage

$= \frac{Mass\ of\ solute}{Volume\ of\ solution} \times 100 = \frac{2.5}{50} \times 100 = 5\%$

11. Which of the following will show "Tyndall effect"? How can you demonstrate Tyndall effect in them?

(a) Salt solution (b) Milk

(c) Copper sulphate solution

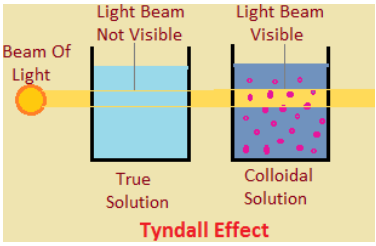
(d) Starch solution.

A. Salt solution, Copper sulphate solution and starch solution are solutions. Milk is colloid. So Milk can show Tyndall effect.

Take each given substance in a beaker. Make the light rays passes through them. The scattering of light means Tyndall effect observed only in milk. The other does not show Tyndall effect.

12. Take a solution, a suspension, a colloidal dispersion in different beakers. Test whether each of these mixtures shows the Tyndall effect by focusing a light at the side of the container.

A. Take a solution, a Colloid and a suspension in different beakers. Make the light rays passes through them. The scattering of light means Tyndall effect observed only in colloids and suspensions. The solution does not show Tyndall effect.



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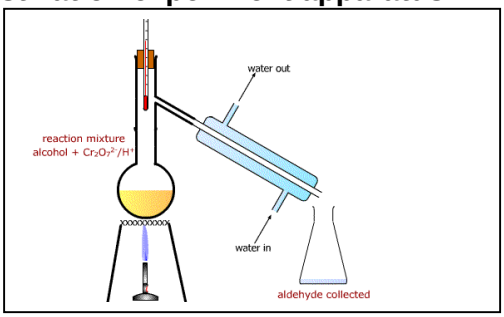
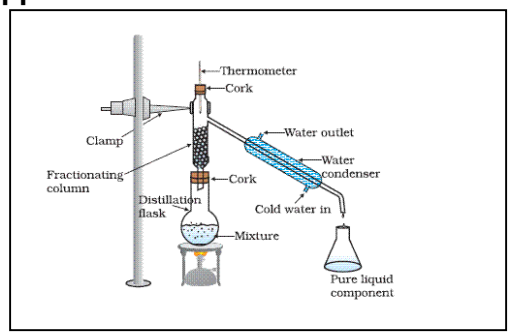
13. Draw the figures of arrangement of apparatus for distillation and fractional distillation. What do you find the major differences in these apparatus?

A. The major difference between the apparatus of distillation experiment and fractional distillation experiment is the fractionating column. Fractionating column is fitted in between the distillation flask and the condenser.

Distillation experiment apparatus:



Fractional Distillation experiment apparatus:



14. Write the steps you would use for making tea. Use the words given below and write the steps for making tea.

Solution	Solvent	Solute	Dissolve,
Soluble	insoluble	filtrate	residue.

A. Keep a bowl over the flame. Take some water in it. Water is <u>solvent</u>. Add tea powder. This is <u>solute</u>. The colour and essence particles of tea powder <u>dissolve</u>s in water. Now boil the mixture. Add milk and sugar sufficiently. Sugar is <u>soluble</u> in water. Filter the prepared tea with sieve. The <u>insoluble</u> tea powder remains as <u>residue</u> in the sieve. It can be thrown away. The <u>filtrate</u> is the tea <u>solution</u> containing water, milk, sugar and extract from tea powder.