Is Matter Pure

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Q. 1. A. Which separation techniques will you apply for the separation of the following?

Sodium chloride from its solution in water.

Answer : Evaporation

Since, we know that Sodium chloride is soluble in water, so we can easily separate out Sodium chloride from water by evaporation. In this process, after evaporation water will evaporate and the Sodium chloride crystals will be remained.

Q. 1. B. Which separation techniques will you apply for the separation of the following?

Ammonium chloride from a mixture containing sodium chloride and ammonium chloride.

Answer : Sublimation

We know that ammonium chloride sublimes at room temperature, so after sublimation only sodium chloride is left in the container and we can hold another container over the mixture of sodium chloride and ammonium chloride so that the sublimed ammonium chloride can be collected in the other container.

Q. 1. C. Which separation techniques will you apply for the separation of the following?

Small pieces of metal in the engine oil of a car.

Answer : Filtration

Small pieces of metals can me separated out from the engine oil of a car by the process of filtration. Since by filtration, the metals will be collected in the filter and the oil will be remaining.

Q. 1. D. Which separation techniques will you apply for the separation of the following?

Different pigments from an extract of flower petals.

Answer : Chromatography

The pigments from an extract of flower petal can be separated out by the process of chromatography. Chromatography is a technique of separation of substances which are very close in their molecular weight but differ in their molecular sizes. Since the pigments in flower petals have different molecular sizes so we can easily separate it out by the process of chromatography.

Q. 1. E. Which separation techniques will you apply for the separation of the following?

(e) Butter from curd.

Answer : Centrifugation

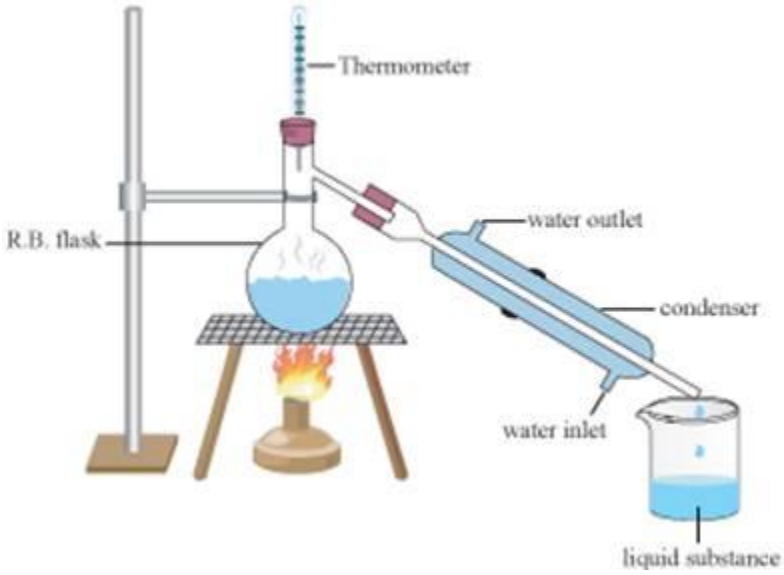
Since the butter is lighter in weight than that of the curd so it can easily be separated out by the process of centrifugation.

Q. 1. F. Which separation techniques will you apply for the separation of the following?

Oil from water.

Answer : Distillation

By the process of distillation, the water will get evaporated and collected in the other container and the oil will be remaining.



In this figure, the mixture is kept in the R.B flask, after evaporation the water will be collected in the container and the oil will be left in the R.B flask.

Q. 1. G. Which separation techniques will you apply for the separation of the following?

Tea leaves from tea.

Answer : Filtration

We can easily separate out the tea from tea leaved by filtration. In this process, the tea leaves are collected in the filter and the tea in remained.

Q. 1. H. Which separation techniques will you apply for the separation of the following?

Iron pins from sand.

Answer : Using Magnet

We know that the iron pins are attracted by the magnet so by holding the magnet over the sand the iron pins can be easily removed.

Q. 1. I. Which separation techniques will you apply for the separation of the following?

Wheat grains from husk

Answer : Winnowing

Since the husk is lighter in weight, so by the process of winnowing the grain and husk can be easily separated out.

From this picture we can see that the grains are collected in the mat and husk being lighter in weight flies away.

Q. 1. J. Which separation techniques will you apply for the separation of the following?

Fine mud particles suspended in water.

Answer : Sedimentation, Decantation and Filtration.

The mud particles are first left undisturbed so that the mud particles settle down in water. Then the water is drawn out in another container. And the remaining water with the mud particles are separated by the process of filtration.

Q. 2. 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 and residue.

Answer : The steps for making tea are:

(i) Here water is used as solvent, it will first be heated.

(ii) When the water starts to boil, we'll add sugar into it

(iii) The sugar acts as a solute that is soluble in water.

(iv) There after, we'll add the tea leaves in the solution and close it with a lid.

(v) Since the tea leaves are insoluble in water so it will settle down in the vessel.

(vi) Now, we will filter out the tea from the tea leaves using a sieve.

(vii) Then we will further add milk in the residue, that is, the tea.

(viii) Thus, the tea is ready.

Q. 3. Explain the following giving examples.

(a) Saturated solution
(b) Pure substance
(c) colloid
(d) Suspension

Answer : (a) At any temperature, the solution that has dissolved as much solute as it is capable of dissolving is called as a saturated solution.

Examples: Drinking Beverages, a large amount of sugar dissolved in water.

(b) A pure substance is a substance that consists on only one type of particle in it. A pure solution should not contain any other particles in it.

Examples: Iron, Water, Nitrogen (N_2).

(c) Colloid is a heterogeneous solution in which the particles are partially dissolved. The particles in the colloidal solution cannot be seen using naked eyes but, it can scatter light particles when light is made to pass through it.

Example: Milk, Smoke.

(d) A suspension is a heterogeneous solution that contains particles that can be seen through naked eyes.

Example: Mud Water, chalk water.

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Q. 4. Classify each of the following as a homogeneous or heterogeneous mixture. Give reasons.

Soda water, wood, air, soil, vinegar, filtered tea.

Answer : (i) **Soda Water:** Homogeneous Solution

The soda water contains carbon dioxide (CO_2) and water that is perfectly dissolved under pressure.

(ii) **Wood:** Heterogeneous Mixture

Since the composition of wood varies from plant to plant thus wood is a heterogeneous mixture.

(iii) **Air:** Heterogeneous Mixture

Air contains various other gases mixed with it such as oxygen, nitrogen etc. due to this air is heterogeneous.

(iv) **Soil:** Heterogeneous Mixture

Example: Soil consists of various matters, sand, pebbles etc that makes it a heterogeneous mixture.

(v) **Vinegar:** Homogeneous Mixture

Vinegar is made of acetic acid and water that is mixed perfectly. Due to this vinegar is homogeneous.

(vi) **Filtered Tea:** Homogeneous Solution

After tea is separated from the tea leaves it is a perfect homogeneous solution.

Q. 5. How would you confirm that a colourless liquid given to you is pure water?

Answer : To check whether the colourless liquid is pure water or not; we will perform electrolysis. In the electrolysis process, electricity is passed through the liquid. If the liquid is pure water then it will break down into hydrogen(H_2) and oxygen(O_2) gasses and get released in air. If not then the liquid will remain in the electrolysis vessel only.

Q. 6. 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

Answer : (a) Pure substance

Ice is a pure substance as it only contains water particles in it.

(b) Impure substance

Milk is an impure substance as it is a mixture of carbohydrates, calcium etc.

(c) Pure substance

Iron is a pure substance as it contains only the iron particles in it

(d) Pure substance

Hydrochloric acid is a pure substance as it contains only the hydrogen chloride particles.

(e) Pure substance

Calcium oxide is a pure substance as it contains only the Calcium oxide particles in it.

(f) Pure substance

The mercury (hydrargyrum) is a pure substance as it contains only the mercury particles in it.

(g) Impure substance

Brick is made up of the mixture of clay and shale due to this it is an impure substance.

(g) Impure substance

Since the composition of wood varies from plant to plant thus wood is an impure substance.

(i) Impure substance

Air contains various other gases mixed with it such as oxygen, nitrogen etc. due to this air is impure.

Q. 7. Identify the solutions among the following mixtures.

(a) Soil (b) Sea water

(c) Air (d) Coal
(e) Soda water.

Answer : Sea water, soda water, air are solutions.

A solution is a homogeneous mixture of two or more substances. A solution may exist in any phase. A solution consists of a solute and a solvent.

Q. 8. 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.

Answer : Since only colloidal solutions can show "Tyndall effect"; thus **milk** and **starch solution** is the correct option.

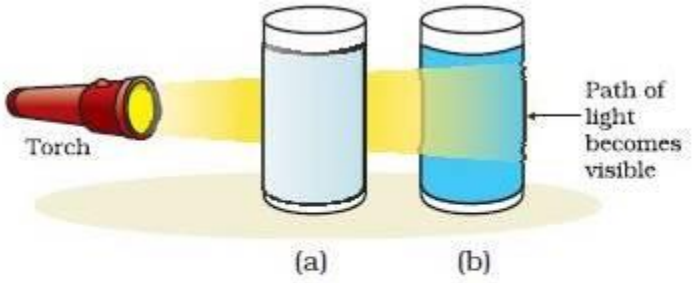


Fig. 2.3: (a) Solution of copper sulphate does not show Tyndall effect, (b) mixture of water and milk shows Tyndall effect.

To demonstrate "Tyndall effect":

(i) Milk:

● Pour the milk in a transparent container.

● Then take a torch and allow the light particles to pass through the milk particles.

● As the light particles come in contact with the milk particles, you will see, that the light particles gets scattered.

● This effect is known as the "Tyndall effect".

(ii) Starch Solution:

● Pour the starch solution in a transparent container.

● Then take a torch and allow the light particles to pass through the starch particles.

● As the light particles come in contact with the starch particles, you will see, that the light particles gets scattered.

● This effect is known as the “Tyndall effect”.

Q. 9. 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 : (a) Element.

As it is a pure substance consists of one kind of atom.

(b) Mixture.

As soil is made up of more than one kind of substances.

(c) Mixture.

As sugar solution is made up of two substances water and sugar.

(d) Element.

As it is a pure substance made up of silver atom only.

(e) Compound.

As in calcium carbonate, calcium, carbon and oxygen chemically combined with each other to form calcium carbonate and they cannot be separated by any physical process.

(f) Element.

As tin is a pure substance made up of tin atoms only.

(g) Element.

Silicon is a pure substance made up of Silicon atom only.

(h) Element.

Coal is an allotrope of carbon and is made up of carbon atom only.

(i) Mixture.

Air is made up of different gases like nitrogen, oxygen, carbondioxide etc. water vapors, dust particle and many other substances. All the constituents retain their property in air as they are only mixed with each other.

(j) Compound.

Soap is made up of different fatty acid salts and sodium/potassium ions. These substances chemically combined with each other to obtain soap and they cannot be separated easily.

(k) Compound.

Since Carbon and hydrogen chemically combined with each other to form methane in a fixed proportion (1:4 ratio).

(l) Compound.

It is a compound because when coal (carbon) is burnt in air it reacts with aerial oxygen to form carbondioxide. Carbon and oxygen can’t be separated easily from carbondioxide.

(m) mixture.

Blood is a mixture of many chemical compounds including cells and many biological compounds which can be separated mechanically.

Q. 10. Classify the following substances in the below given table.

Ink, soda water, brass, fog, blood, aerosol sprays, fruit salad, black coffee, oil and water, boot polish, air, nail polish, starch solution, milk.

Solution	Suspension	Emulsion	Colloidal dispersion

Answer :

Solution	Suspension	Emulsion	Colloidal dispersion
Black Coffee	Fog	Oil and Water	Ink
Soda Water	Aerosol Sprays	Air	Blood
Brass	Fruit Salad		Starch Solution
Nail Polish			Milk
			Boot Polish

Q. 11. 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.

Answer : Take three beakers and marked them as **A**, **B** and **C**.

In beaker **A** take sugar solution, in **B** chalk powder mixed with water and in **C**milk, then stir the contents of all the three beakers.

Direct a beam of light from a torch through all the three beakers.

Observation: Path of light is visible in beaker **B** and **C**

Now keep all the three beakers undisturbed for few minutes and then again pass the beam of light.

Observation: Path of light is visible only in **C**.

Conclusion:

● Beaker **A:** Since sugar is soluble in water so sugar solution form a homogeneous solution and can't show Tyndall effect.

● Beaker **B:** Chalk powder is insoluble in water so it will form a non-homogeneous mixture and initially the particle can scatter the beam of light but when the particle will settle down they will not show Tyndall effect.

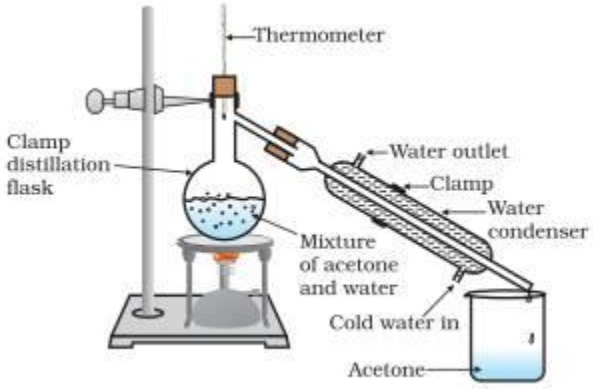
● Beaker **C:** Milk is a colloid whose particle size is too small to see through naked eyes and this particle can easily scatter the beam of light and thus show Tyndall Effect.

Q. 12. Draw the figures of arrangement of apparatus for distillation and fractional distillation.

Answer : <u>Distillation:</u> distillation is a process used in order to separate the components by repeated vaporization-condensation cycles.

In this the mixture is kept at the flask and the flask is heated. Due to this the solvent having lower boiling point evaporates and enters the tube where it undergoes condensation. Thus, the mixture gets separated.

Given below is the diagram of distillation.



<u>Fractional Distillation:</u> fractional distillation is the process of separating the mixture of two miscible liquids where the difference between their boiling point is less than 25°C.

Here the apparatus is similar to the simple distillation except that a fractioning tube, which is packed with glass beads. The beads help the vapour to cool and condense at a faster rate.

Given below is the diagram of fractional distillation.

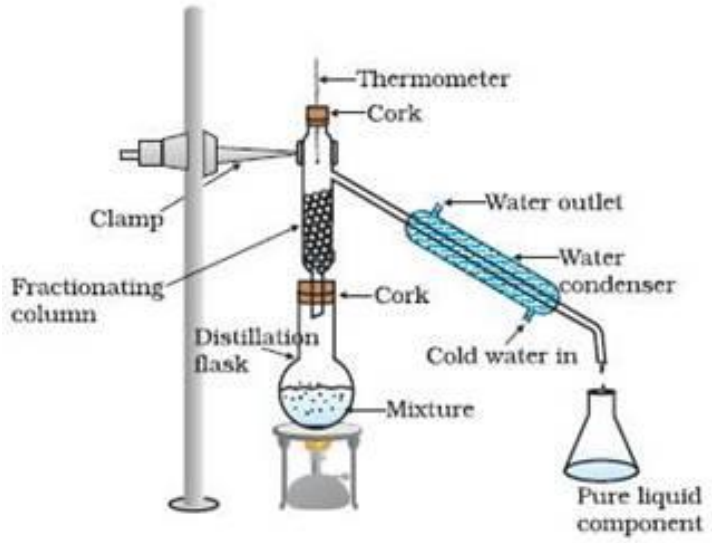


Fig. 2.10: *Fractional distillation*

Q. 13. Determine the mass by mass percentage concentration of a 100g salt solution which contains 20g salt?

Answer : Mass of solute = 20g

Mass of solution= 100g

$$\text{Mass by mass percentage of a solution} = \frac{\text{Mass of solute}}{\text{mass of solution}} \times 100$$

$$= \frac{20}{100} \times 100 = 20\%$$

Q. 14. 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?

Answer : Mass of solute =2.5g

Volume of solution= 50ml

Mass by volume percentage of a solution $= \frac{\text{Mass of solute}}{\text{Volume of solution}} \times 100$

$= \frac{2.5}{50} \times 100 = 5\%$