Ch – 2 IS Matter around us is pure

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Ans. Different substances in a given solvent have different solubilities at the same temperature. So on cooling substances start to precipitate out.

Q. What is suspension?Write its properties?

Ans: Suspension:Non-homogeneous systems, in which solids are dispersed in liquids, are called Suspensions so It is a heterogeneous mixture.

Properties of a Suspension---

• Suspension is a heterogeneous mixture.

• The particles of a suspension can be seen by the naked eye.

• The particles of a suspension scatter a beam of light passing through it and make its path visible.

• The solute particles settle down when a suspension is left undisturbed, that is, a suspension is unstable.

* They can be separated from the mixture by the process of filtration.

Q. How can we separate colour component of from ink(mixture.)?

Ans: By evaporation method: Water (Solvent) has got evaporated and residue color left over.

Conclusion: we can separate the volatile component (solvent) from its non-volatile solute by the method of evaporation.

Q. How can we separate cream(fat) from milk ?

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Ans: The denser particles of water are forced to the bottom and the lighter particles of cream/fats stayat the top when milk spun rapidly by centrifuge machine.

Centrifugation: Applications-

• Used in diagnostic laboratories for blood and urine tests.

• Used in dairies and home to separate butter from cream.

• Used in washing machines to squeeze out water from wet clothes

Q. How can we separate kerosene oil from water?

Ans: By using a separating funnel.

The principle is that immiscible liquids separate out in layers depending on their densities.

Applications

• To separate mixture of oil and water.

• In the extraction of iron from its ore, the lighter slag is removed from the top by this method to leave the molten iron at the bottom in the furnace.

Q. How can we separate mixture of salt and ammonium chloride?

Ans: By sublimation method sice ammonium chloride is a sublimating substance

Q. How can we separate dye in black ink?

Ans: Dye in black ink is a mixture of different compounds.

These different compounds can be separated by chromatography method.

The process of separation of components of a mixture is known as chromatography.

Kroma in Greek means colour. This technique was first used for separation of colours, so this name was given.

Chromatography is the technique used for separation of those solutes that dissolve in the same solvent.

Applications: To separate

• colours in a dye • pigments from natural colours • drugs from blood.

Q. What according to you, can be the reason for the rise of the coloured spot on the paper strip?

Ans. The ink that we use has water as the solvent and the dye is soluble in it. As the water rises on the filter paper it takes along with it the dye particles. Usually, a dye is a mixture of two or more colours. The coloured component that is more soluble in water, rises faster and in this way the colours get separated

Q.1: Which separation techniques will 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.

Ans: (a) Crystallization or Evaporation. (b) Sublimation. (c) Centrifugation or Sedimentation. (d) Chromatography. (e) Centrifugation. (f) Separating funnel. (g) Hand-picking. (h) Magnetic separation. (i) Winnowing. (j) Centrifugation.

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

Ans: Take the solvent, water, in a kettle. Heat it. When the solvent boils, add the solute, milk. Milk and water forms a solution. Then pour some tea leaves over a sieve. Pour slowly hot solution of milk over tea leaves. Colour of tea leaves goes into solution as filtrate. The remaining tea leaves being insoluble remains as residue. Add requisite sugar which dissolves and the tea is ready.

Q.3: Explain the following giving examples:

(a) Saturated solution, (b) Pure substance, (c) Colloid, (e) Suspension.

Ans:

(a) Saturated Solution

a solution in which no more of the solid (solute) can be dissolved at a given temperature is called a saturated solution. Suppose 50 gm of a solute is the maximum amount that can be dissolved in 100 gm water at 298 K. Then 150 gm of solution so obtained is the saturated solution at 298 K.

(b) Pure Substance

A pure substance consists of a single of matter or particles and can not be separated into other kind of matter by any physical process. Pure substances always have the same colour, taste and texture at a given temperature and pressure. For example, pure water is always colourless, odorless and tasteless and boils at 373 K at normal atmospheric pressure.

(c) Colloid

Colloids are heterogeneous mixtures the particle size is too small to be seen with a naked eye, but it is big enough to scatter light. The particles are called the dispersed phase and the medium in which they are distributed is called the dispersion medium. Colloids are useful in industry and daily life.

A colloid has the following characteristics:

(1) It is a heterogeneous mixture.

(2) The size of particles of a colloid lies between 1 - 100 nm and can not be seen by naked eyes.
(3) The particles of colloid can scatter a beam of light passing through it and make the path visible.
(4) The particles of colloid can not be separated from the mixture by filtration. The process of separation of colloidal particles is known as 'centrifugation'.
(5) They do not settle down when left undisturbed. In other words colloids are quite stable e.g. smoke, milk, fog, cloud etc.

(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.

A suspension has the following characteristics:

(1) It is a heterogeneous mixture.
(2) The size of particles of a suspension is greater than 100 nm and is visible to naked eyes.
(3) The particles of suspension can scatter a beam of light passing through it.
(4) The particles of a suspension settle down when left undisturbed.
(5) The particles of a suspension can be separated from its mixture by filtration.

Q.4: Classify each of the following as a homogeneous or heterogeneous mixture: soda water, wood, air, soil, vinegar, filtrated tea.

Ans: Homogeneous mixture
soda water, air, vinegar, filtered tea.
Heterogeneous mixture - wood, soil.

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

Ans: Every liquid has a characteristic boiling point at 1 atmospheric pressure. If the given colourless liquid boils exactly at 373 K at 1 atmospheric pressure, then it is pure water. If the boiling point is different then the water is contaminated.

Q.6: 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.

Ans: (a), (c), (d), (e) and (f) are pure substances.

Q.7: Which of the following will show "Tyndall effect"?

(a) salt solution (b) milk (c) copper sulphate solution (d) starch solution.
Ans: (b) and (d) are colloids and will show Tyndall Effect.

Q.8: 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

Ans: Elements - sodium, silver, tin, silicon.
Compounds - calcium carbonate, methane, carbon dioxide.
Mixtures - soil, sugar solution, coal, air, soap, blood.

Q. 9. In the formation of sodium chloride from its constituent elements, do the properties of its elements change. Explain.

Ans: Sodium is a very reactive metal that reacts exothermically with water. If we were to ingest a pinch of sodium, it would burn our intestines. Chlorine is a greenish yellow gas with a characteristic irritating odour and pungent taste. When sodium and chlorine combine to form sodium chloride, the properties of the elements are totally changed. Sodium chloride is a white substance totally safe to be ingested and is used to add flavour to our food.

Q. 10. Briefly describe how to separate, i) Sulphur from a mixture of sulphur and sand. ii) Black CuO from a mixture of CuO and ZnO.

Answer: i) Add a solvent to the mixture of sulphur and sand. Sulphur dissolves in carbon disulphide while sand does not. When filtered, the residue is sand. The filtrate is kept open, carbon disulphide evaporates and the sulphur crystals form.

ii) Add a solvent to the mixture of CuO and ZnO that dissolves only one component e.g. sodium hydroxide. When sodium hydroxide is added to the mixture, ZnO dissolves. Filter to obtain the residue of CuO.

Question (11): Action of heat on blue vitriol is a physical as well as chemical change. Justify.

Answer: When blue vitriol is a gradually heated to about 800^{o}C, it undergoes a physical change to form a white powder. On adding a drop of water to the white powder, it changes back to blue. Thus the change is a physical change. On strongly heating, copper sulphate (blue vitriol) decomposes to give new substances like copper oxide and sulphur dioxide. On cooling these, copper sulphate cannot be re-obtained. Thus it is a chemical change.

Question (12): How would you separate a mixture of NH_4Cl and I_2?

Answer: Heating cannot separate the mixture, as both substances sublime on heating. However, when water is added to the mixture, NH_4Cl dissolves but I_2 does not. The mixture is filtered. The filtrate is a solution of NH_4Cl, while the residue is iodine. The filtrate is heated to obtain NH_4Cl crystals.

Question (13): How can you prove that air is a mixture?

Answer:
a) The composition of air is variable. The composition varies from place to place and with altitude. For instance, at higher altitudes, there is less oxygen in the air. In industrial areas, due to the waste gases coming out of industrial chimneys in the form of smoke more impurities are added in the air.

b) Air has no definite set of properties. Its properties are an average of its constituents. For e.g., vapour density of oxygen is 16, vapour density of nitrogen is 14 and vapour density of air is 14.4

c) The components of air can be separated by physical means. Fractional distillation of liquid air can separat$_2$ and O_2. Boiling point of a liquid N_2 = -196^0 C, Boiling point of a liquid O_2 = -183^0 C

d) The formation of air does not involve any energy change. No energy is released or absorbed when the constituents of air are mixed in the right proportion. e) Air cannot be assigned a fixed chemical formula.

Question (14): Describe a method for separation of the constituents of gunpowder.

Answer: Gunpowder is a mixture of sulphur, charcoal and potassium nitrate (nitre). When water is added to the mixture potassium nitrate dissolves. The mixture is then filtered. The filtrate is potassium nitrate solution while the residue is a mixture of sulphur and charcoal. The filtrate is evaporated on a sand bath to obtain nitre back. When carbon disulphide is added to the residue, sulphur dissolves. When this mixture is filtered the filtrate is sulphur solution while the residue is charcoal. Leaving it open evaporates the sulphur solution. Carbon disulphide evaporates and sulphur crystals are left behind.

Question (15): Write down the technique used to separate.
i) The constituents of the colouring matter in ink.
ii) Hydrated copper (II) sulphate from its aqueous solution.
iii) Unused zinc, after reacting the excess with dilute sulphuric acid.
iv) Benzene (boiling point 80^0 C) and aniline (boiling point 184^0 C).

Answer:
i) Chromatography
ii) Evaporation
iii) Filtration
iv) Fractional distillation

Question (16): A pupil decides to separate powdered calcium carbonate from powdered sodium chloride by shaking the mixture with water and filtering. Would this procedure succeed? Explain.

Answer: This procedure will succeed, as $CaCO_3$ is insoluble in water while NaCl is soluble in water. On filtering the residue will be $CaCO_3$.

Question (17) If salt is added to water, is the mixture homogeneous or heterogeneous. Give reasons for your Answer.

Answer: The mixture is homogeneous because

a) The salt particles do not form a separate layer.

b) The salt particles cannot be separated from the water by filtration.

c) Also every portion of the solution is equally salty, as the solution has salt uniformly dispersed in it.

Question (18): What is the concentration of a solution in terms of mass percentage if it contains 20 g of a salt in 250 g of water?

Answer: Mass of the solute (salt) = 20 g

Mass of the solvent (water) = 250 g

Mass of the solution = Mass of the solute + Mass of the solvent

= 20 + 250 = 270 g

Mass percentage of solution = Mass of solute /mass of solvent x 100%

= 20/270 x100=7.4%

Question (19)**How is the centrifugation technique used to obtain toned milk**

Answer:*The toned milk should contain a minimum of 3.0 per cent fat and 8.5 per cent non-fat solids. Centrifugation is used to make the skimmed (low or non-fat) milk needed to reconstitute the toned milk, made up from whole milk and this skimmed milk with water to obtain the 3.0/8.5 spec's on fat/non-fat solids.*

Question (20) *How would you separate a mixture of ammonia and hydrogen?*

Answer: Passing the mixture through water can separate the mixture of ammonia and hydrogen. Ammonia being highly soluble dissolves in water while H_2 passes out as gas.