1. Which of the following statements is true for pure substances?

(i) Pure substances contain only one kind of particle.

(ii) Pure substances may be compounds or mixtures.

(iii) Pure substances have the same composition throughout.

(iv) Pure substances can be exemplified by all elements other than nickel.

(a) (i) and (ii)

(b) (i) and (iii)

(c) (iii) and (iv)

(d) (ii) and (iii)

Answer:(b)

Pure substances are made up of only one kind of particles and they have the same composition throughout. Mixtures are not pure substances. Only elements and compounds are pure substances.

2. Rusting of an article made up of iron is called

(a) corrosion, and it is a physical as well as chemical change

(b) dissolution, and it is a physical change

(c) corrosion, and it is a chemical change

d) dissolution and it is a chemical change

Answer: The answer is c) corrosion and it is a chemical change.

Explanation: Rusting of iron is corrosion, and it's a chemical change because rust is a chemical compound called hydrated iron oxide Fe2O3. nH2O, iron(III), which is different from elemental iron.

$$\text{Iron} + \text{oxygen} \xrightarrow{\text{Water}} \text{Hydrated iron oxide (rust)}$$

$$4Fe + 3O_2 \longrightarrow \underset{\text{(Rust)}}{2Fe_2O_3.\,xH_2O}$$

Physical changes are those changes in which substance identity is not changed, and it can get back to its original form. For example, water freezing to ice can be melted back to waste, whereas chemical changes are those in which the original substance identity is changed, and they cannot be restored to their original form.

On adding solid solutes to the solvent, some solute dissolves, and their concentration increases in the solution. This process is known as dissolution.

Crystallization is a process in which solute particles in a solution collide with the solid solute particles to get separated out of the solution.

Pure substances are made up of only one kind of particles and they have same composition throughout. Mixtures are not pure substances. Only elements and compounds are pure substances.

3. A mixture of sulphur and carbon disulphide is

(a) heterogeneous and shows the Tyndall effect

(b) homogeneous and shows the Tyndall effect

(c) heterogeneous and does not show the Tyndall effect

(d) homogeneous and does not show the Tyndall effect

Answer: a) heterogeneous and shows the Tyndall effect.

Explanation: A mixture of sulphur and carbon disulphide is a heterogeneous colloid and shows the Tyndall effect because, in a colloidal solution, the particles are big enough to scatter light. The scattering of light by colloidal particles is known as the Tyndall effect. Colloids are actually heterogeneous in nature though they appear to be homogeneous.

4. Tincture of iodine has antiseptic properties. This solution is made by dissolving

(a) iodine in potassium iodide

(b) iodine in vaseline

(c) iodine in water

(d) iodine in alcohol

Answer: (d) iodine in alcohol

Explanation: The tincture is prepared by using 2-7% elemental iodine and either potassium iodide or sodium dissolved in alcohol. Since alcohol is a good solvent and iodine does not dissolve in water answer should be alcohol.

5. Which of the following are homogeneous in nature?
(i) Ice
(ii) Wood
(iii) Soil
(iv) Air
(a) (i) and (iii)
(b) (ii) and (iv)
(c) (i) and (iv)
(d) (iii) and (iv)

Answer: (c)
Ice and air are homogeneous in nature since they have same composition throughout and there are no visible boundaries between the components.

6. Which of the following are physical changes?
(i) Melting of iron metal
(ii) Rusting of iron
(iii) Bending of an iron rod :
(iv) Drawing a wire of iron metal
(a) (i), (ii) and (iii)
(b) (i), (ii) and (iv)
(c) (i), (iii) and (iv)
(d) (ii), (iii) and (iv)

Answer:(c)
Melting of iron metal, bending of an iron rod and drawing a wire of iron metal are physical changes since no new substances are formed during these changes. Only rusting of iron is a chemical change since a new substance rust is formed.

7. Which of the following are chemical changes?
(i) Decaying of wood
(ii) Burning of wood
(iii) Sawing of wood
(iv) Hammering of a nail into a piece of wood
(a) (i) and (ii)
(b) (ii) and (iii)
(c) (iii) and (iv)
(d) (i) and (iv)

Answer:(a)

Decaying of wood and burning of wood are chemical changes since there is a change in chemical composition of wood. Sawing of wood and hammering of a nail into a piece of wood are physical changes since there is no change in the composition of the wood during these changes.

8. Two substances, A and B, were made to react to form a third substance, A_2B, according to the following reaction $2A + B \rightarrow A_2B$. Which of the following statements concerning this reaction are incorrect?

(i) The product A_2B shows the properties of substances A and B

(ii) The product will always have a fixed composition

(iii) The product so formed cannot be classified as a compound

(iv) The product so formed is an element

(a) (i), (ii) and (iii),

(b) (ii), (iii) and (iv)

(c) (i), (iii) and (iv)

(d) (ii), (iii) and (iv)

Answer: (c) (i), (iii) and (iv)

Explanation: A_2B is a compound made up of two elements, A and B, in a fixed ratio. The properties of a compound (For example, A_2B) are entirely different from those of its constituent elements (i,e.g A and B). The composition of a compound is fixed.

The product A2B is a new compound formed hence, it does not show properties of A and B. The product formed is a compound and not an element.

9. Two chemical species, X and Y, combine together to form a product P which contains both X and Y $X + Y \rightarrow P$. X and Y cannot be broken down into simpler substances by simple chemical reactions. Which of the following concerning the species X, Y and P are correct?

(i) P is a compound

(ii) X and Y are compounds

(iii) X and Y are elements

(iv) P has a fixed composition

(a) (i), (ii) and (iii),

(b) (i), (ii) and (iv)

(c) (ii), (iii) and (iv)

(d) (i), (iii) and (iv)

Answer: (d) (i), (iii) and (iv)

Here, X and Y cannot be further broken down into simpler substances. Hence, X and Y are elements, and P can be broken down into its elements, P is a compound with a fixed composition.

Short Answer Type Questions:

10. Suggest separation technique(s) one would need to employ to separate the following mixtures.

(a) Mercury and water

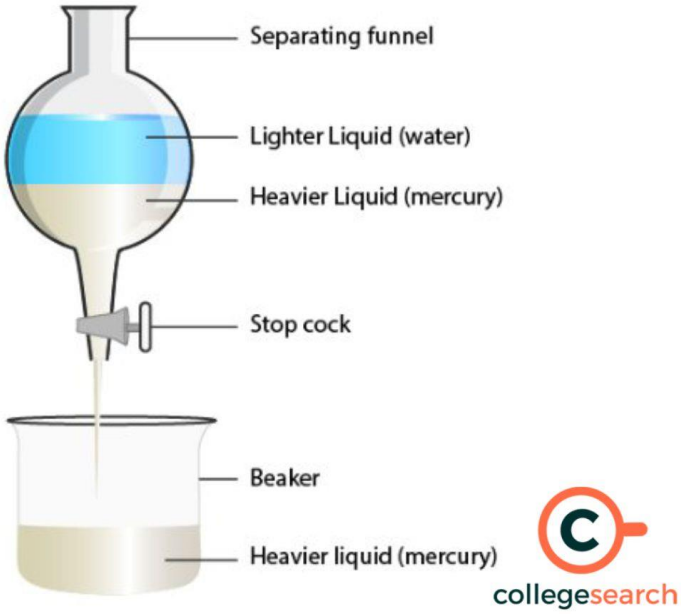
(b) Potassium chloride and ammonium chloride

(c) Common salt, water and sand

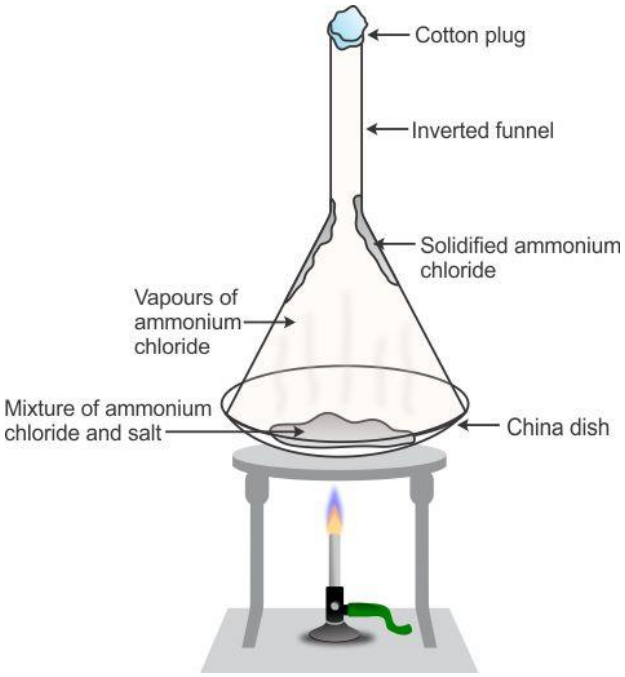
(d) Kerosene oil, water and salt

Answers: a) decantation, b) Sublimation, c) Filtration and evaporation, d) decantation and evaporation

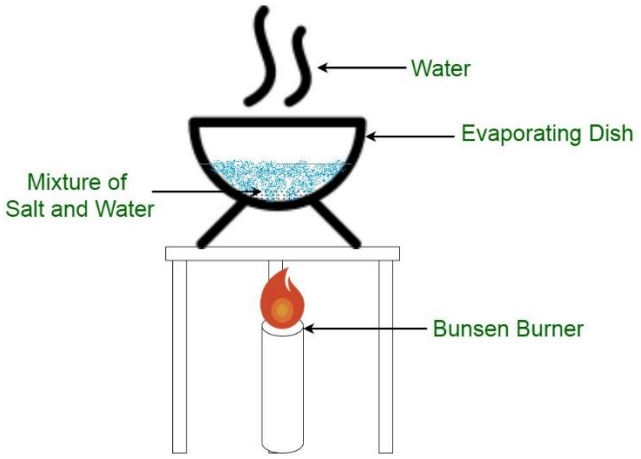
Explanation: a) Decantation method is used to separate the mixture of Mercury and water. Here Mercury is heavier than water hence it forms a separate layer that can be easily separated in a separating funnel.



b) Potassium chloride and ammonium chloride are separated by sublimation method because ammonium chloride is a sublimate, sublimes leaving behind the potassium chloride.



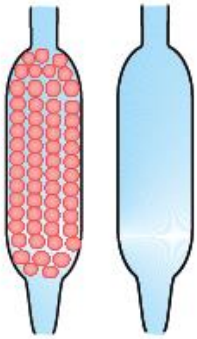
c) Common salt, water and sand are separated by filtration and evaporation processes. Common salt, water, and sand are filtered to separate the sand from the salt solution. Then, a salt solution is heated to evaporate the water leaving behind salt.



(d) Kerosene is separated from salt solution in water by decantation using a separating funnel. Kerosene being heavier, forms a separate layer. Salt from water is further removed by evaporation.

11. Which of the tubes in Fig. 2.1

(a) and (b) will be more effective as a condenser in the distillation apparatus?



Answer: tube (a)

Explanation Beads in tube A provide an increased surface area for cooling of the vapours that come in contact with them. Hence, it is a good condenser.

12. Salt can be recovered from its solution by evaporation. Suggest some other technique for the same.

Answer: crystallization

Explanation: Salt can be recovered from its solution by crystallization. Crystallization is a more efficient process as it removes soluble impurities, which cannot be done by evaporation.

Salt solution can be concentrated by heating to make a supersaturated solution. Crystallisation will occur when the solution is left for cooling and salt will separate out from the solution.

13. The 'seawater' can be classified as a homogeneous as well as heterogeneous mixture. Comment.

Answer: If we consider the seawater on the surface, it comprises water and salts hence it is a homogenous mixture. If we consider the seawater from the deep sea, it consists of salts, water, mud, decayed plants etc, which will be a heterogeneous mixture.

14. While diluting a solution of salt in water, a student, by mistake, added acetone (boiling point 56°C). What technique can be employed to get back the acetone? Justify your choice.

Answer: Fractional Distillation can be used to separate acetone from the mixture of salt and water.

Explanation: There are considerable differences in the boiling points of acetone (56°C) and water (100°C). When the solution is heated, acetone evaporates first. The water is collected in the distillation flask. The vapours of acetone are then condensed to obtain acetone.

The mixture of acetone and salt solution in water can be separated by distillation since a difference in their boiling points is more than 25°C. Acetone will evaporate and get condensed first leaving behind the salt solution.

15. What would you observe when

(a) a saturated solution of potassium chloride prepared at 60°C is allowed to cool to room temperature?

(b) an aqueous sugar solution is heated to dryness>

(c) a mixture of iron filings and sulphur powder is heated strongly?

Solution:

a) Sodium potassium chloride will separate from the saturated solution when the temperature of the solution is reduced from 60°C to room temperature. The solubility of the solid state is affected by the change in temperature.

b) When aqueous sugar solution is heated, first water gets evaporated up to some extent then sugar gets charred.

c) Iron combines with sulphur and forms iron sulphide (FES).

16. Explain why particles of a colloidal solution do not settle down when left undisturbed, while in the case of a suspension, they do.

Answer: The size of the particles in suspension is relatively larger than the size of the particles in a solution. Moreover, in suspension, molecular interaction is weaker to keep the molecules in suspended form. Hence the particles settle down. Similarly, in colloidal solution, molecular interaction is strong hence they remain in suspended form.

The size of colloidal particles in a colloidal solution is smaller than suspension. These particles are in a random motion hence do not settle down when left undisturbed. The particles of suspension are bigger and they tend to settle down under the effect of gravity.

17. Smoke and fog are both aerosols. In what way are they different?

Answer: Both smoke and fog have gas as the dispersion medium (continuous phase). But the difference lies in the dispersed phase. The dispersed phase in fog is liquid, whereas, in smoke, it is solid (particulate matter).

In smoke, the dispersed phase is solid and the dispersion medium is gas. In fog, the dispersed phase is liquid and the dispersion medium is gas.

18. Classify the following as physical or chemical properties:

(a) The composition of a sample of steel is 98% iron, 1.5% carbon and 0.5% other elements.

(b) Zinc dissolves in hydrochloric acid with the evolution of hydrogen gas.

(c) Metallic sodium is soft enough to be cut with a knife.

(d) Most metal oxides form alkalis on interacting with water.

Answer: Physical properties are a) and c). Chemical properties are b) and d)

Explanation:

a) Composition of a sample of steel is 98% iron, 1.5% carbon and 0.5% other elements. It is a chemical property because no new compound is formed as steel is an alloy and alloy and is a homogeneous mixture of two or more metals or of metallic elements with non-metallic elements.

b) It is a chemical property because zinc reacts with HCL to give out zinc chloride and hydrogen gas.

c) The cutting knife will not involve any chemical reaction and did not form a new compound hence it is a physical property.

d) It is chemical property as the new compound is formed by the interaction of metal oxides with alkalis.

19. The teacher instructed three students, 'A', 'B' and 'C', respectively, to prepare a 50% (mass by volume) solution of sodium hydroxide (NaOH). 'A' dissolved 50g of NaOH in 100 mL of water, 'B' dissolved 50g of NaOH in 100g of water, while 'C' dissolved 50g of NaOH in water to make 100 mL of solution. Which one of them has made the desired solution and why?

Answer: The answer is student C because both B and A have made the solution of 150 ml, whereas student C prepared the required quantity.

Alternative Answer: By definition, 50% mass by volume percent solution means 50 grams of a solute dissolved in 100 mL of solution. Therefore, student C made the desired solution. Student A dissolved 50 g of NaOH in 100 ml of water, So the solution is diluted and it is not a desired solution.

By definition, 50% mass by mass percent solution means 50 grams of a solute dissolved in 100 grams of solution.

Student B dissolved 50 g of NaOH in 150 g of solution so, it is not the desired solution.

' C' has made the desired solution by dissolving 50 g NaOH in water to make the volume of the solution 100 mL.

$$\text{Mass by volume \%} = \frac{\text{Mass of solute}}{\text{volume of solution}} \times 100$$

$$= \frac{50}{100} \times 100 = 50\% \text{ mass by volume}$$

20. Name the process associated with the following:

(a) Dry ice is kept at room temperature and at one atmospheric pressure.

(b) A drop of ink placed on the surface of water contained in a glass spreads throughout the water.

(c) A potassium permanganate crystal is in a beaker and water is poured into the beaker with stirring.

(d) An acetone bottle is left open and the bottle becomes empty.

(e) Milk is churned to separate cream from it.

(f) Settling of sand when a mixture of sand and water is left undisturbed for some time.

(g) Fine beam of light entering through a small hole in a dark room, illuminates the particles in its paths.

Answer:

(a) Sublimation of dry ice (solid) to C02 (gas)

(b) Diffusion of ink into water

(c) Diffusion or dissolution of solid into liquid

(d) Evaporation, diffusion of acetone in air

(e) Centrifugation

(f) Sedimentation

(g) Tyndall effect – Scattering of light

21. You are given two samples of water labelled as 'A' and 'B'. Sample 'A' boils at 100°C and sample 'B' boils at 102°C. Which sample of water will not freeze at 0°C? Comment.

Answer: Sample 'B' which boils at 102°C contains impurities. It will not freeze at 0°C. There will be a depression in freezing point.

22. What are the favourable qualities given to gold when it is alloyed with copper or silver for the purpose of making ornaments?

Answer: Pure gold (24 karats) is soft and does not have strength. In order to give strength to gold, silver and copper are alloyed to gold. An alloy that has 20 parts of gold and 4 parts of silver is known as 24-karat gold.

Pure gold is highly malleable and soft. When it is alloyed with copper or silver it becomes hard and strong and can be moulded into various shapes.

23. An element is sonorous and highly ductile. Under which category would you classify this element? What other characteristics do you expect the element to possess?

Answer: An element which is sonorous and highly ductile can be classified as metal. Other characteristics include lustre, malleability, heat and electrical conductivity.

The element is expected to be lustrous, malleable and good conductor of heat and electricity.

24. Give an example, each for the mixture having the following characteristics. Suggest a suitable method to separate the components of these mixtures

(a) A volatile and a non-volatile component.

(b) Two volatile components with appreciable differences in boiling points.

(c) Two immiscible liquids.

(d) One of the components changes directly from a solid to a gaseous state.

(e) Two or more coloured constituents soluble in some solvent.

Answer:

(a) Mixture of acetone and water. It can be separated by distillation.

(b) Mixture of petrol and kerosene. It can be separated by distillation.

(c) Mixture of oil and water. It can be separated by fractional distillation.

(d) Mixture of naphthalene and ammonium chloride. Separating naphthalene by filtration and then separation of ammonium chloride from water by evaporation.

(e) Mixture of pigments from a flower petal extract. It can be separated by chromatography.

Q25. Fill in the blanks.

(a) A colloid is a _____ mixture and its components can be separated by the technique known as _____.

(b) Ice, water, and water vapour look different and display different _____

properties but they are _____ the same.

(c) A mixture of chloroform and water taken in a separating funnel is mixed and left undisturbed for some time. The upper layer in the separating funnel will be of _____ and the lower layer will be that of _____.

(d) A mixture of two or more miscible liquids, for which the difference in the boiling points is less than 25 K can be separated by the process called _____.

(e) When light is passed through water containing a few drops of milk, it shows a bluish tinge. This is due to the _____ of light by milk and the phenomenon is called _____. This indicates that milk is a _____ solution.

Answer:
(a) heterogeneous; centrifugation
(b) physical, chemically
(c) water, chloroform
(d) fractional distillation
(e) scattering, Tyndall effect, colloidal

26. Sucrose (sugar) crystals obtained from sugarcane and beetroot are mixed together. Will it be a pure substance or a mixture? Give reasons for the same.

Answer: It will be a pure substance because the chemical structure of the sugar remains the same despite the change in the source of their extraction. Hence sugar or sucrose is a. pure substance with fixed composition.

27.Give some examples of Tyndall effect observed in your surroundings?

Answer: Examples of Tyndall effect:

(i) When light rays enter into a dark room through a hole or a small window.

(ii) Sunlight passing through a group of trees in the forest.

(iii) Path of light rays seen in front of the projector in a cinema hall.

28. Can we separate alcohol dissolved in water by using a separating funnel? If yes, then describe the procedure. If not, explain.

Answer: We cannot separate alcohol dissolved in water by separating the funnel as they both are miscible solvents.

29. On heating, calcium carbonate gets converted into calcium oxide and carbon dioxide.

(a) Is this a physical or a chemical change?

(b) Can you prepare one acidic and one basic solution by using the products formed in the above process?

If so, write the chemical equation involved

Solution:

Answers:

a) It is a chemical change

$CaCO_3+H_2O \rightarrow CaO+CO_2$

b) Acidic and basic solutions can be prepared by dissolving the products of the above process in water,

$CaO+H_2O \rightarrow Ca(OH)_2$ (basic solution) $CO_2 + H_2O \rightarrow H_2CO_3$ (acidic solution)

30. Non-metals are usually poor conductors of heat and electricity. They are non-lustrous, non-sonorous, non-malleable and are coloured.

(a) Name a lustrous non-metal.

(b) Name a non-metal which exists as a liquid at room temperature.

(c) The allotropic form of a non-metal is a good conductor of electricity. Name the allotrope.

(d) Name a non-metal which is known to form the largest number of compounds.

(e) Name a non-metal other than carbon which shows allotropy.

(f) Name a non-metal which is required for combustion.

Answer:

a) **Iodine** is a lustrous non-metal.

b) **Bromine** is liquid at room temperature

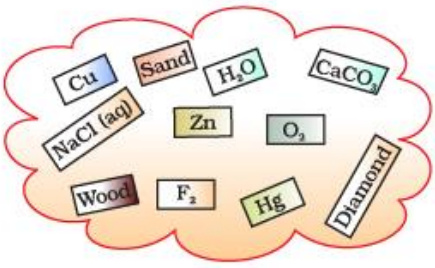
c) **Graphite** is an allotropic form of Carbon (non-metal), which is a good conductor of electricity.

d) **Carbon** is a non-metal which can form the largest number of compounds.

e) **Sulphur and Phosphorous** are the non-metals which show allotropy.

f) **Oxygen** is a non-metal which is required for combustion.

31. Classify the substances given in Fig. 2.2 into elements and compounds



Answer:

Elements - Copper(Cu), Zinc(Zn), Oxygen(O_2), Fluoride(F_2), Mercury(Hg), Diamond

Compounds - NaCl(Aq), Wood, Sand, H_2O, $CaCO_3$

32. Which of the following are not compounds?
(a) Chlorine gas
(b) Potassium chloride
(c) Iron
(d) Iron sulphide
(e) Aluminium
(f) Iodine

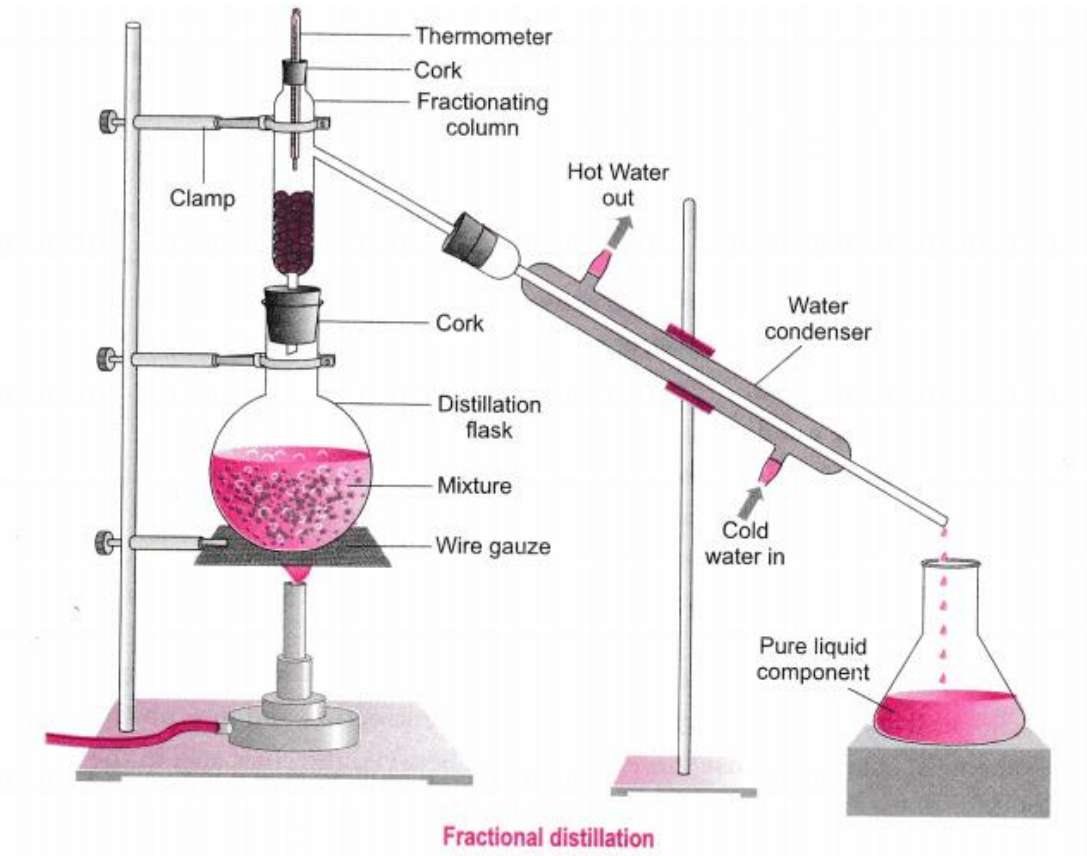
(g) Carbon
(h) Carbon monoxide
(i) Sulphur powder

Answer: Chlorine gas, iron, aluminium, iodine, carbon and sulphur powder are not compounds.

Long Answer Type Questions

Q33. Fractional distillation is suitable for separation of miscible liquids with a boiling point difference of about 25 K or less. What part of fractional distillation apparatus makes it efficient and possess an advantage over a simple distillation process? Explain using a diagram.

Answer: In fractional distillation, a fractionating column is used which is packed with glass beads or small plates. It increases the surface area for the vapours and they quickly loose energy when they come in contact with beads or plates and can be quickly condensed. The length of the column would increase the efficiency of the process.



Fractional distillation

The advantages are as given below:

1. This method can separate the liquids with a boiling point difference of about or less than 25 K,
2. During the process, both evaporation and condensation take place simultaneously.
3. A mixture (like petroleum) can also be separated by the fractional distillation process, which contains several components.

34.

(a)Under which category of mixtures will you classify alloys and why?

(b) A solution is always a liquid. Comment.

(c) Can a solution be heterogeneous?

Answer:

a) An alloy is a homogenous mixture of two or more elements. Elements can be two metals or metals with non-metals.

An alloy is classified as a homogenous mixture because it shows the properties of two or more elements it is made of. Its constituents are in varied compositions. For example, brass is an alloy which shows characteristics of copper and Zinc, and their composition varies from 20 to 35 %.

b) The solution is usually a liquid, but not always. It might also include a mixture of two solids, like in alloys, and a mixture of gases, such as air.

(c) Yes, solutions can be heterogeneous.

35. Iron filings and sulphur were mixed together and divided into two parts, 'A' and 'B'. Part 'A' was heated strongly, while Part 'B' was not heated. Dilute hydrochloric acid was added to both Parts and the evolution of gas was seen in both cases. How will you identify the gases evolved?

Answer: When iron fillings and sulphur is heated, it will give the following reaction

$$Fe + S \xrightarrow{heat} FeS$$

$$FeS + 2HCl \longrightarrow FeCl_2 + H_2S$$

When HCl is added to this mixture, ferric chloride is produced, and Hydrogen Sulphide

gas is produced. A foul rotten egg smell of Hydrogen sulphide is the indicator of H2S production.

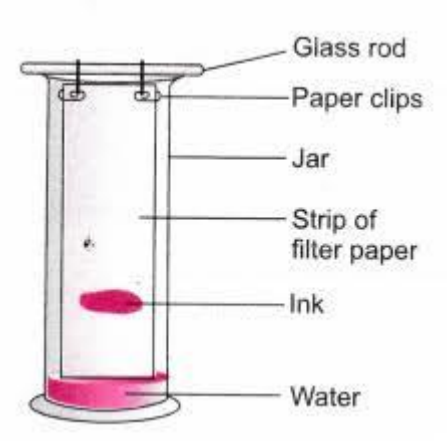
When dilute HCL is added to setup B, Hydrogen gas is evolved, and sulphur does not take part in the reaction. When a burning matchstick is brought near the evolved gas, the matchstick burns with a pop. This is the indication of the production of Hydrogen gas.

36. A child wanted to separate the mixture of dyes constituting a sample of ink. He marked a line by the ink on the filter paper and placed the filter paper in a glass containing water as shown in Fig.2.3. The filter paper was removed when the water moved near the top of the filter paper.

(i) What would you expect to see, if the ink contains three different coloured components?

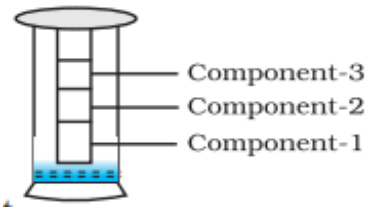
(ii) Name the technique used by the child.

(iii) Suggest one more application of this technique.



Answer:

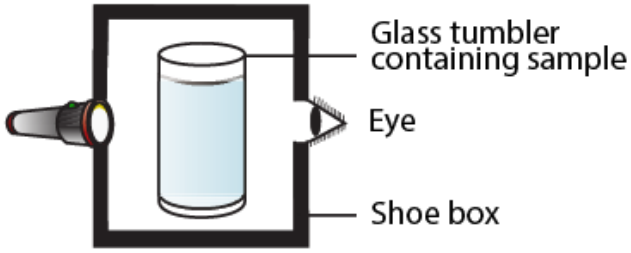
(i) If the ink contains three different coloured components, then you can observe three different bands on the paper



(ii) Child uses the technique of paper chromatography

(iii) Paper chromatography is used to separate different pigments present in the chlorophyll.

37. A group of students took an old shoe box and covered it with black paper from all sides. They fixed a source of light (a torch) at one end of the box by making a hole in it and making another hole on the other side to view the light. They placed a milk sample contained in a beaker/tumbler in the box, as shown in Fig.2.4. They were amazed to see that the milk taken in the tumbler was illuminated. They tried the same activity by taking a salt solution but found that light simply passed through it.



(a) Explain why the milk sample was illuminated. Name the phenomenon involved.

(b) Same results were not observed with a salt solution. Explain.

(c) Can you suggest two more solutions which would show the same effect as shown in the milk solution?

Answer:

a) Milk is a colloidal substance. Particulate matter present in the milk makes the light scatter, which results in the Tyndall effect. Because of the Tyndall effect, the milk got illuminated.

b) Salt is a homogenous solution. Small particles present in salt solution do not scatter light rays hence there will be no Tyndall effect. Since the salt solution did not exhibit the Tyndall effect, light is not illuminated.

c) Detergent solution and sulphur solution exhibit the Tyndall effect.

38. Classify each of the following as a physical or a chemical change. Give reasons.

(a) Drying of a shirt in the sun.

(b) Rising of hot air over a radiator.

(c) Burning of kerosene in a lantern.

(d) Change in the colour of black tea by adding lemon juice to it.

(e) Churning of milk cream to get butter.

Answer:

a) Drying the shirt in the sun is a physical phenomenon because there are no chemical reactions or any chemical changes involved in this process.

b) The rising of hot air over the radiator is a physical change. Water in a radiator converts to vapors. Hot air becomes lighter and rises.

c) Burning of kerosene in a lantern is a chemical change because kerosene burns by using atmospheric oxygen and produces carbon dioxide.

d) A change in the color of black tea on adding lemon juice to it is a chemical change. Lemon juice is a source of citric acid, ascorbic acid, and malic acid. This acid reacts with Flavin antioxidants present in black tea to change the color of the tea.

e) The churning of milk cream to get butter is a physical change as there is no involvement of a chemical reaction. Here, the principle is centrifugation which turns the milk cream into butter.

39. During an experiment the students were asked to prepare a 10% (Mass/Mass) solution of sugar in water. Ramesh dissolved 10 g of sugar in 100 g of water while Sarika prepared it by dissolving 10 g of sugar in water to make 100 g of the solution.
(a) Are the two solutions of the same concentration?

(b) Compare the mass % of the two solutions.

Answer:
(a) No, Sarika has a higher mass percentage.

(b) Solution made by Ramesh –

$$\text{Mass \%} = \frac{10}{(10+100)} \times 100 = \frac{10}{110} \times 100 = 9.09\%$$

Solution made by Sarika –

$$\text{Mass \%} = \frac{10}{100} \times 100 = 10\%$$

40. You are provided with a mixture containing sand, iron filings, ammonium chloride and sodium chloride. Describe the procedures you would use to separate these constituents from the mixture.

Answer:

1. Using Magnet: Move the magnet over the mixture, which will result in the sticking of iron fillings to the magnet. Like this, iron fillings get separated from the mixture.
2. Sublimation: The remaining mixture is heated in a china dish. Ammonium chloride is a sublimating substance, and it will evaporate without passing through the liquid phase. Ammonium chloride can collect an inverted funnel over china-dish.
3. Sedimentation, decantation, and filtration: The remaining mixture is dissolved in water and allowed to settle down. Sand will settle at the bottom. The liquid should be decanted into another beaker. Then it is filtered to remove traces of sand.
4. The filtered solution is heated to evaporate the water. Once all the water gets evaporated, salt remains in the beaker.

41. Arun has prepared a 0.01% (by mass) solution of sodium chloride in water. Which of the following correctly represents the composition of the solutions?

(a) 1.00 g of NaCl + 100g of water

(b) 0.11g of NaCl + 100g of water

(c) 0.0l g of NaCl + 99.99g of water

(d) 0.10 g of NaCl + 99.90g of water

Answer: (c) 0.0l g of NaCl + 99.99g of water

Here,

$$\text{Mass\%} = \frac{\text{Mass of solute}}{\text{Mass of solute + Mass of solvent}} \times 100$$

(a) $\text{Mass percentage} = \frac{1.00}{1.0+100} \times 100 = 0.99$

(b) $\text{Mass percentage} = \frac{0.11}{0.11+100} \times 100 = 0.1098$

(c) $\text{Mass percentage} = \frac{0.01}{0.01+99.99} \times 100 = 0.01$

(d) $\text{Mass percentage} = \frac{0.10}{0.10+99.90} \times 100 = 0.1$

42. Calculate the mass of sodium sulphate required to prepare its 20% (mass percent) solution in 100 g of water?

Answer:

Let the mass of sodium sulphate required be = x g

The mass of solution would be = (x + 100) g x g of solute in (x + 100) g of solution

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

$$20x + 2000 = 100x$$

$$80x = 2000$$

$$x = \frac{200}{80} = 25 \text{ g}$$