CHPATER - 2
IS MATTER AROUND US PURE

Multiple Choice Questions (MCQs)

Question 1:

Which of the following statements are true for pure substances?

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

(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) A pure substance is one which is made up of only one kind of atoms or molecules. They have the same composition throughout.

Question 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:

(c) Rusting of an article made up of iron is called corrosion.

Corrosion is a chemical change because rust is a chemical compound (hydrated iron oxide, Fe203 -*H20) which is totally different from element iron (Fe). Corrosion is

$$4Fe + 3O_2 + xH_2O \longrightarrow \underbrace{2Fe_2O_3 \cdot xH_2O}_{\text{Rust}}$$

Physical changes are those changes in which no new substances are formed. The substances do not change their identity and they can be easily returned to their original form by some physical processes, e.g., melting of ice, glowing of an electric bulb, breaking of glass tumbler, etc.

On the other hand, chemical changes are those changes in which new substances are formed. The substances involved change their identity and they get converted into entirely new substances, which can not be returned to their original form, e.g., burning of paper, rusting of iron, burning of magnesium wire, etc.

Question 3:

A mixture of sulphur and carbon disulphide is

(a) heterogeneous and shows Tyndall effect
(b) homogeneous and shows Tyndall effect
(c) heterogeneous and does not show Tyndall effect
(d) homogeneous and does not show Tyndall effect f

Answer:

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

Question 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) Tincture of iodine is made by dissolving iodine in alcohol.

Question 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) Options (i) Ice and (iv) Air are homogeneous in nature as their particles are not distinctly visible. A homogeneous mixture has a uniform composition throughout its mass. It has no visible boundaries of separation between its various constituents, e.g.,air,sugar solution, brass, etc.
A heterogeneous mixture does not have a uniform composition throughout its mass, It has visible boundaries of separation between its various constituents, e.g., soil, wood, blood etc.

Question 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) Options (i) Melting of iron metal, (iii) Bending of an iron rod and (iv) Drawing a wire of iron metal are physical changes, because in three processes, iron changes its form,not the chemical composition. In rusting of iron, its chemical composition is changed.
(A/so, refer to Q. 2)

Question 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) Options (i) Decaying of wood and (ii) Burning of wood are chemical changes, because in these processes, the chemical composition of wood is changed and new substances are formed, which cannot be converted back into their original form.
In (iii) Sawing of wood and (iv) Hammering of a nail into a piece of wood, chemical composition of wood is not changed, therefore, (iii) and (iv) are physical changes. (Also, refer to Q. 2)

Question 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) A_2B is a compound made up of two elements A and B in a fixed ratio. The properties of a compound (e.g., A2B) are entirely different from those of its constituent elements (ie.gA and B). The composition of a compound is fixed.

Question 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) In this reaction, X and Y can not be broken down into simpler substances by chemical reactions,
therefore, X and Y are elements. A compound is a substance made up of two or more elementschemically combined in a fixed proportion by mass, therefore,
P is a compound, having a fixed composition.

Short Answer Type Questions

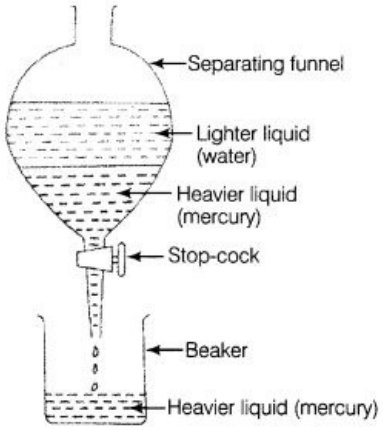
Question 10:

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

Answer:

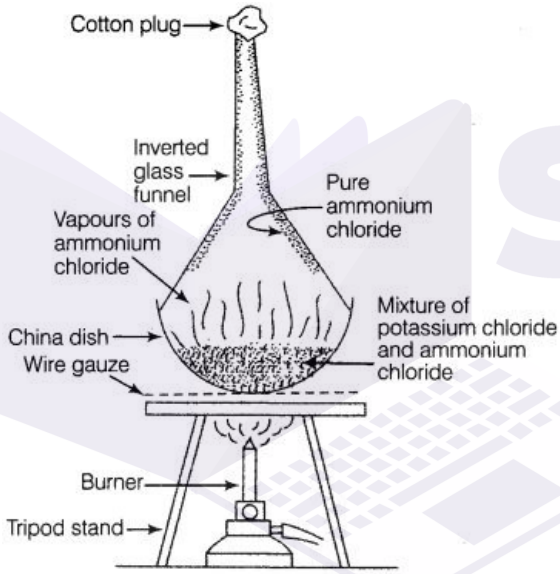
(a) Mercury and water are separated by decantation by using separating funnel as the separation of
two immiscible liquids by a separating funnel depends on the difference in their densities. Mercury is heavier than water therefore, forms the lower layer and separated from water.



Separation of two immiscible liquids by using a separating funnel

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

Sublimation is the process in which a solid changes directly into vapours on heating and vapours change into solid on cooling without going in liquid state.



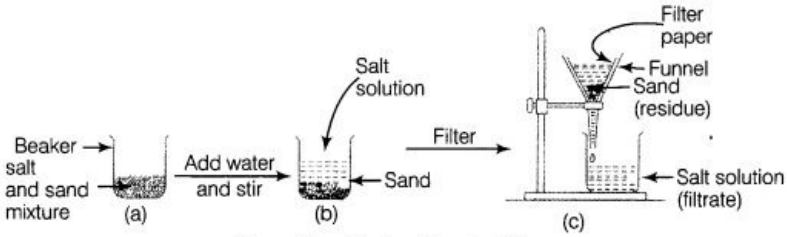
Separation of potassium chloride and ammonium chloride by sublimation

(c) Common salt, water and sand are separated by

(i) Decantation (or filtration) process is used to separate sand from common salt solution in water because common salt is soluble in water whereas sand is insoluble in water.

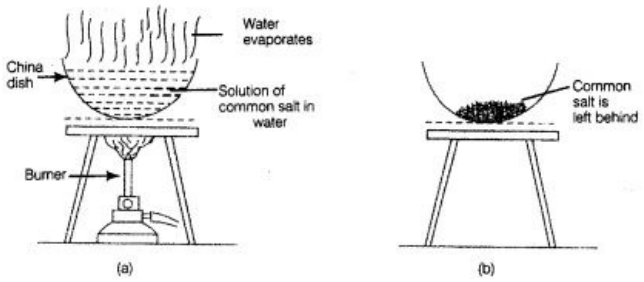
Therefore,

by filtration, sand will be separated as insoluble substance as residue and filtrate will be common salt solution in water.



Separation of salt and sand mixture

(ii) Evaporation process is used to separate common salt from water. Water evaporates and common salt remains as residue.

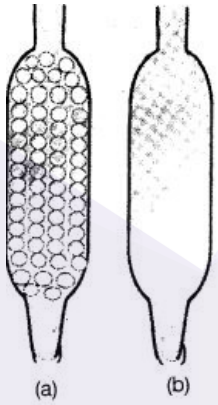


Separation of common salt dissolved in water by evaporation

(d) (i) Decantation by using separating funnel is used to separate kerosene oil from salt solution in
water as they form separate layers (salt is soluble in water).(Refer to ans. 10(a)).
(ii) Evaporation is used to separate salt from water.(Also, refer to Q. 10 (c))

Question 11:

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



Answer:

Figure (a) will be more effective condenser in the distillation apparatus because beads present will provide more surface area for cooling of the vapours passing through it.

Question 12:

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

Answer:

Salt can be recovered from its solution by '**crystallisation**'.
Crystallisation' is a better technique than 'evaporation1 because it removes soluble impurities also, which do not get removed in the process of evaporation.

Question 13:

The 'sea-water' can be classified as a homogeneous as well as heterogeneous mixture. Comment.

Answer:

'Sea-water' is called homogeneous as it contains dissolved salts in it. It may be called heterogeneous as it contains various insoluble components too as sand, microbes, shells made of calcium carbonate and so many other things.

Question 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:

Acetone is soluble in water, a homogeneous mixture is obtained and hence separation by separating funnel cannot be used. Acetone can be get back by simple distillation because the difference in the boiling points of acetone and water is more than 25°C.

Boiling point of acetone — 56°C

Boiling point of water — 100°C

In distillation flask, acetone will boil at 56°C and change into vapours and can be collected in flask after condensation.

Question 15:

What would you observe when

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

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

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

Answer:

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

temperature, crystals of potassium chloride will be formed.

(b) Initially, sugar will obtained as water will get evaporated. But on dry heating sugar gets charred and

it turns black.

$$C_{12}H_{22}O_{11} \xrightarrow{\Delta} \underset{\text{(Black)}}{12C} + 11H_2O\uparrow$$

(c) The black coloured compound, iron sulphide is formed when a mixture of iron filings and sulphur

powder is heated strongly.

$$\underset{\text{Iron filings}}{Fe} + \underset{\text{Sulphur powder}}{S} \xrightarrow{\Delta} \underset{\text{Iron sulphide}}{FeS}$$

Question 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 colloidal particles are smaller and not heavy. They always remain in a state of*zig-zag* motion, called Brownian movement, which counters the force of gravity acting on colloidal particles and hence, helps in providing stability to colloidal sols by not allowing them to settle down. Apart from this, colloidal particles are charged and repel each other.

This fact also do not allow the particles of colloidal solution to settle down. Whereas particles of suspension are larger, heavy and have less movement, thus settle down due to gravity.

Question 17:

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

Answer:

In smoke and fog, dispersion medium is same, *i.e.,* air but they differ in dispersed phase. In smoke, solid carbon particles are dispersed in air while in fog, liquid water particles are dispersed in air.

Question 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:

(a) It is a physical property as no new compound is formed because steel is an alloy and alloy is a
homogeneous mixture of two or more metals or of metallic elements with non-metallic elements.

(b) It is chemical property because chemical reaction takes place between zinc and hydrochloric acid
with the evolution of hydrogen gas and a compound zinc chloride is formed.

$Zn(s) + 2HCl\ (dil) \rightarrow ZnCl_2(aq) + H_2(g)$

(c) It is physical property because cutting with knife does not form new substance.

(d) It is chemical property as new compound is being formed by the reaction of metal oxide and water.

$$M_20\ (s) + H_20\ (Z) \rightarrow 2MOH\ (aq)$$

Metal oxide Water Metal hydroxide

Question 19:

The teacher instructed three students *'A', 'B'* and *V* 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 lOOg of water while*V* dissolved 50g of NaOH in water to make 100 mL of solution. Which one of them has made the desired solution and why?

Answer:

In the given question, student 'C' has made it correctly because 50% (mass by volume) means 50 g of solute for every 100 mL of solution and not in 100 mL of solvent.

$$\text{Mass/volume per cent} = \frac{\text{mass of solute (in g)}}{\text{volume of solution (in mL)}} \times 100$$

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

Student *A'* dissolved 50 g of NaOH in 100 mL of water (solvent) which is incorrect. Student *'B'* dissolved 50 g of NaOH in 100 g of water (solvent), which is incorrect.

Question 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) A 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) The process is sublimation because when dry ice (solid $C0_2$) is kept at room temperature at one
atmospheric pressure, it sublimes leaving no residue.

(b) This process is diffusion because in diffusion, mixing of one substance (ink) into another substance
(water) goes on until a uniform mixture is formed.

(c) This process is dissolution/diffusion as potassium permanganate crystal is dissolved in water.

(d) This process is evaporation as acetone evaporates when kept open in the bottle.
(e) This process is centrifugation. Milk is put in a closed container in big centrifuge machine. When
machine is switched on, milk is rotated at a very high speed.
Due to this, milk separates into 'cream' and 'skimmed milk'. The cream being lighter, floats over the
skimmed milk and then can be removed.
(f) This process is sedimentation as sand does not dissolve completely in water and forms suspension
and settles down at the bottom when left undisturbed for some time.
(g) This shows Tyndall effect, *i.e.,* scattering of light by colloidal solution or by particles in a fine
suspension. Dust particles are suspended in air which scatter the light coming from small hole.

Question 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 '6' will not freeze at 0°C as, it is impure water. It is because sample*'B'* boils at 102°C while the boiling point of pure water is 100°C. It means this sample contains impurities. Only pure substance has sharp melting point.

Question 22:

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

Answer:

Gold is soft metal and can easily change its shape with a little force. Therefore, it is not suitable for making ornaments. But when it is alloyed with copper or silver, the gold becomes harder and stronger and its brittleness decreases. Thus, it becomes suitable for making ornaments.

Question 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:

As the given element is sonorous and highly ductile, therefore, it is categorised as a metal.
Some other e pected characteristics of are
(i) It should possesses metallic lustre and can be polished.
(ii) It should be good conductors of heat and electricity.
(iii) It should be ductile.
(iv) It should be malleable.
(v) It should has high tensile strength.
(vi) It should has high densities and melting point/boiling point too.
(vii) It should be hard (except sodium and potassium which are soft metals).
(viii) It should be solid at room temperature (except mercury, which is liquid at room temperature).
While the characteristics of non-metals are
(i) Non-metals are neither malleable nor ductile and do not conduct electricity.
(ii) Metalloids show some properties of metals and some other properties of non-metals.

Question 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 difference in boiling points.

(c) Two immiscible liquids.

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

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

Answer:

(a) **Example** Mixture of acetone and water.

Method Simple distillation can be used to separate a mixture of volatile and non-volatile components.

(b)**Example** Mixture of kerosene and petrol.

Method Simple distillation can be used to separate two volatile components with appreciable difference in boiling points.

(c)**Example** Mixture of mustard oil and water.

Method Separating funnel is used to separate a mixture of immiscible liquids.

(d)**Example** Mixture of ammonium chloride and common salt.

Method Sublimation can be used to separate the mixture in which one component changes directly from solid to gas.

(d)**Example** A mixture of different pigments from an extract of flower petals.

Method Chromatography method can be used to separate two different substances present in the
same solution.

Question 25:

Fill in the blanks.

(a) A colloid is a mixture and its components can be separated bythe 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) **A** colloid is a **heterogeneous** mixture and its components can be separated by the technique known as centrifugation.

(b) Ice, water and water vapour look different and display different **physical** properties but they are **chemically** 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 **water** and the lower layer will be that of **chloroform** (It is because water is lighter than chloroform).

(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 **fractional distillation.**

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

Question 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:

According to law of constant composition or definite proportions; irrespective of the source a chemical compound it is always found to be made of the same elements combined together in the same fixed proportion by mass.

Thus, in the light of the above law, it will be a pure substance. It is because sugar obtained by different sources like sugarcane and beetroot will have the same composition.

Question 27:

Give some examples of Tyndall effect observed in your surroundings?

Answer:

Examples of Tyndall effect

(i) When sunlight passes through the canopy of a dense forest.

(ii) When a fine beam of light enters a dark room through a small hole.

Question 28:

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

Answer:

No, alcohol cannot be separated from water by using a separating funnel because alcohol is completely miscible in water.

Question 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.

Answer:

(a) The phenomena given in question is a chemical change because the composition of product formed is different from the substance taken. The reaction involved is

$CaC0_3 \rightarrow CaO + C0_2$

Calcium carbonate Calcium oxide Carbon dioxide

(b) Yes

(i) When CaO dissolves in water it forms calcium hydroxide which is basic solution.

$CaO(s) + H_20(Z) \rightarrow Ca(OH)_2(ag)$

Calcium hydroxide

(ii) When $CO_2(g)$ dissolves in water it forms carbonic acid which is acidic solution.

$C0_2(g) + H_20(/) \rightarrow H_2C0_3(ag)$

Carbonic acid

Question 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 allotrpic 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 a non-metal which exists as a liquid at room temperature.

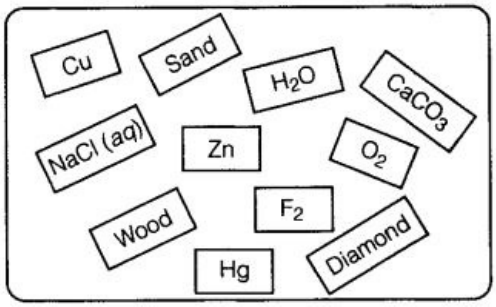
(c) Graphite is the allotropic form of carbon and it is a good conductor of electricity.

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

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

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

Question 31:



Answer:

Elements	Compounds
Cu	Sand
O_2	H_2O
Zn	$CaCO_3$
F_2	NaCl (*aq*)
Hg	
Diamond (Carbon)	

Wood is neither an element nor compound. It is a mixture.

Question 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:

These are not compounds

(a) Chlorine gas (c) Iron

(e) Aluminium (f) Iodine

(g) Carbon (i) Sulphur powder

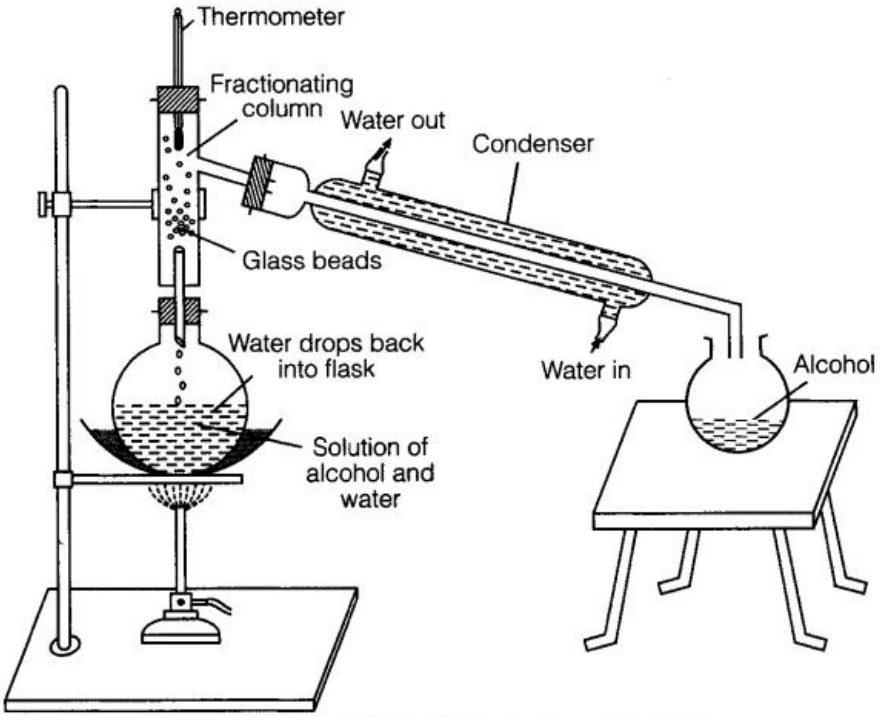
Long Answer Type Questions

Question 33:

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:

Fractionating column is the most important part of the fractional distillation apparatus. This column is provided with some glass beads in it.



Separation of miscible liquids by fractional distillation

It helps to obstruct the upward movement of the vapours of the two liquids. The vapours of high boiling liquid gets condensed earlier (at lower level). The energy (latent heat) released helps to take the vapours of low boiling liquid to a height in the fractionating column.

The advantages are as given below

(i) This method can separate the liquids with a boiling point difference about or less than 25 K.

(ii) During the process, both evaporation and condensation take place simultaneously.

(iii) A mixture (like petroleum) can also be separated by fractional distillation process which contains several components.

Question 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) *Alloys are homogeneous mixtures of metals, because*

(i) it shows the properties of its constituents, and

(ii) it has variable composition., *e.g.,* brass is considered a mixture, because it shows the properties of its constituents, copper and zinc, and it has a variable composition (amount of Zn in brass can vary from 20 to 35 per cent).

(b) A solution is generally a liquid, not always. It may involve solids and gases also, *e.g.,* alloys are solution of solid in solid. Air is solution of gases in gases.

(c) Colloidal solutions are heterogeneous in nature, though they appear to be homogeneous.

Question 35:

Iron filings and sulphur were mixed together and divided into two parts, *'A'* and '8'. Part *'A'* was heated strongly while part 'S' was not heated. Dilute hydrochloric acid was added to both the parts and evolution of gas was seen in both the cases. How will you identify the gases evolved?

Answer:

As part 'A' is heated, a compound FeS is formed by the reaction between iron filings and sulphur. When dilute HCI is added to part *A,* FeS will react with dil HC1 to form H_2S gas which has smell of rotten eggs and will turn lead acetate paper black.

$Fe(s) + S(s) \rightarrow FeS(s)$

$FeS(s) + 2HCl(dil.) \rightarrow FeCl_2(ag) + H_2S(g)$

$(CHjCOO)_2Pb(ag) + H_2S(g) \rightarrow PbS(s) + 2CH_3COOH$

Lead acetate Black ppt Acetic acid

As part 'S' is not heated, so 8 is a mixture of iron filings and sulphur powder. When dil, HCI is added to it, iron filings react with dill. HCI to form $H_2(g)$ which burns with a 'pop' sound if burning match stick is brought near it.

$Fe(s) + 2HCl(dil.) \text{——-} > FeCl_2(ag) + H_2(g)$

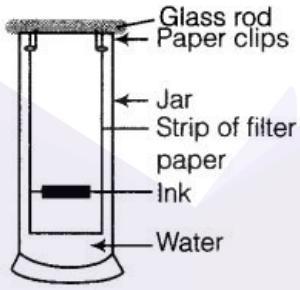
Question 36:

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 figure. The filter paper was removed when the water moved near the top of the filter paper.

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

(b) Name the technique used by the child.

(c) Suggest one more application of this technique.



Answer:

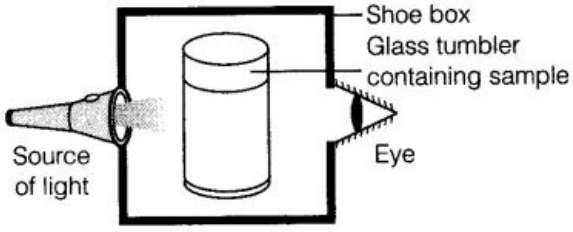
(a) Three different coloured spots are obtained on the strip at different heights.

(b) Chromatography (paper chromatography) technique is used.

(c) The chromatography method is also employed to separate drugs from the blood.

Question 37:

A group of students took an old shoe box and covered it with a 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 made 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 the Figure. They were amazed to see that 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 by the milk solution?

Answer:

(a) The milk sample was illuminated because milk is a colloidal solution and its particles are big enough to scatter the light, hence, they scatter the light passing through it. The

phenomenon observed is called "Tyndall effect".

(b) As salt solution is a true solution *i.e.,* solute particle size is too small to scatter the light, hence, it does

not show "Tyndall effect".

(c) Examples of colloid are gold sol, arsenius sulphide (As_2S_3) sol., Blood etc.

Question 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 on adding lemon juke to it.

(e) Churning of milk cream to get butter, f Thinking Process

Answer:

(a) Physical change because evaporation of water takes place but no change occurs in the composition of the substance.

(b) Physical change because it is also involving only *movement* of air, no change in composition of air.

(c) First physical change, when kerosene vaporises. After that, burning of kerosene is a chemical change as new products are formed.

(d) Physical change as there occurs only the dissolution.

(e) Physical change as there is no change in composition. Only the separation of components takes place by the physical phenomenon, centrifugation.

Question 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, the two solutions do not have the same concentration.

(b) Mass percentage of solution prepared by Ramesh $= \frac{\text{mass of solute}}{\text{mass of solution}} \times 100$

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

$$= \frac{10\text{g}}{(10\text{g} + 100\text{g})} \times 100 = \frac{100}{11} = 9.09\%$$

Mass percentage of solution prepared by Sarika $= \frac{10}{100} \times 100 = 10\%$

The solution prepared by Ramesh has less percentage (9.09%) by mass than that of Sarika (10%),

Question 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:

(i) *Remove iron filings with the help of magnet*

Place the mixture on a paper of petridish, move a bar magnet many times over the mixture. Iron filings get attached to the magnet and get separated.

(ii) *Remove ammonium chloride from sand and sodium chloride by sublimation*

The remaining mixture is transferred to China dish and subjected to sublimation. Ammonium chloride will get vaporised and change into vapours and on condensation will form $NH_4CI(s)$.

Sand and sodium chloride will be left in China dish.

(iii) *Remove sand from sodium chloride by filtration after dissolution*

Dissolve the sand and sodium chloride in water. Sodium chloride will dissolve. Filter the solution. Sand will be left as residue and is separated.

(iv) Get sodium chloride by evaporation or crystallisation. In the filtrate sodium chloride is present. So, evaporate the filtrate to dryness to get sodium chloride back or use crystallisation.

Question 41:

Arun has prepared 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+ 100 g of water

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

(c) 0.01 g of NaCl+ 99.99 g of water

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

Answer:

(c) Here, Mass% $= \frac{\text{mass of solute} \times 100}{(\text{mass of solute} + \text{mass of solvent})}$

$= \frac{0.01\text{g} \times 100}{(0.01 + 99.99)\text{g}} = \frac{0.01 \times 100}{100.00} = 0.01\%$

Which is equal to the percentage of sodium chloride in water prepared by Arun. So, option (c) is correct.

In option(a), mass% $= \frac{1.00\text{g} \times 100}{(1.00 + 100)\text{ g}} = \frac{1.00 \times 100}{101.00} = 0.99\%$

In option(b), mass% $= \frac{0.11\text{g} \times 100}{(0.11 + 100)\text{ g}} = \frac{11}{100.11} = 0.11\%$

In option(d), mass% $= \frac{0.1\text{g} \times 100}{(0.1 + 99.90)\text{ g}} = \frac{10}{100} = 0.1\%$

These % are not equal to the % of sodium chloride solution in water prepared by Arun. So, these are incorrect

Question 42:

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

Answer:

In the given question, mass% of sodium sulphate solution = 20%

Mass of the solvent = 100 g

Let the mass of solute (sodium sulphate) = xg

Applying the formula,

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

$$20 = \frac{x\text{g}}{(x + 100)\text{g}} \times 100 \Rightarrow 20(x + 100) = 100x$$

$$20x + 2000 = 100x \Rightarrow 100x - 20x = 2000$$

$$80x = 2000 \Rightarrow x = \frac{2000}{80} = 25\text{ g}$$

Mass of sodium sulphate = 25 g