Chapter 2 - Is Matter Around Us Pure ? Exercise 56

Question 1

State whether the following statement is true or false:
Milk is a pure substance.

Solution 1

False

Question 2

Name three mixtures found in nature.

Solution 2

Milk, Paint, Glass

Question 3

Which of the following is a mixture?
Salt, Air, Water, Alum, Sugar

Solution 3

Air is a mixture.

Question 4

Name one metal and one non-metal which exist as liquids at room temperature.

Solution 4

Mercury is a liquid metal and bromine is a liquid non-metal.

Question 5

Name a metal which is soft and a non- metal which is hard.

Solution 5

Sodium metal is soft and diamond is an extremely hard non-metal.

Question 6

Name a non-metal which is a good conductor of electricity.

Solution 6

Diamond is a non-metal which is good conductor of electricity.

Question 7

Name a liquid which can be classified as a pure substance and conducts electricity.

Solution 7

Mercury

Question 8

Name one solid, one liquid and gaseous non - metal.

Solution 8

Carbon is a solid non-metal, bromine is a liquid non-metal and chlorine is a gaseous non-metal.

Question 9

Name the property:
(a) Which allows metals to be hammered into thin sheets.
(b) Which enables metals to be drawn into wires.

Solution 9

(a). Malleability
(b). Ductility

Question 10

Which type of elements, metal or non- metals, show the property of brittleness ?

Solution 10

Non-metals show brittleness.

Question 11

What is meant by saying that metals are malleable and ductile?

Solution 11

This means that metals can be drawn into thin sheets and can also be drawn into wires.

Question 12

What is meant by saying that non-metals are brittle ?

Solution 12

This means that non-metals break into pieces when they are hammered.

Question 13

What is meant by saying that metals are sonorous ?

Solution 13

This means that metals make a ringing sound when we strike them.

Question 14

What is meant by saying that metals are lustrous ?

Solution 14

This means that metals are shiny in nature.

Question 15

What is the general name of the materials which contain at least two pure substances and show the properties of the constituents?

Solution 15

Mixtures.

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Question 16

"The properties of the product are different from those of the constituents". State whether this statement best describes an element, a compound or a mixture.

Solution 16

The given statement best describes a compound.

Question 17

Name one element, one compound and one mixture.

Solution 17

Copper is an element, water is a compound and air is a mixture.

Question 18

What is the major difference between a solution and an ordinary mixture?

Solution 18

Mixtures are generally heterogeneous in which there is a boundary separation between different substituents. Solutions are homogeneous mixtures in which no separation is visible between different materials.

Question 19

What name is given to those elements which are neither good conductors of electricity like copper nor insulators like sulphur?

Solution 19

Metalloids

Question 20

Fill in the following blanks with suitable words:

(a) An element is made up of only one kind of _____.

(b) Brine is a _____ whereas alcohol is a _____.

(c) Brass is an alloy which is considered a _____ .

(d) The three important metalloids are _____, _____ and_____ .

(e) The elements which are sonorous are called _____ .

Solution 20

(a).An element is made up of only one kind of atoms.
(b).Brine is a mixture whereas alcohol is a compound.
(c).Brass is an alloy which is considered a mixture.

(d).The three important metalloids
are boron ,silicon and germanium.
(e).The elements which are sonorous are called metals.

Question 21

Classify the following into elements and compounds:
(i) H_2O (ii) He (iii) Cl_2 (iv) CO (v) Co

Solution 21

(i). H_2O - Compound
(ii). He - Element
(iii). Cl_2 - Element
(iv). CO - Compound
(v). Co - Element

Question 22

Classify the following as elements or compound:
Iron, Iron sulphide, Sulphur, Chalk, Washing soda, Sodium, Carbon, Urea

Solution 22

Elements - Iron, Sulphur, Sodium and Carbon
Compounds - Iron sulphide, Chalk, Washing Soda and Urea

Question 23

What elements do the following compounds contain ?
Sugar, Common salt

Solution 23

Sugar contains carbon, hydrogen and oxygen.
Common salt contains sodium and chlorine.

Question 24

What are pure substances ? Give two examples of pure substances.

Solution 24

A pure substance is one which is made up of only one kind of atoms or molecules.
Examples - Oxygen and sugar.

Question 25
What are the two types of pure substances? Give one example of each type.

Solution 25
Two types of pure substances -
(i). Pure substance made up of same kind of atoms.
Example - Sulphur
(ii). Pure substance made up of same kind of molecules.
Example - Water

Question 26
Which of the following are 'pure substances'?
Ice, Milk, Iron, Hydrochloric acid, Calcium oxide, Mercury, Brick, Wood, Air

Solution 26
Ice, iron, hydrochloric acid, calcium oxide and mercury are the pure substances

Question 27
What is the other name for impure substances? Give two examples of impure substances.

Solution 27
Mixture is another name for impure substances.
Examples - Milk and sea-water.

Question 28
Which of the following substances are elements?
Water, Salt, Mercury, Iron, Marble, Diamond, Wood, Nitrogen, Air, Graphite, Hydrogen, Oxygen, Sugar, Chlorine

Solution 28
Elements: Mercury, Iron, Diamond, Nitrogen, Graphite, Hydrogen, Oxygen and chlorine.

Question 29

State three reasons why you think air is a mixture and water is a compound.

Solution 29

Air is a mixture because-
(i). Air can be separated into its constituents like oxygen, nitrogen, etc. by physical process of fractional distillation.
(ii). Air shows the properties of all the gases present in it.
(iii). Liquid air does not have a fixed boiling point.
Water is compound because -
(i). Water cannot be separated into its constituents, hydrogen and oxygen by physical methods.
(ii). Heat and light are given out when water is prepared by burning hydrogen in oxygen.
(iii). Water has standard b.p. of 100^{o}C under standard atmospheric pressure.

Question 30

Name two solid, liquid and two gaseous elements at the room temperature.

Solution 30

Two solid elements at room temp. - Iron and copper
Two liquid elements at room temp. - Mercury and bromine
Two gaseous elements at room temp. - Hydrogen and oxygen

Question 31

Explain why, hydrogen and oxygen are considered elements whereas water is not considered an element.

Solution 31

Hydrogen and oxygen cannot be split up into two or more simpler substances by applying heat, light or electric energy.

Whereas, water can be split up into hydrogen and oxygen by applying electric energy, so it is not an element.

Question 32

What are the three groups into which all the elements can be divided? Name two elements belonging to each group.

Solution 32

All the elements can be divided into following three groups-
(i). Metals ; Iron and copper
(ii).Non-metals ; Carbon and sulphur
(iii).Metalloids ; Boron and silicon

Question 33

State two physical properties on the basis of which metals can be distinguished from non-metals.

Solution 33

Metals are malleable and ductile whereas non-metals are not.

Question 34

Compare the properties of metals and non- metals with respect to (i) malleability (ii) ductility, and (iii) electrical conductivity.

Solution 34

(i). Malleability - Metals show this property but non-metals don't.
(ii). Ductility - Metals show this property but non-metals don't.
(iii). Electrical conductivity - Metals are good conductors of electricity whereas non-metals are bad conductors except graphite.

Question 35

State any two properties for believing that aluminum is a metal.

Solution 35

Aluminium is malleable, ductile and sonorous, so it is a metal.

Question 36

Give reason why:
(a)Copper metal is used for making electric wires.
(b) graphite is used for making electrode in a dry cell.

Solution 36

(a). Copper is ductile so it is used for making wires.
(b). Graphite is the only non-metal which conducts electricity so it can be used to make electrodes.

Question 37

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

Solution 37

We can check this by evaporating the given colourless liquid.
If nothing is left behind then the colourless liquid is pure water.

Question 38

Choose the solutions from among the following mixtures:
Soil, Sea-water, Air, Coal, Soda-water

Solution 38

Sea-water and Soda-water.

Question 39

Is air a mixture or a compound? Give three reasons for your answer.

Solution 39

Air is a mixture because-

(i). Air can be separated into its constituents like oxygen, nitrogen, etc. by physical process of fractional distillation.
(ii). Air shows the properties of all the gases present in it.
(iii). Liquid air does not have a fixed boiling point.

Question 40
Give two reasons for supposing that water is a compound and not a mixture.

Solution 40
Water is a compound because -
(i). Water cannot be separated into its constituents, hydrogen and oxygen by physical methods.
(ii). Heat and light are given out when water is prepared by burning hydrogen in oxygen.

Question 41
Define a compound. Give two points of evidence to show that sodium chloride is a compound.

Solution 41
A compound is a substance made up of two or more elements chemically combined in a fixed proportion by mass.
NaCl cannot be separated into its constituents by physical process and the properties of NaCl is completely different from that of Na and Cl, so NaCl is a compound and not a mixture.

Question 42
Define a mixture. Give two points of evidence to show that sugar solution is a mixture.

Solution 42
A mixture is a substance which consists of two or more elements or compounds not chemically combined together.

As energy is neither evolved nor absorbed during the formation of sugar solution and a sugar solution shows properties of both sugar and water so sugar solution is a mixture not a compound.

Question 43

State two reasons for supposing that brass is a mixture and not a compound.

Solution 43

Brass is a mixture because-
(i). It shows the properties of its constituents, copper and zinc.
(ii). It has a variable composition.

Question 44

List five characteristics by which compounds can be distinguished from mixtures.

Solution 44

MIXTURES	COMPOUNDS
1. A mixture can be separated into constituents by the physical processes. 2. A mixture shows the properties of its constituents. 3. Energy is usually neither given out nor absorbed in the preparation of a mixture. 4. The composition of a mixture is variable. 5. A mixture does not have a fixed melting point, boiling point,etc.	1. A compound cannot be s into its constituents by the processes. 2. The properties of a comp are entirely different from t its constituents. 3. Energy is usually given o absorbed during the prepar a compound. 4. The composition of a cor is fixed. 5. A compound has a fixed boiling point, etc.

Question 45

Explain why, a solution of salt in water is considered a mixture and not a compound.

Solution 45

As energy is neither evolved nor absorbed during the formation of salt solution and a salt solution shows properties of both salt and water so salt solution is a mixture not a compound.

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Question 46

State one property in which a solution of sugar in water resembles a mixture of sugar and sand, and one property in which it differs from it.

Solution 46

Similarity: In both the cases, the mixture can be separated into their constituents by physical methods.
Difference: No separation is visible in the mixture of sugar and water whereas separation is visible in mixture of sand and sand.

Question 47

You are given two liquids, one a solution and the other a compound. How will you distinguish the solution from the compound?

Solution 47

Evaporate both the liquids separately.

A pure compound will evaporate completely, leaving no residue whereas solution will not be evaporated completely, i.e. some residue will be left behind.

Question 48

Name a non-metal:
(a) which is lustrous
(b) which is required for combustion
(c) whose one of the allotrophic forms is a good conductor of electricity. Name the allotrope.
(d) other than carbon which shows allotropy

(e) which is known to form the largest number of compounds

Solution 48

(a). Iodine is a lustrous non-metal.
(b). Oxygen is a non-metal required for combustion.
(c). Allotrope of carbon forms good conductor of electricity.
That allotrope is graphite.
(d). Silicon
(e). Carbon

Question 49

Name a metal:
(a)which can be easily cut with a knife
(b)which forms amalgams
(c)which has no fixed shape
(d)which has a low melting point
(e) which is yellow in colour

Solution 49

(a). Sodium
(b). Mercury
(c). Mercury
(d). Sodium
(e). Gold

Question 50

Which of the following are not compounds?
Chlorine gas, potassium chloride, Iron powder, Iron sulphide, Aluminium foil, Iodine vapour, Graphite, Carbon monoxide, Sulphur powder, Diamond

Solution 50

Chlorine gas, Aluminium foil, Iodine vapour, Graphite, Sulphur powder, Diamond are not compounds.

Question 51

(a) State the main points of difference between homogeneous and heterogeneous mixtures.
(b) Classify the following materials as homogeneous mixtures and heterogeneous mixtures.
Soda-water, Wood, Air, Soil, Vinegar, Alcohol and water mixture, Petrol and water mixture, Chalk and water mixture, Sugar and water mixture, Copper sulphate solution.

Solution 51

(a). Those mixtures in which the substances are completely mixed together and are indistinguishable from one another, are called homogeneous mixtures. They have a uniform composition throughout its mass. All the homogeneous mixtures are called solutions.
Examples- Sugar solution, salt solution, copper sulphate solution, etc.
Those mixtures in which the substances remain separate and one substance is spread throughout the other substance as small particles, droplets or bubbles, are called heterogeneous mixtures. Heterogeneous mixture does not have a uniform composition throughout its mass.
Example- Starch solution, soap solution.
(b). Homogeneous mixtures - Soda water, air, vinegar, alcohol and water mixture, sugar and water mixture, Copper sulphate solution.
Heterogeneous mixture - Wood, petrol and water mixture, chalk and water mixture.

Question 52

(a) What is meant by (i) elements (ii) compound, and (iii) mixtures? Write down the names of two elements, two compounds and two mixtures.
(b) Classify the flowing into elements , compounds and mixtures:

Marble, Air, Gold, Brass, Sand, Diamond, Graphite, Petroleum, Common salt, Sea-water, Chalk

Solution 52

(a).(i).Elements - An element is a substance which cannot be split up into two or more simpler substances by the usual chemical methods of applying heat, light or electricity.
Ex. Hydrogen, Oxygen
(ii). Compounds - A compound is a substance made up of two or more elements chemically combined in a fixed proportion by mass.
Ex. Sodium chloride, calcium carbonate
(iii). Mixtures - A mixture is a substance which consists of two or more elements or compounds not chemically combined together.
(b). Elements - Gold, Diamond, Graphite
Compounds - Common salt, Sea water, Marble
Mixtures - Brass, Sand, Petroleum, Chalk, Air

Question 53

(a) What are (i) metals (ii) non-metals, and (iii) metalloids? Give two examples each of metal, non-metals and metalloids.
(b) Classify the following into metals, non-metals and metalloids:
Silicon, Mercury, Diamond, Sulphur, Iodine, Germanium, Sodium, Carbon, Magnesium, Copper, Boron, Helium

Solution 53

(i). METALS - A metal is an element that is malleable, ductile and conducts electricity.
Example - Iron, Copper
(ii). NON-METALS - A non metal is an element that is neither malleable, nor ductile and does not conducts electricity.

Example - Carbon, Sulphur
(iii). METALLOIDS - The elements which show some properties of metals and some other properties of non-metals are called metalloids.
Example - Boron, Silicon, Helium, Magnesium, Copper
(b). Metals - Mercury, Sodium,
Non-metals - Diamond, Sulphur, Iodine, Carbon, Boron
Metalloids - Silicon, Germanium

Question 54

(a) What is a mixture? Give two example of mixtures.
(b) What is meant by (i) homogeneous mixtures, and (ii) Heterogeneous mixtures? Give two examples of homogeneous mixtures and two of heterogenous mixtures.
(c) What is the other name of homogenous mixtures?

Solution 54

(a). Mixtures - A mixture is a substance which consists of two or more elements or compounds not chemically combined together.
Examples - Air, gun powder.

(b). Homogeneous mixtures- Those mixtures in which the substance are completely mixed together and are indistinguishable from one another, are called homogeneous mixtures.
Examples- Sugar solution, copper sulphate solution.
Those mixtures in which the substances remain separate and one substance is spread throughout the other substance as small particles, droplets or bubbles, are called heterogeneous mixtures.

Example- Starch solution, soap solution.
(c). Other name for homogeneous mixtures is SOLUTIONS.

Question 55

(a)What are the three general classes of matter? Give one example of each type.
(b) Draw a flow chart for the schematic representation of different types of matter.

Solution 55

(a). Three general classes of matter are elements, compounds and mixtures.
Element - Hydrogen
Compound - Sodium chloride
Mixtures - Salt solution
(b).

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Question 71

In the following set of substances, one item does not belong to the set. Select this item and explain why it does not belong to the set.
Hydrogen, Oxygen, Steam, Chlorine

Solution 71

Steam does not belong to the set. This is because all other are elements while steam is a compound.

Question 72

Iron powder and sulphur powder were mixed together and divided into two parts A and B. When part A was heated strongly over burner, then a substance C was

formed. The part B was, however, not heated at all. When dilute hydrochloric acid was added to substance C, then gas D was evolved and when dilute hydrochloric acid was added to part B then gas E was evolved.
(a) What type of substance is B?
(b) What type of substance is C?
(c) Name the gas (i) D, and (ii) E?
(d) State one characteristic property of gas D.
(e) Write one test to identify gas E.

Solution 72

(a). B is a mixture (Fe + S)
(b). C is a compound (Iron sulphide)
(c). (i). D is hydrogen sulphide gas
(ii). E is hydrogen gas
(d). Gas D has a rotten egg like smell.
(e). Gas E burns with a 'pop' sound.

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Question 73

There are three substances X,Y and Z. The substance X does not have a fixed melting point or boiling point and it still show the individual properties of its constituents .The substance Y is a pure substance which occurs in nature as such. The substance Y has a fixed melting point and boiling point but it cannot be broken down into simpler substances by any chemical means. The substance Z is also a pure substance whose properties are entirely different from those of its constituents. The substance Z can however, be divided by electrolysis into two substances which belong to the same class of substances as Y.
(a)What type of substance could X be? Name one substance like X.
(b)What type of substance could Y be? Name one substance like Y.

(c)What type of substance could Z be? Name one substance like Z.
(d)Which process involves absorption or release of an appreciable amount of energy: formation of substance X or formation of substance Z?
(e)Name the three group into which all the substances like Y are divided on the basis of their properties.

Solution 73

(a). X must be a mixture. Salt solution is a substance like X.
(b). Y must be an element. Oxygen is a substance like Y.
(c). Z must be a compound. Water is a substance like Z.
(d). Formation of Z (a compound) involves absorption or release of an appreciable amount of energy.
(e). The three groups are metals, non-metals and metalloids.

Question 74

There is a large group of materials P which can be divided into three groups Q, R and S on the basis of their properties. The substances belonging to group Q can be solids, liquids or gases. The solids belonging to group Q are usually electrical insulators. Most of the substances of group R are solids which are good conductors of electricity. The substances belonging to group S are neither insulators like Q nor good conductors like R. The properties of S are intermediate between those of Q and R.
(a) What could the group of materials P be?
(b) Name the substances Q. Give two examples of such substances.
(c) Name the substances R. Write two examples of such substances.

(d) Name the substances S. Give two examples of such substances.
(e) Out of Q, R and S, which substances are malleable and ductile?

Solution 74

(a). Group of materials P is elements.
(b). Q is a non-metal. Example - Carbon and sulphur.
(c). R is a metal. Example - Copper and Aluminium.
(d). S is a metalloid. Example - Boron and Silicon.
(e). R (metals) are malleable and ductile.

Question 75

A,B and C are all liquids. Liquid A has a comparatively low boiling point. On heating , liquid A vaporizes completely without leaving behind any residue. Liquid A is being used increasingly as a fuel in motor vehicles either alone or by mixing with petrol. Liquid B has a very high boiling point. It also vaporizes completely on heating, without leaving any reaving any residue. Liquid B is a conductor of electricity and used in making thermometers. Liquid C has a moderate boiling point. On heating, liquid C vaporizes leaving behind a white solid D which is used in cooking vegetables. The condensation of vapours from C give a liquid E which turns anhydrous $CuSO_4$ to blue.

(a) Which liquid could be an element? Name this element.
(b) Which liquid could be a mixture? Name this mixture.
(c) Which liquid could be a compound? Name this compound.
(d) What could the solid D be ?
(e) What do you think is liquid E?

Solution 75

(a). B could be an element. It is mercury.

(b). C could be the mixture. It is a salt solution.
(c). A could be a compound. It is an alcohol.
(d). Solid D is Sodium Chloride.
(e). Liquid E is water.

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Question 1

Out of a colloid, solution and a suspension:
(a) Which one has the smallest particles?
(b) Which one has the largest particles?

Solution 1

(a)Solution
(b)Suspension

Question 2

What is the name of the clear liquid formed when a solid dissolves in a liquid?

Solution 2

Solution

Question 3

Which of the two will scatter light: soap solution or sugar solution ? Why?

Solution 3

Soap solution will scatter light because in true solution i.e. sugar solution, the solute particles are so small that they cannot scatter light rays while in soap solution particles are big enough to scatter light.

Question 4

State whether colloidal solutions are homogeneous or heterogeneous.

Solution 4

Heterogeneous

Question 5

What is the most common way of expressing the concentration of a solution?

Solution 5

Percentage method

Question 6

How much water should be added to 15 grams of salt to obtain 15 per cent salt solution?

Solution 6

Mass of water = Mass of solution - Mass of salt (solute)

$$= 100 - 15 = 85 \text{ g}$$

Question 7

How much water should be mixed with 12 mL of alcohol so as to obtain 12% alcohol solution?

Solution 7

So, Volume of solution = 100 ml

Volume of water = Volume of solution - Volume of solute (alcohol)

$$= 100 - 12 = 88 \text{ ml}$$

Question 8

A 5 per cent sugar solution means that:

(a) 5g of sugar is dissolved in 95 g of water.

(b) 5 g of sugar is dissolved in 100 g of water.

Choose the correct answer.

Solution 8

(a)

A 5 per cent sugar solution means that 5g of sugar is dissolved in 95 g of water.

Question 9

A 15% alcohol solution means:

(a) 15mL alcohol and 85mL water

(b) 15mL alcohol and 100mL water

Choose the correct answer.

Solution 9

(a)

A 15% alcohol solution means 15mL alcohol and 85mL water

Question 10

Calculate the concentration of solution which contains 2.5 g salt dissolved in 50 g water.

Solution 10

Given: Mass of salt = 2.5 g and mass of water = 50 g
So, total mass of solution = 50 g + 2.5g = 52.5 g.
Hence,

Question 11

What is the concentration of a solution which contains 16 g of urea in 120 g of solution?

Solution 11

Given mass of urea = 16 g
And, mass of solution = 120 g
So,

Question 12

A solution contains 5.6 mL of alcohol mixed with 75 mL of water. Calculate the concentration of this solution.

Solution 12

Given volume of alcohol = 5.6 mL
And, volume of water = 75 mL
So, volume of solution = 75 mL + 5.6 mL = 80.6 mL

Question 13

If 25 mL of acetone is present in 150 mL of its aqueous solution, calculate the concentration of solution.

Solution 13

Given volume of acetone = 25 mL
And, volume of solution = 150 mL

Question 14

What happens when the temperature of a saturated sugar solution is increased?

Solution 14

When the temperature of a saturated sugar solution is increased, it becomes unsaturated.

Question 15

Which of the following contains less solute at a given temperature and pressure?
Unsaturated solution or Saturated solution.

Solution 15

Unsaturated solution contains less solute at a given temperature and pressure.

Question 16

State one instance where water undergoes a physical change and one in which it undergoes a chemical change.

Solution 16

Physical change-Vaporisation(water changes to water vapour or steam)
Chemical change-Electrolysis(i.e.water forms hydrogen and oxygen)

Question 17

State whether the following statements are true or false:
(a)Bread is an example of solid foam.
(b)Sponge is an example of solid sol.

Solution 17

(a)True

(b)False

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Question 18

Choose one term from the following which includes the other three:
Aerosol, emulsion, colloid, sol

Solution 18

Colloid

Question 19

Which of the following is a sol?
Shaving cream, Milk, Fog, Soap solution, Hairspray

Solution 19

Soap solution

Question 20

Fill in the following blanks:
(a) Milk is a _____ solution but vinegar is a _____ solution.
(b) A colloid is a _____ mixture and its components can be separated by the technique know as _____ .

Solution 20

(a) Colloidal; true
(b) Heterogeneous; centrifugation

Question 21

Define (a) solute, and (b) solvent

Solution 21

(a)Solute-The substance which is dissolved in a liquid to make a solution is called as solute.
(b)Solvent-The liquid in which solute is dissolved is known as solvent.

Question 22

What is the difference between solutions and colloids?

Solution 22

A solution is a homogeneous mixture of two or more substances whereas a colloid is a kind of solution in which the size of solute particles is intermediate between those in true solutions and those in suspensions.

Question 23

What is the difference between colloids and suspensions?

Solution 23

A colloid is a kind of solution in which the size of solute particles is intermediate between those in true solutions and those in suspensions whereas a suspension is a heterogeneous mixture in which the small particles of a solid are spread throughout a liquid without dissolving in it.

Question 24

In what respects does a solution differ from a colloidal solution?

Solution 24

A true solution does not scatter a beam of light passing through it but a colloidal solution scatters a beam of light passing through it and renders its path visible. A true solution is a homogeneous mixture of two or more substances whereas a colloidal solution is a kind of solution in which the size of solute particles is intermediate between those in true solutions and those in suspensions and is a heterogeneous mixture.

Question 25

Classify the following into true solutions and colloidal solutions:
Ink, Salt solution, Starch, Blood, Sugar Solution

Solution 25

True Solutions - Salt solution and sugar solution

Colloidal Solution - Starch solution, Ink, Blood

Question 26
How will you test whether a given solution is a colloidal solution?

Solution 26
The given solution is taken in a beaker. Then, a strong beam of light is allowed to fall on the solution from one side of the beaker in a dark room. If the beam of light is visible in the solution, then it is a colloidal solution.

Question 27
Explain what happens when a beam of light is passed through a colloidal solution.

Solution 27
The path of light beam is illuminated and becomes visible.

Question 28
How will you distinguish a colloid from a solution?

Solution 28
A true solution can be distinguished from a colloidal solution by experimenting Tyndall effect. A true solution does not scatter a beam of light passing through it but a colloidal solution scatters a beam of light passing through it.

Question 29
How will you differentiate between a suspension and a colloid?

Solution 29
The particles of a suspension cannot pass through a filter paper whereas particles of colloids can easily pass through filter paper.
Colloidal solutions are quite stable whereas suspensions are very unstable.

Question 30

You have been given a suspension and solution. How could you tell the difference between them by their appearance?

Solution 30

Both the given solutions will be kept stationary in different beakers for some time.
The beaker in which the dissolved particles settle down after some time is a suspension and another one is a solution.

Question 31

Which of the following will show Tyndall effect? Why?
(a) Salt solution (b) Starch solution
(c) Milk (d) Copper sulphate solution

Solution 31

Starch solution and milk will show Tyndall effect.
This is because in a milk solution and starch solution (colloidal solutions) the size of solute particles is big enough to scatter the light passing through it.

Question 32

Name the different types of solutions. Give one example of each.

Solution 32

Types of solution-
(i). Solid in solid.
Example- Brass
(ii). Solid in a liquid
Example- Tincture of iodine
(iii). Liquid in liquid
Example- ethanoic acid
(iv). Gas in a liquid
Example- CO_2 in water
(v). gas in gas
Example- Air

Question 33

Classify the following into solutions, suspensions and colloids:
Soda - water, milk, Brine, Blood Ink, Smoke in air, Chalk water mixture, Milk of Magnesia, shaving cream, Muddy river water.

Solution 33

Solutions - Brine
Suspensions - Chalk water mixture, milk of magnesia, Muddy river water
Colloids - Milk, blood, ink, shaving cream, smoke in air, soda water

Question 34

Define the following :
(a) Sol (b) Aerosol (c) Emulsion (d) Foam
Give one example of each.

Solution 34

(a). Sol - Sol is a colloid in which tiny solid particles are dispersed in a liquid medium. Examples are ink and soap solution
(b). Aerosol- Aerosol is a colloid in which a solid or liquid is dispersed in a gas. Examples are hairspray and fog.
(c). Emulsion - An emulsion is a colloid in which minute droplets of one liquid are dispersed in another liquid which is not miscible with it. Examples are milk and butter.
(d). Foam- A foam is a colloid in which a gas is dispersed in a liquid medium. Examples are soap bubbles and shaving cream.

Question 35

What is meant by the concentration of a solution?

Solution 35

The concentration of a solution is the amount of solute present in given quantity of the solution.

Question 36

What will happen if a saturated solution is: (i) heated, and (ii) cooled?

Solution 36

If a saturated solution is heated to a higher temperature, then it becomes unsaturated.
If a saturated solution is cooled to a lower temperature, then some of its dissolved solute will separate out in the form of solid crystals.

Question 37

21.5 g of sodium chloride dissolves in 60 g of water at 25°C. Calculate the solubility of sodium chloride in water at that temperature.

Solution 37

According to question-
21.5 g of NaCl dissolves in 60 g of water.
So, amount of NaCl which gets dissolved in 100 g of water = 21.5 x 100 / 60 = 35.8 g
Thus, the solubility of NaCl is 35.8 g at 25°C.

Question 38

9.72 g of potassium chloride dissolves in 30 g of water at 70°C. Calculate the solubility of potassium chloride in water at that temperature.

Solution 38

According to question-
9.72 g of KCl dissolves in 30 g of water.
So, amount of KCl which gets dissolved in 100 g of water = 9.72 x 100/30 = 32.4 g
Thus, the solubility of KCl = 32.4 g

Question 39

Classify the following as physical or chemical changes:

(i)Cooking of food (ii) Boiling of water
(iii)Cutting of trees (iv)Dissolving salt in water
(v)Digestion of food (vi)Melting of ice

Solution 39

i. Cooking of food - Chemical change
ii. Boiling of water - Physical change
iii. Cutting of trees - Physical change
iv. Dissolving salt in water - Physical change
v. Digestion of food - Chemical change
vi. Melting of ice- Physical change

Question 40

Which of the following are physical changes and which are chemical changes?
(a) Burning of a magnesium wire
(b) Freezing of water
(c) Rusting of iron
(d) Glowing of an electric bulb

Solution 40

(a) Burning of magnesium wire - Chemical change
(b) Freezing of water - Physical change
(c) Rusting of iron - Chemical change
(d) Glowing of electric bulb - Physical change

Question 41

Classify the following as physical or chemical changes:
(i) Formation of curd from milk (ii) Condensation of steam
(iii) Growth of a plant (iv) Breaking of glass tumbler

Solution 41

(a) Formation of curd from milk - Chemical change
(b) Condensation of steam - Physical change

(c) Growth of plant - Chemical change
(d) Breaking of a glass tumbler - Physical change

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Question 42

Separate the following into physical and chemical changes: Sublimation of a solid, decomposition of water into hydrogen and oxygen by passing electric current, Formation of clouds, Making a fruit salad from raw fruits, Dissolving carbon dioxide in water

Solution 42

Physical change - Sublimation of solid, Formation of clouds, making of fruit salad from raw fruits, dissolving CO_2 in water
Chemical change - Decomposition of water into H_2 and O_2 by passing electric current

Question 43

Which of the following are physical changes and which are chemical changes?
Burning of candle wax, Melting of candle wax, Mixing of iron filings and sand, Burning of wood, Breaking a piece of chalk, Burning a piece of paper, Cutting a piece of paper

Solution 43

Physical change - Melting of candle wax, mixing of iron filings and sand, breaking a piece of chalk, cutting a piece of paper
Chemical change - Burning of candle wax, burning of wood, burning of piece of paper

Question 44

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

Solution 44

When sea water is a mixture of dissolved salts and water only, it is homogeneous solution.
And if sea water contains suspended impurities like decayed plants or animal material, etc. then it is called heterogeneous solution.

Question 45

Which of the following do not exhibit Tyndall effect? Starch solution, Sugar solution, Ink, Salt solution, Copper sulphate solution, Ammonium chloride solution, Fog, Smoke, Car exhausts.

Solution 45

Sugar solution, Salt solution, copper sulphate solution and ammonium chloride solution do not show Tyndall effect.

Question 46

(a) What is a physical change? Give two examples of physical changes.
(b) What is a chemical change? Give two examples of physical changes.

Solution 46

(a). The change in which no new substance is formed is called a physical change.
Example- Melting of candle wax, mixing of iron filings and sand
(b).The change in which new substance is formed is called a chemical change.
Example- Burning of candle wax, burning of wood

Question 47

(a)Give the main differences between physical changes and chemical changes.
(b) Which of the following are chemical changes and which physical? Give reason.
(i) A glass bottle breaking (ii) Coal burning in air
(ii) Making a cake (iv) Wool being knitted into a sweater

Solution 47
(a).

PHYSICAL CHANGE	CHEMICAL CHANGE
1. No new substance is formed in a physical change. 2. It is a temporary change. 3. It is easily reversible. 4. Very little heat or light energy is usually absorbed or given out in this process. 5. Mass of substance does not alter.	1. New substance is formed chemical change. 2. A chemical change is a permanent change. 3. This process is usually irreversible. 4. A lot of heat or light ene absorbed or given out in th process. 5. Mass of substance does this process.

(b). Chemical change - Coal burning in air, making of cake
Physical change- A glass bottle breaking, wool being knitted into a sweater.

Question 48
(a) Define solubility of a substance. How does it vary with temperature?
(b) What do you understand by the statement "the solubility of copper sulphate in water at 20^{o}C is 20.7g"?
(c) What is the effect of temperature on the solubility of solids in liquids?

Solution 48

(a). The maximum amount of a solute which can be dissolved in 100 g of a solvent at a specified temperature is known as the solubility of that solute in that solvent .
The solubility of solids in liquids is directly proportional to temperature whereas the solubility of gases in liquids is inversly proportional to temperature.
(b). This statement means that 100 g of water can dissolve a maximum of 20.7 g of copper sulphate at $20^{o}C$.
(c). The solubility of solids in liquids increases on increasing the temperature and decreases on decreasing the temperature.

Question 49

(a) What is meant by a solution ? Give two examples of solutions.
(b) What is a suspension? Give two examples of suspensions.
(c)What is a colloid ? Give two examples of colloids (or colloidal solutions).

Solution 49

(a). A solution is a homogeneous mixture of two or more substances.
Example- Salt solution, metal alloys.
(b). A suspension is a heterogeneous mixture in which the small particles of a solid are spread throughout a liquid without dissolving in it.
Example- Muddy-water, Milk of magnesia.
(c). A colloid is a kind of solution in which the size of solute particles is intermediate between those in true solutions and those in suspensions.
Example- Soap solution, milk.

Question 50

(a) Differentiate between a saturated and an unsaturated solution. How will you test whether a given solution is saturated or not ?
(b) How would you prepare a saturated solution of sodium chloride in water at 25°C? What will happen if this solution is cooled to 10°C?

Solution 50

(a). A solution in which no more solute can be dissolved at that temperature is called a saturated solution while a solution in which more quantity of solute can be dissolved without raising its temperature is called an unsaturated solution.
To test the saturation or unsaturation of a solution, more solute may be added to the solution. If that solute gets dissolved in the solution then the solution will be unsaturated.
To test whether a given solution is saturated or not, add some more solute to the solution and try to dissolve it by stirring. If solute does not dissolve in the given solution, then it will be a saturated solution.
(b). Take some water in a beaker and heat it slowly with the help of burner. Now, start adding sodium chloride salt to the hot water with a spoon and stir it with a glass rod continuously so that sodium chloride goes on dissolving in water. Take the temperature of water up to 25°C and then keeping this temperature constant, go on adding sodium chloride till no more sodium chloride dissolves in it and some undissolved crystals will be left at the bottom. The contents of the beaker are now filtered and the clear solution obtained is the saturated solution of sodium chloride at 25°C.
If the temperature is lowered from 25°C to 10°C, then some of the crystals of sodium chloride will separate out from the solution in the form of solute crystals.

Question 66

Many indigestion mixtures are suspensions. What do the instructions written on the bottle of an indigestion mixture tell us before taking the mixture, and why?

Solution 66

Indigestion mixtures are suspensions so there is an instruction written on the bottle of these mixtures "SHAKE IT WELL BEFORE USE". This is because the particles of indigestion mixture i.e. suspensions are unstable and settle down at the bottom of the bottle after some time.

Question 67

Three mixtures A, B and C are obtained by stirring three different solids in water taken in separate beakers. When mixture A is allowed to stand for some time, then its particles at the bottom of the beaker. When a beam of light is passed through mixture A in dark room, the path of light becomes visible when observed from the side of the beaker. When mixture B is allowed to stand for a considerable time, even then its particles do not settle down. Mixture B, however, scatters the beam of light just like mixture A . The particles of mixture C do not settle down on keeping and it also does not beam of light passing through it.
(a)What are mixtures like A known as?
(b)What are mixtures like B known as?
(c)What are mixtures like C known as?
(d) Name the phenomenon exhibited by A and B which occurs on passing a beam of light through them.
(e) Name one mixture each which is like (i) A (ii) B and (C).

Solution 67

(a) Mixtures like A are known as suspensions.
(b) Mixtures like B are known as colloids.
(c) Mixtures like C are known as true solutions.
(d) The phenomenon existed by A and B which occurs on passing a beam of light through them is called Tyndall effect.
(e) (i) Chalk-water mixture is like A.
(ii) Soap solution is a mixture like B.
(iii) Salt solution is a mixture like C.

Question 68

When the solid A is added to water, it dissolves with the evolution of a lot of heat and making little explosions to form two products B and C. The properties of B and C are entirely different from those of solid A as well as water . Moreover, products B and C cannot be reconverted into solid A and water. When another solid D is added to water, it dissolves with the absorption of a litte heat to form a product E which cools down. The product E shows the properties of both, solid D as well as water. Moreover, product E can be converted into solid D and water.
(a) What type of change occurs when solid A is dissolved in water? Why?
(b) What type of change occurs when solid D is dissolved in water? Why?
(c) Name a metal which you think could behave like solid A. Also name the products B and C.
(d) Name the solid D if it is the one which is used in making ordinary dry cells.
(e) Name the process by which D can be recovered from E.

Solution 68

(a) When solid A is dissolved in water, chemical change takes place. This is because the properties of products B and C are entirely different from those of solid A and

water and a lot of heat and energy is evolved in the reaction.

(b) Physical change occurs when solid D is dissolved in water. This is because the product E shows the properties of both, solid D and water.
(c) Sodium metal could behave like solid A.
Product B is sodium hydroxide.
Product C is hydrogen.
(d) Solid D is ammonium chloride.
(e) D can be recovered from E by evaporation.

Question 69

100 mL of water at room temperature of 25^{o}C is taken in beaker and a little of solid S is dissolved in it by stirring to obtain a solution X. More and more of solid S is added to the solution with constant stirring, while keeping the temperature of solution constant at 30^{o}C. After some time it is observed that no more solid dissolves in water and at the same time some solid is also left undissolved at the bottom of the beaker. The contents of beaker are filtered through a filter paper to obtain solution Y in the form of a filtrate.
(a) What name is given to solutions like X?
(b) What name is given to solutions like Y?
(c) What will you observe if the solution Y at 30^{o}C cooled down to 10^{o}C by keeping the beaker in crushed ice? Why?
(d) What term is used to denote of solid dissolved in 100 grams of water in a solution like Y?

Solution 69

(a) Solution like X are known as unsaturated solution.
(b) Solution like Y are known as saturated solution.
(c) If solution Y at 30^{o}C is cool down to 10^{o}C by keeping the beaker in crushed ice, then some of the dissolved solid will separate out from the solution and

settle at the bottom of the beaker as crystals. This is because the solubility of solid decreases on cooling.
(d) Solubility is the term used to denote the amount of solid dissolved in 100 grams of water in a solution.

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Question 70

The solubility of ammonium chloride in water at various temperatures is given below:

Temperature :	10^oC	20^oC	40^oC	60^oC	80^oC
Solubility :	24 g	37g	41g	55g	66g

What mass of ammonium chloride would be needed to make a saturated solution of ammonium chloride in fifty grams of water at 40^oC?

Solution 70

According to question:
Solubility at 40^oC = 41 g
But, solubility = solid dissolved in 100 grams of water in a solution
So, mass of ammonium chloride needed to make a saturated solution of ammonium chloride in 50 g of water at 40^oC= 41/2 g = 20.5 g

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Question 1

Name the solvent you would use to separate a mixture of sulphur and carbon.

Solution 1

Carbon disulphide

Question 2

Name the process you would use to separate ammonium chloride from a mixture of sodium chloride and ammonium chloride.

Solution 2

Sublimation

Question 3
Which method can be used to separate a mixture of naphthalene and common salt?

Solution 3
Sublimation

Question 4
Name the process you would use to separate a mixture of anthracene and copper sulphate?

Solution 4
Sublimation

Question 5
Name the property of any one of the components which can be used for separating the following mixture:
Salt and Camphor

Solution 5
Camphor undergoes sublimation.

Question 6
What type of magnet is fitted on a crane to separate scrap iron object from a heap of waste materials in factories ?

Solution 6
Electromagnet.

Question 7
Name the property of one of the constituents which can be used to separate a mixture of salt and iodine

Solution 7
Iodine undergoes sublimation.

Question 8
Name the process you would use to separate a mixture of two miscible liquids (like acetone and water).

Solution 8
Fractional distillation

Question 9
What difference in the property, of two miscible liquids enables their separation by fractional distillation?

Solution 9
Difference in their boiling point.

Question 10
Name one pair of substances whose mixture can be separated by fractional distillation.

Solution 10
Acetone and water

Question 11
Name one pair liquids which can be separated by using a separating funnel.

Solution 11
Kerosene and water.

Question 12
State whether the following statement are true or false:
(a)Alcohol can be separated from a mixture of alcohol and water by a separating funnel.
(b)Salt and water can be recovered from an aqueous salt solution by the process of evaporation.

Solution 12
(a)False
(b)False

Question 13
Name the source from which nitrogen and oxygen are obtained on a large scale.

Solution 13
Air

Question 14

Name the process by which the various gases of the air are separated.

Solution 14
Fractional distillation of liquid air.

Question 15
A carpenter wants to separate iron nails from saw-dust. Which method of separation should he choose?

Solution 15
He should choose magnetic separation method to separate iron nails from saw-dust.

Question 16
Name any two solid substances whose mixture can be separated by sublimation.

Solution 16
Salt and camphor.

Question 17
Name one pair of substances whose mixture can be separated completely by distillation.

Solution 17
Mixture of common salt and water.

Question 18
How will you separate a mixture of chalk powder and water?

Solution 18
By filtration.

Question 19
Name the process which can be used to separate a mixture of salt solution and sand.

Solution 19
Filtration

Question 20

Name the process which can be used to recover salt from an aqueous salt solution.

Solution 20
Evaporation

Question 21
Name the process which is used in milk dairies to separate cream from milk.

Solution 21
Centrifugation

Question 22
State one application of centrifugation.

Solution 22
Centrifugation is used to separate cream from milk.

Question 23
What is the general name of the process by which tea-leaves are separated from prepared tea?

Solution 23
Filtration

Question 24
Name the process you would use to separate a mixture of water and alcohol.

Solution 24
Fractional distillation

Question 25
Name the apparatus you would use to separate oil from water.

Solution 25
Separating funnel

Question 26
What differences in the properties of oil and water enable their separation by a separating funnel?

Solution 26

Difference in the densities of oil and water enable their separation by a separating funnel.

Question 27

(a) Name the process by which common salt is obtained from sea- water.
(b)Name the process by which common salt is purified.

Solution 27

(a)Evaporation
(b)Crystallization

Question 28

Name the process by which can be used to purify an impure sample of copper sulphate.

Solution 28

Crystallization

Question 29

(a) Name the process by which all the dye can be recovered from black ink.
(b) Name the process by which the various 'dyes' (coloured materials) present in black ink can be separated.

Solution 29

(a) Evaporation
(b) Paper chromatography

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Question 30

Which technique is used in a washing machine to squeeze out water from wet clothes while drying?

Solution 30

Centrifugation

Question 31

Which technique can be used to detect and identify traces of poison present in the stomach wash of a person?

Solution 31

Chromatography

Question 32

Fill in the following blanks with suitable words:
(a) Miscible liquids are separated by _____.
(b) Immiscible liquids are separated by using a _____.
(c) A mixture of kerosene and petrol can be separated by _____.
(d) The separation of liquids by fractional distillation is based on the difference in their _____.
(e) The gases of air can be separated by fractional distillation of liquid air because they have different _____.
(f) A heterogeneous mixture of liquid and solid is conveniently separated by _____.
(g) If a mixture contains iron fillings as one of the constituents, it can be separated by using a _____.

Solution 32

(a) Fractional distillation
(b) Separating funnel
(c) Fractional distillation
(d) Boiling points
(e) Boiling points
(f) Centrifugation
(g) Magnet

Question 33

How will you separate a mixture containing sand and sugar?

Solution 33

Sugar is soluble in water whereas sand is insoluble in water. The difference in their solubility is used to separate them. The mixture of sand and sugar is dissolved in water, then it is filtered with the help of filter paper. Sand remains as residue on the filter paper while sugar solution is obtained as filtrate.The filtrate is then evaporated to get crystals of sugar.

Question 34

What difference in the properties of common salt and sand would enable you to separate a mixture of these two substances?

Solution 34

The difference in the solubility of salt and sand in water is used to separate them from their mixture.

Question 35

Describe a method to separate a mixture of common salt and sand.

Solution 35

Salt is soluble in water whereas sand is insoluble in water. The difference in their solubility is used to separate them. The mixture of sand and salt is dissolved in water, then it is filtered with the help of filter paper. Sand remains as residue on the filter paper while salt solution is obtained as filtrate .The filtrate is then evaporated to get crystals of salt.

Question 36

How would you separate a mixture of sugar and salt?

Solution 36

Sugar is soluble in alcohol but salt is insoluble in alcohol, so a mixture of sugar and salt can be separated by using alcohol as solvent.

Question 37

How will you separate a mixture of sodium chloride and sand?

Solution 37

Sodium chloride is soluble in water whereas sand is insoluble in water. The difference in their solubility is used to separate them. The mixture of sand and sodium chloride is dissolved in water, then it is filtered with the help of filter paper. Sand remains as residue on the filter paper while sodium chloride solution is obtained as filtrate .The filtrate is then evaporated to get crystals of sodium chloride.

Question 38

Write a method to separate a mixture of sand and potash alum.

Solution 38

Potash alum is soluble in water whereas sand is insoluble in water. The difference in their solubility is used to separate them. The mixture of sand and potash alum is dissolved in water, then it is filtered with the help of filter paper. Sand remains as residue on the filter paper while potash alum solution is obtained as filtrate .The filtrate is then evaporated to get crystals of potash alum.

Question 39

How would you obtain sodium chloride from a mixture of sodium chloride and sulphur without using water?

Solution 39

Sulphur is soluble in carbon disulphide whereas sodium chloride is insoluble in carbon disulphide.The mixture of sulphur and sodium chloride is shaken with carbon disulphide.Sulphur dissolves in carbon disulphide whereas sodium chloride remains undissolved. The solution is then filtered,sodium chloride is obtained as

residue.On evaporating the filtrate ,carbon disulphide solvent is eliminated and solid sulphur remains behind.

Question 40
How would you separate iodine from a mixture of iodine and common salt?

Solution 40
Mixture of iodine and common salt is heated. Iodine sublimes on heating leaving behind common salt and can be recovered in the form of sublimate by cooling its vapours.

Question 41
Describe a method to separate a mixture of camphor and sand.

Solution 41
Mixture of camphor and sand is heated. Camphor sublimes on heating leaving behind sand and can be recovered in the form of sublimate by cooling its vapours.

Question 42
How will you separate a mixture of iron filings and powdered carbon?

Solution 42
Mixture of iron filings and powdered carbon can be separated by using magnet.A horse-shoe magnet is moved on the surface of the mixture.The iron filings are attracted by the magnet,they cling to the poles of the magnet and get separated. This process is repeated a number of times till complete separation of iron filings is done.

Question 43
How will you separate a mixture of iron filings and sulphur powder without using carbon disulphide?

Solution 43

Mixture of iron filings and powdered carbon can be separated by using magnet.A horse-shoe magnet is moved on the surface of the mixture.The iron filings are attracted by the magnet,they cling to the poles of the magnet and get separated. This process is repeated a number of times till complete separation of iron filings is done.

Question 44

How is scrap iron separated from a heap of waste meterials in factories?

Solution 44

In factories, scrap iron is separated from the heap of waste materials by using big electromagnets fitted to a crane.When a crane fitted with a powerful electromagnet is lowered on to the heap of waste materials, then the scrap iron objects present in the heap cling to the electromagnet. The crane is then moved up and away to drop these scrap iron objects at a separate place.

Question 45

How is the impurity of iron present in several substances removed in industries?

Solution 45

In industries, the impurity of iron present in several substances is removed by the use of magnets. Iron objects stick to the magnet leaving behind other objects.

Question 46

How will you separate iron pins from sand?

Solution 46

Mixture of iron pins and sand can be separated by using magnet.A horse-shoe magnet is moved on the surface of the mixture.The iron pins are attracted by

the magnet,they cling to the poles of the magnet and get separated. This process is repeated a number of times till complete separation of iron pins is achieved.

Question 47

How will you separate a mixture of common salt, sulphur powder and sand?

Solution 47

At first, the mixture of common salt, sulphur powder and sand is shaken with carbon disulphide. Sulphur dissolves in carbon disulphide whereas common salt and sand remain undissolved. The solution is then filtered, common salt and sand mixture is obtained as residue. On evaporating the filtrate, carbon disulphide solvent is eliminated and solid sulphur remains behind. Now, the common salt and sand mixture is shaken with water. Common salt gets dissolved in water .The solution is then filtered, sand is obtained as residue. The filtrate is then evaporated to get crystals of common salt.

Question 48

A mixture contains water, kerosene and sand . How will you separate this mixture?

Solution 48

The mixture of water, kerosene and sand is filtered with the help of filter paper first. Sand remains as residue on the filter paper while mixture of water and kerosene is obtained as filtrate .The mixture of water and kerosene is then put in separating funnel and allowed to stand for sometime. The mixture separates into two layers according to the difference in the densities of water and kerosene. Water is heavier than kerosene. So,water forms lower layer while kerosene forms upper layer.On opening the stop clock of separating funnel,the lower layer of water comes out

first and collected in beaker leaving behind kerosene in the separating funnel.

Question 49

Describe the method of separating a mixture containing salt, sand and ammonium chloride.

Solution 49

The mixture of common salt,sand and ammonium chloride will be heated first.Ammonium chloride sublimes on heating and can be recovered in the form of sublimate by cooling its vapours leaving behind mixture of common salt and sand.Salt is soluble in water whereas sand is insoluble in water.The mixture of sand and salt is dissolved in water, then it is filtered with the help of filter paper. Sand remains as residue on the filter paper while salt solution is obtained as filtrate .The filtrate is then evaporated to get crystals of salt.

Question 50

How will you separate camphor, common salt and iron nails from their mixture?

Solution 50

A horse-shoe magnet is moved on the surface of the mixture of camphor,common salt and iron nails.The iron nails are attracted by the magnet, they cling to the poles of the magnet and get separated. This process is repeated a number of times till complete separation of iron nails occur leaving behind mixture of camphor and common salt. Mixture of camphor and common salt is heated. Camphor sublimes on heating leaving behind common salt and can be recovered in the form of sublimate by cooling its vapours

Question 51

You are given a mixture of water, groundnut oil and common salt. How will you separate groundnut oil and common salt from it?

Solution 51

The mixture of water, groundnut oil and common salt is put in a separating funnel and allowed to stand for sometime. The mixture separates into two layers according to the densities of water and groundnut oil. Water is heavier than groundnut oil. So, water forms lower layer while groundnut oil forms upper layer. On opening the stop clock of separating funnel, the lower layer of water comes out first and collected in beaker leaving behind groundnut oil in the funel. Now, solution of water and common salt is heated. Water gets evaporated leaving behind solid common salt.

Question 52

Discuss the method of separating a mixture containing chalk powder, iron fillings and naphthalene.

Solution 52

Mixture of chalk powder,iron filings and naphthalene can be separated by using magnet and then by sublimation. A horse-shoe magnet is moved on the surface of the mixture.The iron filings are attracted by the magnet, they cling to the poles of the magnet and get separated. This process is repeated a number of times till complete separation of iron filings occur leaving behind mixture of chalk powder and naphthalene. Then, mixture of chalk powder and naphthalene is heated.Naphthalene sublimes on heating leaving behind chalk powder and can be recovered in the form of sublimate by cooling its vapours.

Question 53

Describe the various steps involved in the separation of iodine, iron filings and salt from a mixture.

Solution 53

Mixture of iodine, iron filings and salt can be separated by using magnet and then by sublimation. A horse-shoe magnet is moved on the surface of the mixture.The iron filings are attracted by the magnet, they cling to the poles of the magnet and get separated. This process is repeated a number of times till complete separation of iron filings occur leaving behind mixture of iodine and salt. Then, mixture of iodine and salt is heated. Iodine sublimes on heating leaving behind salt and can be recovered in the form of sublimate by cooling its vapours.

Question 54

How will you separate a mixture of iron filings, chalk powder and common salt?

Solution 54

Mixture of iron filings,chalk powder and common salt can be separated by using magnet first.A horse-shoe magnet is moved on the surface of the mixture.The iron filings are attracted by the magnet,they cling to the poles of the magnet and get separated. This process is repeated a number of times till complete separation of iron filings occur leaving behind mixture of chalk powder and common salt.The mixture of chalk powder and common salt is then dissolved in water and then filtered with the help of filter paper. Chalk powder remains as residue on the filter paper while common salt solution is obtained as filtrate .The filtrate is then evaporated to get crystals of common salt.

Question 55

How will you separate common salt, sand and iron filings from their mixture?

Solution 55

Mixture of common salt, sand and iron filings can be separated by using magnet first. A horse-shoe magnet is moved on the surface of the mixture. The iron filings are attracted by the magnet, they cling to the poles of the magnet and get separated. This process is repeated a number of times till complete separation of iron filings occur leaving behind mixture of common salt and sand.The mixture of common salt and sand is then dissolved in water and then filtered with the help of filter paper. Sand remains as residue on the filter paper while common salt solution is obtained as filtrate .The filtrate is then evaporated to get crystals of common salt.

Question 56

How will you separate a mixture of kerosene oil and water? Explain with the help of labeled diagram.

Solution 56

The mixture of water and kerosene is put in separating funnel and allowed to stand for sometime. The mixture separates into two layers according to the densities of water and kerosene. Water is heavier than kerosene.So, water forms lower layer while kerosene forms upper layer. On opening the stop clock of separating funnel, the lower layer of water comes out first and collected in beaker leaving behind kerosene.

Fig. Separation of kerosene oil and water mixture by separating funnel

Question 57

How will you separate water from mustard oil?

Solution 57

The mixture of mustard oil and water is put in separating funnel and allowed to stand for

sometime.The mixture separates into two layers according to the densities of water and mustard oil. Water is heavier than mustard oil. So,water forms lower layer while mustard oil forms upper layer. On opening the stop clock of separating funnel, the lower layer of water comes out first and collected in beaker leaving behind mustard oil.

Question 58

How will you separate a mixture of cooking oil (groundnut oil) and water?

Solution 58

The mixture of cooking oil(groundnut oil) and water is put in separating funnel and allowed to stand for sometime.The mixture separates into two layers according to the densities of water and groundnut oil. Water is heavier than groundnut oil. So,water forms lower layer while groundnut oil forms upper layer. On opening the stop clock of separating funnel,the lower layer of water comes out first and collected in beaker leaving behind groundnut oil.

Question 59

How will you separate a mixture of mercury, oil and water?

Solution 59

Mercury, oil and water are immiscible liquids and have different densities. Mixture of mercury, oil and water will be put in separating funnel and allowed to stand for sometimes. The mixture separates into three layers according to the densities of mercury, oil and water. On opening the stop clock of separating funnel, the lower layer formed by mercury comes out first and collected in beaker leaving behind other two layers. Similarly, again on opening the stop clock of separating funnel,

the lower layer of water comes out first and collected in beaker leaving behind oil in the funnel.

Question 60

Describe a method for separating a mixture of iron filings and sulphur powder other than that by using a magnet.

Solution 60

Sulphur is soluble in carbon disulphide whereas iron filing is insoluble in carbon disulphide.The mixture of sulphur and iron filing is shaken with carbon disulphide.Sulphur dissolves in carbon disulphide whereas iron filings remain undissolved. The solution is then filtered, iron filing is obtained as residue.On evaporating the filtrate, carbon disulphide solvent is eliminated and solid sulphur remains behind.

Question 61

How is cream separated from milk?

Solution 61

Centrifugation is used to separate cream from milk.Milk is a suspension of tiny droplets of oil in a watery liquid.It is put in closed container in a big centrifuge machine.When machine is switched on,milk is rotated at very high speed in its container.The cream being lighter floats over the skimmed milk and then can be removed.

Question 62

Explain how, impure copper sulphate can be purified by crystallisation.

Solution 62

Impure copper sulphate is dissolved in minimum amount of water in a china dish to make copper sulphate solution. It is then filtered to remove insoluble impurities. Now, copper sulphate solution is heated

gently on a water bath to evaporate water and a saturated solution is obtained. Then heating is stopped and saturated solution of copper sulphate is allowed to cool slowly. Crystals of pure copper sulphate will be formed leaving behind impurities. These crystals are then separated and dried.

Question 63

Which method is better for recovering sugar from sugar solution : evaporation or crystallization ?Give reason for your answer.

Solution 63

Crystallisation is better method for recovering sugar from sugar solution than evaporation because-
(a)Sugar decomposes or get charred on heating to dryness during evaporation.There is no such problem in crystallization.
(b)The soluble impurities do not get removed in the process of evaporation. But such impurities get removed in crystallization.

Question 64

What is chromatography? State its two applications.

Solution 64

Chromatography is a technique of separating two or more dissolved solids which are present in a solution in very small quantities.Its two applications are-
(a)Chromatography is used to separate solutions of coloured substances(dyes and pigments).
(b)Chromatography is used to separate small amounts of products of chemical reactions.

Question 65

Which of the following can be separated by using a separating funnel and which cannot be separated by using a separating funnel?
(a) Water and kerosene mixture.

(b) Water and acetone mixture.
Give reasons for your answer.

Solution 65

(a)Water and kerosene mixture can be separated by using a separating funnel because these are immiscible liquids and they have different densities.
(b)Water and acetone mixture can not be separated by by using a separating funnel because these are miscible liquids.

Chapter 2 - Is Matter Around Us Pure ? Exercise 107

Question 66

With the help of a labeled diagram, describe the method of separating ammonium chloride from a mixture of ammonium chloride and common salt. Mention the difference in the properties of ammonium chloride and sodium chloride which has made this separation possible.

Solution 66

The mixture of common salt and ammonium chloride is taken in a china dish and placed on a tripod stand. The china dish is covered with an inverted glass funnel. A loose cotton plug is put in the upper, open end of the funnel to prevent the ammonium chloride vapours from escaping into the atmosphere. The china dish is heated by using a burner. On heating the mixture, ammonium chloride changes into white vapours. These vapours rise up and get converted into solid ammonium chloride on coming in contact with the cold, inner walls of the funnel. In this way, pure ammonium chloride collects on the inner sides of the funnel in the form of a sublimate and can be removed. Common salt does not change into vapours on heating, so it remains behind in the china dish and can be separated out.

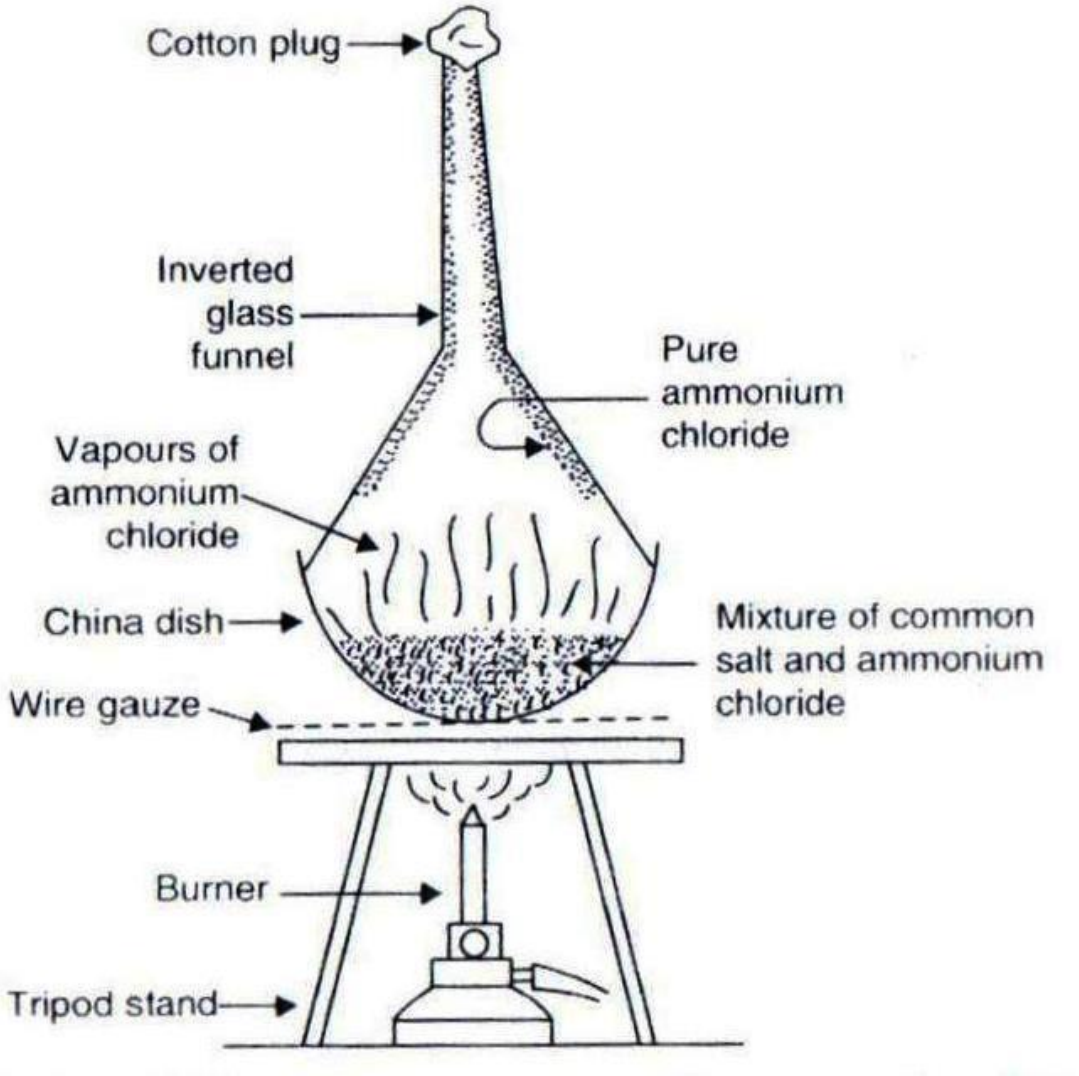

Fig. Separation of mixture of common salt and ammonium chloride by sublimation

Ammonium chloride sublimes on heating whereas common salt does not sublime on heating. So, we can separate ammonium chloride from a mixture of common salt and ammonium chloride by the process of sublimation.

Question 67

How can you obtain pure water from a salt-water mixture (or salt-solution)? Draw a neat and labelled diagram of the apparatus you would use to obtain pure water from a salt-water mixture (or salt-solution).

Solution 67

A mixture of common salt and water can be separated completely by the process of distillation. The distillation can be used to separate a liquid from dissolved non-volatile solids.

The salt water mixture is taken in the distillation flask A and heated. Some porcelain pieces are put in the distillation flask to avoid bumping of the solution due to uneven heating. On heating, water forms vapours which rise up and come out through the side tube B of the distillation flask, and go into water condenser C. Cold water from tap is circulated through the outer tube of condenser for cooling the vapours. The hot vapours get cooled in the condenser to form pure water (i.e. distilled water) which trickles down from the condenser and collects in the beaker D. Since the salt is non-volatile, so it remains behind in the distillation flask.

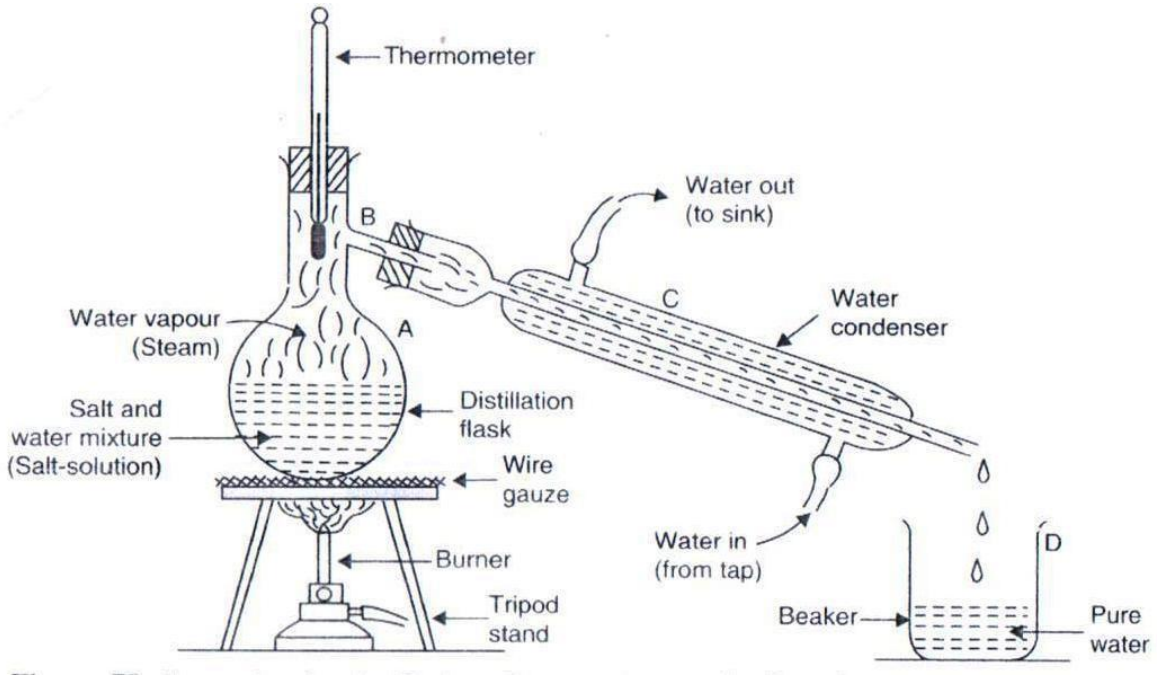

Fig. Separation of mixture of salt and water by distillation

Question 68

How is water purified on a large scale at water works? Explain with the help of a labeled diagram. Name the substance which is added to kill germs in the drinking water supply?

Solution 68

In cities, drinking water is supplied from water works where river or lake water is made free from suspended solid substances and germs. In water works, the methods like sedimentation, decantation, loading, filtration and chlorination etc. are used to remove undesirable materials from water. The source of water supply in a city is either a nearby river or lake (reservoir), from there it is pumped into 'sedimentation tank'. Here it is allowed to stand for sometime so that many of insoluble substances present in water settle down at bottom of the tank. From there, it is sent to a 'loading tank' where some alum is added to water. Here suspended clay particles in water get loaded with alum particles, become heavy and settle down at the bottom of the tank. Then, it is passed through 'filtration tank'. It has three layers: fine sand layer at top, coarse sand layer in middle and gravel as the bottom layer. These act as filters and even the small suspended particles get removed when water passes through these layers. Then, the clear water is passed into a chlorination tank. Here, chlorine is added to water to kill the germs present in it. Now, the clean and disinfected water is pumped by pumping station into high storage tanks and from there, it is supplied to homes and factories through the network of big and small pipes.

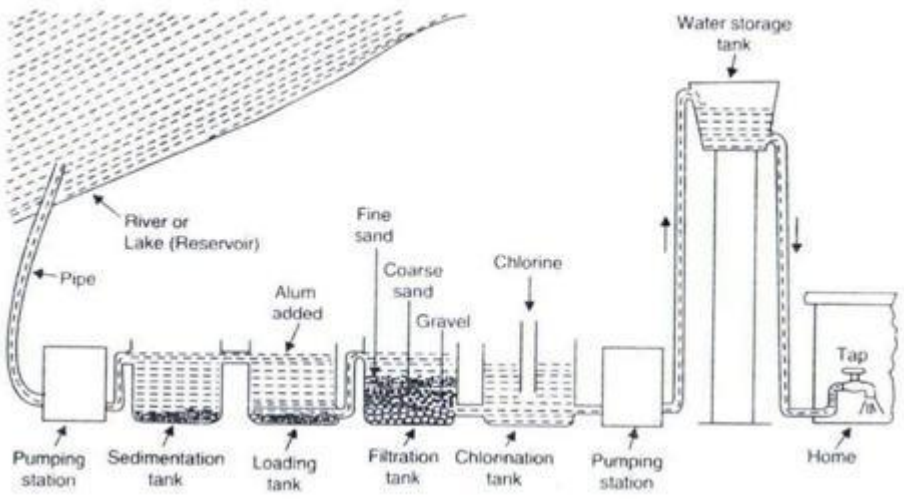

Fig. Water purification process at water works

Question 69

(a) What is fractional distillation? What is the use of fractionating column in fractional distillation?
(b) Draw a labelled diagram of the fractional distillation apparatus used for separating a mixture of alcohol and water.

Solution 69

(a) Fractional distillation is the process of separating two or more miscible liquids (liquids which mix together in all proportions and form a single layer) by distillation, the distillate being collected in fractions boiling at different temperatures. The separation of two liquids by fractional distillation depends on the difference in their boiling points. It is carried out by using a fractionating column.
Fractionating column is a long vertical glass tube filled with glass beads. The glass beads provide a large surface area for hot vapours to cool and condens repeatedly. It provides different temperature zones inside it, the highest temperature being at the bottom of the column and the lowest temperature near its top. It is fitted in the neck of the distillation flask.
(b)

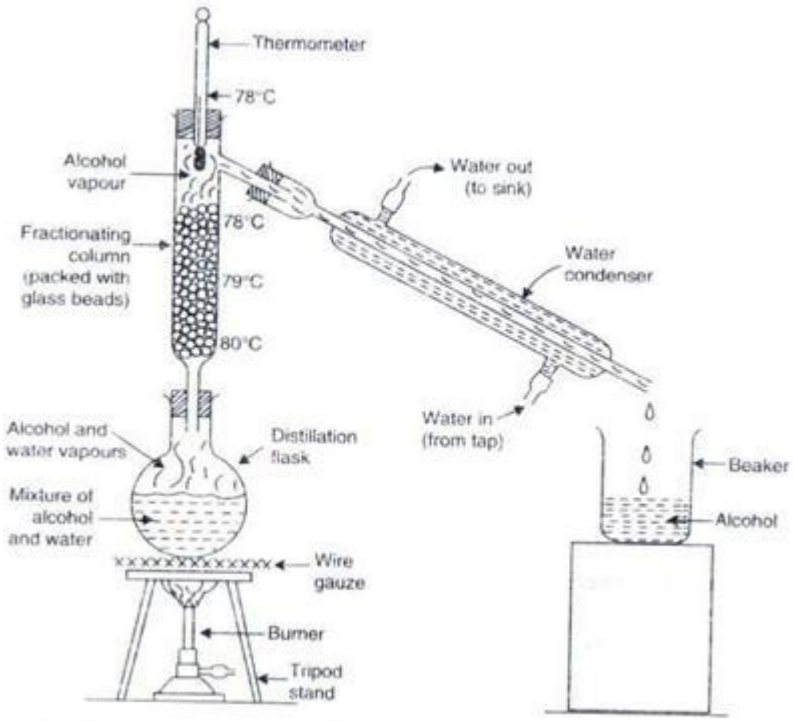

Fig. Separation of mixture of alcohol and water by fractional distillation

Question 70

(a) Explain how, nitrogen, oxygen and argon gases are separated from air.
(b) Draw a flow diagram of the processes involved in obtaining gases like nitrogen, oxygen and argon from air.

Solution 70

(a)Air is mixture of gases like nitrogen, oxygen, argon, carbon dioxide, helium, neon, krypton, xeon etc. The various gases of air are separated from one another by fractional distillation of liquid air. This separation is based on the fact that different gases of air have different boiling points(in liquid form).
The air is first filtered to remove dust, then water vapour and carbon dioxide are removed. Air is compressed to a high pressure and then cooled. The cooled air is then allowed to expand quickly into a chamber through a jet. This cools the air even more.

This process of compression, cooling and rapid expansion of air is repeated again and again to make the air more and more cool so that it becomes liquid air. Now, the liquid air is fed into a tall fractionating column and warmed up slowly.
Liquid nitrogen has lowest boiling point of -196°C.So, on warming, it boils off first to form nitrogen gas and is collected at the upper part of the fractional distillation column. Liquid argon has a slightly higher boiling point of -186°C. So, it boils off next and collected as argon gas in the middle part of fractional distillation column. Liquid oxygen has a still higher boiling point of -183 °C. So, liquid oxygen boils off last and collected as oxygen gas at the bottom of fractional distillation column.

(b)

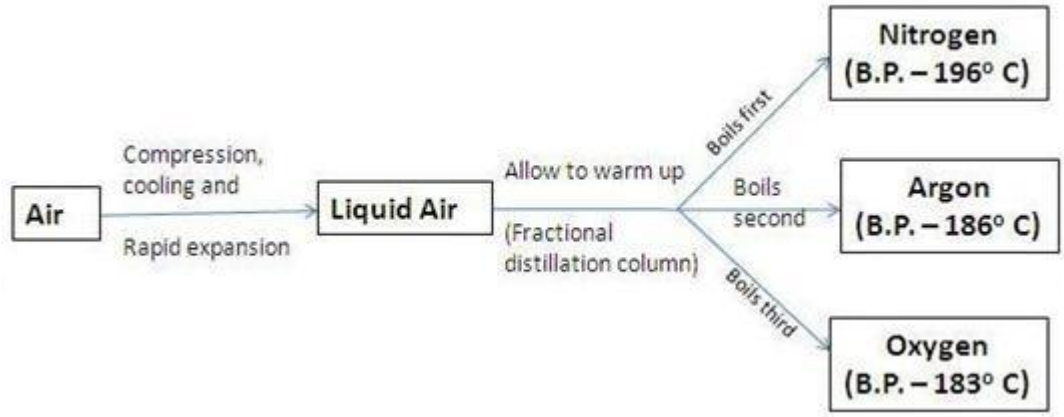

Fig. Separation of major gases of air

Chapter 2 - Is Matter Around Us Pure ? Exercise 108 Question 86

The liquid air has three components X, Y and Z whose boiling points are:- 186°C, -183°C and -196°C, respectively. When liquid air is fed into a tall fractional distillation column from near its bottom and warmed up slowly :
(a)Which component will be collected from near the bottom of the fraction distillation column? Why?

(b) Which component will be collected from the top part of the fractional distillation column? Why?
(c) Which component will be collected from the middle part of the fractional distillation column? Why?
(e) What could the component X, Y and Z be?

Solution 86

(a) Y will be collected from near the bottom of the fractional distillation column because it has highest boiling point of -183^{o}C.
(b) Z will be collected from the top part of the fractional distillation column because it has lowest boiling point of -196^{o}C.
(c) X will be collected from the middle part of the fractional distillation column because it has a boiling point of -186^{o}C which is lower than that of Y but higher than that of Z.
(d) X is liquid argon; Y is liquid oxygen; Z is liquid nitrogen.

Question 87

There are three liquids A, b and C, all having different densities and different boiling points. Liquids A and C are organic in nature whereas liquid B is considered to be inorganic. When liquids A and B are put together ina container, they form a single layer. On the other hand, when, liquids B and C are mixed, they form two separate layers:
(a) Which process will you use to separate a mixture of A and B?
(b) Which method will you use to separate a mixture of B and C?
(c) Name the liquids which would behave like (i) A (ii) B (iii) C

Solution 87

(a) We will use fractional distillation to separate a mixture of A and B.
(b) We will use separating funnel to separate a mixture of B and C.
(c) (i) Alcohol would behave like A.
(ii) Water would behave like B.
(iii) Oil would behave like C.

Question 88

A solid mixture contains four constituents P, Q R and S. P consists of tiny grains and it is mixed with cement for plastering the walls. Q is a white solid which is recovered on a large scale from sea water by the process of evaporation. R is in the form of tiny particles of a material whose corrosion is called rusting. And S is a white solid which is used in making ordinary dry cells.
(a) What could P, Q, R and S be?
(b) How would you separate a mixture containing P, Q, R and S?

Solution 88

(a) P is sand; Q is common salt; R is iron fillings; S is ammonium chloride.
(b) We first separate R (iron filings) by using a magnet to attract them. Then, separate S (ammonium chloride) by sublimation. Now, we shake P(sand)and Q(common salt) with water and filter. P(sand) is obtained as residue. Now, we evaporate filtrate to dryness to obtain Q(common salt).

Question 89

Tincture of iodine is a mixture of two materials X and Y. Then material Y has a property that its solid form can be converted directly into vapours on heating by a process called.
(a)What could X be?
(b) What could X be?

(c) Name the process Z.
(d)Which process would you used to recover both the components X and Y from tincture of iodine?
(e)Which process can be used to recover only component Y from tincture of iodine?

Solution 89

(a) X is alcohol.
(b) Y is iodine.
(c) Process Z is called sublimation
(d) Process used to recover both the components alcohol and iodine from tincture of iodine is distillation.
(e) The process used to recover only component Y from tincture of iodine is evaporation.

Question 90

The given mixture contains three constituents A, B and C. The constituent A is a yellow coloured, solid element which dissolves in a liquid D. The constituent B is a blue coloured salt which is insoluble in liquid D but dissolves easily in another liquid E. The constituent C is a liquid which is used in cooking food and forms a solid fat on hydrogenation.
(a) What do you think could (i) constituent A, and (ii) liquid D be?
(b) What could (i) constituent B, and (ii) liquid E be?
(c) What could liquid C be?
(d) How will you separate the mixture containing A, B and C?

Solution 90

(a) (i) Constituent A could be sulphur.
(ii) Liquid D could be carbon disulphide.
(b) (i) Constituent B could be copper sulphate.
(ii) Liquid E could be water.
(c) Liquid C could be vegetable oil.

(d) Filter the mixture of A, B and C. C(oil) being liquid will be obtained as a filtrate. Residue consists of A(sulphur) and B(copper sulphate). Add water to the residue mixture, shake and filter. A(sulphur) is obtained as residue. Now, evaporate filtrate to obtain B(copper sulphate).