Question Bank

Elements, Compounds and Mixtures

1. *Fill in the blank spaces with the appropriate words given within the brackets.*

(a) *A pure chemical compound is _____ (homogenous/heterogenuos) in nature.*

(b) *Constituents of a mixture can be separated by employing suitable _____ (chemical/physical) means.*

(c) *The clear liquid obtained from a mixture of an _____ (soluble/insoluble) solid and a liquid by the process of _____ (filtration/decantation) is called filtrate.*

(d) *The process of separation of different dissolved constituents of a mixture by adsorbing them over an appropriate _____ (adsorbent/absorbent) material is called _____ (filtration/chromatography).*

(e) *A mixture of iodine and sand can be separated by the process of _____ (decantation/sublimation).*

Ans. (a) homogenous **(b)** physical

(c) insoluble, filtration **(d)** absorbent, chromatography

(e) sublimation.

2. *Match the statements in Column A, with the statements in Column B.*

Column A	*Column B*
(a) *The process of removing coloured dyes from blue black ink.*	*Sedimentation*
(b) *The process of removing common salt from its aqueous solution.*	*Fractional crystallisation*
(c) *The process of obtaining nitre crystals from an aqueous solution of nitre and common salt.*	*Chromatography*
(d) *The process of obtaining drinking water from sea.*	*Evaporation*
(e)*The process of removing suspended particles from river water.*	*Distillation*

Ans. (a) Chromatography **(b)** Evaporation

(c) Fractional crystallisation **(d)** Distillation

(e) Sedimentation.

3. *Statements given below are incorrect. Write the correct statements.*

(a) *The number of atoms present in one molecule of a compound is called atomicity.*

(b) *The symbol for element sodium is SO.*

(c) *The constituents of a mixture are present in a fixed ratio.*

(d) *The insoluble material which settles down, when a suspension is allowed to stand undisturbed is called a filtrate.*

(e) *Alcohol is separated from its solution in water, because there is very little difference in their boiling points.*

Ans.(a) The number of atoms present in one molecule of **an elemen**t is called atomicity.

(b) The symbol for element sodium is **Na.**

(c) The constituents of a mixture are present in **any** ratio.

(d) The insoluble material which settles down, when a suspension is allowed to stand undisturbed is called a **sediment.**

(e) Alcohol is separated from its solution in water, because there is very **large** difference in their boiling points.

4. *(a) What is a pure substance?*

(b) State three characteristics of a pure substance.

(c)Pick out the pure substances from the following list :

(i) Sugar solution	*(ii)Common salt crystals*
(iii) Milk	*(iv)Lead nitrate crystals*
(v) Brass	*(vi)Distilled water*
(vii) Lime stone	*(viii)Petrol*
(ix) Ammonium nitrate	*(x) Honey.*

Ans. (a) Pure Substance : A homogeneous material which contains particles of only one kind and has a definite set of properties is called a pure substance.

(b) (1) A pure substance is homogeneous in nature.

(2) A pure substance has a definite set of properties.

(3) The composition of a pure substance cannot be altered by any physical means.

(c) (i) Common salt crystals. (ii) Lead nitrate crystals.

(iii) Distilled water. (iv) Ammonium nitrate.

5. *Sodium metal is a pure substance and so is sodium chloride, inspite of the fact that sodium chloride contains two different elements. Give one reason to explain your answer.*

Ans. Sodium as well as sodium chloride are regarded as pure substances, because they are homogeneous and have one particular set of properties, which cannot be altered by any physical means.

6. *(a)What do you understand by the following terms? Give one example in each case.*

(i) Element (ii) Normal elements (iii) Radioactive elements.

(b) State the number of normal elements

Ans. (a) (i) Element : A pure substance which cannot be broken into two or more simpler substances by any known physical or chemical means is called an element.

Example : Sodium metal is an element.

(ii) Normal elements : Those elements which do not give harmful radiations are called normal elements. There are 82 normal elements.

Example : Sulphur is a normal element.

(iii) Radioactive elements : Those elements which give harmful radiations are called radioactive elements.

Example: Uranium is a radioactive element.

(b) There are 82 normal elements.

7. *(a) State four characteristics of metals.*

(b) State four characteristics of non-metals.

Ans. (a) Metals : Those elements which have the following characteristics are called metals.

(i) They have lustre, i.e., they can be polished.

(ii) They are good conductors of heat and electricity.

(iii) They are malleable and ductile.

(iv) They are generally solids at room temperature.

(b) Non-metals : The elements which have the following characteristics are called non-metals.

(i) They have no lustre, i.e., they cannot be polished.

(ii) They are bad conductors of heat and electricity.

(iii) They are neither malleable nor ductile.

(iv) They are generally brittle solids or gases at room temperature.

8. *By giving two examples each, define :*

(i) Metalloids (ii) Noble gases.

Ans. **(1) Metalloids :** The elements which exhibit some properties of the metals and some properties of the non-metals are called metalloids.

Examples of metalloids : Germanium (Ge) and Arsenic (As).

(2) Noble gases or Rare gases or Inert gases : The elements in gaseous form, found in traces, which do not react chemically with any other element are called noble gases.

Examples of noble gases: Helium (He) and Argon (Ar).

9. *(a) What do you understand by the term atomicity of an element?*

(b) State the atomicity of the following elements :

(i) Oxygen (ii) Phosphorus (iii) Sulphur

(iv) Ozone (v) Sodium (vi) Carbon.

Ans. (a) Atomicity : The number of atoms present in one molecule of an element is called its atomicity.

(b) (i) Atomicity of oxygen (O_2) is 2.

(ii) Atomicity of phosphorus (P_4) is 4.

(iii) Atomicity of sulphur (S_8) is 8.

(iv) Atomicity of ozone (O_3) is 3.

(v) Atomicity of sodium (Na) is 1.

(vi) Atomicity of carbon (C_{60}) is 60.

10. *(a) Name two metals which cannot be kept in air or water.*

(b) Name a non-metal which is kept under water.

(c) Name two metals which are in the liquid state at room temperature (20 °C).

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

(e) Name two metals which offer very large resistance to the passage of electric current.

(f) Name an inert gas heavier than air and is given out by the earth.

(g) Name a non-metal lighter than air.

(h) Name a non-metal which is in the liquid state at room temperature.

(i) Name two non-metals which dissolve in carbon disulphide.

(j) Name two elements present in stars.

(k)Name three most common elements present in the human body.

(l) Name a non-metal having lustre.

(m) Name three elements which are attracted by a magnet.

Ans.(a) (i) Sodium (ii) Potassium **(b)** Phosphorus

(c) Mercury and gallium **(d)** Graphite

(e) Tungsten and platinum **(f)** Radon

(g) Nitrogen **(h)** Bromine

(i) Sulphur and phosphorus **(j)** Hydrogen and helium

(k) Carbon, hydrogen and oxygen **(l)** Graphite

(m) Iron, cobalt and nickel

11. *(a) What do you understand by the term compound?*

(b) State four characteristics of a chemical compound.

Ans. (a) Compound : It is a pure substance, which is composed of two or more elements, combined chemically in a fixed proportion by weight and can be broken into simpler parts or elements by chemical methods only.

(b) Characteristics of a chemical compound :

1. The nature of elements constituting a chemical compound remains the same.

2. A pure chemical compound is homogeneous in nature.

3. A chemical compound can be broken into two or more different elements. Conversely, it can be synthesised from these elements by chemical means.

4. A chemical compound has a fixed composition, i.e., elements constituting it combine in a fixed ratio by weight.

12. *(a) What do you understand by the term mixture?*

(b) State four characteristics of a mixture.

Ans. (a) Mixture : When two or more substances (elements, compounds or both) are mixed together in any proportion, such that they do not undergo any chemical change and retain their characteristics, then the resulting mass is called a mixture.

(b) Characteristics of a mixture :

1. The constituents of a mixture are present in any ratio.
2. Mixtures are a result of physical change.
3. The properties of a mixture are the average of the properties of its constituents
4. Most of the mixtures are heterogeneous in nature.

13. *(a) By giving two examples each define :*

(i)Heterogeneous mixture *(ii) Homogeneous mixture.*

(b) What is an alloy? Name two alloys and state their constituents.

Ans.(a) (i) Heterogeneous mixture : A mixture which has different composition at different points in a given mass is called a heterogeneous mixture.

Examples : Air and muddy water are heterogeneous mixtures.

(ii) Homogeneous mixture :A mixture which has uniform composition throughout is called a homogeneous mixture.

Examples: Salt solution and sugar solution are examples of homogeneous mixtures.

(b) A homogeneous solid solution of two or more metals is called an alloy.

Brass is an alloy of copper and zinc.

Bronze is an alloy of copper, zinc and tin.

14. *State four differences between a chemical compound and a mixture.*

Ans.

Mixture	Compounds
1. Mixtures are heterogeneous. 2. Mixtures are the result of physical changes. 3. Constituents of a mixture can be separated by physical means. 4. Properties of a mixture are an average of its constituents properties.	1. Compounds are homogeneous. 2. Compounds are the result of chemical changes. 3.Constituents of a compound cannot be separated by physical means. 4. Properties of a compound are entirely different from the properties of its constituents.

15. *"Water is a chemical compound". State three reasons to prove the correctness of the statement.*

Ans. (1) Pure water always contains the same elements (hydrogen and oxygen) in the fixed ratio of 1 : 8.

(2) The properties of pure water are different from the properties of hydrogen and oxygen.

(3) Pure water cannot be separated into hydrogen and oxygen by any physical means.

16. *"Air is a mixture". Is this statement correct? Give three reasons in support of your answer.*

Ans. Yes, the statement is correct.

Reasons :

(1) The composition of air is different at different places and different altitudes.

(2) The constituents of air can be easily separated by physical means.

(3) The properties of air are the mean of the properties of oxygen and nitrogen.

17. *Milk is regarded as a mixture and not a pure substance. Give one reason.*

Ans. Milk is a mixture because it is a suspension of fats, carbohydrates, proteins, vitamins and mineral salts in water.

Milk is not regarded as a pure substance as it contains more than one set of molecules which have different properties.

18. *Sugar is regarded as a pure substance, but not a mixture. Give one reason.*

Ans. Sugar is a pure substance because it contains the same elements (carbon , hydrogen and oxygen) combined in the same fixed ratio and has a definite set of properties for all its molecules.

Sugar cannot be regarded as a mixture, because we cannot separate its constituents by any physical means.

19. *Wax is regarded as a mixture and not a pure substance. Give one reason.*

Ans. Wax contains large number of hydrocarbons having carbon atoms from 22 to 30 in its molecules. As it does not have a definite composition, therefore it is regarded as a mixture.

20. *Classify the following into elements, mixtures and compounds.*

(1) Distilled water	*(2) Mercury*	*(3) Glass*
(4) Ammonia gas	*(5) Honey*	*(6) Gold*
(7) Milk	*(8) Rain water*	*(9) Oxygen*
(10) Common salt	*(11) Diamond*	*(12) Soap*
(13) Cooking gas	*(14) Ice-cream*	*(15) Graphite*
(16) Silver	*(17) Nitre*	*(18) Sea water*
(19) Apple juice	*(20) Alcohol*	*(21) Sulphur*
(22) Carbon dioxide	*(23) Sugar*	*(24) Lime stone*
(25) Dry ice	*(26) Washing soda*	*(27) Kerosene oil*
(28) Wax	*(29) Rust*	*(30) Hydrogen.*

Ans. Elements :

(1) Mercury	(2) Gold	(3) Oxygen	(4) Diamond
(5) Graphite	(6) Silver	(7) Sulphur	(8) Hydrogen

Mixtures :

(1) Honey	(2) Milk	(3) Rain water	(4) Cooking gas
(5) Ice-cream	(6) Sea water	(7) Apple juice	(8) Kerosene oil
(9) Wax.			

Compounds:

(1) Distilled water	(2) Glass	(3) Ammonia gas	(4) Common salt
(5) Soap	(6) Nitre	(7) Alcohol	(8) Carbon dioxide

(9) Sugar (10) Lime stone (11) Dry ice (12) Washing soda

(13) Rust.

21. *Give one example of each of the following types of mixture :*

(i) A solid in solid (ii)A solid in liquid (iii) A solid in gas

(iv)A liquid in liquid (v)A gas in liquid (vi) A gas in gas.

Ans. (1) Brass is an example of a mixture of a solid in solid.

(2) Common salt solution is an example of a mixture of a solid in liquid.

(3) Smoke is an example of a mixture of a solid in gas.

(4) A solution of alcohol and chloroform is an example of a mixture of a liquid in liquid.

(5) Soda water is an example of a mixture of a gas in liquid.

(6) Air is an example of a mixture of a gas in gas.

22. *You are given substances P and Q. P is a mixture of iron and sulphur and Q is iron sulphide. Describe all what you will observe and state the products formed when they are treated with (i) dilute sulphuric acid (ii) carbon disulphide.*

Ans.(i) (a) Action of dilute sulphuric acid with P : The iron present in the mixture reacts slowly with dilute sulphuric acid to form ferrous sulphate and hydrogen. Sulphur does not take part in the reaction and settles down as a yellow residue. The colour of the reaction mixture is light green on account of the formation of ferrous sulphate.

(b) Action of dilute sulphuric acid on Q : Dilute sulphuric acid reacts with iron sulphide to form ferrous sulphate solution (light green) and a colourless gas having a smell like that of rotten eggs. The gas is hydrogen sulphide.

(ii)(a) Action of carbon disulphide on P : Sulphur in the mixture dissolves to form a clear solution. Iron (grey) settles at the base as residue.

(b) Action of carbon disulphide on Q : No reaction takes place.

23. *(a) Define : (i) Filtration (ii) Filtrate.*

(b) Why common salt cannot be filtered from common salt solution?

Ans.(a) (i) Filtration : The process of separation of a insoluble solid constituent of a mixture from its liquid constituent, by passing it through some porous material is called filtration.

(ii) Filtrate : The clear liquid obtained from the mixture of an insoluble solid and a liquid by the process of filtration is called a filtrate.

(b) The size of sodium ions and chloride ions present in water is very small as compared to the size of the pores in any filter paper. Thus, these ions easily pass through the pores of the filter paper along with water, and hence cannot be filtered out.

24. ***(a)*** *Define :*

(i) Sedimentation (ii) Sediment

(iii) Supernatant liquid (iv) Decantation.

(b) *Name a suspension which can be separated by decantation.*

(c) *Why is decantation considered inferior method for separating insoluble solids from a suspension ?*

Ans. (a) (i) Sedimentation : The process in which a suspension of an insoluble fine particles and a liquid is allowed to stand undisturbed, such that the solid particles settle down, leaving the clear liquid above is called sedimentation.

(ii) Sediment : The insoluble material which settles down when a suspension is allowed to stand undisturbed is called a sediment.

(iii) Supernatant liquid : The clear liquid above the sediment, when a suspension is allowed to stand undisturbed is called a supernatant liquid.

(iv) Decantation : The process of pouring a clear supernatant liquid without disturbing the sediment, thus helping the separation of solid particles from the liquid is called decantation.

(b) Muddy water can be subjected to sedimentation and decantation to obtain clear water.

(c) (i) The constituents of a suspension, i.e., solid and liquid cannot be separated completely.

(ii) The constituents of a solid lighter than a liquid cannot be separated as they float on the surface of the liquid, rather than settling down.

25. *Define the following terms :*

(1) Evaporation *(2) Distillation* *(3) Fractional distillation*

(4) Crystallisation *(5) Chromatography.*

Ans.(1) Evaporation : The process of changing a liquid into its gaseous state, below its boiling point by the supply of external heat is called evaporation.

(2) Distillation : The process of changing a liquid into its gaseous state on boiling and recondensing the gas into the liquid by condensation in another vessel is called distillation.

(3) Fractional distillation : The process of separating two miscible liquids by the process of distillation, making use of their differences in boiling points is called fractional distillation.

(4) The process of separating solid from its saturated solution at a higher temperature, by cooling, is called crystallisation.

(5) Chromatography : The process of separation of different dissolved constituents of a mixture by adsorbing them over an appropriate adsorbent material is called chromatography.

26. *Name the process or processes used to separate the following mixtures.*

(1) Coloured dyes from black ink.

(2) Carbon particles from smoke.

(3) Iodine from a solution of iodine and alcohol.

(4) Nitrogen from liquefied air.

(5) Petrol from a mixture of petrol and mobil oil.

(6) Common salt from its salt solution.

(7) Suspended particles from river water.

(8) Drinking water from sea water.

(9) Iron from a mixture of iron fillings and sand.

(10)Nitre from a solution of nitre and common salt.

(11)Saw dust from a mixture of saw dust and zinc powder.

(12)Petrol from a mixture of petrol and water.

Ans.(1) Chromatography. **(2)** Electric precipitation.

(3) Evaporation. **(4)** Fractional distillation.

(5) Fractional distillation. **(6)** Evaporation.

(7) Sedimentation followed by decantation. **(8)** Distillation.

(9) With the help of magnet.

(10) Fractional crystallisation.

(11) Removing floating saw dust form the suspension of zinc in water by a ladle.

(12) With the help of a separating funnel.

27. *Name a mixture whose constituents can be conveniently separated from each other by :*

(i) Fractional distillation *(ii) Fractional crystallisation.*

(iii) Sublimation *(iv)Evaporation*

(v) Filtration *(vi)Liquefaction*

(vii) Chromatography *(viii) Diffusion.*

Ans.(i) A mixture of water and alcohol.

(ii) A mixture of nitre and common salt.

(iii) A mixture of ammonium chloride and common salt.

(iv) A mixture of common salt and water.

(v) A mixture of water and sand.

(vi) A mixture of ammonia and oxygen gas.

(vii) A mixture of blue black ink.

(viii) A mixture of carbon dioxide and hydrogen.

28. *Complete the table given below based on separation techniques. The first has been done as an example.*

Mixture	***Type of Mixture***	***Separation Technique***	***Principle involved***
1. *Oxygen+ nitrogen*	*Heterogeneous*	*Fractional evaporation of liquefied mixture.*	*Difference in boiling points.*
2. Sand + water			
3. *Alcohol + water*			
4. Salt + water			
5. Petrol + wax			
6. Ammonia + hydrogen			
7. Colours of blue black ink.			
8. Zinc dust and sulphur			
9. Carbon dioxide + nitrogen			
10. Sulphur + carbon disulphide			

Ans.

Mixture	Type of Mixture	Separation Technique	Principle involved
1. Oxygen + Nitrogen	Heterogeneous	Fractional evaporation of liquefied mixture	Difference in boiling points
2. Sand + Water	Heterogeneous	Filtration	One of the components is insoluble
3. Alcohol + Water	Homogeneous	Fractional distillation	Difference in boiling points.
4. Salt + Water	Homogeneous	Evaporation	One of the component has low boiling point.
5. Petrol + Wax	Homogeneous	Fractional distillation	Difference in boiling points.
6. Ammonia + Hydrogen	Homogeneous	Liquefaction	Ammonia liquefies easily as compared to hydrogen.
7. Zinc dust + Sulphur	Heterogeneous	Dissolving in carbon disulphide.	Sulphur is soluble in carbon disulphide.
8. Colours of blue black ink	Homogeneous	Chromatography	Different colours are adsorbed differently
9. Carbon dioxide + Nitrogen	Homogeneous	Diffusion	Rates of diffusion are different
10. Sulphur and carbon disulphide	Homogeneous	Evaporation	Carbon disulphide is volatile

29. *Choose the appropriate words from the list given below and complete the sentences (i) to (iv) by filling in the blanks :*

Fractional distillation, methylated spirit, evaporation, decantation, sedimentation, filtration.

(i) In a refinery, petrol is obtained from crude oil by the process of _____ .

(ii) Grass stains are removed from clothes by using the solvent _____.

(iii) Common salt is obtained from sea water by the process of _____ .

(iv) When caustic soda solution is added to aqueous copper sulphate, a blue precipitate of copper hydroxide is obtained. The copper hydroxide can be separated from mixture by the process of _____ .

Ans.(i) Fractional distillation. **(ii)** Methylated spirit.

(iii) Evaporation. **(iv)** Filtration.

30. *You are given a powdered mixture of sulphur, potassium chloride and carbon. State briefly how you would separate and collect each constituent in the solid or powder form?*

Ans. (a) Separation of potassium chloride : Prepare the suspension of mixture in water. Potassium chloride dissolves, but not carbon or sulphur. Filter the suspension and collect the clear filtrate of potassuim chloride. Evaporate the clear filtrate on low heat. Water evaporates leaving behind white potassium chloride.

(b) Separation of sulphur : Dissolve the residue in carbon disulphide. Sulphur dissolves leaving behind carbon. Filter the suspension and collect the clear filtrate. Evaporate the filtrate in shade. Carbon disulphide evaporates leaving behind sulphur.

(c) Removal and purification of carbon : Wash the residue of carbon on filter paper with carbon disulphide, so as to remove any sulphur. Dry the residue in shade. Carbon disulphide evaporates leaving behind carbon.

31. *Amongst dilute sulphuric acid, carbon disulphide and water which liquid will you select to remove sulphur sticking to a crucible?*

Ans. Carbon disulphide, as sulphur dissolves in it.

32. *What do you mean by the statement that oxygen molecule is diatomic?*

Ans. It means one molecule of oxygen consists of two atoms of oxygen.

33. *How will you obtain pure iodine from a sample of impure iodine?*

Ans. Heat the impure iodine in a china dish over a low flame. When violet fumes of iodine start coming out, place a cold inverted funnel over the china dish. The violet fumes condense on the cooler sides of the funnel to form tiny crystals of pure iodine.

34. *Describe briefly how will you remove grease stains from warm clothes?*

Ans. Grease is soluble in petrol. Rub the spot with petrol. Grease will dissolve in it.

35. *Describe briefly how will you obtain pure water from sea water?*

Ans. Sea water is boiled in a retort. The steam formed is then condensed in a cold receiver to form pure distilled water.

36. *How will you obtain a pure sample of iodine from a mixture of iodine and ammonium chloride, without heating?*

Ans. Dissolve the mixture in water. Ammonium chloride dissolves, leaving behind iodine. Filter the mixture. The insoluble iodine is left on the filter paper. Wash the crystals with distilled water so as to remove traces of ammonium chloride. Dry the crystals in the folds of a filter paper.

37. *How will you obtain pure sulphur from a mixture of coke and sulphur?*

Ans. Dissolve the mixture in carbon disulphide, when sulphur dissolves leaving behind coke. Filter the mixture and collect the clear filtrate. Allow the filtrate to evaporate in shade. Carbon disulphide evaporates, leaving behind pure sulphur.

38. *Why does a white deposit appear near the top of a test tube in which ammonium chloride is heated?*

Ans. On heating, ammonium chloride decomposes to form ammonia gas and hydrochloric acid gas. As these gases leave solid ammonium chloride, they cool and again react to form tiny crystals of ammonium chloride. These crystals deposit on the cooler parts of the test tube and appear as white deposit.

39. *How will you separate the following :*

(i) Black copper oxide from a mixture of copper oxide and zinc oxide?

(ii) Unused magnesium from a reaction between magnesium and hydrochloric acid?

(iii) Copper filings from a mixture of copper filings and iron filings.

Ans. (i) Boil the mixture with conc. sodium hydroxide solution. Zinc oxide dissolves in sodium hydroxide to form soluble sodium zincate. Copper oxide does not react.

Filter the reaction mixture. The black copper oxide is left on the filter paper. Wash it with distilled water and dry it in the folds of a filter paper.

(ii) Subject the reaction mixture to filtration. The insoluble magnesium is left on the filter paper.

(iii) Roll a strong horse shoe magnet in the mixture. The iron filings cling to the magnet, leaving behind copper.

40. *From the techniques (methods) of distillation, filtration , fractional distillation, chromatography, electrolysis, crystallisation select and write down the techniques you would use to separate :*

(i) Constituents of colouring matter in ink.

(ii) Hydrated copper sulphate from its aqueous solution.

(iii) Pure copper from a sample of impure copper.

(iv) Nitrogen gas from liquid air.

(v) Unused zinc after reaction of excess of zinc with dilute sulphuric acid.

Ans.(i) By chromatography **(ii)** By crystallisation

(iii) By electrolysis **(iv)** By fractional distillation

(v) By filtration.

41. *Briefly describe how will you carry out the following separations :*

(i) Ammonium chloride from a mixture of ammonium chloride and sand without heating the mixture.

(ii) Ammonium chloride from a mixture of ammonium chloride and sand on heating.

(iii) Iron filings from sulphur.

(iv) All the constituents of a mixture of iron, sulphur and sand.

(v) All the constituents of a mixture of saw dust, sulphur and common salt.

(vi) Iodine from a mixture of iodine and ammonium chloride.

(vii) All the constituents of gunpowder (mixture of nitre, sulphur and charcoal).

(viii) All the constituents of copper sulphate, iodine and carbon.

(ix) Hydrogen from a mixture of hydrogen and hydrochloric acid gas.

(x) Oxygen from sulphur trioxide without the use of solvent.

Ans. (i) Separation of ammonium chloride from a mixture of ammonium chloride and sand, without heating the mixture :

Dissolve the mixture in water, when ammonium chloride dissolves, but not sand. Filter the mixture and collect the clear filtrate of ammonium chloride. Evaporate the filtrate till crystallisation point is reached. Allow the solution to cool, when crystals of ammonium chloride separate out. Filter the crystals and dry them in the folds of a filter paper.

(ii) Separation of ammonium chloride from a mixture of ammonium chloride and sand by heating the mixture :

Heat the mixture in a china dish, till dense white fumes start coming. Place an inverted cold funnel on the china dish. The white fumes condense on the cooler parts of the funnel to form white powdery mass of pure ammonium chloride.

(iii) Iron filings from sulphur, without heating :

Roll a powerful horse shoe magnet in the mixture. The iron filings cling to the magnet and sulphur is left behind. Scrap the iron filings from the magnet.

(iv) All the constituents of a mixture of iron, sulphur and sand.

(a) Separation of iron : Roll a powerful horse shoe magnet in the mixture. The iron filings will cling to the magnet, leaving behind a mixture of sulphur and sand. Scrap the iron filings from the magnet.

(b) Separation of sulphur : Dissolve the left over mixture in carbon disulphide. Sulphur dissolves but not sand. Filter the mixture and collect the clear filtrate containing sulphur. Allow the filtrate to evaporate in shade. Carbon disulphide evaporates leaving behind sulphur.

(c) Separation of sand : Wash the residue on a filter paper with carbon-disulphide so as to remove traces of sulphur. Dry the residue, in the folds of a filter paper.

(v) Separation of all the constituents of a mixture of saw dust, sulphur and common salt :

(a) Separation of common salt : Dissolve the mixture in water, when common salt dissolves, but not saw dust or sulphur. Filter the mixture and collect the clear filtrate of salt solution. Evaporate the filtrate over a flame, when water evaporates, leaving behind common salt.

(b) Separation of saw dust and sulphur : Dissolve the mixture in carbon disulphide, when only sulphur dissolves. Filter the mixture. The saw dust is left on the filter paper. The clear filtrate contains dissolved sulphur. Allow the filtrate to evaporate. Carbon disulphide evaporates, leaving behind sulphur.

(vi) Iodine from a mixture of iodine and ammonium chloride :

Dissolve the mixture in water. Ammonium chloride dissolves, but not iodine. Filter the mixture. The clear filtrate of ammonium chloride is collected and iodine is left on the filter paper.

Evaporate the filtrate on a low flame till the crystallisation point.

Allow the solution to cool when crystals of ammonium chloride separate out. Filter the crystals.

(vii) Separation of all the constituents of gunpowder :

(a) Separation of nitre : Dissolve the mixture in water. Nitre dissolves but not sulphur or charcoal. Filter the mixture and collect the clear filtrate of nitre. Heat the filtrate to crystallisation point. On cooling, crystals of nitre separate out. Filter the crystals and dry them in the folds of a filter paper.

(b) Separation of carbon and sulphur : Dissolve the mixture left on the filter paper in carbon disulphide.

Sulphur dissolves but not carbon. Filter the mixture and collect the clear filtrate containing sulphur. Allow the filtrate to evaporate in shade. Carbon disulphide evaporates leaving behind sulphur.

Carbon is left on the filter paper.

(viii) Separation of the constituents of copper sulphate, iodine and carbon :

(a) Separation of copper sulphate : Dissolve the mixture in water. Copper sulphate dissolves, but not iodine or carbon. Filter the mixture. The clear solution of copper sulphate collects as filtrate, while iodine and carbon are left as residue on the filter paper.

Evaporate the filtrate to crystallisation point and then allow it to cool. The crystals of copper sulphate separate out. Filter the crystals.

(b) Separation of iodine and carbon : Dissolve the residue in methyl alcohol. Iodine dissolves, but not carbon. Filter the mixture. Insoluble carbon is left on filter paper, whereas the filtrate consists of iodine . Allow the filtrate to evaporate in shade. Methyl alcohol evaporates leaving behind crystals of iodine.

(ix) Hydrogen from a mixture of hydrogen and hydrochloric acid gas : Pass the mixture through water. Hydrochloric acid gas dissolves in water, but not hydrogen. Hydrogen gas which bubbles out of water is then collected by the downward displacement of water.

(x) Oxygen from a mixture of oxygen and sulphur trioxide : Place the mixture of gases in a freezing mixture of ice and common salt. Sulphur trioxide solidifies leaving behind oxygen.

42. *State two advantages of chromatography over the other methods of separation.*

Ans. (a) Chromatography can be carried out with a very small amount of material.

(b) The substance under investigation does not get wasted in chromatographic separation.

43. *(a) What is centrifugation?*

(b) What kind of solution / suspension is separated by centrifugation?

(c)What is the principle of centrifugation?

Ans.(a) The method of separting finely suspended particles in a liquid by whirling the liquid at a very high speed is called centrifugation.

(b) Centrifugation is employed to separate insoluble particles in a colloidal solution.

(c) It is based on the principle that when a very fine suspension of a colloidal solution is whirled rapidly, the heavier particles are forced down the bottom of the liquid and the lighter particles stay at the top.

44. *State four applications of centrifugation technique.*

Ans. (1) It is employed in milk dairies to separate cream from milk.

(2) It is employed in diagnostic laboratories for testing urine and blood samples.

(3) It is employed in blood banks to separate the different constituents of blood.

(4) It is used in drying machines to squeeze out water from wet clothes.

45. *State four characteristics of a true solution.*

Ans. 1. A true solution is always clear and transparent.

2. Particles of a solute in a true solution break down to almost molecular size and their diameter is of the order 1 nm (10^{-9} m) or less.

3. A true solution can completely pass though a filter paper as the particle size of the solute is far smaller than the size of the pores of the filter paper.

4. A true solution is homogenous in nature.

46. *State four characteristics of a suspension.*

Ans. 1. Size of the particles in a suspension is more than 10^{-5} cm in diameter.

2. The particles of a suspension can be separated from the solvent, by the process of filtration.

3. When suspension is kept undisturbed the particles of a suspension settle down.

4. A suspension is heterogeneous in nature.

47. *State four characteristics of a colloidal solution.*

Ans. 1. Size of the colloidal particles is between 10^{-9} m to 10^{-7} m.

2. The particles of a colloidal solution are visible under a powerful microscope.

3. The particles of a colloidal solution do not settle down with the passage of time.

4. The particles of a colloidal solution cannot be recovered by crystallisation or evaporation. However, they can be separated by the process of centrifugation.

48. *Classify the following as (i) true solution, colloidal solution and suspension.*

(i)Clear sea water *(ii)Muddy water* *(iii) Paints*

(iv) Milk *(v)Copper sulphate solution* *(vi) Starch solution*

Ans. (i) Clear sea water and copper sulphate solution are true solutions.

(ii) Milk and starch solution are colloidal solution.

(iii) Muddy water and paints are suspensions.

49. *Give one example each of :*

(i) aerosol

(ii) sol

(iii) true solution

Ans.(i) Fog is an example of aerosol.

(ii) Milk of magnesia is an example of sol.

(iii) Common salt solution is an example of a true solution.

50. *Give four differences between colloidal solution and suspension.*

Ans.

Colloidal solution	**Suspension**
1. The size of the particles of the solute is between 10^{-7} cm to 10^{-5} cm.	1. The size of the particles of the suspension is more than 10^{-5} cm.
2. Particles of the solute do not settle when colloidal solution is allowed to stand.	2. The particles of the suspension settle down when allowed to stand.
3. Particles of the solute cannot be filtered.	3. Particles of the suspension can be easily filtered.
4. The particles of the solute are not visible to an unaided eye.	4. The particles of the solute are visible to an unaided eye.

51. *Give four differences between true solution and colloidal solution.*

Ans.

True solution	Colloidal solution
1. The particles are not visible under a powerful microscope.	1. The particles are visible under a powerful microscope.
2. The particles of a true solution can be recovered by evaporation or crystallisation.	2. The particles of a colloidal solution cannot be recovered by evaporation or crystallisation.
3. Particles of a true solution do not scatter light.	3. The particles of a colloidal solution scatter light.
4. True solution is clear and transparent.	4. A colloidal solution is not clear and is translucent.

52. *Rain water stored in a tank contains grains of sand, unfilterable clay particles, calcium carbonate, small pieces of paper and air bubbles. Select amongst these one example of*

(i) Solute, (ii) Solvent, (iii) Colloidal solution and (iv) Suspension.

Ans.1. Bubbles of dissolved air is the solute.

2. Water is the solvent.

3. Clay particles in water is the colloidal solution.

4. Sand and calcium carbonate are examples of suspensions.