Level – 1

1. B

   Solution - The reaction in which substance is decomposed on heating to give its constituent element is called decomposition reaction.

2. D

   Solution – $HCl + NaOH \longrightarrow NaCl + H_2O$

3. B

   Solution - Sodium chloride (NaCl) and silver nitrate (AgNO3) are both solids that are highly soluble in water. They give a double displacement reaction where the ions switch places and give sodium nitrate (NaNO3) and silver chloride (AgCl) as the products.

4. C

   Solution - The change of state of substance from gas to liquid is called condensation.

5. D

   Solution – Atomicity is the total number of atoms present in one molecule of an element or a substance.

6. C

   Solution - Freezing is a phase transition in which a liquid turns into a solid when its temperature is lowered to or below its freezing point.

7. B

   Solution - Rust is the product of a combination reaction of iron and oxygen, rust is formed when iron reacts with oxygen in moist air. The following chemical equation represents the reaction $4Fe + 3O_2 \rightarrow 2Fe_2O_3$.

8. A

Solution – Simple Distillation is the joint process of vapourisation and condensation. We use this method for the purification of liquids which boil without decomposition and contain non-volatile impurities.

9. B

Solution – Redox reaction are those where oxidation and reduction occur simultaneously.

10. C

Solution – Mixtures are unlike chemical compounds, because the substances in a mixture can be separated using physical methods such as filtration, freezing, and distillation. The formation of mixture does not involve any energy change.

11. C

Solution - The reaction is an example of Double displacement reaction. It is a type of reaction in which the reactants of both the compound interchanges. The reaction between Barium chloride and Copper sulphate the products will be Barium sulphate and copper chloride. Barium sulphate settles down in the container in which the reaction takes place. Barium sulphate is the precipitate of the reaction.

12. D

Solution – The freezing point of water is 0°Celsius, 273.15 Kelvin.

13. A

Solution – The following reaction is redox because CuO is reduced to Cu, hydrogen is oxidised to H_2O. The CuO releases its oxygen and it was gained by hydrogen.

14.A

Solution - A neutralization reaction is when an acid and a base react to form water and a salt and involves the combination of H^+ ions and OH^- ions to generate water.

15.B

Solution – Density is mass per unit volume of substance.

16.B

Solution - Melting point analysis can also provide information about the purity of a sample. A substance containing soluble impurities usually melts at a lower temperature than the pure compound.

17.D

Solution – The gas that turns lime water milky is SO_2 and CO_2.

18.D

Solution - Silica, SiO2, is a chemical compound that is composed of one silicon atom and two oxygen atoms. It appears naturally in several crystalline forms, one of which is quartz.

19.C

Solution – In neutralization reaction acid reacts with base.

20. A

Solution - At temperatures above 32°F (0°C), pure water ice melts and changes state from a solid to a liquid water 32°F (0°C) is the melting point.

21.A

Solution - Formation SO3 from SO2 and O2 is a combination reaction. This is also an intermediate state of the manufacture of sulphuric acid and acid rain.

22. A

Solution - The pressure influences the boiling point of water. When atmospheric pressure increases, the boiling point becomes

higher, and when atmospheric pressure decreases, the boiling point becomes lower.

23. A

Solution - Calcium carbonate is strongly heated until it undergoes thermal decomposition to form calcium oxide and carbon dioxide.

24. A

Solution - Ammonia is formed by the bacterial decomposition of urea, therefore ammonia has a pungent smell.

25. B

Solution - Magnesium is acting a reducing agent because it reduces hydrogen to hydrogen gas while being oxidized in the process.

26. C

Solution – Catalyst added to a chemical reaction changes the speed of reaction.

27. C

Solution – Critical temperature is the temperature above which a gas cannot be liquefied.

28. B

Solution - The water begins to boils at 150oC the pressure is greater than atmospheric pressure is greater than atmospheric pressure beacuse as the greater the pressure, the more energy required for liquids to boil, and the higher the boiling point.

29. C

Solution - Substances with higher boiling points condense on the lower trays in the column. So in fractional distillation of petroleum, the liquid with the highest boiling point, condenses in lower tray.

30. B

Solution - $Pb(NO_3)_2 \longrightarrow PbO + NO_2 + O_2$

X - NO_2 and Y – O_2

31. D

Solution - The method that can be used to remove impurities from an organic liquid is fractional distillation because it takes care of the different boiling points.

32. D

Solution – Redox reaction are useful in bleaching industry, extraction of metals and dying industry.

33. A

Solution - Filtration can be used to separate components of a mixture of an insoluble solid and a liquid.

34. D

Solution - As the reduction potential for Zn is low it can replace Fe in salts.

35. B

Solution - As for an exothermic reaction, yield of products will be maximum. The reaction is exothermic and the yield of SO_3 will be maximum under conditions of low temperature, high pressure and increase in concentration of SO_2 and O_2.

36. B

Solution - When an electric current is passed through water, "Electrolysis of water" occurs, which is the decomposition of water i.e. H_2O into hydrogen gas i.e. H_2 and oxygen i.e. O_2.

37. A

Solution - Iodine is removing the hydrogen from H_2S so iodine is the oxidizing agent.

38. D

Solution – In our body the catalyst which helps to breakdown food is digestive enzymes.

39. A

Solution – Heating of wax is melting of wax which is a physical change. In melting of wax, only the state of wax changes from solid to liquid.

40. C

Solution - LPG gas is basically propane and butane, and it is odourless in its natural state. The smell that you notice when there is a leak is actually of an entirely different agent, called Ethyl Mercaptan. Ethyl Mercaptan is added to the gas, which possesses that strong odour of rotten cabbages. The smell helps us detect when there is a leak, which actually makes a lot of sense from a safety and security perspective.

41.B

Solution - Naphthalene is a sublimate which on heating changes to gaseous state directly. Hence to separate a volatile compound (sublimate) from a non-volatile compound (non-sublimate), the sublimation process is used.

42. B

Solution - Alcohol and water have different boiling points. The alcohol has a smaller boiling point than water. Heat the mixture and the first to evaporate is alcohol. It will cool and condense to form a liquid. It would be collected in a beaker. The same thing will be done with the water. Both chemicals are now separated from their mixture.

43. B

Solution – $Fe_2O_3.xH_2O$

44. D

Solution - When H_2S reacts with Cl_2, sulphur (S) and HCl are formed. In this reaction, the H_2S is changing into S i.e. hydrogen is being removed from hydrogen sulphide. Removal of hydrogen

from a substance is known as oxidation. In other words, Cl_2 is reduced to HCl.

45. A

Solution - An endothermic reaction, on the other hand, absorbs energy from its surroundings in the form of heat.

46. A

Solution - The following reaction is redox because CuO is reduced to Cu, hydrogen is oxidised to H_2O. The CuO releases its oxygen and it was gained by hydrogen.

Level – 2

1. A

Solution – The water boils when saturated vapour pressure of water becomes equal to the atmospheric pressure.

2. B

Solution - Evaporation can take place at temperatures below boiling point since the molecules in the liquid have different energies.

3. C

Solution - Sublimation is the transition of a solid substance matter directly from the solid to the gas phase without passing through the liquid phase. Copper sulphate does not have property of sublimation.

4. B

Solution - $CaCO_3 \rightleftharpoons CaO + CO_2\uparrow$

5. A

Solution – Salt, when placed on top of a melting ice cube, will dissolve in the little bit of water that melts first, and the

dissolved salt lowers the melting temperature of the ice it's in contact with.

6. D

Solution – Air – mixture, O_2 – element, copper sulphate – salt, sodium hydroxide – base.

7. B

Solution – Air is a mixture of many elements and gases so it is not a compound.

8. D

Solution – Reduction is a process which involves removal of oxygen, addition of hydrogen.

9. B

Solution – The boiling point of water is 373K.

Subjective question

1. Solid, liquid and gases are as follows :-

Solid	Liquid	Gas
retains a fixed volume and shape.	Takes the shape of the part of the container which it occupies.	Takes the shape and volume of its container.
compressible	Cannot be compressible	Cannot be compressible
particles can move past one another	particles can move past one another	particles cannot move past one another

2. i. Latent heat of fusion - The latent heat of fusion is the heat energy required to change 1 kg of solid to gas at atmospheric pressure at it's melting point.

ii. Latent heat of vaporization - The latent heat of vaporisation is the heat energy required to change 1 kg of liquid to gas at atmospheric pressure at it's boiling point.

3. Solid – Chair and almonds

Liquid – Cold drinks

Gases - Air, smell and smell of perfume

4. Diffusion is a process by which a substance spread evenly in the container or environment. Substances diffuse from areas of high concentration to low concentration. Gases are having lot of interparticle spaces between them and they can move anywhere. And because of large interparticle spaces and kinetic energy they diffuses faster.
5. Order of increasing density –
   air < exhaust from chimney < cotton < water < honey < chalk < iron.
6. a. The rate of evaporation is affected by the following factors –
   i. Temperature: The rate of evaporation increases with an increase in temperature.
   ii. Surface area: The rate of evaporation increases with an increase in surface area.
   iii. Humidity: The amount of water vapour present in the air is called humidity. The rate of evaporation decreases with an increase in humidity.
   iv. Wind speed: Evaporation increases with an increase in wind speed.

   b. Evaporation will be faster far away from the sea because the air above the sea may have a lot of water vapours and so the humidity will also be more while far away from the sea the water vapour content would be less and hence evaporation will be faster far away from sea.

7. Water can be separated from salt solution by simple distillation. This method works because water has a much lower boiling point than salt. When the solution is heated, the water evaporates. It is then cooled and condensed into a separate container.

8. The different kind of mixtures are homogenous and heterogenous. The substances in a mixture can be separated using physical methods such as filtration, freezing, and distillation. There is little or no energy change when a mixture form. Mixtures have variable compositions, while compounds have a fixed, definite formula.

- Homogenous - In a homogenous mixture, they tend to completely mix and you are unable to see the different components.

- Heterogenous - In heterogeneous mixtures, you can see the different aspects that make up the mixture and they can be separated.

9. Air is a mixture and not compound because of the following reasons - Air can be separated into its components like N2, O2 , Argon and CO2 by the process of fractional distillation of liquid air. Air shows the properties of all the gases present in the atmosphere. Air does not have a fixed formula. Air has a variable composition because air at differen places contains different amount of gases. Heat or Light energy is neither absorbed nor released when air is prepared physical by mixing required amount of gases. Mixture does have fixed boiling point. It holds good in case of liquid air.

10. i. Chromatography - Chromatography is a physical method of separation that distributes components to separate

between two phases, one stationary (stationary phase), the other (the mobile phase) moving in a definite direction.

ii. Crystallization - Crystallization is the solidification of atoms or molecules into a highly structured form called a crystal. It can also be refer to the solid-liquid separation and purification technique in which mass transfer occurs from the liquid solution to a pure solid crystalline phase.

iii. Centrifugation - Centrifugation is the process where a mixture is separated through spinning. It is used to separate skim milk from whole milk, water from your clothes, and blood cells from your blood plasma.

iv. Sedimentation - The process of particles settling to the bottom of a body of water is called sedimentation.

v. Decantation - Decantation is pouring out of upper clear layer of liquid into another container to separate two immiscible liquids.

Technique to separate –

i. Centrifugation
ii. Distillation
iii. Sublimation

11. Blood – mixture
Common salt – compound
Sugar – compound
Brass – mixture

12. Liquefaction refers to the change of phase from a gas to a liquid. Condensation refers to the change of phase from a gas to either a liquid or a solid. When ice crystals condense out of humid air it is just as much a process of condensation as when water droplets condense out of humid air.

13. Using a bar magnet the iron fillings must be separated from the mixture. Now we are left with camphor and common salt. Sublimation - Place the mixture in a china dish on a tripod stand and place an inverted funnel on top of it. Cover the mouth of the funnel using a cotton plug. Heat the mixture. Camphor sublimes due to the heat and cools and becomes a solid on the underside of the funnel. Common salt is left on the china dish.

14. Physical changes are limited to changes that result in a difference in display without changing the composition. Some common changes are: Texture, Color, Temperature, Shape, Change of State (Boiling Point and Melting Point are significant factors in determining this change.)

    Chemical changes, on the other hand, are quite different. A chemical change occurs when the substance's composition is changed. When bonds are broken and new ones are formed a chemical change occurs. The following are indicators of chemical changes: Change in Temperature, Change in Color, Noticeable Odor (after reaction has begun), Formation of a Precipitate, Formation of Bubbles.

15. Liquids always tend to flow, because the intermolecular forces between molecules is less. However in solids, the bonds are very strong and prevent molecules from moving around. Liquids often are volatile and take the shape of the container, since the molecules are more free to move around.