3. Chemical Reactions and Equations

Extra Questions

Q. 1) When barium chloride solution is added to sodium sulphate solution.

Ans :– Barium chloride solution is added to sodium sulphate solution then white precipitate is formed.

Q. 2) $C_{12}H_{22}O_{11} \rightarrow$ _____ C + _____

Ans :– 12, $11H_2O$

Q. 3) A chemical substances which bring about an oxidation reaction by making oxygen available are called ….

Ans :– Oxidants.

Q. 4) The substance that brings about reduction is called ….

Ans :– Reductant.

Q. 5) The chemical reaction in which reactants gain hydrogen or a reactant loses oxygen to from the product is called reaction.

Ans :– Reduction

Q. 6) Identify from the following reactions that reactants that undergo oxidation and reduction.

i) $HCl + NaOH \rightarrow NaCl + H_2O + heat$

ii) $KNO_3(s) + H_2O + Heat \rightarrow KNO_{3\,(aq)}$

Ans :– i) Exothermic Reaction.

ii) Endothermic Reaction.

Q. 7) Distinguish between the following-

Ans :–

Oxidation	Reduction
1) The chemical reaction in which reactant gain oxygen or loses hydrogen to form the product is oxidation.	1) The chemical reaction in which reactant gain hydrogen or loses oxygen to form the product is called reduction.
2) A reducing agent undergoes oxidation.	2) An oxidizing agent undergoes.
3) For example: Mg + O_2 → 2MgO	3) For example: MgH_2 → Mg+ H

Q. 8) The rate of a reaction depends upon the size of the particles of the reactants taking part in the reaction. Is the following statement true or false?

Ans :– True.

Q. 9) Glucose combines with oxygen in our body and provides energy. The reaction is exothermic

Ans :– True

Q. 10) Chemical reactions in which reactants gain oxygen are reduction reactions.

Ans :– False, chemical reactions in which reactants gain oxygen are reduction reactions.

Q. 11) Organic waste is decomposed by micro-organisms thus produce manure and biogas formed

Ans :– True

Q. 12) (Identify the type of reactions)

$CaO + H_2O \rightarrow Ca(OH)_2 + heat$

Ans :– Exothermic Reaction

Q. 13) Match the following

Column A	Column B
1) Decomposition	1) $CH_3 - CH_2 - OH$
2) Reduction	2) $2Cu + O_2 \rightarrow 2CuO$
3) Oxidation	3) $NH_{3(g)} + Cl$
4) Rusting of iron	4) $C_{12}H_{22}O_{11} \xrightarrow{\Delta} 12C + 11H_2O$
	5) $MgH_2 + Mg + H_2$

Ans :– Column A Column B

1) Decomposition	1) $C_{12}H_{22}O_{11} \xrightarrow{\Delta} 12C + 11H_2O$
2) Reduction	2) $MgH_2 + Mg + H_2$
3) Oxidation	3) $CH_3 - CH_2 - OH$
4) Rusting of iron	4) $2Cu + O_2 \rightarrow 2CuO$

Q. 14) ……. Is formed on mixing yeast in glucose solution under proper condition.

Ans :– Alcohol

Q. 15) When oil and fats are oxidized or even allowed to stand in air for a long time, they become ……

Ans :– rancid

Q. 16) Zink strip is dipped in a $CuSO_4$ solution this reaction is …..

Ans :– displacement reaction.

Q. 17) The slow process of decay or destruction of a metal due to effect of air moisture and acids on it is known as ….

Ans :– Corrosion.

Q. 18) Iron articles rust readily whereas steel which is also mainly made of iron does not undergo corrosion.

Ans :–(1) Iron articles rust readily as iron reacts with oxygen and moisture of air to convert into its hydroxide and oxide ($Fe_2O_3.xH_2O$) while steel is an alloy of iron, carbon and chromium.

(2) The properties of an alloy are different from the properties of an alloy are different from the properties of its constituents. The added metals increase its resistance to corrosion. It is more durable and clean.

Q. 19) The rate of a reaction increases on increasing the temperature, is the following statement true or false?

Ans :– True

Q. 20) Complete the analogy

$$2C_2H_5OH + 2Na \rightarrow 2C_2H_5ONa + H_2$$

Displacement :: $CuO + H_2 \rightarrow Cu + H_2O$

Ans :– Reduction

Q. 21) Complete the analogy

$$CuCl_2 + 2KI \rightarrow CuI_2 + 2KCL$$: Double

Displacement :: $Zn + HCl \rightarrow ZnCl_2 + H_2$

Ans :– Displacement Reaction

Q. 22) Write down the physical states of reactants and products in following reactions.

a) $SO_2 + 2H_2S \rightarrow 3S + 2H_2O$

Ans :– $SO_{2(g)} + 2H_2S_{(g)} \rightarrow 3S_{(s)} + 2H_2O_{(aq)}$

Q. 23) Why are the combination reactions called as the opposite of the decomposition reactions?

Ans :– When a decomposition reaction takes place, one substance is broken down into two or more substances by using heat, light or electric energy.

When a combination reaction takes place, two or more substances get combined and from a single substance. Hence the combination reactions.

Q. 24) Antioxidants are used while packing foods prepared in ghee or oil.

Ans :– The atmospheric oxygen has an effect on the ghee or oil by oxidizing it. When the ghee or oil becomes oxidised it makes the food rancid, which cannot be consumed. Packed food products that are fried in oil or ghee contains anti oxidants that prevent oxidation. Thus antioxidants are used while packing foods prepared in ghee or oil.

Q. 25) What is the importance of a chemical equation?

Ans :– (1) Reactants are converted into products

(2) Mass is conserved.

(3) Atoms are conserved.

(4) The properties and compositions of the products of a chemical reaction are different from those of its reactants.

(5) Generally, energy is either absorbed or evolved.

Q. 26) What is Rancidity?

Ans :– Foods containing oil or fat generally loose their taste or acquire. An odour if kept for a long time. this change in taste is termed as rancidity e.g. chips, wafers, lays etc. kept for a long time.

Q. 27) What is a catalyst?

Ans :– A catalyst is substance that modifies the rate of a chemical reaction without itself under going any permanent chemical change.

E.g. MnO_2 behaves as a catalyst in the decomposition of potassium chloride to potassium chloride and oxygen gas.

$$2KClO_3 \xrightarrow[MnO_2]{\Delta} 2KCl + 3O_2$$

Q. 28) What is an oxidant ?

Ans :– An oxidant is a substance which brings about oxidation of a substance Oxidants provide oxygen or remove hydrogen.

E.g. In the reaction, between copper oxide and hydrogen, copper oxide is an oxidant as it supplies oxygen to hydrogen and oxidises it to water.

$CuO + H_2 \uparrow\rightarrow Cu + H_2O$

Q. 29) Differentiate between Dissolution and chemical Reaction.

Ans :–

Dissolution	Chemical Reaction
1) Dissolution is a physical change.	It is a chemical change.
2) Solute is added to solvent during this prosess. e.g. common salt dissolved in water.	Reactants undergo a reaction to form products e.g. salt (Nacl) + $AgNO_3$ → AgCl ↓ $NaNO_3$

Q. 30) What is oxidation ?

Ans :– In process of oxidation, substance gets oxidised. It is a chemical reaction in which oxygen is addled to a substance. It also take place in any of the following cases.

- Hydrogen is removed from a substance

- Loss of electrons.

Q. 31) Complete the reaction and state the type of reaction.

$$C_{12}H_{22}O_{11} \xrightarrow{\Delta} - - - - - - - - - -$$

Ans:- $C_{12}H_{22}O_{11} \xrightarrow{\Delta} -12C + 11H_2O$

Q. 32) Sugar is heated.

Ans :– When sugar is heated, it decomposes to form carbon (black substance).

$$C_{12}H_{22}O_{11(s)} \xrightarrow{\Delta} -12C_{(s)} + 11H_2O_{(g)}$$

Sugar carbon

Q. 33) Lead is added to copper sulphate solution.

Ans :– When lead is added to copper suphate solution, more reactive lead displaces less reactive copper from copper sulphate. The colourless lead sulphate solution is formed with evolution of heat

$CuSO_{4(aq)} + Pb_{(s)} \rightarrow PbSO_{4(aq)} + Cu_{(s)} + Heat$

Lead Lead sulphate

Q. 34) Match the following

Column A	Column B
1) Catalyst	1) CaO
2) Oxidant	2) MnO_2
3) Slaked time	3) $Na_2 + SO_4$
4) Lime Stone	4) H_2O_2
	5) $CaCO_3$

Ans:-

Column A	Column B
1) Catalyst	1) MnO_2
2) oxidant	2) H_2O_2
3) Slaked time	3) CaO

4)Lime stone 4) $CaCO_3$

Q. 35) What is a chemical reaction? How is it represented?

Ans :– In the process of chemical reaction, some substances undergo the process of breaking of bond, and get transformed into new substance by formation of new bonds. A chemical reaction is represented by writing a chemical equation.

Q. 36) What is nascent oxygen?

Ans :– Nascent oxygen is a state prior to the formation of the O_2 molecule. It is the relative form of oxygen. it is represented by writing the symbol as [O].

Q. 37) What happens when copper reacts with the concentrated nitric acid? Given balanced chemical equation.

Ans :– When copper reacts with the concentrated nitric acid, reddish coloured poisonous nitrogen dioxide gas, copper nitrate and water are formed.

$$Cu_{(s)} + 4HNO_{3(aq)} \rightarrow Cu(NO_3)_{2(aq)} + 2NO_{2(g)} + 2H_2O_{(l)}$$

Concentrated

Q. 38) Define the Balanced equation.

Ans :– The equation in which the number of atoms of the elements in the reactants is same as the number of atom of those elements in the products is a balanced equation.

Q. 39) Define the unbalanced equation.

Ans :– When the number of atoms of each elements are not the same on the two sides of an equation, it is called an unbalanced equation.

Q. 40) Distinguish between the following-

Ans :– a)

Physical change	Chemical change
1) In a physical change, the composition of matter remains same.	1) In chemical change the composition of matter changes.
2) It is reversible change, as it is temporarty in nature.	2) It is irreversible, that is permanent in nature.
3) New substances are not formed in this process.	3) New substances are formed in this process.

b)

Endothermic Reaction	Exothermic Reaction
1) During endothermic reaction heat is either absorbed from the surroundings or has to be supplied continuously from outside.	1) During endothermic reaction heat is given away when reactants are transformed into products.
2) In this reaction, temperature of the resulting solution decreases. e.g $CaCO_{3(S)}$ + heat → $CaO_{(s)}$ + $CO_{2(s)}$	2) In this reaction temperature of the resulting solution increases. e.g. $CaO_{(g)}$ + $H_2O_{(l)}$ → ca $(OH)_{2(aq)}$ + heat
3) New substances are not formed in this process.	3) New substances are formed in this process.

Q. 41) Why are the physical states of reactants and products mentioned while writing a chemical equation?

Ans :–1) When the physical states of the reactants and products are mentioned with the chemical formulae, the chemical equation becomes more informative.

(2) The gaseous, liquid, aqueous and solid states of reactants and products are represented by the notations (g), (l), (aq) and (s). The word aqueous (aq) is written if the reactant or product is present as a solution in water.

Q. 42) Give reason. Silver Nitrate is used in the voter -ink .

Ans :– i) silver nitrate is soluble in water and makes an inky black solution. ii) When this solution is put on the skin, silver nitrate reacts with the salt present on it to form silver chloride. iii) Silver chloride is not soluble in water and clings to the skin. It cannot be washed off with soap and water. Iv) The ink will disappear. Only when the old skin cells die and get replaced by the new one.

Q. 43) Explain the term – Endothermic Reaction.

Ans :– 1) The reaction in which heat is either absorbed from the surroundings or has to be supplied continuously from outside is called endothermic reaction for example,

$CaCO_{3(s)} + heat \rightarrow CaO_{(s)} + CO2_{(g)}$

2) When calcium carbonate is strongly heated, it decomposes to form calcium oxide powder and carbon dioxide gas.

Q. 44) Double Displacement reaction.

Ans :– 1) The reactions in which the ions in the reactants are exchanged to form a precipitate are called as double.

2) For example, when silver nitrate solution reacts with sodium chloride, solution, silver chloride and sodium nitrate are formed.

$AgNO_{3(ag)} + NaCl_{(ag)} \rightarrow AgCl\downarrow + NaNO_{3(ag)}$

3) While precipitate of AgCl is formed by present in the reactants. Therefore, it is a double displacement reaction.

Q. 45) Decomposition Reaction

Ans :– The chemical reaction in which two or move products are formed from a single reactant is called decomposition reaction Decomposition reaction takes place when heat, light or electricity is applied. E.g. when calcium carbonate is heated, it decomposes to give calcium oxide and carbon dioxide

$$CaCO_{3(s)} \xrightarrow{\Delta} CaO_{(s)} + CO_2 \uparrow$$

Q. 46) Differentiate in slow reaction, fast reaction

Ans :–

Slow reaction	Fast Reaction
1) Iron article undergoes rusting	1) Cooking gas starts burning on ignition.
2) Erosion of rocks take place to form soil.	2) Effervescence is formed on adding baking soda into test tube.
3) Alcohol is formed on mixing yeast in glucose solution under proper condition	3) A white precipitate is formed on adding dilute sulphuric acid to barium chloride solution

Q. 47) What are the factors affecting the rate of chemical reaction

Ans :– The factors affecting the rate of chemical reaction are as follows –

a) Nature of the reactants

b) size of the particles of the reactants

c) concentration of the reactants

d) temperature of the reaction

e) catalyst

Q. 48) Explain the factors affecting the rate of a chemical reaction

Ans :– Following are the factors affecting the rate of chemical reaction are as follows

1) Nature of the reactants :- It influence the rate of a chemical rection. For example, Al is more reactive than Zn. Therefore, Aluminum reacts with dilute hydrochloric acid at a faster rate than zinc than zinc to form salt and hydrogen gas.

2) Size of the particles of the reactants :- Smaller the size of the reactant particles, higher is the rate of the reaction for example, in the reaction of Shahabad tile with dilute hydrochloric acid, CO_2 effervescence is formed slowly with the pieces of Shahabad tile while at a faster speed with the powder of Shahabad tile.

3) Concentration of the reactants :- Rate of a reaction is proportional to the concentration of reactants. For example, dilute HCl reacts slowly with $CaCO_3$ and thereby $CaCO_3$ disappears slowly and CO_2 also liberates slowly. On the other hand, the reaction with concentrated HCl takes place rapidly and $CaCO_3$ disappears fast.

4) Temperature of the reaction :- Rate of the reaction increases with the increase in temperature.

5) Catalyst :- When a catalyst is present in chemical reaction, it increases the rate of the reaction. For example, on heating, potassium chlorate ($KClO_3$) decomposes slowly. But $KClO_3$ decomposes rapidly in the presence of MnO_2 to liberate O_2 gas. The reaction is represented as,

$$2KCLO_3 \xrightarrow[MnO_2\ (catalyst)]{\Delta} 2KCl + 3O_2\ (catalyst)$$

Q. 49) How will you indicate the following effects in a chemical equation? Given suitable examples

i) A solution made in water

ii) Heat is to be given from outside.

iii) Heat is released during a reaction.

Ans :– i) A solution made in water is indicated by putting the letter ‘aq’ in brackets after their formula for example. $CuSO_{4\,(aq)}$.

ii) When heat is to be given from outside to bring about a reaction, it is indicated by the Δ sign written above the arrow that indicates the direction of reaction.

for example, $CaCO_{3(s)} \xrightarrow{\Delta} CaO_{(s)} + CO_2 \uparrow$

iii) When heat is released during a reaction, it is indicated by writing ‘+Heat” on right side of the equation.

For e.g. $CuSO_{4(aq)} + Zn_{(s)} \rightarrow ZnSO_{4(aq)} + Cu_{(s)} + Heat$

Q. 50) What are the sign conventions followed while writing a chemical equation?

Ans :– 1) When a chemical equation is given, the reactants are written on the left hand side while the products on the right had is drawn in between them. This arrow indicates the direction reaction.

2) If the reactants and products are two or more they are linked with a plus sign (+) in between them.

3) To make the chemical equation move informative the physical state of the reactants and products are indicated in the equation. The letters (g), (l) and (s) are used for gaseous, liquid and solid states upward arrow (↑) for gaseous product and downward around (↓) for precipitate and letters (aq) after formula for solution in water.

4) When heat is given outside to bring about a reaction, it is given outside to bring about a reaction, it is indicated by the sign Δ written above the arrow that indicates the direction of the reaction. When heat is released during the reaction, it is indicated by writing (+Heat) along with products.

5) It is necessary to fulfill certain conditions like specific temperature, pressure, catalyst etc. to bring about some reactions. These conditions are indicated below or above the arrow indicating the direction of the reaction

6) Special information or names of reactants or products are written below their formulae.

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