

UNIT I: CHEMICAL SUBSTANCES: NATURE AND BEHAVIOUR

CHAPTER

1

CHEMICAL REACTIONS

Syllabus

Chemical equation, balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions: Combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction.



STAND ALONE MCQs

(1 mark each)

Q. 1. Which of the following is not a physical change?

- (A) Boiling of water to give water vapour
- (B) Melting of ice to give water
- (C) Dissolution of salt in water
- (D) Combustion of liquified petroleum gas (LPG)

Ans. Option (D) is correct.

Explanation: During combustion of liquified petroleum gas (LPG), it forms CO_2 and H_2O .

Q. 2. Which one of the following processes involve chemical reactions?

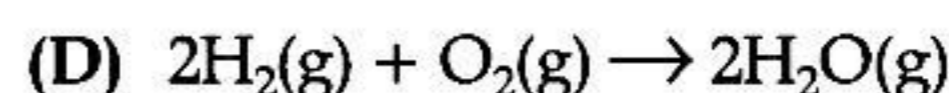
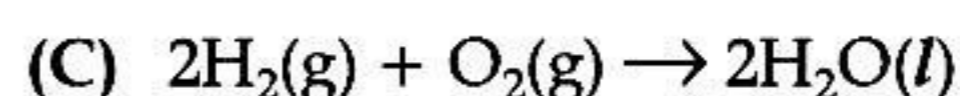
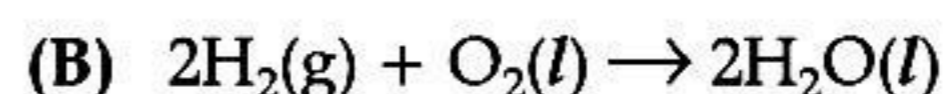
- (A) Storing of oxygen gas under pressure in a gas cylinder
- (B) Liquification of air
- (C) Keeping petrol in a china dish in the open
- (D) Heating copper wire in presence of air at high temperature

Ans. Option (D) is correct.

Explanation: Chemical changes involve formation of new compounds from one or more substances. On heating copper wire in presence of air at high temperature copper (II) oxide is formed.

Q. 3. In which of the following chemical equations, the abbreviations represent the correct states of the reactants and products involved at reaction temperature?

- (A) $2\text{H}_2(l) + \text{O}_2(l) \rightarrow 2\text{H}_2\text{O}(g)$



Ans. Option (C) is correct.

Explanation: It is because, the standard state for hydrogen and oxygen is gas and for water is liquid at reaction temperature.

Q. 4. The reaction in which a substance or substances undergo change to produce new substances with new properties is called

- (A) A biochemical reaction
- (B) A nuclear reaction
- (C) A physical reaction
- (D) A chemical reaction

Ans. Option (D) is correct.

Explanation: A reaction in which a substance is changed to one or more new substances is called a chemical reaction.

Q. 5. Which of the following conditions is necessary for a chemical reaction?

- (A) It must be accompanied with change in temperature and pressure.
- (B) At least one of the reactants must be in a fixed quantity.
- (C) It must follow the law of conservation of mass.
- (D) All of the above.

Ans. Option (C) is correct.

Explanation: A chemical reaction must follow the law of conservation of mass.

Q. 6. There is an equation 'X', which contains equal number of atoms of each element on both the sides. What is 'X'?

- (A) A balanced equation
- (B) An unbalanced equation
- (C) A chemical equation
- (D) All of the above

Ans. Option (A) is correct.

Explanation: A balanced equation is the one in which the atoms of every element will be the same on both the sides of the equation.

Q. 7. Which among the following is not a physical change?

- (A) Evaporation of petrol
- (B) Burning of liquified petroleum gas (LPG)
- (C) Heating of an iron rod to red hot.
- (D) Sublimation of solid ammonium chloride U

Ans. Option (B) is correct.

Explanation: Changes which are temporary with no new substance being formed, are known as physical changes.

Change in which one or more new substances are formed is known as chemical change.

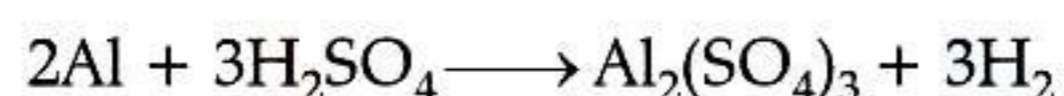
Q. 8. In the given equation, what does 'X' stand for?



- (A) 2 (B) 3
- (C) 1 (D) 5

Ans. Option (B) is correct.

Explanation: The X value is 3 because, to balance the given equation, the number of atoms of each element should be same on both the sides.



Q. 9. Which of the following reactions is an endothermic reaction?

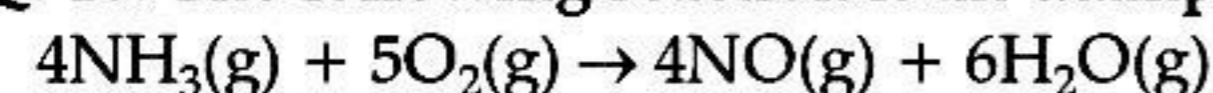
- (A) Burning of coal.
- (B) Decomposition of vegetable matter into compost.
- (C) Process of respiration.
- (D) Decomposition of calcium carbonate to form quick lime and carbon dioxide.

[Board SQP, 2020]

Ans. Option (D) is correct.

Explanation: The reactions which require energy in the form of heat, light or electricity to break reactants are called endothermic reactions.

Q. 10. The following reaction is an example of a



- (i) Displacement reaction
 - (ii) Combination reaction
 - (iii) Redox reaction
 - (iv) Neutralisation reaction
- (A) (i) and (iv) (B) (ii) and (iii)
 - (C) (i) and (iii) (D) (iii) and (iv)

Ans. Option (B) is correct.

Explanation: The given reaction is a redox reaction because oxidation and reduction both take place simultaneously. Also, it is a displacement reaction because hydrogen of NH_3 has been displaced by oxygen.

Q. 11. Three beakers labelled as A, B and C each containing 25 mL of water were taken. A small amount of NaOH, anhydrous $CuSO_4$ and NaCl were added to the beakers A, B and C respectively. It was observed that there was an increase in the temperature of the solutions contained in beakers A and B, whereas in case of beaker C, the temperature of the solution falls. Which one of the following statement(s) is (are) correct? U

- (i) In beakers A and B, exothermic process has occurred.
 - (ii) In beakers A and B, endothermic process has occurred.
 - (iii) In beaker C, exothermic process has occurred.
 - (iv) In beaker C, endothermic process has occurred.
- (A) (i) only (B) (ii) only
 - (C) (i) and (iv) (D) (ii) and (iii)

Ans. Option (C) is correct.

Explanation: In beakers A and B, heat is given out, so the temperature of the solution increases, hence it is an exothermic reaction while in beaker C, heat is absorbed from water, so temperature falls, hence it is an endothermic process.

Q. 12. A dilute ferrous sulphate solution was gradually added to the beaker containing acidified permanganate solution. The light purple colour of the solution fades and finally disappears. Which of the following is the correct explanation for the observation?

- (A) $KMnO_4$ is an oxidising agent, it oxidises $FeSO_4$.
- (B) $FeSO_4$ acts as an oxidising agent and oxidises $KMnO_4$.
- (C) The colour disappears due to dilution; no reaction is involved.
- (D) $KMnO_4$ is an unstable compound and decomposes in presence of $FeSO_4$ to a colourless compound.

Ans. Option (A) is correct.

Explanation: A dilute ferrous sulphate solution was gradually added to the beaker containing acidified permanganate solution. A permanganate solution is usually purple in colour. The light purple colour of the solution fades and finally disappears. This is because potassium permanganate ($KMnO_4$) is relatively an unstable compound, it tends to decompose in the presence of ferrous sulphate ($FeSO_4$). This changes the colour of the solution from purple to colourless. $FeSO_4$ gets oxidised to $Fe_2(SO_4)_3$ as $KMnO_4$ acts as a good oxidising agent in an acidic medium.

Q. 13. Which among the following is (are) double displacement reaction(s)?

- (i) $\text{Pb} + \text{CuCl}_2 \rightarrow \text{PbCl}_2 + \text{Cu}$
 (ii) $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$
 (iii) $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
 (iv) $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$ U
 (A) (i) and (iv) (B) (ii) only
 (C) (i) and (ii) (D) (iii) and (iv)

Ans. Option (B) is correct.

Explanation: Double displacement reaction is the reaction in which two different atoms or group of atoms are mutually exchanged. In this reaction ($\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$), sodium and barium were mutually exchanged.

Q. 14. Barium chloride on reacting with ammonium sulphate forms barium sulphate and ammonium chloride. Which of the following correctly represents the type of the reaction involved?

- (i) Displacement reaction
 (ii) Precipitation reaction
 (iii) Combination reaction
 (iv) Double displacement reaction
 (A) (i) only (B) (ii) only
 (C) (iv) only (D) (ii) and (iv)

Ans. Option (D) is correct.

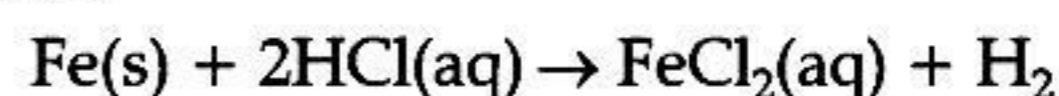
Explanation: The reaction is a double displacement reaction as :
 $\text{BaCl}_2 + (\text{NH}_4)_2\text{SO}_4 \rightarrow \text{BaSO}_4\downarrow + 2\text{NH}_4\text{Cl}$
 It is also called precipitation reaction due to the formation of white precipitate of barium sulphate.

Q. 15. What happens when dilute hydrochloric acid is added to iron filings? Choose the correct answer.

- (A) Hydrogen gas and iron chloride are produced.
 (B) Chlorine gas and iron hydroxide are produced.
 (C) No reaction takes place.
 (D) Iron salt and water are produced.

Ans. Option (A) is correct.

Explanation: When dilute hydrochloric acid is added to iron filings, hydrogen gas and iron chloride are produced. The reaction is as follows :



Q. 16. Which among the following statement(s) is (are) true? Exposure of silver chloride to sunlight for a long duration turns grey due to

- (i) The formation of silver by decomposition of silver chloride
 (ii) Sublimation of silver chloride
 (iii) Decomposition of chlorine gas from silver chloride
 (iv) Oxidation of silver chloride
 (A) (i) only (B) (i) and (iii)
 (C) (ii) and (iii) (D) (iv) only

Ans. Option (A) is correct.

Explanation: In the presence of sunlight, the heavy amount of energy of light decomposes AgCl to silver (Ag^+) and chloride (Cl^-) ions. The silver flakes are truly black which when fully spread over white silver chloride looks grey.



ASSERTION AND REASON BASED MCQs (1 Mark each)

Directions : In the following questions, A statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as.

- (A) Both A and R are true and R is the correct explanation of A.
 (B) Both A and R are true but R is NOT the correct explanation of A.
 (C) A is true but R is false.
 (D) A is false and R is true.

Q. 1. Assertion (A): Carbon dioxide turns lime water milky.

Reason (R): Carbon dioxide sullies the water.

Ans. Option (C) is correct.

Explanation: Carbon dioxide reacts with lime water (calcium hydroxide) to form milky precipitate of calcium carbonate.

Q. 2. Assertion (A): A chemical reaction becomes faster at higher temperatures.

Reason (R): At higher temperatures, molecular motion becomes more rapid.

Ans. Option (A) is correct.

Explanation: A chemical reaction becomes faster at higher temperatures because at high temperature, the movement of particles are greater.

Q. 3. Assertion (A): After white washing the walls, a shiny white finish on walls is obtained after two to three days.

Reason (R): Calcium oxide reacts with carbon dioxide to form calcium hydrogen carbonate which gives shiny white finish.

Ans. Option (C) is correct.

Explanation: Calcium hydroxide is present in whitewash. It reacts slowly with the carbon dioxide in air to form a thin layer of calcium carbonate on the walls. Calcium carbonate is formed after two to three days of white washing. Hence the shiny white finish appears after two to three days on the walls.

Q. 4. Assertion (A): Burning of candle is a physical change.

Reason (R): In physical change, no new substance is formed.

Ans. Option (D) is correct.

Explanation: Burning of candle is chemical change. Burning of candle melts the wax and hence physical state of wax has changed from solid to liquid. Again the wax combines with the atmosphere oxygen and changes to carbon dioxide, heat and light.

Q. 5. Assertion (A): Sodium metal is stored under kerosene.

Reason (R): Metallic sodium melts when exposed to air.

Ans. Option (C) is correct.

Explanation: Sodium is a very reactive metal. It is kept in kerosene to prevent it from coming in contact with oxygen and moisture. If this happens, it will react with the moisture present in air and form sodium hydroxide. This is a strongly exothermic reaction, and lot of heat is generated.

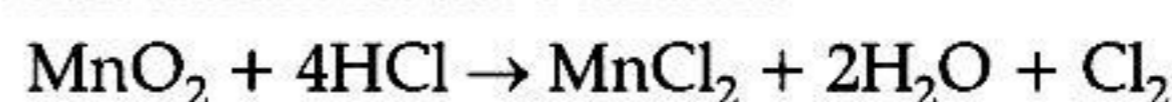
Q. 6. Assertion (A): To dilute sulphuric acid, acid is added to water and not water to acid.

Reason (R): Specific heat of water is quite large.

Ans. Option (A) is correct.

Explanation: The mixing of water to an acid is highly exothermic in nature. If water is added to an acid it produces very large amount of heat which can break the container and some times even causes burning. So it is advised to add concentrated acid to water in very slow manner.

Q. 7. Assertion: In the reaction :



HCl is getting oxidized while MnO_2 is getting reduced.

Reason: The process in which oxygen is added to a substance is called oxidation.

whereas the process in which oxygen is removed from a substance is called reduction.

Ans. Option (A) is correct.

Explanation: In the given reaction, HCl is oxidized to Cl_2 while MnO_2 is reduced to MnCl_2 .

Q. 8. Assertion (A): Chips manufacturers usually flush bags of chips with gas such as nitrogen.

Reason (R): Nitrogen gas prevents the oil and fats of the chips from being oxidized.

Ans. Option (A) is correct.

Explanation: Chips manufacturers usually flush bags of chips with gas such as nitrogen to prevent the oil and fats of the chips from being oxidized or become rancid.



CASE-BASED MCQs

Attempt any 4 sub-parts from each question. Each sub-part carries 1 mark.

I. Read the following and answer any four questions from Q.1. to Q.5. [CBSE QB 2021]

Marble's popularity began in ancient Rome and Greece, where white and off-white marble were used to construct a variety of structures, from hand-held sculptures to massive pillars and buildings.



Q. 1. The substance not likely to contain CaCO_3 is

- (A) Dolomite
- (B) A marble statue

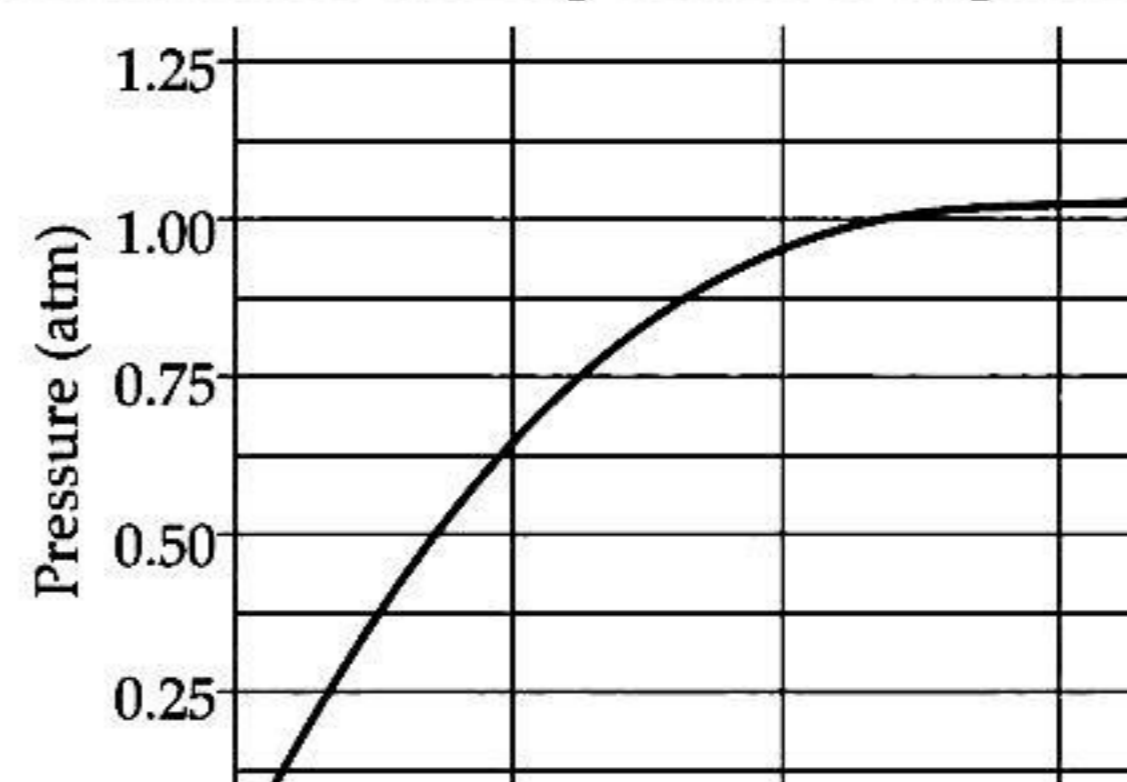
(C) Calcined gypsum

(D) Sea shells.

Ans. Option (C) is correct.

Explanation: The composition of gypsum is $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. It does not have CaCO_3 .

Q. 2. A student added 10g of calcium carbonate in a rigid container, secured it tightly and started to heat it. After some time, an increase in pressure was observed, the pressure reading was then noted at intervals of 5 minutes and plotted against time, in a graph as shown below. During which time interval did maximum decomposition took place?



- (A) 15-20 min (B) 10-15 min
(C) 5-10 min (D) 0-5 min

Ans. Option (D) is correct.

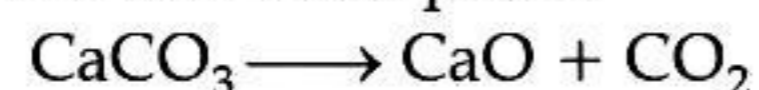
Explanation: The maximum decomposition is when the pressure is maximum. As we can see in graph that from 0 to 5 minutes, the pressure increases from 0 to 0.625 atm.

Q. 3. Gas A, obtained above is a reactant for a very important biochemical process which occurs in the presence of sunlight. Identify the name of the process -

- (A) Respiration (B) Photosynthesis
(C) Transpiration (D) Photolysis

Ans. Option (B) is correct.

Explanation: When CaCO_3 is heated, the following reaction takes place:



The gas evolved is carbon dioxide, which is utilised in the process of photosynthesis.

Q. 4. Marble statues are corroded or stained rain water. Identify the main reason.



- (A) decomposition of calcium carbonate to calcium oxide
(B) polluted water is basic in nature hence it reacts with calcium carbonate
(C) polluted water is acidic in nature he
(D) calcium carbonate dissolves in water to give calcium hydroxide.

Ans. Option (B) is correct.

Explanation: Chemically, marble is Calcium Carbonate.

The atmosphere contains many oxides, which dissolve in water forming acids like sulfuric; nitric which are common due to modern pollution. Even carbon dioxide forms carbonic acid which also does damage.

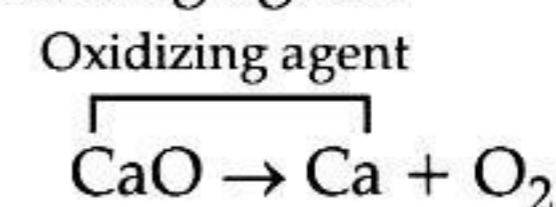
These will react with marble and result in formation of calcium salt, carbon dioxide and water. So, under extended periods, the wear of marble statues is expected.

Q. 5. Calcium oxide can be reduced to calcium, by heating with sodium metal. Which compound would act as an oxidizing agent in the above process?

- (A) sodium (B) sodium oxide
(C) calcium (D) calcium oxide

Ans. Option (D) is correct.

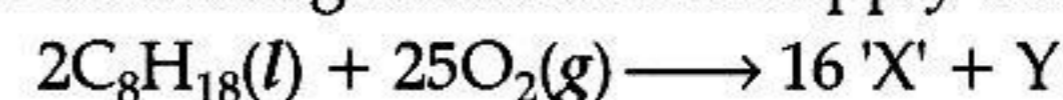
Explanation: A substance that undergoes reduction is an oxidizing agent. Here, CaO is losing oxygen and undergoing reduction. So, CaO is the oxidizing agent.



II. Read the following and answer any four questions from Q.1. to Q.5. [CBSE QB 2021]

Chemistry in Automobiles:

For an internal combustion engine to move a vehicle down the road, it must convert the energy stored in the fuel into mechanical energy to drive the wheels. In your car, the distributor and battery provide this starting energy by creating an electrical "spark", which helps in combustion of fuels like gasoline. Below is the reaction depicting complete combustion of gasoline in full supply of air:



Q. 1. Which of the following are the products obtained from the reaction mentioned in the above case?

Product 'X' Product 'Y'

- (A) CO_2 H_2O_2
(B) H_2O CO
(C) CH_3OH H_2O
(D) CO_2 H_2O

Ans. Option (D) is correct.

Explanation: The complete combustion of gasoline in full supply of air results in production of carbon dioxide and water. The chemical reaction is as follows:



Q. 2. Identify the types of chemical reaction occurring during the combustion of fuel:

- (A) Oxidation & Endothermic reaction
(B) Decomposition & Exothermic reaction
(C) Oxidation & Exothermic reaction
(D) Combination & Endothermic reaction

Ans. Option (C) is correct.

Explanation: The addition of oxygen to a substance or removal of hydrogen from a substance is called oxidation. The reaction in which the heat energy is produced is called exothermic reaction.

Q. 3. On the basis of evolution/absorption of energy, which of the following processes are similar to combustion of fuel?

- (i) Photosynthesis in plants
(ii) Respiration in the human body
(iii) Decomposition of vegetable matter
(iv) Decomposition of ferrous sulphate. U

- (A) (ii) & (iii) (B) (i) & (ii)
(C) (iii) & (iv) (D) (ii) & (i)

Ans. Option (A) is correct.

Explanation: The process of respiration in the human body and decomposition of vegetable matter involves evolution of energy.

Q. 4. 'A student while walking on the road observed that a cloud of black smoke belched out from the exhaust stack of moving trucks on the road.' Choose the correct reason for the production of black smoke:

- (A) Limited supply of air leads to incomplete combustion of
 (B) Rich supply of air leads to complete combustion of fuel.
 (C) Rich supply of air leads to a combination reaction.
 (D) Limited supply of air leads to complete combustion of fuel.

Ans. Option (A) is correct.

Explanation: The limited supply of air leads to incomplete combustion of fuel, which in turn leads to the production of black smoke.

Q. 5. 'Although nitrogen is the most abundant gas in the atmosphere, it does not combustion'. Identify the correct reason for this statement.

- (A) Nitrogen is a reactive gas
 (B) Nitrogen is an inert gas
 (C) Nitrogen is an explosive gas
 (D) Only hydrocarbons can take part in combustion

Ans. Option (B) is correct.

Explanation: The triple bond in nitrogen is too strong to be broken and hence it is an inert gas which does not take part in combustion.

III. Read the given passage and answer any four questions from Q.1 to Q.5.

The physical states of the reactants and products can be represented by using the symbols (s) for solids, (l) for liquids, (g) for gases and (aq) for aqueous solution along with their respective formulae. The word aqueous is written if the reactant or product is present as a solution in water. Precipitate can also be represented by using an arrow pointing downwards (\downarrow) instead of using symbol (s).

In the same way, the gaseous state of an evolved gas can be represented by using an arrow pointing upward direction (\uparrow) instead of using symbol (g). The specific condition of the reaction like temperature, pressure, catalyst etc. is written above or below the arrow in the chemical equation.

Q. 1. If the reactant or product is present as a solution of water, it is represented as:

- (A) (s) (B) (l) (C) (aq) (D) \downarrow

Ans. Option (C) is correct.

Explanation: The word aqueous is written if the reactant or product is present as a solution in water.

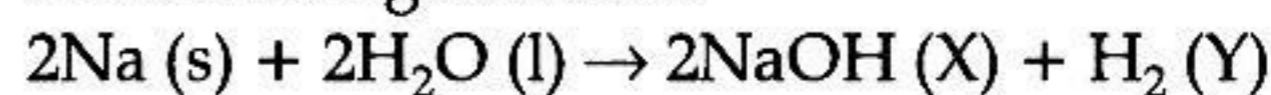
Q. 2. The correct way to represent the evolution of gas, is to use which of the following symbol:

- (A) \downarrow (B) \rightarrow (C) \uparrow (D) (g)

Ans. Option (C) is correct.

Explanation: The gaseous state of an evolved gas can be represented by using an arrow pointing upward direction (\uparrow) instead of using symbol (g).

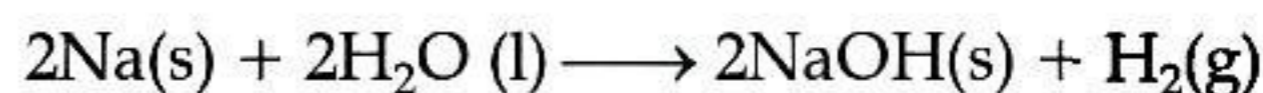
Q. 3. Complete the missing variable given as X and Y in the following reaction:



- (A) (aq) and (g) (B) (s) and (g)
 (C) (g) and (l) (D) (g) and (aq)

Ans. Option (A) is correct.

Explanation: Explanation: The complete reaction is :



Q. 4. Which of the following reaction is balanced?

- (A) $\text{NaCl} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + 2\text{Cl}_2 + \text{H}_2$
 (B) $2\text{NaCl} + \text{H}_2\text{O} \rightarrow 2\text{NaOH} + 2\text{Cl}_2 + \text{H}_2$
 (C) $2\text{NaCl} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{Cl}_2 + \text{H}_2$
 (D) $2\text{NaCl} + 2\text{H}_2\text{O} \rightarrow \text{NaOH} + \text{Cl}_2 + \text{H}_2$ U

Ans. Option (C) is correct.

Explanation: The equation in which atoms of various elements on both sides of a chemical equation are equal in accordance with the law of conservation of mass are said to be balance. Hence, $2\text{NaCl} + 2\text{H}_2\text{O} \longrightarrow 2\text{NaOH} + \text{Cl}_2 + \text{H}_2$ represents the correct balanced equation.

Q. 5. Which of the following reaction is balanced?

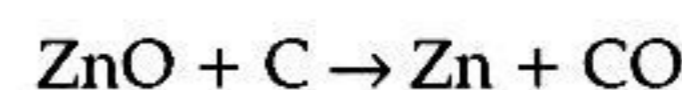
- (A) $\text{Mg (aq)} + \text{H}_2\text{SO}_4 \text{ (aq)} \rightarrow \text{MgSO}_4 \text{ (aq)} + \text{H}_2 \uparrow$
 (B) $\text{Mg (s)} + \text{H}_2\text{SO}_4 \text{ (aq)} \rightarrow \text{MgSO}_4 \text{ (aq)} + \text{H}_2 \uparrow$
 (C) $\text{Mg (s)} + \text{H}_2\text{SO}_4 \text{ (l)} \rightarrow \text{MgSO}_4 \text{ (l)} + \text{H}_2\text{(g)}$
 (D) $\text{Mg (s)} + \text{H}_2\text{SO}_4 \text{ (l)} \rightarrow \text{MgSO}_4 \text{ (s)} + \text{H}_2$

Ans. Option (B) is correct.

Explanation: $\text{Mg (s)} + \text{H}_2\text{SO}_4 \text{ (aq)} \longrightarrow \text{MgSO}_4 \text{ (aq)} + \text{H}_2 \uparrow$ is the balanced chemical reaction. A balanced equation is the one in which the atoms of every element will be the same on both the sides of the equation.

IV. Read the given passage and answer any four questions from Q.1 to Q.5.

In the following chemical reaction "zinc oxide reacts with carbon to produce zinc metal and carbon monoxide." Answer any four question from (1) to (5).



Q. 1. Name the substance getting oxidised and reduced in the above reaction: R

- (A) C and ZnO (B) Zn and C
 (C) ZnO and CO (D) CO and ZnO

Ans. Option (A) is correct.

Explanation: C is getting oxidized to CO, ZnO is getting reduced to Zn, as carbon is gaining oxygen and ZnO is losing oxygen.

Q. 2. Name the type of reaction: U

- (A) oxidation reaction
 (B) reduction reaction

- (C) redox reaction
(D) decomposition reaction

Ans. Option (C) is correct.

Explanation: It is a redox reaction or oxidation and reduction reaction.

Q. 3. The reduction reaction involves: R

- (A) gain of electrons
(B) loss of electrons
(C) increase in oxidation state
(D) addition of oxygen

Ans. Option (A) is correct.

Explanation: Reduction is just reverse of oxidation. It is the process of gain of electron and losing oxygen or gaining hydrogen.

Q. 4. Which of the following is the effect of oxidation reaction in everyday life:

- (A) Precipitation
(B) Fermentation
(C) Corrosion
(D) Hydrogenation of oil

Ans. Option (C) is correct.

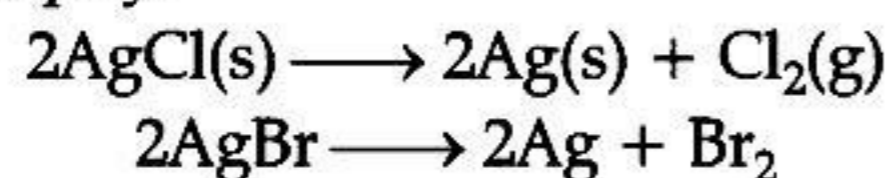
Explanation: Corrosion is a process in which metals are deteriorated by action of air, moisture, chemicals etc. It is a redox reaction where metal gets oxidised to metal oxide and oxygen gets reduced to oxide ion.

Q. 5. The reactions used in black and white photography: R

- (A) Decomposition of silver bromide
(B) Decomposition of silver chloride
(C) Both
(D) None of the above

Ans. Option (C) is correct.

Explanation: Decomposition reactions of silver chloride and silver bromide in presence of sunlight are used in black and white photography.



V. P, Q and R are three elements which undergo chemical reactions according to the following equations. Answer any four question from Q.1 to Q.5.

- (i) $\text{P}_2\text{O}_3 + 2\text{Q} \rightarrow \text{Q}_2\text{O}_3 + 2\text{P}$
(ii) $3\text{RSO}_4 + 2\text{Q} \rightarrow \text{Q}_2(\text{SO}_4)_3 + 3\text{R}$
(iii) $3\text{RO} + 2\text{P} \rightarrow \text{P}_2\text{O}_3 + 3\text{R}$

Q. 1. The most reactive and the least reactive elements are: U

- (A) Q and P (B) Q and R
(C) R and Q (D) R and P

Ans. Option (B) is correct.

Explanation: Q is the most reactive as it has replaced both P and R from their compounds and R is least reactive element as it has been replaced by both P and Q.

Q. 2. The type of reaction is : R

- (A) Displacement reaction
(B) Combination reaction
(C) Neutralisation reaction
(D) Substitution reaction

Ans. Option (A) is correct.

Explanation: Displacement reaction is a type of reaction in which more active element displaces a less reactive element from its compound.

Q. 3. $3\text{RSO}_4 + 2\text{Q} \rightarrow \text{Q}_2(\text{SO}_4)_3 + 3\text{R}$

The given reaction shows: AE

- (A) Q is more reactive than R
(B) Q is less reactive than R
(C) Q and R are equally reactive
(D) none of the above

Ans. Option (A) is correct.

Explanation: The given reaction shows that Q is the most reactive as it has replaced both P and R from their compounds.

Q. 4. Choose the correct statement: U

- (A) Zinc and lead are more reactive elements than copper.
(B) Zinc and lead are less reactive elements than copper.
(C) Zinc and copper are more reactive elements than lead.
(D) Copper and lead are more reactive elements than zinc.

Ans. Option (A) is correct.

Explanation: A more reactive metal has a tendency to get oxidized and a less reactive metal ion has a tendency to get reduced. Therefore, a more reactive metal displaces a less reactive metal from its salt solution.

Q. 5. $\text{Na}_2\text{SO}_4\text{(aq)} + \text{BaCl}_2\text{(aq)} \rightarrow \text{BaSO}_4\text{(s)} + 2\text{NaCl(aq)}$

The above reaction is an example of: R

- (A) Double displacement reaction.
(B) Displacement reaction.
(C) Can be both.
(D) None of the above.

Ans. Option (A) is correct.

Explanation: Double displacement reaction is a reaction in which two different ions or group of atoms in the reactant molecules are displaced by each other. Na^+ being more reactive than Ba^{2+} displaces Ba^{2+} from its compound BaCl_2 and form NaCl .

VI. The following diagram displays a chemical reaction. Observe carefully and answer any four questions from Q.1 to Q.5.

The following diagram displays a chemical reaction. Observe carefully and answer any four questions from (1) to (5).



Q. 1. The type of chemical reaction that will take place is

R

- (A) Photochemical decomposition
- (B) Displacement reaction
- (C) Reduction reaction
- (D) Combination reaction

Ans. Option (A) is correct.

Explanation: The type of chemical reaction that will take place is photochemical decomposition. This is a type of decomposition reaction which involves the use of light energy for decomposition.

Q. 2. What colour change is observed in silver chloride?

U

- (A) Silver chloride turns white.
- (B) Silver chloride turns brown.
- (C) Silver chloride shows no colour change.
- (D) White silver chloride changes to grey.

Ans. Option (A) is correct.

Explanation: When silver chloride is exposed to sunlight, it decomposes to give silver metal and chlorine gas. In this reaction white color of silver chloride changes to grayish white due to the formation of silver metal.

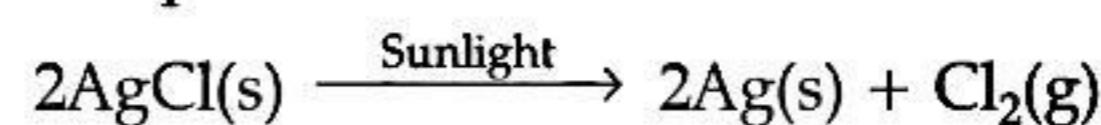
Q. 3. The correct balanced chemical equation involves:

AE

- (A) $2\text{AgCl}(\text{s}) \xrightarrow{\text{sunlight}} 2\text{Ag}(\text{s}) + \text{Cl}_2(\text{g})$
- (B) $\text{Ag} + \text{Cl} \rightarrow \text{AgCl}$
- (C) $\text{AgCl}_2 \rightarrow \text{Ag}_2 + \text{Cl}_2$
- (D) $\text{AgCl} \xrightarrow{\text{sunlight}} 2\text{Ag} + \text{Cl}_2$

Ans. Option (A) is correct.

Explanation: The decomposition reaction of silver chloride into silver and chlorine by light can be depicted as:



Q. 4. When decomposition is carried out by heating, it is called as:

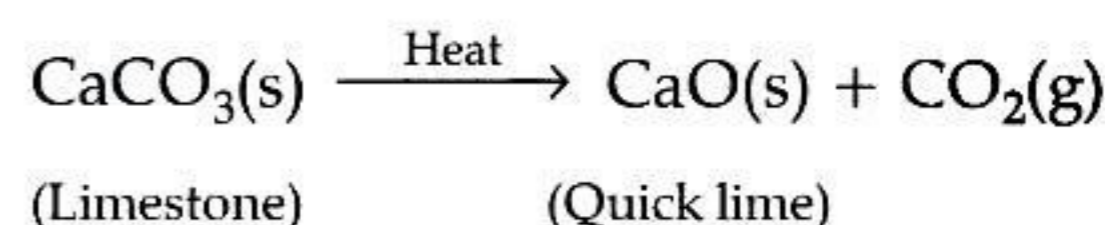
R

- (A) Heat decomposition
- (B) Photolytic decomposition
- (C) Electrolytic decomposition
- (D) Thermal decomposition

Ans. Option (D) is correct.

Explanation: Thermal decomposition reaction uses the energy in the form of heat. For example.

Calcium carbonate on heating decomposes to give calcium oxide and carbon dioxide.



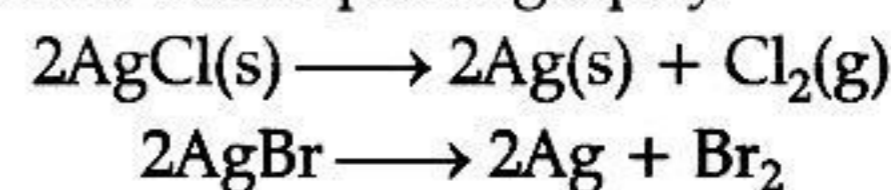
Q. 5. The other silver salt which behaves like silver chloride in sunlight is:

U

- (A) silver hydride
- (B) silver bromide
- (C) silver iodide
- (D) silver nitrite

Ans. Option (B) is correct.

Explanation: silver bromide gives silver metal and bromine gas on photolytic decomposition. Decomposition reactions of silver chloride and silver bromide in presence of sunlight are used in black and white photography.



□□□