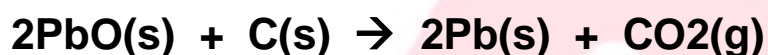

Chapter – 1 (Chemical Reactions and Equations) (Class 10)

Questions:

Question:1 Which of the statements about the reaction below are incorrect?



- a.) Lead is getting reduced.
- b.) Carbon dioxide is getting oxidised.
- c.) Carbon is oxidised.
- d.) Lead oxide is getting reduced.

Options:

- i.) (a) and (b)
- ii.) (a) and (c)
- iii.) (a), (b) and (c)
- iv.) all

Answer:

- i.) (a) and (b)

Explanation: (a) Because Oxygen is being removed and (b) because the removed oxygen from Lead is added to the elemental Carbon.



The above reaction is an example of a -----

Options:

- a.) Combination reaction.
- b.) Double displacement reaction.
- c.) Decomposition reaction.
- d.) Displacements reaction.

Answer:

- (d) Displacement reaction.

Explanation: The Oxygen from the Ferrous oxide is getting displaced to the Aluminium metal to form Aluminium Oxide. In this reaction Aluminium is more reactive metal than Fe. Therefore, Al will displace Fe from its oxide. The type of chemical reactions in which one of the elements displace

another is called displacement reaction. Here less reactive metal is displaced by more reactive metal. Since one-time displacement is occurring, therefore, it is called a single displacement reaction.

Question:3 What happens when dilute hydrochloric acid is added to iron filings? Tick 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.

Answer:

1. Hydrogen gas and iron chloride are produced.

Explanation: the Chlorine from Hydrogen chloride is displaced by the Iron filings to undergo the following reaction.



Question:4 What is balanced chemical equation? Why should chemical equation be balanced?

Answer:

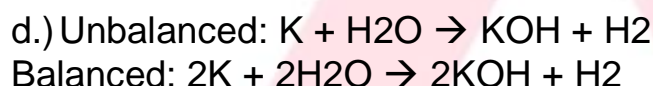
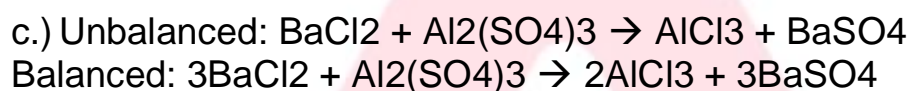
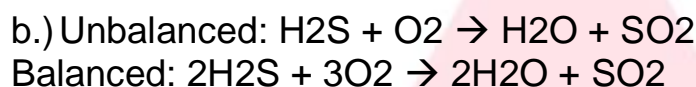
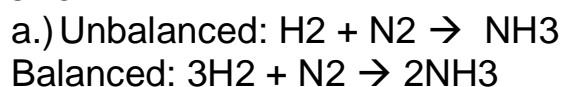
A balanced equation is the one in which number of different atoms on both the reactants and product sides are equal. Balancing chemical equation is necessary for the reaction should obey the Law of Conservation of energy. Balancing the chemical equation has no defined method and is purely a trial and error attempt.

Question:5 Translate the following statements into chemical equations and then balanced them.

- a.) Hydrogen gas combines with nitrogen to form ammonia.
- b.) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.

- c.) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.
- d.) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

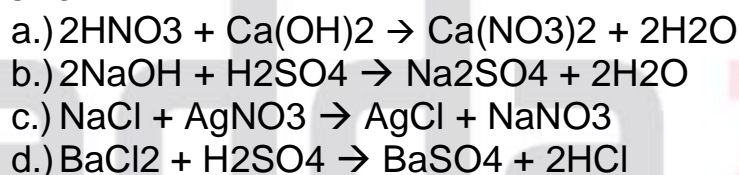
Answer:



Question:6 Balanced the chemical equations.

- a.) $\text{HNO}_3 + \text{Ca}(\text{OH})_2 \rightarrow \text{Ca}(\text{NO}_3)_2 + \text{H}_2\text{O}$
- b.) $\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$
- c.) $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$
- d.) $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + \text{HCl}$

Answer:



Question:7 Write the balanced chemical equation for the following reactions.

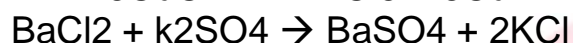
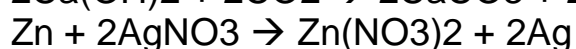
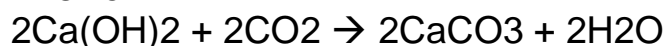
Calcium hydroxide + Carbon dioxide \rightarrow Calcium carbonate + Water

Zinc + Silver nitrate \rightarrow Zinc nitrate + Silver

Aluminium + Copper chloride → Aluminium chloride + Copper

Barium chloride + Potassium sulphate → Barium sulphate + Potassium chloride

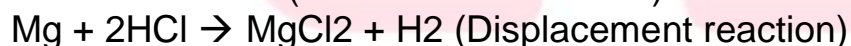
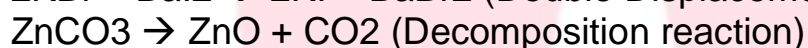
Answer:



Question:8 Write a balanced chemical equation for the following and identify the type of reaction of each case



Answer:



Question:9 What is meant by exothermic and endothermic reactions? Give examples.

Answer:

An endothermic reaction occurs when energy is absorbed from the surroundings in the form of heat. (Example: Photosynthesis, melting of ice, evaporation). Conversely, an exothermic reaction is one in which energy is released from the system into the surroundings. (Example: Explosions, concrete setting, nuclear fission and fusion.)

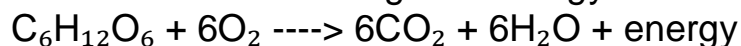
Question:10 Why is respiration considered to be an exothermic reaction?

Answer:

An exothermic reaction is a reaction in which energy is liberated out.

Respiration is considered as exothermic reaction because energy is released in this process.

Glucose combines with oxygen present in our cells to form carbon dioxide and water along with energy.

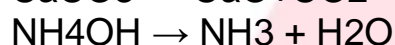
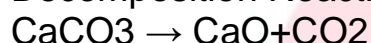


Question:11 Why are decomposition reactions called the opposite of Combination reactions? Write equations for decomposition reactions.

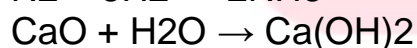
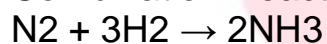
Answer:

A decomposition reaction is breakdown or separation of a chemical compound into its elements or simpler compounds while in composition reactions two or more elements or compounds combine to form a single compound that is why decomposition reactions called the opposite of combination reactions.

Decomposition Reaction



Combination Reaction



Question:12 Write one equation each for the decomposition reactions in which energy is supplied in the form of heat, light or electricity.

Answer:

Thermal decomposition is a chemical reaction where a single substance breaks into two or more simple substances when heated.

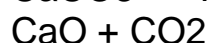
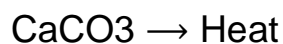
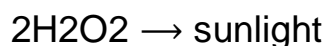
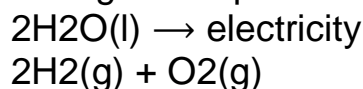


Photo decomposition is a chemical reaction in which a substance is broken down into simple substances by exposure to light (photons).



Electrolytic decomposition may result when the electric current is passed through an aqueous solution of a compound.



Question:13 What is the difference between displacement and double displacement reactions? Write relevant equations for the above.

Answer:

Displacement

1 In these reaction, more reactive metal displace less reactive metal from its compound

2 It is a slow reaction

3 Change of colour take place

4 E.g $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$

Double displacement

1 There is an exchange of ions between two reactant

2 It is a fast reaction

3 Precipitate are formed

4 E.g $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$

Question:14 In the refining of Silver, the recovery of silver from Silver nitrate solution involves displacement reaction by Copper metal. Write down the reaction involved.

Answer:



Question:15 What do you mean by a precipitation reaction? Explain by giving examples.

Answer:

- A precipitation reaction is a reaction in which an insoluble salt is formed. It is formed by the combination of two solutions that contain soluble salts.

- The insoluble salt that emerges out from the solution is termed to be precipitate.
- For example, the precipitate Silver Chloride is formed when Aqueous silver nitrate (AgNO_3) is added to a solution containing potassium chloride (KCl).

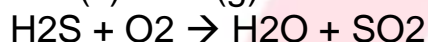
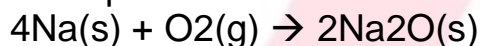
Question:16 Explain the following in terms of gain of oxygen with two examples each.

- a.) Oxidation**
- b.) Reduction**

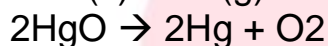
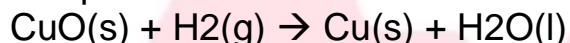
Answer:

- a.) In a chemical reaction, when the oxygen is added to the element to form its respective oxides it is the element being oxidised.

Example:



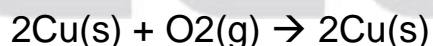
- b.) In a chemical reaction, when oxygen is being removed from the compound then it is said to be reduced. Example:



Question:17 A shiny brown coloured element 'X' on heating in the air becomes black in colour. Name the element 'X' and black coloured compound formed.

Answer:

The shiny brown coloured element is the Copper metal (Cu). When the metal is heated in air, it reacts with amphoteric oxygen to form copper oxide. Hence the black coloured compound is the copper oxide.



Question:18 Why do we apply paint on iron articles?

Answer:

Iron articles are painted to prevent them from rusting. When left unpainted, the metal surface comes in contact with the atmospheric oxygen and in the presence of moisture Iron(III) oxide. But if painted the

surface does not come in contact with moisture and air thus preventing Rusting.

Question:19 Oil and Fat containing food items are flushed with Nitrogen. Why?

Answer:

The main purpose of flushing Nitrogen into food packets that contain oil and fat items is to prevent rancidity which occurs when the oil or fat reacts with the oxygen letting out an unpleasant smell and taste.

Therefore, by flushing nitrogen, an unreactive surrounding is created thus preventing rancidity.

Question:20 Explain the following terms with one example each.

- a.) Corrosion
- b.) Rancidity

Answer:

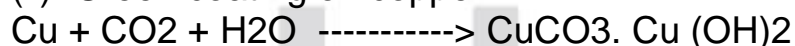
(a) Corrosion: Metal are reacted with atmosphere oxygen, carbon dioxide and moisture and converted into metal oxides and carbonate. This phenomenon is called corrosion.

Eg.:

(i) Black coating on silver.



(ii) Green coating on copper.



(b) Rancidity: Oil and fat containing items when comes in contact with atmosphere oxygen they get oxidised and start smelling and tasting bad. The food item have gone rancid. This phenomeon is called rancidity.

Eg.: Smell and taste on food items get change after some times.

In-text questions:

Que.1 Why should a magnesium ribbon be cleaned before burning in air?

Ans. Magnesium ribbon should be cleaned before burning in air because Magnesium metal reacts with the atmospheric oxygen and forms Magnesium oxide layer which is very stable compound. In order to prevent further reactions with oxygen, it is therefore necessary to clean the ribbon by to remove the layer of MgO.

Que.2 Write the balanced equation for the following chemical reactions.

- i.) Hydrogen + Chloride \rightarrow Hydrogen chloride**
- ii.) Barium Chloride + Aluminium sulphate \rightarrow Barium sulphate + Aluminium chloride.**
- iii.) Sodium + Water \rightarrow Sodium hydroxide + Hydrogen**

Answer:

- i.) $H_2 + Cl_2 \rightarrow 2HCl$
- ii.) $3BaCl_2 + Al_2(SO_4)_3 \rightarrow 2AlCl_3 + 3BaSO_4$
- iii.) $2Na + 2H_2O \rightarrow 2NaOH + H_2$

Que.3 Write a balanced chemical equation with state symbol for the following reactions:

- i.) Solutions of Barium chloride and Sodium sulphate in water react to give insoluble Barium sulphate and solution of Sodium chloride.**
- ii.) Sodium hydroxide solution in water reacts with hydrochloric acid solution to produce Sodium chloride solution and water.**

Ans.

- i.) $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$
- ii.) $NaOH + HCl \rightarrow NaCl + H_2O$

Que.4 a solution of a substance 'X' is used for whitewashing.

- i.) Name the substance 'X' and write its formula.**
- ii.) Write the reaction of the substance 'X' named in (i) above with water.**

Ans.

-
- i.) The substance 'X' which is used in whitewashing is quick lime or Calcium oxide and its formula is CaO.
- ii.) $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$

Que.5 Why is the amount of gas collected in one of the test tubes in Activity 1.7 double of the amount collected in the other? Name this gas.

Ans.

In activity 1.7, gas collected in one of the test tubes is double of the amount collected in the other because water gets hydrolysed to release H_2 and O_2 gas. Here, after electrolysis two molecules of Hydrogen and one molecule of oxygen gas is released, hence the amount of Hydrogen collected would be double than that of oxygen.

Que.6 Why does the colour sulphate solution change when an iron nail is dipped in it?

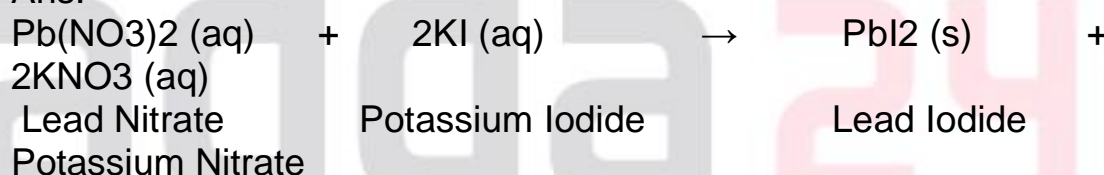
Ans.

It changes from blue to pale green because iron being more reactive than copper, displaces copper from its aqueous salt solution. As a result colour of solution changes and copper gets deposited on iron nail.

$\text{CuSO}_4 (\text{aq}) + \text{Fe} (\text{s})$ gives $\text{FeSO}_4 (\text{aq}) + \text{Cu} (\text{s})$

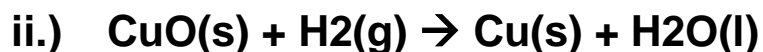
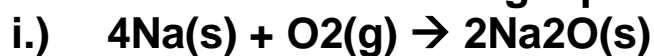
Que.7 Give an example of a double displacement reaction other than one given in Activity 1.10.

Ans.



When the aqueous solution of lead Nitrate is mixed with potassium Iodide, we obtain a precipitate of lead iodide and a solution of potassium nitrate. In double displacement reaction, there is exchange of ions between the reactant. In this reaction, the cation Pb^{2+} and K^+ exchange their anions NO_3^- and I^- to give new substance PbI_2 and KNO_3 .

Que.8 identify the substances that are oxidised and that are reduced in the following equation.



Ans.

(i). Sodium (Na) is oxidised as it gains oxygen and oxygen gets reduced.

(ii). Copper oxide (CuO) is reduced to copper (Cu) while hydrogen (H₂) gets oxidised to water (H₂O).


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