

Class 10 Chapter 1 Chemical Reactions and Equations Important Questions with Answers

Multiple Choice Type Questions

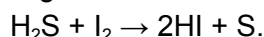
Q1. Which of the following gases is used to store fat and oil-containing foods for a long time?

- (a) Carbon dioxide
- (b) Oxygen
- (c) Nitrogen
- (d) Neon

Answer:

(c) Nitrogen gas is used to store fat and oil-containing foods for a long time.

Q2. The chemical reaction between Hydrogen sulphide and iodine to give Hydrogen iodide and sulphur is given below:

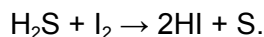


The reducing and oxidising agents involved in this redox reaction are:

- (a) Iodine and sulphur, respectively
- (b) Iodine and hydrogen sulphide, respectively
- (c) Sulphur and iodine, respectively
- (d) Hydrogen sulphide and sulphur, respectively

Answer:

(b) Iodine is a reducing agent, and hydrogen sulphide is the oxidising agent in the reaction mentioned above.



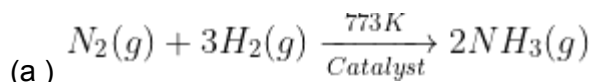
Short Answer Type Questions

Q1. Write the balanced chemical equations for the following reactions and identify the type of reaction in each case.

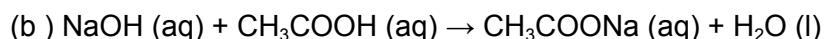
- (a) Nitrogen gas is treated with hydrogen gas in the presence of a catalyst at 773K to form ammonia gas.
- (b) Sodium hydroxide solution is treated with acetic acid to form sodium acetate and water.

- (c) Ethanol is warmed with ethanoic acid to form ethyl acetate in the presence of concentrated H_2SO_4 .
 (d) Ethene is burnt in the presence of oxygen to form carbon dioxide and water and releases heat and light.

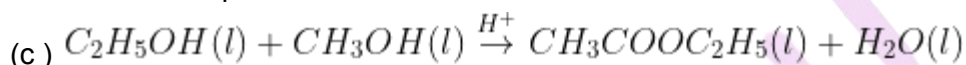
Answer:



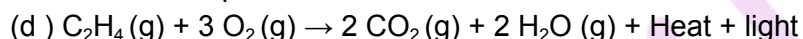
It is an addition reaction.



It is a double displacement or a neutralisation reaction.



It is a double displacement or an esterification reaction.

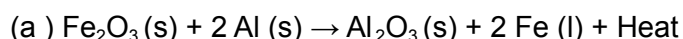


It is a redox or a combustion reaction.

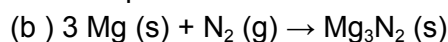
Q2. Write the balanced chemical equations for the following reactions and identify the type of reaction in each case.

- (a) In the thermite reaction, iron (III) oxide reacts with aluminium and gives molten iron and aluminium oxide.
 (b) Magnesium ribbon is burnt in an atmosphere of nitrogen gas to form solid magnesium nitride.
 (c) Chlorine gas is passed in an aqueous potassium iodide solution to form potassium chloride solution and solid iodine.
 (d) Ethanol is burnt in the air to form carbon dioxide and water and releases heat.

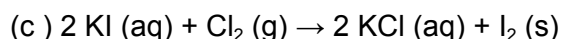
Answer:



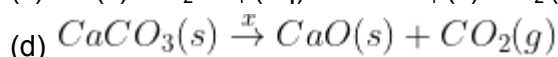
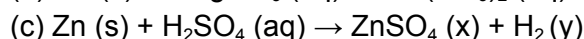
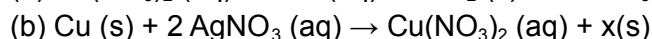
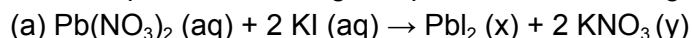
It is a displacement or redox reaction.



It is a combination reaction.



Q3. Complete the missing components / variables given as x and y in the following reactions



Answer:

- (a) $\text{Pb}(\text{NO}_3)_2 (\text{aq}) + 2 \text{KI} (\text{aq}) \rightarrow \text{PbI}_2 (\text{s}) + 2 \text{KNO}_3 (\text{aq})$
- (b) $\text{Cu} (\text{s}) + 2 \text{AgNO}_3 (\text{aq}) \rightarrow \text{Cu}(\text{NO}_3)_2 (\text{aq}) + 2 \text{Ag} (\text{s})$
- (c) $\text{Zn} (\text{s}) + \text{H}_2\text{SO}_4 (\text{aq}) \rightarrow \text{ZnSO}_4 (\text{aq}) + \text{H}_2 (\text{g})$
- (d) $\text{CaCO}_3 (\text{s}) \xrightarrow{\text{Heat}} \text{CaO} (\text{s}) + \text{CO}_2 (\text{g})$

Q4. Which among the following changes are exothermic or endothermic in nature?

- (a) Decomposition of ferrous sulphate
- (b) Dilution of sulphuric acid
- (c) Dissolution of sodium hydroxide in water
- (d) Dissolution of ammonium chloride in water

Answer:

- (a) The decomposition of ferrous sulphate is an example of an endothermic reaction because heat is absorbed during this reaction.
- (b) The dilution of sulphuric acid is an example of an exothermic reaction because heat is released during this reaction.
- (c) The dissolution of sodium hydroxide in water is an example of an exothermic reaction because heat is released during this reaction.
- (d) The dissolution of ammonium chloride in water is an example of an endothermic reaction because heat is absorbed during this reaction.

Q5. Identify the reducing agent in the following reactions

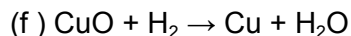
- (a) $4 \text{NH}_3 + 5 \text{O}_2 \rightarrow 4 \text{NO} + 6 \text{H}_2\text{O}$
- (b) $\text{H}_2\text{O} + \text{F}_2 \rightarrow \text{HF} + \text{HOF}$
- (c) $\text{Fe}_2\text{O}_3 + 3 \text{CO} \rightarrow 2 \text{Fe} + 3 \text{CO}_2$
- (d) $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$

Answer:

- (a) Here, ammonia (NH_3) is the reducing agent.
- (b) Here, water (H_2O) is the reducing agent.
- (c) Here, carbon monoxide (CO) is the reducing agent.
- (d) Here, hydrogen (H_2) is the reducing agent.

Q6. Identify the oxidising agent (oxidant) in the following reactions

- (a) $\text{Pb}_3\text{O}_4 + 8 \text{HCl} \rightarrow 3 \text{PbCl}_2 + \text{Cl}_2 + 4 \text{H}_2\text{O}$
- (b) $2 \text{Mg} + \text{O}_2 \rightarrow 2 \text{MgO}$
- (c) $\text{CuSO}_4 + \text{Zn} \rightarrow \text{Cu} + \text{ZnSO}_4$
- (d) $\text{V}_2\text{O}_5 + 5 \text{Ca} \rightarrow 2 \text{V} + 5 \text{CaO}$
- (e) $3 \text{Fe} + 4 \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4 \text{H}_2$



Answer:

(a) Pb_3O_4 is the oxidising agent here. The oxidation state of Pb in Pb_3O_4 reduces from + 6 to + 2 in PbCl_2 . Thus it acts as an oxidising agent.

(b) O_2 is the oxidising agent here. The oxidation state of oxygen in elemental form O_2 reduces from 0 to - 2 in MgO . Thus it acts as an oxidising agent.

(c) CuSO_4 is the oxidising agent here. The oxidation state of Cu in CuSO_4 reduces from + 2 to 0 in Cu. Thus it acts as an oxidising agent.

(d) V_2O_5 is the oxidising agent here. The oxidation state of V in V_2O_5 reduces from + 5 to 0 in V. Thus, it acts as an oxidising agent.

(e) H_2O is the oxidising agent here. The oxidation state of oxygen in H_2O reduces from - 2 to - 3 in H_2O_2 . Thus it acts as an oxidising agent.

(f) CuO is the oxidising agent here. The oxidation state of Cu in CuO reduces from + 2 to 0 in Cu. Thus, it acts as an oxidising agent.

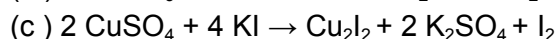
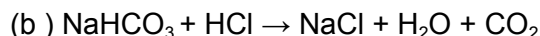
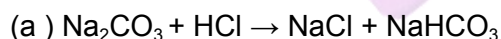
Q7. Write the balanced chemical equations for the following reactions

(a) Sodium carbonate on reaction with hydrochloric acid in equal molar concentrations gives sodium chloride and sodium hydrogen carbonate.

(b) Sodium hydrogen carbonate on reaction with hydrochloric acid gives sodium chloride, water and liberates carbon dioxide.

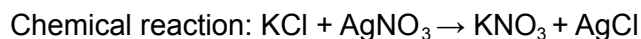
(c) On treatment with potassium iodide, copper sulphate precipitates cuprous iodide (Cu_2I_2), liberates iodine gas and forms potassium sulphate.

Answer:



Q8. A solution of potassium chloride, when mixed with silver nitrate solution, an insoluble white substance is formed. Write the chemical reaction involved and also mention the type of the chemical reaction?

Answer:



It is a double displacement reaction.

Q9. Ferrous sulphate decomposes with the evolution of a gas having a characteristic smell of burning sulphur. Write the chemical reaction involved and identify the type of reaction.

Answer:



It is a thermal decomposition reaction.

Q10. Why do fireflies glow at night?

Answer:

Fireflies glow at night because of a chemical reaction involving light's emission. Fireflies store a protein (luciferin) that combines with oxygen in the air to form a new substance (oxyluciferin) and the evolution of energy in light.

Q11. Grapes hanging on the plant do not ferment, but after being plucked from the plant can be fermented. Under what conditions do these grapes ferment? Is it a chemical or a physical change?

Answer:

When attached to the plants, Grapes are living, and therefore, their immune system prevents fermentation. The microbes can grow in the plucked grapes, which can be fermented under anaerobic conditions. This is a chemical change.

Q12. Which among the following are physical or chemical changes?

- (a) Evaporation of petrol
- (b) Burning of Liquefied Petroleum Gas (LPG)
- (c) Heating of an iron rod to red hot.
- (d) Curdling of milk
- (e) Sublimation of solid ammonium chloride

Answer:

(a) Evaporation of petrol is a physical change as it only gets converted from one physical state to another.

(b) Burning of Liquefied Petroleum Gas (LPG) is a chemical change as heating produces carbon dioxide and water.

(c) The heating of an iron rod to red hot is a physical change as heating involves only temperature change.

(d) The curdling of milk is a chemical change as it affects the chemical composition of the milk.

Q13. We made the following observations during the reaction of some metals with dilute hydrochloric acid.

- (a) Silver metal does not show any change
- (b) The temperature of the reaction mixture rises when aluminium (Al) is added.
- (c) The sodium metal reaction is highly explosive.
- (d) Some gas bubbles are seen when lead (Pb) is reacted with the acid.

Explain these observations giving suitable reasons.

Answer:

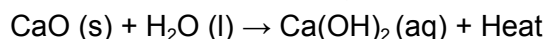
- (a) Silver does not show any characteristics change because silver is less reactive than hydrogen. Thus, it cannot displace hydrogen from dilute hydrochloric acid.
- (b) The reaction between aluminium (Al) and hydrochloric acid is highly exothermic. Thus, the temperature of the reaction mixture rises.
- (c) Sodium is a highly reactive metal. It reacts with hydrochloric acid, vigorously forming hydrogen gas and a large amount of heat.
- (d) When lead reacts with hydrochloric acid, the gas bubbles observed are hydrogen gas.
$$\text{Pb (s)} + 2 \text{HCl (aq)} \rightarrow \text{PbCl}_2 \text{(s)} + \text{H}_2 \text{(g)}$$

Q14. A substance X, an oxide of a group 2 element, is used intensively in the cement industry. This element is present in bones also. On treatment with water, it forms a solution which turns red litmus blue. Identify X and also write the chemical reactions involved.

Answer:

Here, X is calcium oxide.

- Calcium oxide is used intensively in the cement industry.
- The element present in it (in bones also) is calcium.
- On treatment with water, calcium oxide forms a solution of calcium hydroxide $[\text{Ca(OH)}_2]$, which is an alkali. Hence, it turns red litmus blue.



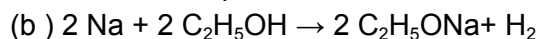
Q15. Write a balanced chemical equation for each following reaction and classify them.

- (a) Lead acetate solution is treated with dilute hydrochloric acid to form lead chloride and acetic acid solution.
- (b) A piece of sodium metal is added to absolute ethanol to form sodium ethoxide and hydrogen gas.
- (c) Iron (III) oxide on heating with carbon monoxide gas reacts to form solid iron and liberates carbon dioxide gas.
- (d) Hydrogen sulphide gas reacts with oxygen gas to form solid sulphur and liquid water

Answer:



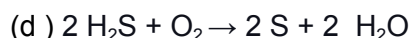
It is a double displacement reaction.



It is a displacement or a redox reaction.



It is a redox reaction.



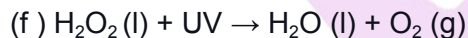
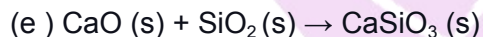
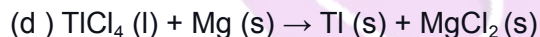
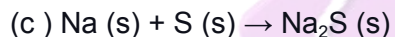
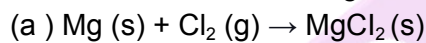
It is a redox reaction.

Q16. Why do we store silver chloride in dark coloured bottles?

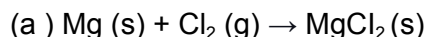
Answer:

We store silver chloride in the dark-coloured bottles because silver chloride decomposes into silver and chlorine gas in sunlight.

Q17. Balance the following chemical equations and identify the type of chemical reaction.



Answer:



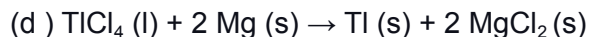
It is a combination reaction.



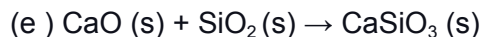
It is a thermal decomposition reaction.



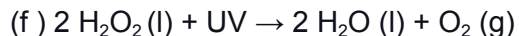
It is a combination reaction.



It is a displacement reaction.



It is a combination reaction.



It is a decomposition reaction.

Q18. A magnesium ribbon is burnt in oxygen to give a white compound X accompanied by light emission. If the burning ribbon is now placed in an atmosphere of nitrogen, it continues to burn and forms a compound Y.

(a) Write the chemical formulae of X and Y.

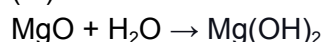
(b) Write a balanced chemical equation when X is dissolved in water.

Answer:

Here, X is magnesium oxide, and Y is magnesium nitride.

(a) The chemical formulae of X are MgO and Y is Mg_3N_2 .

(b) When X is dissolved in water following reaction occurs.



Q19. Zinc liberates hydrogen gas when reacted with dilute hydrochloric acid, whereas copper does not. Explain why?

Answer:

Zinc is more reactive than copper as Zinc is placed above hydrogen, and copper is placed below hydrogen in the activity series of metals. Thus, zinc liberates hydrogen gas when reacted with dilute hydrochloric acid, whereas copper does not.

Q20. A silver article generally turns black when kept in the open for a few days. The article, when rubbed with toothpaste again, starts shining.

(a) Why do silver articles turn black when kept in the open for a few days? Name the phenomenon involved.

(b) Name the black substance formed and give its chemical formula.

Answer:

(a) The silver article turns black when kept in the air because the silver article reacts with sulphur compounds such as hydrogen sulphide (H_2S) present in the air to form silver sulphide Ag_2S . This phenomenon is called corrosion. It is also known as tarnishing of silver.

(b) The black substance is silver sulphide. Its chemical formula is Ag_2S .

Long Answer Type Questions

Q1. On heating blue coloured powder of copper (I) nitrate in a boiling tube, copper oxide (black), oxygen gas, and a brown gas X is formed

- (a) Write a balanced chemical equation of the reaction.
- (b) Identify the brown gas X evolved.
- (c) Identify the type of reaction.
- (d) What could be the pH range of the aqueous solution of the gas X?

Answer:

- (a) $2 \text{CuNO}_3 (\text{s}) + \text{Heat} \rightarrow 2 \text{CuO} (\text{s}) + 4 \text{NO}_2 (\text{g}) + \text{O}_2 (\text{g})$
- (b) The brown gas is of nitrogen dioxide.
- (c) It is a thermal decomposition reaction.
- (d) NO_2 gas reacts with water to produce nitric acid. Thus, its pH range will be less than 7.

Q2. Give the characteristic tests for the following gases

- (a) CO_2
- (b) SO_2
- (c) O_2
- (d) H_2

Answer:

The characteristics test for

- (a) CO_2 : CO_2 turns lime water milky due to the formation of insoluble calcium carbonate.
 $\text{CO}_2 + \text{Ca}(\text{OH})_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$
- (b) SO_2 : SO_2 turns purple coloured acidic potassium permanganate solution colourless.
 $5 \text{SO}_2 + 2 \text{KMnO}_4 + 2 \text{H}_2\text{O} \rightarrow \text{K}_2\text{SO}_4 + 2 \text{MnSO}_4 + 2 \text{H}_2\text{SO}_4$
- (c) O_2 : We can confirm the evolution of oxygen gas by bringing a burning candle near the mouth of the test tube containing the reaction mixture. The intensity of the flame increases because oxygen supports burning.
- (d) H_2 : Hydrogen (H_2) gas burns with a pop sound when a burning candle is brought near it.

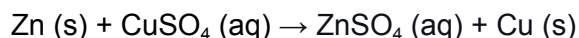
Q3. What happens when a piece of

- (a) Zinc metal is added to copper sulphate solution?
- (b) Aluminium metal is added to dilute hydrochloric acid?
- (c) Silver metal is added to copper sulphate solution?

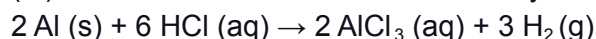
Also, write the balanced chemical equation if the reaction occurs

Answer:

- (a) Zinc metal reacts with copper sulphate solution and forms colourless zinc sulphate and reddish-brown copper metal.



(b) Aluminium metal reacts with dilute hydrochloric acid to form aluminium chloride and hydrogen gas.

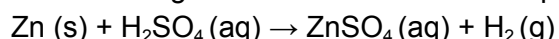


(c) Silver is less reactive than copper. Hence, no reaction will occur.

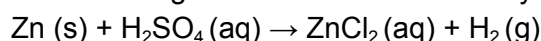
Q4. When zinc granules are treated with a dilute solution of H_2SO_4 , HCl , HNO_3 , NaCl and NaOH . Write the chemical equations if a reaction occurs.

Answer:

- Zinc granules react with dilute sulphuric acid to form zinc sulphate and hydrogen gas.



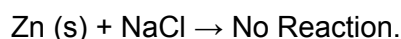
- Zinc granules react with dilute hydrochloric acid to form zinc chloride and hydrogen gas.



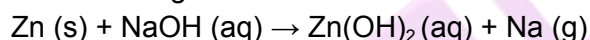
- Zinc granules react with dilute nitric acid to form zinc nitrate, water and dinitrogen gas.



- Zinc does not react with sodium chloride



- Zinc granules react with dilute sodium hydroxide to form zinc hydroxide and hydrogen gas.



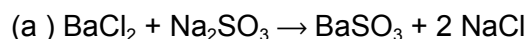
Q5. A white precipitate is obtained when adding a drop of barium chloride solution to an aqueous sodium sulphite solution.

(a) Write a balanced chemical equation of the reaction involved

(b) What other name can be given to this precipitation reaction?

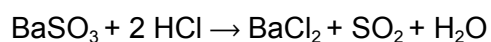
(c) On adding dilute hydrochloric acid to the reaction mixture, white residue disappears. Why?

Answer:



(b) It can be assigned as a double displacement reaction.

(c) On adding dilute hydrochloric acid to the reaction mixture, white residue disappears due to the formation of barium chloride.



Q6. You are provided with two containers made up of copper and aluminium. You are also provided with dilute HCl , HNO_3 , ZnCl_2 and H_2O solutions. In which of the above containers we can keep these solutions?

Answer:

The solution of dilute HCl , HNO_3 , ZnCl_2 and H_2O can be kept in a container made of copper since copper is a less reactive metal and is placed below the hydrogen in the reactivity series. Hence it does not react with HCl , HNO_3 , ZnCl_2 and H_2O . At the same time, aluminium is a highly reactive metal and can react with these solutions. Thus container made of copper is suitable to keep the given solutions.

