



1

Chemical Reactions And Equations

MULTIPLE CHOICE QUESTIONS

1. Which of the following statements about the reaction given below are incorrect?



- (i) Lead is getting reduced.
(ii) Carbon dioxide is getting oxidised.
(iii) Carbon is getting oxidised.
(iv) Lead oxide is getting reduced.
- (a) (i) and (ii) (b) (iii) and (iv)
(c) (i) and (iii) (d) (ii) and (iv)
2. What happens when dilute hydrochloric acid is added to iron filings?
- (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.
3. Calcium oxide reacts vigorously with water to produce slaked lime.



This reaction can be classified as

- (i) combination reaction
(ii) exothermic reaction
(iii) endothermic reaction
(iv) oxidation reaction

Which of the following is a correct option?

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

Answers: 1 (a) 2 (a) 3 (d)

ASSERTION-REASON TYPE QUESTIONS

In the following questions, two statements are given—one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below.

- (i) Both A and R are true and R is the correct explanation of the assertion.

(ii) Both A and R are true but R is not the correct explanation of the assertion.

(iii) A is true but R is false.

(iv) A is false but R is true.

1. **Assertion:**



The above chemical equation is an example of displacement reaction.

Reason: Iron being more reactive than aluminium, displaces aluminium from its oxide.

Ans. (iii)

Explanation: Aluminium is more reactive than iron, so it displaces iron from its oxide.

2. **Assertion:** On heating, the colour of ferrous sulphate crystals changes from green to white.

Reason: When ferrous sulphate crystals are heated, there is a loss of molecules of water of crystallisation.

Ans. (i)

Explanation: When the ferrous sulphate crystals ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) are heated, they lose water of crystallisation and the colour of the crystals changes to white due to the formation of anhydrous ferrous sulphate (FeSO_4).

READ AND ANSWER

Read the following passage and answer the given questions:

Potato chips, one of the most popular snacks, were invented in 1853 by a chef named George Crum in New York. A regular potato chips factory makes thousands of chips every day. The potatoes used for making chips are high in starch and low in sugar. Potatoes are washed and the skin is removed. Then, they are sliced, washed and fried. The chips are then salted, flavoured and packaged. Many manufacturers fill the empty space in the packet with a gas.

These packets are then sold in the market.

1. Name the gas that is filled in the potato chips packets.

Ans. Nitrogen

2. Why do you think this gas is filled in the packets?

Ans. The packets are filled with nitrogen to prevent the oxidation of fats and oils of the chips and keep them fresh for a longer time.

3. Suppose, you open the packet of chips and leave it for a day. On the next day, what changes will you observe in the chips and why? Mention the term used for the changes observed.

Ans. The smell and taste of the chips will change. The chips will become rancid. This happens because of the oxidation of fat and oil present in potato chips.

4. Suggest a way to keep the chips of the open packet fresh.

Ans. We can keep the chips in an airtight container and keep them fresh.

VERY SHORT ANSWER QUESTIONS

1. Translate the following statement into a balanced chemical equation.

"Barium chloride reacts with aluminium sulphate to give aluminium chloride and barium sulphate."

Ans. $3\text{BaCl}_2 + \text{Al}_2(\text{SO}_4)_3 \longrightarrow 2\text{AlCl}_3 + 3\text{BaSO}_4$
Barium Chloride Aluminium sulphate Aluminium chloride barium sulphate

2. What happens when a piece of silver metal is added to copper sulphate solution?

Ans. When a piece of silver metal is added to a copper sulphate solution, no reaction takes place because silver being less reactive than copper, does not displace copper from the copper sulphate.

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

Ans. Magnesium ribbon should be cleaned before burning in air to remove the protective layer of magnesium oxide from the surface of the magnesium ribbon.

4. Anhydrous ferrous sulphate decomposes with the evolution of gas having a characteristic odour of burning sulphur. Write the chemical reaction involved and identify the type of reaction.

Ans. $2\text{FeSO}_4(\text{s}) \xrightarrow{\text{heat}} \text{Fe}_2\text{O}_3(\text{s}) + \text{SO}_2(\text{g}) + \text{SO}_3(\text{g})$
ferrous sulphate ferric sulphur oxide sulphur dioxide trioxide

It is a thermal decomposition reaction.

5. Why do we apply paint on iron articles?

Ans. We apply paint on iron articles to prevent them from rusting. This is because paint does not allow oxygen (from air) and water (moisture) to come in contact with the surface of iron and thus, prevents rusting.

6. In the refining of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write down the reaction involved.

Ans. $2\text{AgNO}_3(\text{aq}) + \text{Cu}(\text{s}) \longrightarrow \text{Cu}(\text{NO}_3)_2(\text{aq}) + 2\text{Ag}(\text{s})$
silver nitrate copper copper nitrate silver

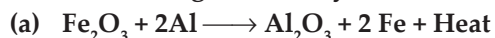
7. Can we stir silver nitrate solution with a copper spoon? Why/Why not? Support your answer with reason.

Ans. We cannot stir silver nitrate solution with a copper spoon because a reaction takes place between them as copper is more reactive than silver. So, copper displaces silver from the silver nitrate.

$\text{Cu}(\text{s}) + 2\text{AgNO}_3(\text{aq}) \longrightarrow \text{Cu}(\text{NO}_3)_2(\text{aq}) + 2\text{Ag}(\text{s})$
copper silver nitrate copper nitrate silver

SHORT ANSWER QUESTIONS

1. Identify the type of each of the following reactions stating reason for your answers.



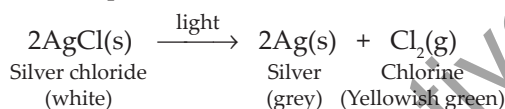
Ans. (a) It is a displacement reaction as aluminium is displacing iron from Fe_2O_3 to form Al_2O_3 and Fe. (Also, it is an exothermic reaction)

- (b) It is a **double displacement reaction** because there is an **exchange of ions** between $\text{Pb}(\text{NO}_3)_2$ and KI .
- (c) It is a **thermal decomposition reaction** because a single compound ZnCO_3 on heating gives simpler compounds, ZnO and CO_2 .

2. **2g of silver chloride is taken in a china dish and the china dish is placed in sunlight for some time. What will be your observation in this case? Write the chemical reaction involved in the form of a balanced chemical equation. Identify the type of chemical reaction.**

Ans. When silver chloride is placed in sunlight for some time, the white coloured silver chloride **decomposes and turns grey** due to the formation of **silver metal** and a **yellowish green chlorine gas** also evolves.

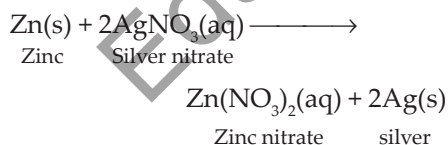
It is a **decomposition reaction** (photo-decomposition reaction).



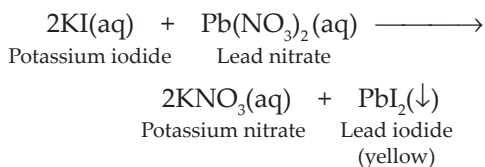
3. **Identify the type of reactions taking place in each of the following cases and write the balance chemical equation for the reactions.**

- (a) **Zinc reacts with silver nitrate to produce zinc nitrate and silver.**
- (b) **Potassium iodide reacts with lead nitrate to produce potassium nitrate and lead iodide.**

Ans. (a) **Displacement reaction**

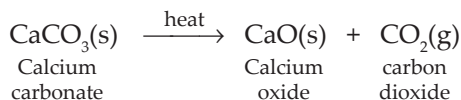


- (b) **Double displacement reaction**

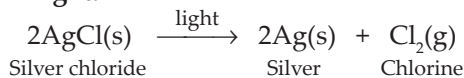


4. **Decomposition reactions require energy either in the form of heat or light or electricity for breaking down the reactants. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light and electricity.**

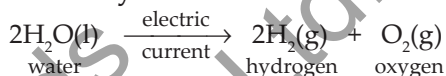
Ans. Heat:



Light:



Electricity:



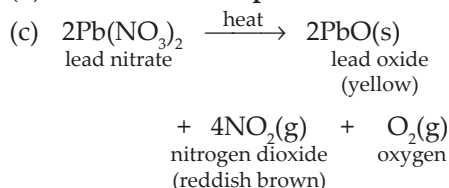
5. (a) **Write two observations when lead nitrate is heated in a test tube.**

(b) **Name the type of reaction.**

(c) **Write a balanced chemical equation to represent the above reaction.**

Ans. (a) When lead nitrate is heated in a test tube, it **turns yellow** due to formation of **lead oxide** and **reddish brown fumes of nitrogen dioxide** are evolved.

(b) **Thermal decomposition reaction**



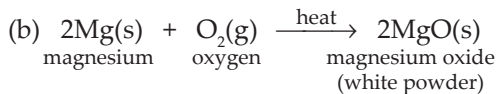
6. **A shining metal 'M', on burning gives a dazzling white flame and changes to white powder 'N'.**

(a) **Identify M and N.**

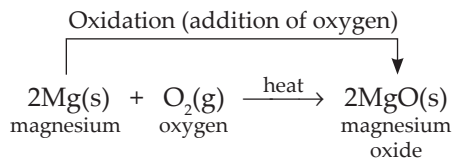
(b) **Represent the above reaction in the form of a balanced chemical equation.**

(c) **Does 'M' undergo oxidation or reduction in this reaction? Justify.**

Ans. (a) Shining metal 'M' is Magnesium (Mg) and white powder 'N' is Magnesium oxide (MgO).



- (c) Magnesium (metal M) **undergoes oxidation** because **magnesium is gaining oxygen** and forming magnesium oxide (MgO).



7. In the electrolysis of water

- (a) Name the gases liberated at anode and cathode.
- (b) Why is it that the volume of gas collected on one electrode is two times that on the other electrode?
- (c) What would happen if dil. H_2SO_4 is not added to water?

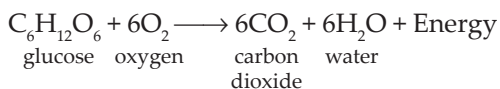
Ans. (a) Oxygen gas is liberated at anode and hydrogen gas is liberated at cathode.

- (b) Water is formed by the combination of hydrogen and oxygen in the **ratio of 2:1 by volume**. Therefore, when electrolysis of water takes place, the constituent gases, hydrogen and oxygen are produced in the same ratio of 2:1. Thus, the volume of hydrogen gas collected at cathode is double than that of oxygen gas collected at anode.

- (c) If H_2SO_4 is not added to water, then the **conductivity of water** will remain **low** which will result in the **slow electrolysis of water**.

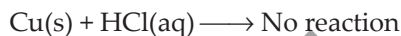
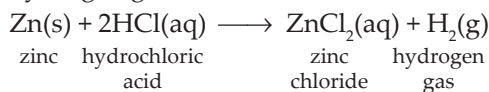
8. Why is respiration considered as an exothermic reaction? Explain.

Ans. During the process of respiration, glucose reacts with oxygen inside the body cells to form carbon dioxide gas, water and also releases energy. As **energy is produced** during respiration, it is considered as an exothermic reaction.



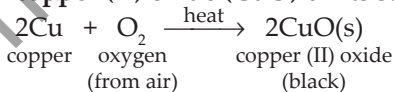
9. Zinc liberates hydrogen gas when it reacts with dilute hydrochloric acid, whereas copper does not. Why?

Ans. When zinc reacts with dilute hydrochloric acid, it gives hydrogen gas because zinc is more reactive than hydrogen and therefore, it **displaces hydrogen from the hydrochloric acid**. Copper does not react with hydrochloric acid as **copper is less reactive than hydrogen** and thus, no hydrogen gas is evolved in this case.

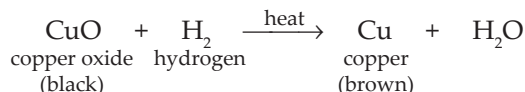


10. 1 g of copper powder was taken in a china dish and heated. What change takes place on heating? When hydrogen gas is passed over this heated substance, a visible change is seen in it. Give the chemical equations of reactions, the name and the colour of the products formed in each case.

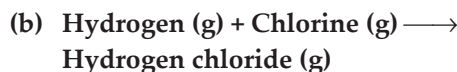
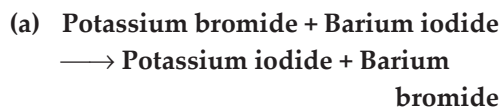
Ans. On heating copper powder, it **oxidises** and forms a **black coloured coating of copper (II) oxide (CuO)** on its surface.



When hydrogen gas is passed over this heated substance (CuO), the black coating on its surface **turns brown**. This is because the **reverse reaction takes place** here with the addition of hydrogen gas and copper is obtained back.

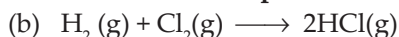


11. Write the balanced equation for the following reaction and identify the type of reaction in each case.



Ans. (a) $2\text{KBr}(aq) + \text{BaI}_2(aq) \longrightarrow 2\text{KI}(aq) + \text{BaBr}_2(aq)$

It is a **double displacement reaction**.



It is a **combination reaction**.

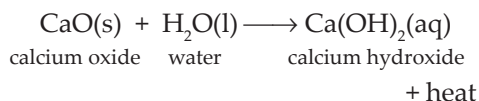
12. A solution of a substance 'X' is used for white washing.

(a) Name the substance 'X' and write its formula.

(b) Write the reaction of the substance 'X' with water.

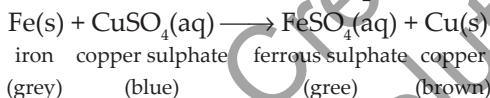
Ans. (a) 'X' = quicklime (calcium oxide), CaO

(b) When quicklime reacts with water, it forms **slaked lime (calcium hydroxide)** and also **releases a large amount of heat**.

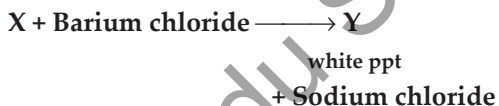


13. Why does the colour of copper sulphate solution change when an iron nail is dipped into it?

Ans. The colour of copper sulphate solution changes when an iron nail is dipped into it because **iron being more reactive than copper, displaces copper from the copper sulphate**. Thus, the blue colour of copper sulphate fades away to give **green colour solution of ferrous sulphate**.



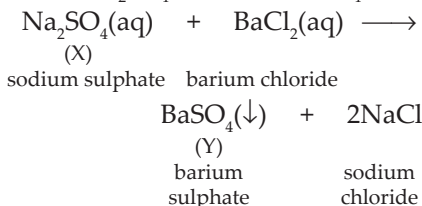
14. Consider the following chemical reaction:



(a) Identify 'X' and 'Y'.

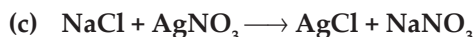
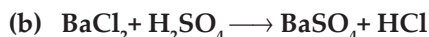
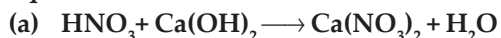
(b) Name the type of reaction of the above chemical reaction.

Ans. (a) 'X' is Na_2SO_4 and 'Y' is BaSO_4

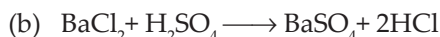


(b) It is a double displacement reaction.

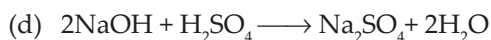
15. Balance the following chemical equations.



Ans. (a) $2\text{HNO}_3 + \text{Ca}(\text{OH})_2 \longrightarrow \text{Ca}(\text{NO}_3)_2 + 2\text{H}_2\text{O}$



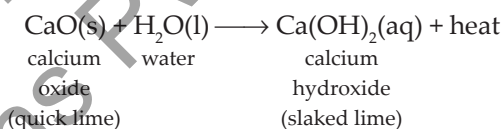
(c) It is a balanced chemical equation.



16. What do you mean by exothermic and endothermic reactions? Give one example of each.

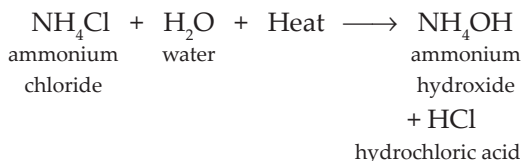
Ans. The chemical reactions in which **heat is released along with products** are called **exothermic reactions**.

For example, slaking of lime



The chemical reactions in which **heat is absorbed** are called **endothermic reactions**. This heat may be given by heating or can be taken from the surroundings.

For example, Dissolution of ammonium chloride,

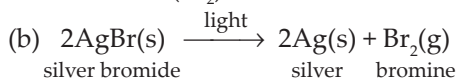


17. A metal salt MX when exposed to light, split up to form metal M and a gas X_2 . Metal M is used in making ornaments. The salt MX is used in black and white photography.

(a) Identify metal M and X_2 .

(b) Write the chemical equation and mention the type of chemical reaction involved when salt MX is exposed to light.

Ans. (a) Metal M is **silver** (Ag) and gas X₂ is **bromine** (Br₂).

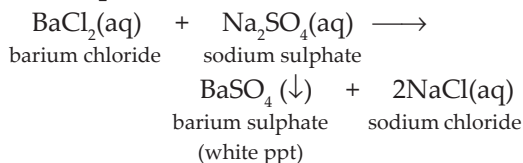


It is a **decomposition reaction**.

18. What do you mean by a precipitation reaction? Explain by giving an example.

Ans. The chemical reactions in which an insoluble solid (precipitate) is formed that separates from the solution are called **precipitation reactions**.

Example:



19. What is the difference between displacement and double displacement reactions?

Ans.

Displacement	Double displacement
A reaction in which a more reactive element displaces a less reactive element from its compound is called a displacement reaction.	A chemical reaction in which two compounds react by an exchange of ions to form two new compounds is called a double displacement reaction

20. Define the following:

(a) Corrosion (b) Rancidity

Ans. (a) The slow destruction of metals by the action of air, moisture or chemicals is called corrosion.

(b) The condition produced by oxidation of fats and oils in food marked by unpleasant smell and taste is called rancidity.

LONG ANSWER QUESTION

Q. (a) Explain the following in terms of gain or loss of oxygen with one example

each: (i) Oxidation (ii) Reduction

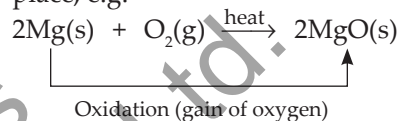
(b) A small amount of quicklime is added to water in beaker.

(i) Name and define the type of reaction that has taken place.

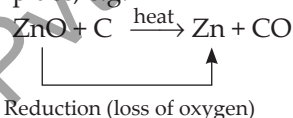
(ii) Write balanced chemical equation for the above reaction and the chemical name of the product formed.

(iii) List two main observations of this reaction.

Ans. (a) (i) **Oxidation:** It is a process in which gain of oxygen takes place, e.g.

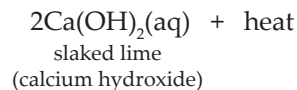


(ii) **Reduction:** It is a process in which removal of oxygen takes place, e.g.



(b) (i) It is **combination reaction**. Combination reaction is a type of reaction in which two or more reactants react to form a single product.

(ii) $2\text{CaO}(s) + 2\text{H}_2\text{O}(l) \longrightarrow$
quicklime water
(calcium oxide)



Chemical name of the product is **calcium hydroxide**.

(iii) Two main observations:

- Quicklime (calcium oxide) reacts vigorously with water to produce calcium hydroxide.
- A large amount of heat is released in this reaction (exothermic reaction)

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