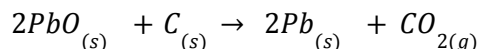


Board – CBSE

Class – 10<sup>th</sup>

Topic – Chemical Reactions and Equations

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 getting oxidised.

(d) Lead oxide is getting reduced.

(i) (a) and (b)

(ii) (a) and (c)

(iii) (a), (b) and (c)

(iv) all

**Ans.** (i) (a) and (b)

2.  $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe$ . The above reaction is an example of a

(a) Combination Reaction.

(b) Double Displacement Reaction.

(c) Decomposition Reaction.

(d) Displacement Reaction.

**Ans.** (d) The given reaction is an example of a displacement reaction.

3. What happens when dilute hydrochloric acid is added to iron filings? Tick the correct answer.

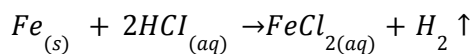
(a) Hydrogen gas and iron chloride are produced.

(b) Chlorine gas and iron hydroxide are produced.

(c) No reaction takes place.

(d) Iron salt and water are produced.

**Ans.** (a) Hydrogen gas and iron chloride are produced. The reaction is as follows.



4. What is a balanced chemical equation? Why should chemical equations be balanced?

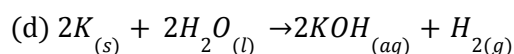
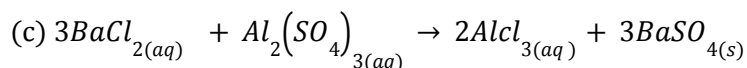
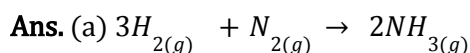
**Ans.** A reaction which has an equal number of atoms of all the elements on both sides of the chemical equation is called a balanced chemical equation.

The law of conservation of mass states that mass can neither be created nor destroyed. Hence, in a chemical reaction, the total mass of reactants should be equal to the total mass of the products. It means that the total number of atoms of each element should be equal on both

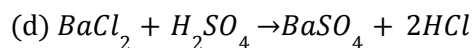
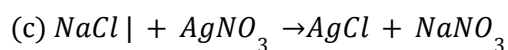
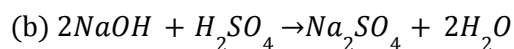
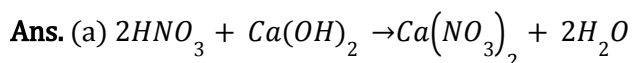
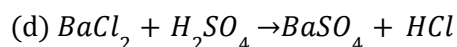
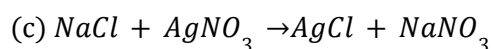
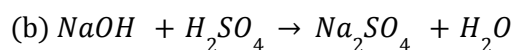
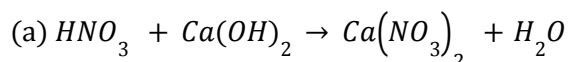
sides of a chemical equation. Hence, it is for this reason that chemical equations should be balanced.

5. Translate the following statements into chemical equations and then balance 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.



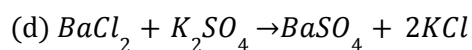
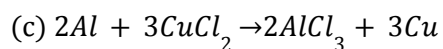
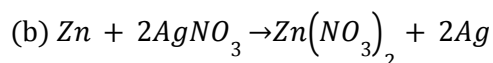
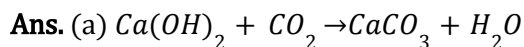
6. Balance the following chemical equations.



7. Write the balanced chemical equations for the following reactions.

- (a) Calcium hydroxide + Carbon dioxide  $\rightarrow$  Calcium carbonate + Water
- (b) Zinc + Silver nitrate  $\rightarrow$  Zinc nitrate + Silver
- (c) Aluminium + Copper chloride  $\rightarrow$  Aluminium chloride + Copper

(d) Barium chloride + Potassium sulphate → Barium sulphate + Potassium chloride



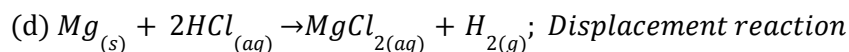
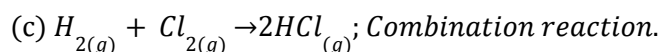
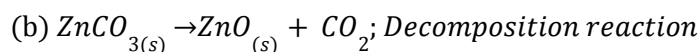
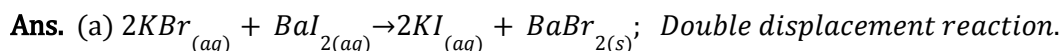
**8.** Write the balanced chemical equation for the following and identify the type of reaction in each case.

(a) Potassium bromide<sub>(aq)</sub> + Barium iodide<sub>(aq)</sub> → Potassium iodide<sub>(aq)</sub> + Barium bromide<sub>(s)</sub>

(b) Zinc carbonate<sub>(s)</sub> → Zinc oxide<sub>(s)</sub> + Carbon dioxide<sub>(g)</sub>

(c) Hydrogen<sub>(g)</sub> + Chlorine<sub>(g)</sub> → Hydrogen chloride<sub>(g)</sub>

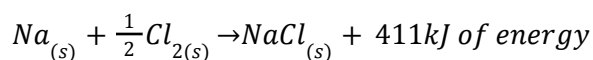
(d) Magnesium<sub>(s)</sub> + Hydrochloric acid<sub>(aq)</sub> → Magnesium chloride<sub>(aq)</sub> + Hydrogen<sub>(g)</sub>



**9.** What does one mean by exothermic and endothermic reactions? Give examples.

**Ans.** Chemical reactions that release energy in the form of heat, light, or sound are called exothermic reactions.

Example. Mixture of sodium and chlorine to yield table salt

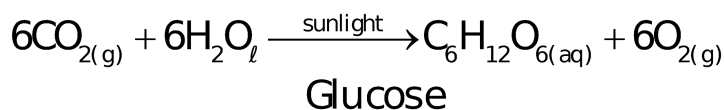


In other words, combination reactions are exothermic.

Reactions that absorb energy or require energy in order to proceed are called endothermic reactions.

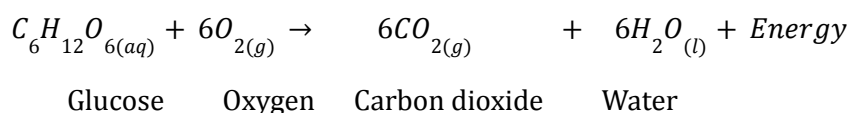
Energy of reactants < Energy of products

For example. In the process of photosynthesis, plants use the energy from the sun to convert carbon dioxide and water to glucose and oxygen.



10. Why is respiration considered an exothermic reaction? Explain.

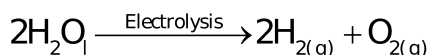
**Ans.** Energy is required to support life. Energy in our body is obtained from the food we eat. During digestion, large molecules of food are broken down into simpler substances such as glucose. Glucose combines with oxygen in the cells and provides energy. The special name of this combustion reaction is respiration. Since energy is released in the whole process, it is an exothermic process.



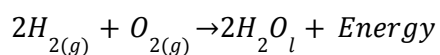
11. Why are decomposition reactions called the opposite of combination reactions? Write equations for these reactions.

**Ans.** Decomposition reactions are those in which a compound breaks down to form two or more substances. These reactions require a source of energy to proceed. Thus, they are the exact opposite of combination reactions in which two or more substances combine to give a new substance with the release of energy.

Decomposition reaction.  $AB + \text{Energy} \rightarrow A + B$

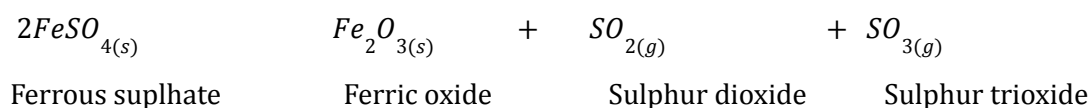


Combination reaction  $A + B \rightarrow AB$  Energy.

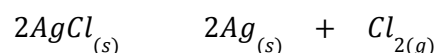


12. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.

**Ans.** (a) Thermal decomposition.

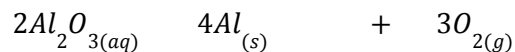


(b) Decomposition by light.



Silver chloride                  Silver                  Chlorine

(c) Decomposition by electricity.



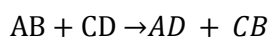
Aluminium oxide                  Aluminium                  Oxygen

**13.** What is the difference between displacement and double displacement reactions? Write equations for these reactions.

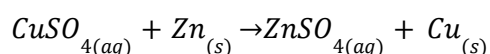
**Ans.** In a displacement reaction, a more reactive element replaces a less reactive element from a compound.



In a double displacement reaction, two atoms or a group of atoms switch places to form new compounds.

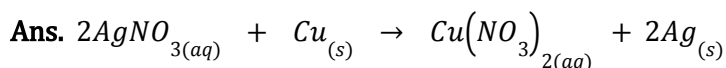


For example. Displacement reaction.



Double displacement reaction.  $Na_2SO_{4(aq)} + BaCl_{2(aq)} \rightarrow BaSO_{4(s)} + 2NaCl_{(aq)}$

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

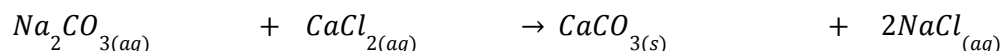


Silver nitrate          Copper          Copper nitrate          Silver

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

**Ans.** A reaction in which an insoluble solid (called precipitate) is formed is called a precipitation reaction.

For example.



Sodium carbonate          Calcium chloride          Calcium carbonate          Sodium chloride

In this reaction, calcium carbonate is obtained as a precipitate. Hence, it is a precipitation reaction.

Another example of precipitation reaction is.



Sodium sulphate          Barium chloride          Barium sulphate          Sodium chloride

In this reaction, barium sulphate is obtained as a precipitate.

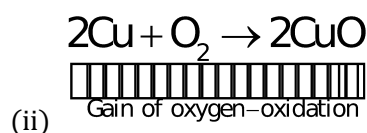
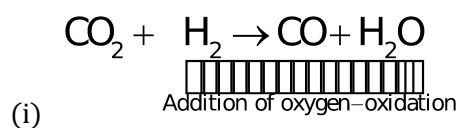
16. Explain the following in terms of gain or loss of oxygen with two examples each.

(a) Oxidation

(b) Reduction

**Ans.** (a) Oxidation is the gain of oxygen.

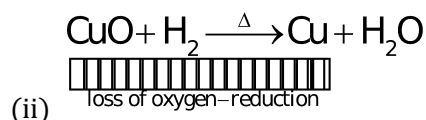
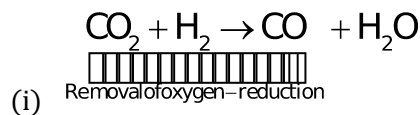
For example.



In equation (i), H<sub>2</sub> is oxidized to H<sub>2</sub>O and in equation (ii), Cu is oxidised to CuO.

(b) Reduction is the loss of oxygen.

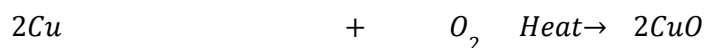
For example.



In equation (i), CO<sub>2</sub> is reduced to CO and in equation (ii), CuO is reduced to Cu.

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

**Ans.** 'X' is copper (Cu) and the black-coloured compound formed is copper oxide (CuO). The equation of the reaction involved on heating copper is given below.



(Shiny brown in colour)

(Black in colour)

18. Why do we apply paint on iron articles?

**Ans.** Iron articles are painted because it prevents them from rusting. When painted, the contact of iron articles from moisture and air is cut off. Hence, rusting is prevented. So presence of air and moisture is essential for rusting to take place.

19. Oil and fat containing food items are flushed with nitrogen. Why?

Ans: Oils and fat containing items are perishable and can be spoiled when exposed to oxygen. This is because oil and fats are reactive and can react with oxygen easily and get oxidised. To prevent oxidation, these items are flushed with nitrogen gas. Nitrogen is an inert gas and cannot react with oils or fats easily. So, food items with oils and fats are kept in packets having nitrogen gas that increases the shelf life and makes these items last for a long time.

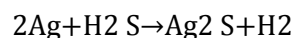
20. Explain the following terms with one example each.

a) Corrosion

Ans: Corrosion: Corrosion is defined as a process where a substance, generally metal deteriorates and forms a layer of oxide on its surface. Metals get converted into their hydrated oxides or sulphides. Ex; Iron, Cu, Ag



Hydrated iron oxide



(b) Rancidity

Ans: Rancidity: It is a process in which food items like fats and oils are oxidised. This results in the change in taste and smell of the food item and is called rancidity. For example, when any fried food is exposed to air for a long time then it has a change in smell and taste and it becomes rancid.

Rancidity can be avoided by:

- Adding antioxidants.
- Refrigerate the food items
- Keep food items in airtight containers
- Adding nitrogen to food packets to prevent oxidation.