

FA-1 & 2; SA-1

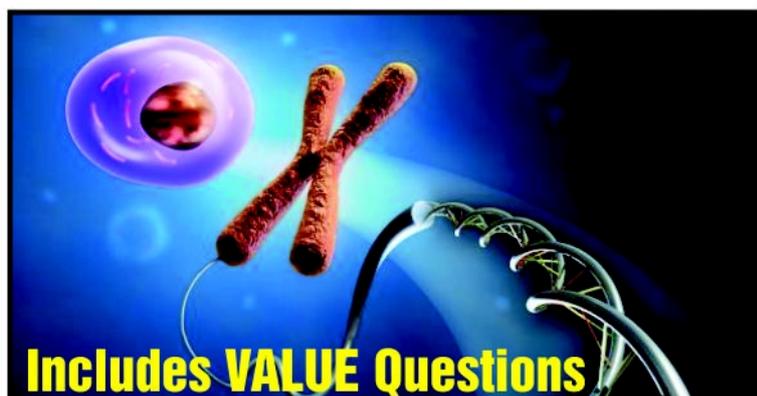
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PART A

CHAPTER-WISE QUICK REVISION NOTES, NCERT SOLUTIONS AND PRACTICE QUESTION BANK

A-1-A-208

Chemical Reactions and Equations

KEY CONCEPTS

1. **Chemical Reaction :** The process in which a substance undergoes change to produce new substances with new properties are known as chemical reaction. For example magnesium carbonate when heated produces magnesium oxide and carbon dioxide (i.e. new substances with new properties).

A chemical change is generally accompanied by a *change of state, change of colour, evolution of a gas or change of temperature* etc.

2. **Chemical Equation :** The qualitative representation of a chemical reaction in a short hand or concise form in term of symbols and formulae, is called a chemical equation.

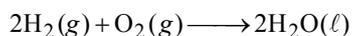
3. **Skeletal Chemical Equation or Symbol Equation:** A chemical equation written in the form of symbols and formulae is called a skeletal chemical equation.

4. **Balanced Chemical Equation :** A chemical equation in which number of atoms of each elements on L.H.S. (i.e. reactants) and R.H.S. (i.e.products) is equal is called a balanced chemical equation.

5. **Balancing of Chemical Equations :** The process of making the number of different elements on both side of the equation equal is known as balancing of chemical equation.

6. **Types of Chemical Reactions :** Various types of chemical reactions are :-

- (i) **Combination reactions :** Combination reactions are those in which one element reacts with another to form a compound. This type of reactions are also known as synthesis reaction. For example, hydrogen combines with oxygen to give water.

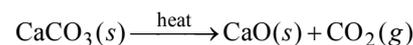


- (ii) **Decomposition reactions :** Decomposition reactions are those reactions in which a

compound breaks down into simpler compounds (or substances). This type of reaction is simply the reverse of combination reactions.

These reactions require energy in the form of heat, light, electricity etc.

For example:



- (iii) **Displacement Reactions**

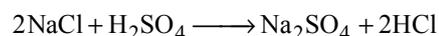
A displacement reaction is a reaction in which an atom, or group of atoms, present in a molecule is displaced by another atom. This type of reaction can be represented as follows:



- (iv) **Double Displacement Reactions or Double Decomposition**

The reactions in which mutual exchange of radicals takes place are known as double decomposition reactions. As a result of double decomposition reactions two new substances are formed.

Examples :



The double-displacement reactions have two major features in common. First, two compounds exchange ions or elements to form new compounds. Second, one of the products is either a compound that will separate from the reaction mixture in some way (commonly as a solid or gas) or a stable covalent compound, often water.

Double-displacement reactions can be further classified as **precipitation, gas formation, and acid-base neutralization reactions.**

Precipitation Reactions : A precipitation reaction occurs when two solutions are mixed together and a solid separates from the solution.

The solid part that forms and separates from the solutions is called the precipitate the reaction given above is a precipitation reaction.

(v) **Oxidation-Reduction Reactions**

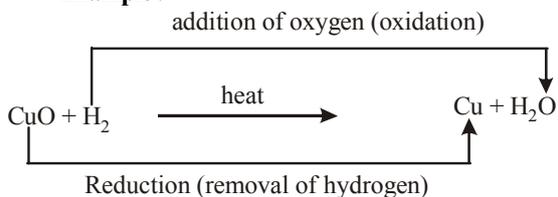
Oxidation reactions : Oxidation is defined as a process which involve addition of oxygen or removal of hydrogen.

Reduction : The term reduction is defined as a process which involve the removal of oxygen or addition of hydrogen.

(vi) **Redox Reactions :**

Those reactions in which oxidation and reduction takes place simultaneously, are known as redox reactions.

Example :

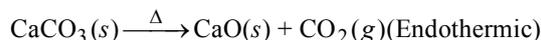
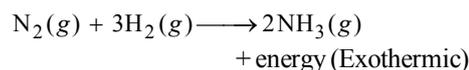


(vii) **Exothermic and Endothermic Reactions :**

Chemical reactions usually proceed with either

liberation of heat or the absorption of heat.

When a chemical reaction liberates heat to the surroundings, it is said to be 'exothermic reaction' and when it absorbs the heat from the surroundings, it is said to be endothermic reaction.



7. **Corrosion (Erosion by chemical action) :**

Corrosion is the degradation of metals and generally called rust.

Corrosion causes damage to car bodies, iron railings, ships and to all objects made of metals, specially those of iron.

Corrosion of iron is a serious problem.

8. **Rancidity :**

The most important cause of deterioration in fats and fatty foods is oxidation of fats. What we perceive is an unpleasant change in the flavour and odour of a food, called rancidity.

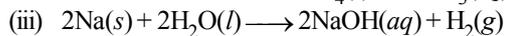
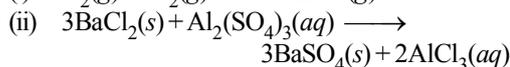
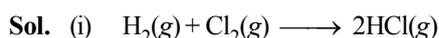
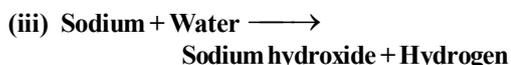
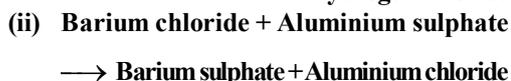
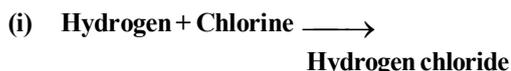
TEXTBOOK SOLUTIONS

IN-CHAPTER QUESTIONS

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

Sol. The magnesium ribbon which we use has a coating of "basic magnesium carbonate" on its surface, which is formed by a slow action of moist air on it. Therefore before burning it in air, it is cleaned by a sand paper which remove the protective layer of basic magnesium carbonate from the surface of magnesium ribbon, so that it can easily burn.

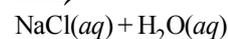
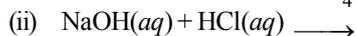
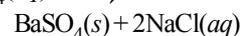
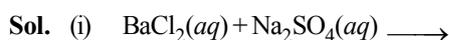
2. **Write the balanced equation for the following chemical reactions**



3. **Write a balanced chemical equation with state symbols for the following reactions.**

(i) **Solutions of barium chloride and sodium sulphate in water react to give insoluble barium sulphate and the solution of sodium chloride.**

(ii) **Sodium hydroxide solution (in water) reacts with hydrochloric acid solution (in water) to produce sodium chloride solution and water.**



Ans. (a) $\text{Fe}(s) + 2\text{HCl}(aq) \longrightarrow \text{FeCl}_2(aq) + \text{H}_2(g)$

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

Sol. **Balanced chemical equation:** – A chemical equation is said to be balanced if the number of atoms of each element participating in the reaction are equal on both side of the equation. The chemical reaction should be balanced because law of conservation of mass holds good which states that “in a chemical reaction total mass of the reactant must be equal to the total mass of the product”.

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.**

Sol. (a) $\text{N}_2(g) + 3\text{H}_2(g) \longrightarrow 2\text{NH}_3(g)$

(b) $2\text{H}_2\text{S}(g) + 3\text{O}_2(g) \longrightarrow 2\text{H}_2\text{O}(l) + 2\text{SO}_2(g)$

(c) $3\text{BaCl}_2(aq) + \text{Al}_2(\text{SO}_4)_3(s) \longrightarrow$
 $3\text{BaSO}_4(s) + 2\text{AlCl}_3(aq)$

(d) $2\text{K}(s) + 2\text{H}_2\text{O}(l) \longrightarrow 2\text{KOH}(aq) + \text{H}_2(g)$

6. **Balance the following chemical equations.**

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

(b) $\text{NaOH} + \text{H}_2\text{SO}_4 \longrightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$

(c) $\text{AgNO}_3 + \text{NaCl} \longrightarrow \text{AgCl} + \text{NaNO}_3$

(d) $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \longrightarrow \text{BaSO}_4 + \text{HCl}$

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

(b) $2\text{NaOH} + \text{H}_2\text{SO}_4 \longrightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$

(c) $\text{AgNO}_3 + \text{NaCl} \longrightarrow \text{AgCl} + \text{NaNO}_3$

(d) $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \longrightarrow \text{BaSO}_4 + 2\text{HCl}$

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

(a) **Calcium hydroxide + Carbon dioxide**
 \longrightarrow **Calcium carbonate + water**

(b) **Zinc + Silver nitrate** \longrightarrow
Zinc nitrate + Silver

(c) **Aluminium + Copper chloride** \longrightarrow
Aluminium chloride + Copper

(d) **Barium chloride + Potassium sulphate**
 \longrightarrow **Barium sulphate + Potassium chloride**

Sol. (a) $\text{Ca}(\text{OH})_2 + \text{CO}_2 \longrightarrow \text{CaCO}_3 + \text{H}_2\text{O}$

(b) $\text{Zn} + 2\text{AgNO}_3 \longrightarrow \text{Zn}(\text{NO}_3)_2 + 2\text{Ag}$

(c) $2\text{Al} + 3\text{CuCl}_2 \longrightarrow 2\text{AlCl}_3 + 3\text{Cu}$

(d) $\text{BaCl}_2 + \text{K}_2\text{SO}_4 \longrightarrow \text{BaSO}_4 + 2\text{KCl}$

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

(a) **Potassium bromide(aq) + Barium iodide(aq)** \longrightarrow
Potassium iodide(aq) + Barium bromide(s)

(b) **Zinc carbonate(s)** \longrightarrow
Zinc oxide(s) + Carbon dioxide(s)

(c) **Hydrogen(g) + Chlorine(g)** \longrightarrow
Hydrogen chloride(g)

(d) **Magnesium(s) + Hydrochloric acid(aq)**
 \longrightarrow **Magnesium chloride(aq) +**
Hydrogen(g)

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

(b) $\text{ZnCO}_3(s) \longrightarrow \text{ZnO}(s) + \text{CO}_2(g)$

(c) $\text{H}_2(g) + \text{Cl}_2(g) \longrightarrow 2\text{HCl}(g)$

(d) $\text{Mg}(g) + 2\text{HCl}(aq) \longrightarrow \text{MgCl}_2(aq) + \text{H}_2(g)$

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

Sol. **Exothermic reaction:** – Those reactions which occur with the evolution of heat are exothermic reactions. e.g.

$2\text{NaOH}(aq) + \text{H}_2\text{SO}_4(aq) \longrightarrow$
 $\text{Na}_2\text{SO}_4(aq) + 2\text{H}_2\text{O}(l) + \text{heat}$

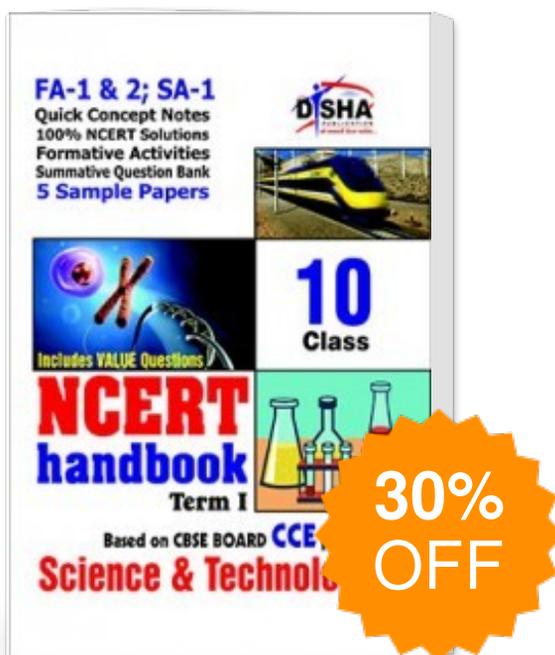
Endothermic reaction: – Those reactions which require heat to occur are endothermic reactions. e.g.

$2\text{Pb}(\text{NO}_3)_2(s) \xrightarrow{\text{heat}} 2\text{PbO}(s) + 4\text{NO}_2(g)$
 $+ \text{O}_2(g)$

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

Sol. **Respiration** is the most important biochemical reaction which releases energy in the cell. When we breathe air (oxygen) enters into our lungs and this oxygen binds itself to haemoglobin present in red blood cells (RBC). It is then carried to million of cells present in our body. Respiration occurs in these cells and is accompanied by the combustion of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) producing carbon dioxide (CO_2) and water (H_2O). A large amount of energy is released in this chemical reaction.

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