NCERT INTEXT QUESTIONS

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

Ans. When magnesium ribbon is exposed to air, it forms a layer of magnesium oxide on its surface. This layer of magnesium oxide, being a stable compound, prevents further reaction of magnesium with oxygen. Hence, it should be cleaned before burning in air to remove this layer so that the metal can be exposed to air properly(the oxide layer may prevent or slow down the burning of magnesium).

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

(a) Hydrogen + Chlorine ⟶ Hydrogen chloride

(b) Barium chloride + Aluminium sulphate ⟶ Barium sulphate + Aluminium chloride

(c) Sodium + Water ⟶ Sodium hydroxide + Hydrogen

Ans. (a) $H_2(g) + Cl_2(g) \longrightarrow 2HCl(g)$

(b) $3BaCl_2(aq) + Al_2(SO_4)_3(aq) \longrightarrow 3BaSO_4(s) + 2AlCl_3(aq)$

(c) $2Na(s) + 2H_2O(l) \longrightarrow 2NaOH(aq) + H_2(g)$

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

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

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

Ans. (a) $BaCl_2(aq) + Na_2SO_4(aq) \longrightarrow BaSO_4(s) + 2NaCl(aq)$

(b) $NaOH(aq) + HCl(aq) \longrightarrow NaCl(aq) + H_2O(l)$

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1. 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 named in (i) above with water.

Ans. (a) The substance X is lime or quick lime which is used for white washing. Its formula is CaO.

(b) $CaO + H_2O \longrightarrow Ca(OH)_2 + Heat$

2. Why is the amount of gas collected in one of the test tubes in Activity 1.7, (electrolysis of water) is double of the amount collected in the other? Name this gas.

Ans. Water contains two parts of hydrogen and one part of oxygen. Therefore, during the electrolysis of water the amount of hydrogen gas collected in one of the test tubes is double that of the oxygen produced and collected in the other test tube.

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

Ans. Iron is more reactive than copper. So, when an iron nail is dipped in a copper sulphate solution, iron displaces copper from its solution to form iron sulphate, which is green in colour.

$$Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4(aq) + Cu(s)$$

Hence, the blue colour of copper sulphate solution changes into green colour because of this displacement reaction.

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

Ans. Sodium carbonate and calcium chloride exchange ions to form two new compounds calcium carbonate and sodium chloride.

$$Na_2CO_3(aq) + CaCl_2(aq) \longrightarrow CaCO_3(s) + 2NaCl(aq)$$

3. Identify the substances that are oxidized and the substances that are reduced in the following reactions:

(a) $4Na(s) + O_2(g) \longrightarrow 2Na_2O(s)$

(b) $CuO(s) + H_2(g) \longrightarrow Cu(s) + H_2O(l)$

Ans. (a) Sodium (Na) is oxidized to Na_2O, oxygen is getting reduced to O^{2-} ion.

(b) CuO (Copper oxide) is reduced to Cu, while H_2 gas is oxidized to H_2O.

NCERT EXERCISES

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

$2PbO(s) + C(s) \longrightarrow 2Pb(s) + CO_2(g)$

(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) are incorrect statements because 'Pb' and 'CO_2' are products and not reactants.

2. $Fe_2O_3 + 2Al \longrightarrow Al_2O_3 + 2Fe$

The above reaction is an example of a

(a) combination reaction.

(b) double displacement reaction.

(c) decomposition reaction.

(d) displacement reaction.

Ans. (d) Al is displacing iron from iron (III) oxide. Therefore, it is a displacement reaction.

3. What happens when dilute hydrochloric acid is added to iron fillings? 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) $Fe(s) + 2HCl(dil.) \longrightarrow FeCl_2(aq) + H_2(g)$

Hydrogen gas and iron (II) chloride are produced.

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

Ans. Balanced chemical equation means total number of atoms of each element should be equal on both sides of the reaction.

For example, magnesium and oxygen combine, when heated to form a single compound, magnesium oxide.

$$2Mg(s) + O_2(g) \longrightarrow 2MgO(s)$$

The reaction should be balanced because matter can neither be created nor be destroyed. The total mass of reactants should be equal to the total mass of products.

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.

[CBSE 2012]

Ans. (a) $3H_2(g) + N_2(g) \rightleftharpoons 2NH_3(g)$

(b) $2H_2S(g) + 3O_2(g) \longrightarrow 2H_2O(l) + 2SO_2(g)$

(c) $3BaCl_2(aq) + Al_2(SO_4)_3(aq) \longrightarrow 3BaSO_4(s) + 2AlCl_3(aq)$

(d) $2K(s) + 2H_2O(l) \longrightarrow 2KOH(aq) + H_2(g)$

6. Balance the following chemical equations.

(a) $HNO_3 + Ca(OH)_2 \longrightarrow Ca(NO_3)_2 + H_2O$

(b) $NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + H_2O$

(c) $NaCl + AgNO_3 \longrightarrow AgCl + NaNO_3$

(d) $BaCl_2 + H_2SO_4 \longrightarrow BaSO_4 + HCl$

Ans. (a) $2HNO_3(aq) + Ca(OH)_2(aq) \longrightarrow Ca(NO_3)_2(aq) + 2H_2O(l)$

(b) $2NaOH(aq) + H_2SO_4(aq) \longrightarrow Na_2SO_4(aq) + 2H_2O(l)$

(c) $NaCl(aq) + AgNO_3(aq) \longrightarrow AgCl(s) + NaNO_3(aq)$

(d) $BaCl_2(aq) + H_2SO_4(aq) \longrightarrow BaSO_4(s) + 2HCl(aq)$

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

(a) Calcium hydroxide + Carbon dioxide ⟶ Calcium carbonate + Water

(b) Zinc + Silver nitrate ⟶ Zinc nitrate + Silver

(c) Aluminium + Copper chloride ⟶ Aluminium chloride + Copper

(d) Barium chloride + Potassium sulphate ⟶ Barium sulphate + Potassium chloride.

Ans. (a) $Ca(OH)_2(aq) + CO_2(g) \longrightarrow CaCO_3(s) + H_2O(l)$

(b) $Zn(s) + 2AgNO_3(aq) \longrightarrow Zn(NO_3)_2(aq) + 2Ag(s)$

(c) $2Al(s) + 3CuCl_2(aq) \longrightarrow 2AlCl_3(aq) + 3Cu(s)$

(d) $BaCl_2(aq) + K_2SO_4(aq) \longrightarrow BaSO_4(s) + 2KCl(aq)$

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) ⟶ Potassium iodide(aq) + Barium bromide(s)**

(b) **Zinc carbonate(s) ⟶ Zinc oxide(s) + Carbon dioxide(g)**

(c) **Hydrogen(g) + Chlorine(g) → Hydrogen chloride(g)**

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

Ans. (a) $2KBr(aq) + BaI_2(aq) \longrightarrow 2KI(aq) + BaBr_2(s)$

Double displacement reaction.

(b) $ZnCO_3(s) \longrightarrow ZnO(s) + CO_2(g)$

Decomposition reaction.

(c) $H_2(g) + Cl_2(g) \longrightarrow 2HCl(g)$

Combination reaction.

(d) $Mg(s) + 2HCl(aq) \longrightarrow MgCl_2(aq) + H_2(g)$

Displacement reaction.

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

Ans. **Exothermic reactions** are those reactions in which heat is evolved, e.g.

$$C(s) + O_2(g) \longrightarrow CO_2(g) + \text{heat}$$

$$CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l) + \text{heat}$$

Endothermic reactions are those reactions in which heat is absorbed, e.g.

$$CaCO_3(s) \xrightarrow{\text{heat}} CaO(s) + CO_2(g)$$

$$N_2(g) + O_2(g) \xrightarrow{\text{heat}} 2NO(g)$$

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

Ans. During respiration, glucose combines with oxygen in the cells of our body and provides energy. As energy is released during respiration, therefore, respiration is regarded as exothermic reaction.

$$C_6H_{12}O_6(aq) + 6O_2(g) \longrightarrow 6CO_2(g) + 6H_2O(l) + \text{Energy}$$

11. Why are decomposition reactions called the opposite of combination reactions? Write equations for these reactions. [CBSE 2012]

Ans. **In decomposition reaction**, a compound is broken down into simpler compounds or elements, e.g.

$$CuCO_3(s) \xrightarrow{\text{Heat}} CuO(s) + CO_2(g)$$

Combination reaction is a reaction in which two or more elements or compounds combine to form new compound, e.g.

$$N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$$

Thus, decomposition and combination reactions are opposite to each other.

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

Ans. (i) $CaCO_3(s) \xrightarrow{\text{Heat}} CaO(s) + CO_2(g)$

(ii) $2AgCl(s) \xrightarrow{\text{Sunlight}} 2Ag(s) + Cl_2(g)$

(iii) $2H_2O(l) \xrightarrow{\text{Electricity}} 2H_2(g) + O_2(g)$

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

Ans. **Displacement reaction:** Those reactions in which more reactive metal displaces less reactive metal from its salt solution are called displacement reactions.

$$Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4(aq) + Cu(s)$$

Double displacement reaction: Those reactions in which two compounds exchange their ions to form two new compounds are called double displacement reactions.

$$HCl(aq) + NaOH(aq) \longrightarrow NaCl(aq) + H_2O(l)$$

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

Ans. $Cu(s) + 2AgNO_3(aq) \longrightarrow Cu(NO_3)_2(aq) + 2Ag(s)$

Copper — Silver nitrate — Copper nitrate — Silver

Thus, silver metal can be recovered.

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

Ans. Those reactions in which two compounds react to form insoluble compound, which is called precipitate, are called precipitation reactions, e.g.

When solutions of silver nitrate and sodium chloride are mixed, white precipitate of silver chloride is formed.

$$AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$$

On adding dilute hydrochloric acid to the aqueous solution of lead nitrate, precipitate of lead chloride is formed.

$$Pb(NO_3)_2(aq) + 2HCl(aq) \rightarrow PbCl_2(s) + 2HNO_3(aq)$$

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

(a) Oxidation (b) Reduction

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

$$2Mg(s) + O_2(g) \xrightarrow{\text{Burning}} 2MgO(s)$$

$$2Cu(s) + O_2(g) \xrightarrow{\text{Heat}} 2CuO(s)$$

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

$$CuO(s) + H_2(g) \xrightarrow{\text{Heat}} Cu(s) + H_2O(g)$$

$$Fe_2O_3(s) - 2Al(s) \longrightarrow Al_2O_3(s) + 2Fe(s)$$

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.

Copper gets oxidised to copper oxide which is black in colour.

$$\underset{\text{(Reddish brown)}}{2Cu(s)} + \underset{\text{Oxygen}}{O_2(g)} \xrightarrow{\text{Heat}} \underset{\text{(Black)}}{2CuO(s)}$$

18. Why do we apply paint on iron articles?

Ans. Painting is done so as to prevent iron from rusting. When the surface of iron is coated with paint, its surface does not come in contact with oxygen and moisture and therefore, rusting does not take place.

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

Ans. When food items prepared in oil are kept for a long time, fat and oils present in them get oxidised by the oxygen. As a result of oxidation, some products are formed which have unpleasant smell and taste. To prevent the food items containing oil and fat from being oxidised and turned rancid, they are flushed with an unreactive gas like nitrogen.

20. Explain the following terms with one example each.

(*a*) Corrosion (*b*) Rancidity

Ans. (*a*) **Corrosion:** It is a process in which metal reacts with substances present in the atmosphere to form surface compounds, e.g. iron reacts with oxygen in presence of moisture to form rust, $Fe_2O_3.xH_2O$ (hydroted Iron(III) oxide).

(*b*) **Rancidity:** When food items prepared in oil such as potato chips are kept for long time, fat and oil present in them get oxidised by the oxygen, and they start giving unpleasant smell and taste. This condition, produced by aerial oxidation of fats and oils in foods marked by unpleasant smell and taste, is called rancidity. Rancidity spoils the food materials and makes them unfit for eating.