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CHEMICAL REACTIONS AND EQUATION

Chapter – 1

EDUCATION SOURCE
CLASS: 10TH

Chapter – 1

(chemical reactions and equation)

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Ques 1. why should a magnesium ribbon be cleaned before burning in air?

Ans: Magnesium is very reactive metal when it keeps in air it reacts with oxygen and form a layer of magnesium oxide on magnesium ribbon. this layer hinders the burning of magnesium. hence, it is to be cleaned before burning.

Ques 2. write the balanced equation for the following chemical reactions:

I. **Hydrogen + chlorine → Hydrogen chloride.**
II. **Barium chloride + Aluminium sulphate → Barium sulphate + Aluminium chloride**
III. **Sodium + water → sodium hydroxide + Hydrogen.**

Ans –

I. $H_2 + Cl_2 \rightarrow 2HCl$
II. $3BaCl_2 + Al_2(SO_4)_3 \rightarrow 3BaSO_4 + 2\,AlCl_3$
III. $2Na + 2H_2O \rightarrow 2NaOH + H_2$

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

Ans -

I. $BaCl_2\,(aq) + Na_2SO_4\,(aq) \rightarrow BaSO_4\,(s)\downarrow + 2NaCl\,(aq)$
II. $NaOH\,(aq) + HCl\,(aq) \rightarrow NaCl\,(aq) + H_2O\,(l)$.

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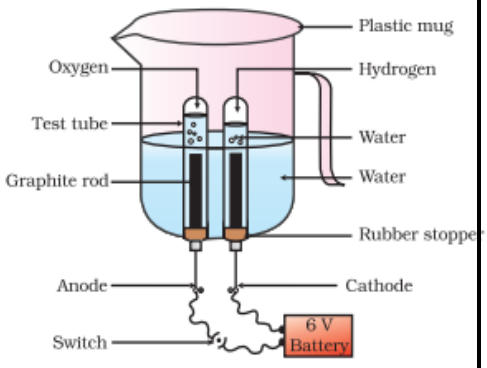
Ques 1. A solution of a substance 'X' is used for whitewashing.

i. **Name the substance 'X' and write its formula.**
ii. **Write the reaction of the substance 'X' named in (I) above with water.**

Ans. I. The substance X is quicklime (calcium oxide) which is used for white washing. Its formula is CaO.

ii. $CaO + H_2O \rightarrow Ca(OH)_2$.

Ques2. Why is the amount of gas collected in one of the tubes in Activity 1.7, double of the amount collected in the other? Name this gas.



Ans.- Water contains two parts of hydrogen and one part oxygen. therefore, during the electrolysis of water. the volume of hydrogen is double than that of oxygen in water.

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

Ans – Because iron sulphate is formed by the displacement of copper by iron.

$CuSO_4$ (aq) + Fe → $FeSO_4$ + Cu

Copper sulphate (Blue) → (iron sulphate) (Pale green)

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

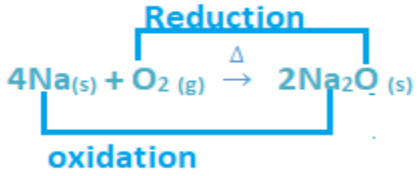
Ans - $Pb(NO_3)_2 + 2KI \rightarrow 2KNO_3 + PbI_2$

Ques 3. Identify the substance that are oxidised and the substances that are reduced in the following reactions:

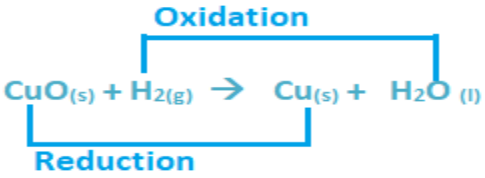
i. $4Na_{(s)} + O_{2\,(g)} \rightarrow 2Na_2O_{\,(s)}$
ii. $CuO_{(s)} + H_{2(g)} \rightarrow Cu_{(s)} + H_2O_{\,(l)}$

Ans:

i. Na is oxidised and O_2 is reduced.



ii. CuO is reduced and H_2 is oxidised.



Exercise

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

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

a) Lead is getting reduced.
b) Carbon dioxide is getting oxidised.
c) Carbon is getting an 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)

Ques2. $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe$

The above reaction is an example of a:

a) Combination reaction.
b) Double displacement reaction.
c) Decomposition reaction.
d) **Displacement reaction**

Ans - d) displacement reaction.

Ques3. 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.

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

Ans – i. when the number of atoms of different elements on both sides of a chemical equation are equal, it is called a balanced equation.

ii. According to law of conservation of mass, the total mass of products must be equal to the total mass of reactants. that's why chemical equation should be balanced.

Ques 5. Translate the following statements into balanced chemical equations.

a) Hydrogen gas combine with nitrogen to form ammonia.
b) Hydrogen sulphide 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.

Ans – a) $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

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

c) $3BaCl_2 + Al_2(SO_4)_3 \rightarrow 3BaSO_4 + 2AlCl_3$

d) $2K + 2H_2O \rightarrow 2KOH + H_2(g)$

Ques 6. Balance the following chemical equations:

a) $HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + H_2O$
b) $NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$
c) $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$
d) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + HCl$

Ans - a) $2HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + 2H_2O$

b) $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

c) $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$

d) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl.$

Ques 7. Write 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) $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

b) $Zn + 2AgNO_3 \rightarrow Zn(NO_3)_2 + 2Ag$

c) $2Al + 3CuCl_2 \rightarrow 2AlCl_3 + 3Cu$

d) $BaCl_2 + K_2SO_4 \rightarrow BaSO_4 + 2KCl.$

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

a) **Potassium bromide (aq) + Barium iodide (aq) → Potassium iodide (aq) + barium bromide (aq).**
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) $2KBr_{(aq)} + BaI_{2\ (aq)} \rightarrow 2KI_{\ (aq)} + BaBr_{2\ (aq)}$

b) $ZnCO_{3\ (s)} \rightarrow ZnO_{(s)} + CO_{2(g)}$

c) $H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)}$

d) $Mg_{(s)} + 2HCl_{\ (aq)} \rightarrow MgCl_{2\ (aq)} + H_{2(g)}$

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

Ans – Exothermic reactions: Those reactions in which heat energy is released are called exothermic reactions.

Example: - All combustion reactions like

$$CaO + H_2O \rightarrow Ca(OH)_2 + \text{heat}$$

Endothermic reactions: Those reactions in which energy is utilized are called endothermic reactions.

Example: - All Decomposition reactions like

$$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$$

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

Ans – In respiration, food is broken or oxidised in the presence of oxygen inhaled. In this process, energy is released. So, respiration is called an exothermic reaction.

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6\,Co_2 + 6H_2O + \text{Energy.}$$

Ques 11. Why are decomposition reactions called the opposite of combustion reactions? write equations for these reactions.

Ans – Decomposition reactions are those reactions in which a compound is broken into two or more compounds.

$$CaCO_3 \rightarrow CaO + CO2$$

Combination reactions are those reactions in which two substances are combined to form a new substance.

$$CaO + H_2O \rightarrow Ca(OH)_2 + \text{heat}$$

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

Ans- a) When decomposition is carried out by heating is called thermal decomposition.

$$FeSO_4\,(s) \xrightarrow{\Delta} Fe_2O_3\,(s) + SO_2\,(g) + SO_3\,(g)$$

b) When decomposition is carried out by passing electricity is called electrolytic decomposition.

$$2H_2O \xrightarrow{electroysis} 2H_2 + O_2$$

c) when decomposition is carried out in presence of sunlight is called photolytic decomposition reaction.

$$2AgCl(s) \xrightarrow{sunlight} 2Ag(s) + Cl_2(g)$$

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

Ans- Displacement reaction: - The reaction in which more reactive element displaces less reactive element from its salt solution.

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

Copper sulphate (Blue) — iron sulphate (Pale Green)

Double Displacement: - The reaction in which new compounds are formed by mutual exchange of ions between two compounds.

$$Na_2SO_4(aq) + BaCl_2(aq) \rightarrow BaSO_4(s) + 2NaCl(aq)$$

Ques 14. In the refining of silver, the recovery of silver nitrate solution involves displacement by copper metal. write down the reaction involved.

Ans- When copper is mixed in silver nitrate solution, it displaces the silver because copper is more reactive than silver.

$$2AgNO_3 + Cu \rightarrow Cu(NO_3)_2 + Ag$$

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

Ans – The reactions in which a precipitate is formed are called precipitation reactions.

Example - $Na_2SO_4(aq) + BaCl_2(aq) \rightarrow BaSO_4(s)\downarrow + 2NaCl(aq)$

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

a. Oxidation b. reduction

Ans – a) Oxidation – It is a process which involves gain of oxygen or loss of hydrogen.

Example - $C + O2 \rightarrow CO2$

b) Reduction – it is a process which involves loss of oxygen or gain of hydrogen.

Example - $ZnO(s) + C(s) \rightarrow Zn(s) + CO(g)$

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

Ans – The shiny brown coloured element X is copper. when it is heated in air, it becomes black due to the deposit of copper oxide.

$2Cu + O_2 \rightarrow 2CuO$

Brown Black

Ques 18. Why do we apply paint on iron articles?

Ans – We apply paint on iron articles to prevent them from corrosion. paint disconnect the relation between iron and air or water.

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

Ans – Because nitrogen acts as an antioxidant and it prevents them from being oxidised.

Ques 20. Explain the following terms with an example each:

a) Corrosion, b) Rancidity.

Ans – Corrosion - When the metal come in contact with air or water it gets corrode and the phenomenon is known as corrosion.

Example: Iron in the presence of moisture, reacts with oxygen to form hydrated iron oxide.

$4Fe + 3\ O_2 + n\ H_2O \rightarrow 2Fe_2O_3.nH_2O$

This hydrated iron oxide is rust.

Rancidity – when the oily food come in contact with air or water it gets rancid and the phenomenon is known as Rancidity.

Example: The taste and smell of biryani changes when kept for long time.