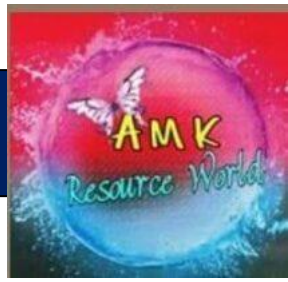
AMK Resource World



CLASS 10 – SCIENCE SOLUTIONS

CHPATER 1: CHEMICAL REACTIONS & EQUATIONS

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 oxidised.

(d) Lead oxide is getting reduced.

Answer:

(ii) (a) and (c) — Correct.

- Lead is getting reduced (True)
- Carbon is getting oxidised (True)
- Carbon dioxide getting oxidised (False — CO_2 is a product)

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

The above reaction is an example of:

Answer:

(d) Displacement reaction.

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

Answer:

(a) Hydrogen gas and iron chloride are produced.

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

Answer:

- A balanced chemical equation has equal number of atoms of each element on both sides of the equation.
- It should be balanced to obey the "Law of Conservation of Mass", meaning matter cannot be created or destroyed in a chemical reaction.

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

(a) Hydrogen gas combines with nitrogen to form ammonia.

$N_2 + 3H_2 \rightarrow 2NH_3$

(b) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.

$2H_2S + 3O_2 \rightarrow 2H_2O + 2SO_2$

(c) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.

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

(d) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

$2K + 2H_2O \rightarrow 2KOH + H_2$

6. Balance the following chemical equations.

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

Balanced: $2HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + 2H_2O$

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

Balanced: $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

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

Balanced: $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$

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

Balanced: $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

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

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

$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

(b) Zinc + Silver nitrate → Zinc nitrate + Silver

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

(c) Aluminium + Copper chloride → Aluminium chloride + Copper

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

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

$BaCl_2 + K_2SO_4 \rightarrow BaSO_4 + 2KCl$

8. Write the balanced chemical equation and identify the type of reaction.

(a) Potassium bromide(aq) + Barium iodide(aq) → Potassium iodide(aq) + Barium bromide(s)

$2KBr(aq) + BaI_2(aq) \rightarrow 2KI(aq) + BaBr_2(s)$

Type: Double displacement reaction

(b) Zinc carbonate(s) → Zinc oxide(s) + Carbon dioxide(g)

$ZnCO_3 \rightarrow ZnO + CO_2$

Type: Decomposition reaction

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

$H_2 + Cl_2 \rightarrow 2HCl$

Type: Combination reaction

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

$Mg + 2HCl \rightarrow MgCl_2 + H_2$

Type: Displacement reaction

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

Answer:

- Exothermic reactions release heat (Example: $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$)
- Endothermic reactions absorb heat (Example: Photosynthesis - $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$)

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

Answer:

During respiration, glucose is broken down with the intake of oxygen, releasing energy. Thus, it is an exothermic process.

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + Energy$

11. Why are decomposition reactions called the opposite of combination reactions?

Answer:

- In decomposition, one reactant breaks into two or more products.
- In combination, two or more reactants combine to form a single product.

Example:

- Decomposition: $2H_2O \rightarrow 2H_2 + O_2$
- Combination: $2H_2 + O_2 \rightarrow 2H_2O$

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

- Heat: $CaCO_3 \rightarrow CaO + CO_2$
- Light: $2AgCl \rightarrow 2Ag + Cl_2$ (in sunlight)
- Electricity: $2H_2O \rightarrow 2H_2 + O_2$ (electrolysis)

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

Answer:

- Displacement: One element replaces another. (Example: $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$)
- Double Displacement: Exchange of ions. (Example: $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$)

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

Answer:

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

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

Answer:

A precipitation reaction forms an insoluble solid (precipitate) from two solutions.

Example: $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4$ (ppt) $+ 2NaCl$

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

(a) Oxidation: Gain of oxygen.

- $2Mg + O_2 \rightarrow 2MgO$
- $C + O_2 \rightarrow CO_2$

(b) Reduction: Loss of oxygen.

- $CuO + H_2 \rightarrow Cu + H_2O$
- $ZnO + C \rightarrow Zn + CO$

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

Answer:

X = Copper (Cu) Black compound = Copper oxide (CuO)

18. Why do we apply paint on iron articles?

Answer:

To prevent rusting and corrosion by isolating iron from moisture and air.

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

Answer:

To prevent oxidation and rancidity, thereby increasing shelf life.

20. Explain the following terms with one example each.

(a) Corrosion: Gradual destruction of metals by chemical reaction with environment (Example: Rusting of iron).

(b) Rancidity: Oxidation of fats and oils resulting in bad taste and smell (Example: Spoiling of butter).