Chemistry

Chemical Reactions & Equations

1. Ramesh took a beaker containing dilute HCl and dropped some zinc granules into it. He observed bubbles coming out.
   (a) Write the balanced chemical equation.
   (b) Name the gas released.
   (c) How will you test this gas?

2. A student used copper vessels for storing silver nitrate solution. After a few days, he observed holes in the vessel. Explain the reason with chemical reaction.

3. Assertion (A): Neutralisation reaction is always exothermic.
   Reason (R): Formation of water from H^+ and OH^- releases energy.

4. Assertion (A): Combustion of methane is an oxidation reaction.
   Reason (R): Methane loses hydrogen during burning.

5. A reddish-brown gas is liberated when lead nitrate is heated.
   (a) Write the balanced chemical equation.
   (b) Name the gas evolved.
   (c) Identify the type of reaction.

6. A reaction mixture contains Fe^{3+}, Al^{3+} and Cu^{2+} ions. Which metal will be displaced first if zinc granules are added? Justify using reactivity series.

7. A student added dilute sulphuric acid to marble chips and observed effervescence.
   (a) Write the balanced equation.
   (b) Which gas is evolved?
   (c) How can you confirm this gas?

8. A silver spoon turns black after a few days of exposure to air.
   (a) Which chemical reaction is responsible?
   (b) Write the equation.
   (c) Suggest one method to prevent it.

9. Why is respiration considered an exothermic redox reaction? Support with balanced chemical equation.

10. Explain why electrolysis of acidified water is considered a decomposition reaction, but rusting of iron is considered a combination reaction.

11. A piece of magnesium ribbon is burnt in nitrogen gas.
    (a) Write the balanced reaction.
    (b) Name the product formed.
    (c) State the type of reaction.

12. A student burnt magnesium ribbon in air.
    (a) Write the balanced equation.
    (b) Identify type of reaction.
    (c) Is it exothermic or endothermic?

13. 2g of ferrous sulphate crystals were heated strongly in a dry boiling tube.

(a) Write the observations.
(b) Write balanced chemical equation.
(c) Name type of reaction.

14. During whitewashing, $Ca(OH)_2$ is applied on walls. After a few days, walls appear shiny due to the formation of $CaCO_3$.
(a) Write the balanced chemical equation.
(b) Identify the type of reaction.

15. Assertion (A): Electrolysis of water gives hydrogen and oxygen gases in the ratio of 2 : 1.
Reason (R): The molecular formula of water is H_2O.

Solution

S1. Sol. (a) $Zn + 2HCl \longrightarrow ZnCl_2 + H_2 \uparrow$
(b) Hydrogen gas.
(c) Bring a burning splinter near it →burns with a 'pop' sound.

S2. Sol. Cu displaces Ag from $AgNO_3$:
$Cu + 2AgNO_3 \longrightarrow Cu(NO_3)_2 + 2Ag$
Cu is oxidised to Cu^{2+}; $Cu(NO_3)_2$ formed is soluble and the metal dissolves away, thinning the vessel and causing perforation.

S3. Sol. Both A and R are true, R correct explanation.

S4. Sol. Both A and R are true, but R not the correct explanation.

S5. Sol. (a) $2Pb(NO_3)_2 \longrightarrow 2PbO + 4NO_2 + O_2$
(b) Nitrogen dioxide (NO_2)
(c) Thermal decomposition.

S6. Sol. Cu^{2+} is displaced first to copper metal:
$Zn + Cu^{2+} \longrightarrow Zn^{2+} + Cu(s)$
Reactivity series: … Al > Zn > Fe > H > Cu
Zn can reduce $Cu^{2+} \longrightarrow Cu$ readily.
Fe^{3+}/Fe^{2+} can also be reduced by Zn but Cu^{2+} has a greater tendency to get reduced, so it occurs first readily.
Al^{3+} is not displaced to $Al(s)$ in aqueous solution by Zn because Al is more reactive than Zn (and protected by a stable oxide layer).

S7. Sol. (a) $CaCO_3 + H_2SO_4 \longrightarrow CaSO_4 + CO_2 \uparrow + H_2O$
(b) CO_2
(c) Pass through limewater ⟶ turns milky ($CaCO_3\ ppt.$). (Extra: excess CO_2 clears milkiness due to $Ca(HCO_3)_2$).

S8. Sol. (a) Corrosion/tarnishing due to silver sulphide formation.
(b) Simplified: $2Ag + H_2S \longrightarrow Ag_2S + H_2$
(c) Keep airtight.

S9. Sol. $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$ + energy
Glucose is oxidised (adds O/loses H), O_2 is reduced to H_2O.
Energy released ⟶ exothermic.

S10. Sol. Electrolysis of acidified water:
Single compound decomposes $\longrightarrow 2H_2O \longrightarrow 2H_2 + O_2$ (decomposition).
Rusting: Overall combination of Fe with O_2/H_2O to form hydrated Fe_2O_3
$Fe + O_2 + H_2O \longrightarrow Fe_2O_3 \cdot xH_2O$ (rust).

S11. Sol. (a) $3Mg + N_2 \longrightarrow Mg_3N_2$
(b) Magnesium nitride.
(c) Combination reaction.

S12. Sol. (a) $2Mg + O_2 \longrightarrow 2MgO$
(b) Combination reaction.
(c) Exothermic.

S13. Sol. (a) Green crystals $\longrightarrow$ brown solid + smell of SO_2/SO_3
(b) $2FeSO_4 \longrightarrow Fe_2O_3 + SO_2 + SO_3$
(c) Thermal decomposition.

S14. Sol. (a) $Ca(OH)_2 + CO_2 \longrightarrow CaCO_3 \downarrow + H_2O$
(b) Reaction type = Combination reaction.

S15. Sol. Both true; correct explanation (from $2H_2O \longrightarrow 2H_2 + O_2$).