Chemical Reactions and Equations

1 Mark Questions

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1. Some crystals of copper sulphate were dissolved in water. The colour of the solution obtained would be
(a) green
(b) red
(c) blue
(d) brown.
Ans. (c) blue

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2. When dilute HCl is added to zinc pieces taken in a test tube
(a) No change takes place
(b) the colour of the solution becomes yellow.
(c) A pungent smelling gas gets liberated.
(d) small bubbles of H_2 gas appear on the surface of zinc pieces
Ans. (d) small bubbles of H_2 gas appear on the surface of zinc pieces.

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3. PbS reacts with ozone (O_3) and forms $pbso_4$. As per the balanced equation, molecules of ozone required for every one molecule of PbS is / are
(a) 4
(b) 3
(c) 2
(d) 1
Ans. (a) 4

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4. Chemically rust is
(a) Hydrated ferrous oxide
(b) hydrated ferric oxide
(c) only ferric oxide
(d) none of these
Ans. (b) hydrated ferric oxide

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5. Which of the following reactions is not correct

(a) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

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

(c) $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

(d) $Mg + 2HCl \rightarrow MgCl_2 + H_2$

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

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6. Copper displaces which of the following metals from its salt solution:
(a) $ZnSO_4$
(b) $FeSO_4$
(c) $AgNO_3$
(d) $NiSO_4$
Ans. (c) $AgNO_3$

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7. In an electrolytic cell where electrolysis is carried, anode has:
(a) Positive change
(b) Negative charge
(c) Connected to negative terminal of the battery
(d) None of these is correct.
Ans. (a) Positive change

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8. The reaction H_2+Cl_2 2HCl represents :
(a) Oxidation
(b) Reduction
(c) Decomposition
(d) Combination
Ans. (d) Combination

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9. In the reaction PbO + C Pb + CO
(a) Pbo is oxidised
(b) C act as an oxidising agent
(c) C act as a reduction agent
(d) Reaction does not represent redox reaction.
Ans. (c) C act as a reduction agent

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10. A substance which oxidizes itself and reduces other is known as
(a) Oxidising agent
(b) reducing agent
(c) Both (a) and (b)
(d) None of these.
Ans. (b) reducing agent

11. Take about 5 ml of dil. HCl in a test tube and add a few pieces of fine granules to it. Which gas is evolved?
(a) Chlorine
(b) Hydrogen
(c) HCl
(d) Nitrogen
Ans. (b) Hydrogen

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12. Dissolving suger is an example of-
(a) Physical change
(b) Chemical change
(c) Redox Reaction
(d) None of these.
Ans. (a) Physical change

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13. Heat is evolved diving
(a) Endothermic Reaction
(b) Displacement Reaction
(c) Combustion Reaction
(d) Combination Reaction
Ans. (c) Combustion Reaction

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14. Which of the following is not a balanced equation?

(a) $Fe + Cl_2 \rightarrow FeCl_3$

(b) $Mg + CuSO_4 \rightarrow MgSO_4 + C_4$

(c) $NaOH + HCl \rightarrow NaCl + H_2O$

(d) $Zn + S \rightarrow ZnS$

Ans. (a) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

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15. The reaction between lead nitrate and potassium iodide present in aqueous solutions is an example of
(a) Decomposition Reaction
(b) Displacement Reaction
(c) Double Displacement Reaction

(d) Neutralisation Reaction
Ans. (c) Double Displacement Reaction

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16. What happens when dilute hydrochloric acid is added to iron filling? 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) is correct.

2 Mark Questions

1. Identify the type of chemical reaction

(i) $A \rightarrow B + C$

(ii) $AD + CD \rightarrow AD + CB$

Ans. (i) Decomposition reaction
(ii) Double displacement reaction

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2. Why does not silver evolve hydrogen on reacting with dil H_2So_4?
Ans. Silver do not evolve hydrogen on reacting with dil. H_2SO_4 as silver is less reactive metal than hydrogen.

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3. Way do diamond and graphite, the two allotropic forms of carbon evolve different amounts of heat on combustion?
Ans. Diamond and graphite are the two allotropes of carbon but they do not evolve same amount of heat on combustion because they differ in the arrangement of carbon atoms and also their shapes one different.

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4. What is the sole of oxidizing agent is a reaction?
Ans. The oxidizing agent supply the oxygen in a reaction or it removes the hydrogen.

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5. What happens chemically when quick lime is added to water?
Ans. When quick lime is added to water calcium hydroxide (slaked lime) is formed with a hissing sound and lot of heat is evolved during the reaction. The reaction involved is $CaO\ (s) + H_2O$(Quick Lime) $\longrightarrow$ $Ca\ (OH)_2\ (s)$ + Heat (Shaked Lime)

6. Why a combustion reaction an oxidation reaction?

Ans. Combustion reaction because it is always carried out in the presence of air or oxygen for e.g. CH_4 (g) + $2O_2$ (g) $\longrightarrow$ Co_2 (g) +$2H_2O$ (l)

7. Why are food particle preferably packed in aluminum foil?

Ans. Aluminium foil do not corrode in atmosphere even if kept for a long time because a protective coating of aluminium oxide (Al_2O_3) is formed on the surface of the foil and stops any further reaction of the metal with air and water thus food particles do not get spoiled.

8. What happens to lime water when Co_2 gas is bubbled through it in excess?

Ans. When CO_2 gas is bubbled through lime water in excess then initially it becomes milky but then its milkiness disappears.

9. Why is a *Combustion* reaction an oxidation reaction?

Ans. Combustion is an oxidation reaction as it is always carried out in the presence of oxygen.

$$For\ eg \rightarrow CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

10. Identify the type of chemical reaction

(i) $A + B \rightarrow C$

(ii) $A + BC \rightarrow AC + B$

Ans. (i) Combination reaction

(ii) Displacement reaction

11. Why cannot a chemical change be normally reversed?

Ans. Chemical change cannot be reversed back because products so formed in a chemical reaction are totally different from the reactants.

12. Identify the substance oxidized and reduced in the reaction.

$$CuO(s) + Zn(s) \rightarrow ZnO(s) + Cu(s)$$

Ans. The substance oxidized is Zinc oxide and the copper oxide get's reduced to copper.

13. A student took 2-3 g of a substance X in a glass beaker & poured water over it slowly. He observed bubbles along with hissing noise. The beaker becomes quite hot. Identify X. What type of reaction is it?

Ans. X = Calcium oxide (Quick lime), Combination reaction.

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14. A substance X used for coating iron articles is added to a blue solution of a reddish brown metal Y,the color of the solution gets discharged Identify X and Y & also the type of reaction.
Ans. X= Fe, Y = Cu, Displacement reaction.

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15. A student burnt a metal A found in the form of ribbon. The ribbon burnt with a dazzling Flame & a white powder B is formed which is basic in nature. Identify A & B. Write the Balanced chemical equation.
Ans. X = Mg, Y = MgO, Mg + $O_2 \rightarrow 2\,MgO$

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16. Why should a magnesium ribbon be cleaned before burning in air?
Ans. Magnesium ribbon is cleaned before burning to remove the protective layer of basic magnesium carbonate from the surface of magnesium ribbon.

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17. Write the balanced chemical equation with state symbols for the following reactions?
Ans. Balance chemical reaction with state symbols are as follows-
i. $BaCl_2(aq) + Na_2SO_4\,(aq) \rightarrow BaSO_4\,(s) + 2NaCl\,(aq)$
ii. $NaOH\,(aq) + HCl\,(aq) \rightarrow NaCl\,(aq) + H_2O$

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18. A solution of a substance 'X' is used for white washing
i. Name the substance 'X' and writes its formula.
ii. Write the reaction of the substance 'X' named in (i) above with water
Ans. (i). The substance whose solution is water is used for white washing is calcium oxide. Its formula is CaO.
(ii). $CaO\,(s) + H_2O \rightarrow Ca(OH)_2\,(s)$

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19. Which of the following statement 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 oxidized
(c) Lead oxide is getting oxidized
(d) Lead is getting reduced
i. (a) and (b)
ii. (a) and (c)
iii. (a), (b) and (c)
iv. All

Ans. As statement (a) and (b) are incorrect, answer (i) is correct.

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20. In refining of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write down the reaction involved.
Ans. The reaction involved is:

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

21.What do you mean by a precipitation reaction? Explain by giving examples.
Ans. A chemical reaction in which an insoluble substance (precipitate) is formed is called precipitation reaction. For example

$AgNO_3 + NaCl \longrightarrow AgCl + NaNO_3$

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22. 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. The brown coloured element 'X' is copper. On heating in air it forms copper oxide, which is black in colour.

$2CuS + O_2 \longrightarrow 2CuO$

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23. Why do we apply paint on iron articles?
Ans. We apply paint on iron articles to prevent rusting. Iron articles do not come in contact of atmospheric oxygen and moisture and thus the rusting is prevented.

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24. Oil and fat containing food items are flushed with nitrogen. Why?
Ans. Oil and fat containing items get rancid due to oxidation with atmospheric oxygen. To prevent rancidity food items are flushed with nitrogen. Nitrogen do not reacts with oil and fat containing items.

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3 Mark Questions

1. (a) Define Rusting
(b) Why do you apply paint an iron articles?
Ans. (a) The process of slow eating of the surface of metal iron when exposed to air for a longer period of time is called rusting.
(b) We apply paint on iron articles because it forms a protective coating on the surface of iron and we can protect it against rusting.

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2. White the balanced reactions for the following

(i) Potassium Bromide (aq) + Barium iodide (aq) → Potassium iodide (aq) + Barium Bromide(aq)

(ii) Zinc carbonate (s) → Zinc oxide (s) + carbon dioxide (g)

(iii) Hydrogen (g) + chlorine (g) → Hydrogen chloride

Ans. (i) $2KBr(aq) + BaI_2(aq) \rightarrow 2KI(aq) + BaBr_2(aq)$

(ii) $ZnCO_3(s) \rightarrow ZnO(s) + CO_2(g)$

(iii) $H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$

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3. The reaction is given by

$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

(i) White the ionic equation for the reaction
(ii) The ionic equations can be represented by two half equations.
Write these equations.
(iii) Explain why this is a redox reaction

Ans. (i) $Zn + 2H^+ \rightarrow Zn^{2+} + H_2$

(ii) The half ionic equations are-

$Zn \rightarrow Zn^{2+} + 2e^-$

$2H^+ 2e^- \rightarrow H_2$

(iii) The first half represents oxidation since these is loss of electrons and second half represents reduction as there is gain of electrons.

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4. What are neutralization reactions? Why are they named so? Give one example?
Ans. A neutralization reaction is the chemical reaction between an acid and base dissolved in water

For $eg \rightarrow KOH(aq) + HNO_3(aq) \rightarrow KNO_3(aq) + H_2O(aq)$

It is called neutralization reaction because both KNO_3 and H_2O formed as the products, are neutral in nature.

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5. Identify the type of reaction in the following

(a) $ZnCO_3 + 2HCl$ (aq) ⟶ $ZnCl_2$ (aq) + H_2CO_3 (aq)

(b) $2NaBr\ (aq) + Cl\ (g) \rightarrow 2Nacl\ (aq) + Br_2\ (aq)$

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

Ans. (a) Double decomposition reaction.
(b) Displacement reaction.
(c) Decomposition reaction.

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6. A student dropped few pieces of marble in dilute hydrochloric acid contained in a test tube. The evolved gas was then passed through lime water. What change would be observed in lime water? Write balanced chemical equation for both the change observed?

Ans. When marble reacts with dil. HCl, CO_2 gas evolved

$CaCO_3\ (s) + 2HCl\ (aq) \rightarrow CaCl_2\ (aq) + H_2O\ (l) + CO_2\ (g)$

When this gas is evolved and is passed through lime water, becomes milky due to the formation of insoluble Calcium carbonate

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

But when milkiness disappears i.e. when CO_2 gas is passed in excess through $CaCO_3$ (s)

$CaCO_3\ (s) + CO_2\ (g) + H_2O\ (l) \rightarrow Ca\ (HCO_3)_2\ (aq)$

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7. In the reaction $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

(a) Name the substance oxidised.
(b) Name the oxidising agent.
(c) Name the reducing agent and the substance reduced.

Ans. (a) HCL has been oxidized to Cl_2
(b) MnO_2
(c) HCL is the reducing agent and Mno_2 has been reduced to $MnCl_2$

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8. Give one example each of
(a) Thermal decomposition
(b) Electrolytic decomposition
(c) Photo decomposition

Ans. (a) $MgCo_3\ (s) \xrightarrow{Heat} MgO\ (s) + Co_2\ (g)$

(b) $2H_2O\ (l) \xrightarrow[Current]{Electric} 2H_2\ (g) + O_2\ (g)$

(c) $2H_2O_2\ (l) \xrightarrow{Light} 2H_2O\ (l) + O_2\ (g)$

9. Write three equations for decomposition reaction where energy is supplied in the form of heat, light and electricity?

Ans. (i) $MgCO_3 \xrightarrow{heat} MgO + CO_2$

(ii) $2AgCl \xrightarrow{light} 2Ag + Cl_2$

(iii) $2NaCl \xrightarrow{electricity} 2Na + Cl_2$

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10. When you mix solutions of lead (II) nitrate and potassium iodide,
(i) What is the colour of the precipitate formed? Name the compound evolved?
(ii) Write a balanced chemical reaction?
(iii) Is this a double displacement reaction?
Ans. (i) The precipitate is yellow in colour and the compound is lead (II) Iodide.

(ii) $Pb(NO_3)_2(aq) + 2kI(aq) \rightarrow PbI_2(s) + 2KNO_3(aq)$

(iii) Yes it is a double displacement reaction.

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11. Transfer the following into chemical equations and balance them.
(i) Hydrogen gas combines with nitrogen to from ammonia.
(ii) Hydrogen sulphide gas burns in air to give water and sulphurdioxide.
(iii) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

Ans. (i) $3H_2 + N_2 \rightarrow 2NH_3$

(ii) $2H_2S + 3O_2 \rightarrow 2H_2O + 2SO_2$

(iii) $2K + 2H_2O \rightarrow 2KOH + H_2$

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12. Balance the equations

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

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

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

Ans. (i) $2HNO_3 + Ca(OH)_2 \rightarrow Ca(NO3)_2 + 2H_2$

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

(iii) $BaCl_2 + H2SO_4 \rightarrow BaSO_4 + 2HCl$

13. A compound ‘X’ is used for drinking, has pH =7.Its acidified solution undergoes decomposition in presence of electrictiy to produce gases ‘Y’ and ‘Z’ The volume of Y is double than Z. Y is highly combustible whereas Z is supporter of combustion. Identify X, Y & Z and write the chemical reactions involved.

Ans. $2H_2O\ (1) \rightarrow \underset{X}{} \underset{Y}{H_2(g)} + \underset{Z}{O_2(g)}$

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14. An aqueous solution of metal nitrate P reacts with sodium bromide solution to form yellow ppt of compound Q which is used in photography. Q on exposure to sunlight undergoes decomposition reaction to form metal present in P along with reddish brown gas. Identify P &Q. Write the chemical reaction & type of chemical reaction.

Ans. P = Ag NO $P = Ag\ NO_3$, $Q = AgBr$ $2AgBr\ (s) \rightarrow 2Ag(S) + Br_2(g)$

Photochemical decomposition.

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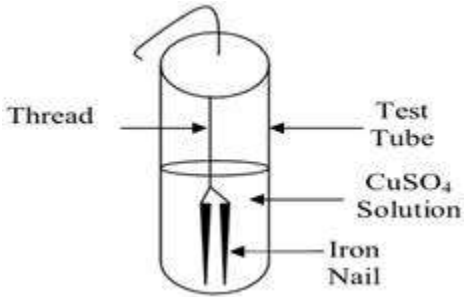
15. Bhawana took a pale green substance A in a test tube. And heated it over the flame of a burner. A brown colored residue B was formed along with evolution of two gases with burning smell of sulphur. Identify A & B. Write the chemical reaction involved.

Ans. $2FeSO_4\ (s) \xrightarrow{Heat} \underset{A\ (green)}{} Fe_2O_3(s) + SO_2(g) + \underset{B\ (brown)}{SO_3(g)}$



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16. A reddish brown vessel developed a green colored solid X When left open in air for a long time. When reacted with dil H_2SO_4, it forms a blue colored solution along with brisk efficient due to colourless & odourless gas Z. X decomposes to form black colored oxide Y of a reddish brown metal along with gas Z, Identify X, Y, & Z.

Ans. $X = CuCO_3\ Cu\ (OH)_2$, $Y = CuO$, $Z = CO_2$

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17. A student has mixed the solutions of lead (II) nitrate and potassium iodide.
(i) What was the colour of the precipitate formed? Can you name the compound?
(ii) Write the balanced chemical equation for this reaction.
(iii) What type of reaction is it?
Ans. (i) Yellow, Lead iodide

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

(iii) Double displacement reaction

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18. Name the type of reaction seen in the diagram below. Write the reaction for the Same.
Ans. Displacement Reaction

$Fe(s) + CuSO_4 \rightarrow FeSO_{4aq} + Cu$

Oxygen and is being oxidized.

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19. A student dropped few pieces of marble in dilute HCI contained in a test tube. The gas evolved was passed through lime water. What change would be observed in lime water? Write chemical reactions for both the changes observed.
Ans.

$Ca(OH)_2(aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l)$

$Ca(OH)_2(aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l)$

(Calcium hydroxide) (Calcium carbonate)

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20. Astha has been collecting silver coins and copper coins. One day she observed a black Coating on silver coins and a green coating on conner coins. Which chemical phenomenon is responsible for these coatings? Write the chemical name of black and green coatings?
Ans. Corrosion is responsible for this coating. Black coating is due to formation of Ag_2S And green coating is due to formation of $CuCO_3.Cu(OH)_2$

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21. Write the balance equation for the following reactions Give reasons for the following reactions?

i. Hydrogen + Chlorine $\longrightarrow$ Hydrogen chloride

ii. Barium chloride + Aluminium sulphate $\longrightarrow$ Barium sulphate + Aluminium

chloride

iii. Sodium + water $\longrightarrow$ Sodium hydroxide + water

Ans. The chemical equations are as follows-

i. $H_2 + Cl_2 \longrightarrow 2HC$

ii. $3BaCl_2 + Al_2(SO_4)_3 \longrightarrow 3BaSO_4 + 2AlCl_3$

iii. $2Na + 2H_2O \longrightarrow 2NaOH + H_2$

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

The above reaction is an example of a

(a) combination reaction

(b) double displacement reaction

(c) decomposition reaction

(d) displacement reaction

Ans. This is an example of displacement reaction because Fe in FeO_3 has been displaced by Al. Hence correct answer is (d).

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23. What is balanced chemical equation? Why should chemical equation be balanced?

Ans. The reaction in which the number of atoms of each element is equal on the reactant side and product side is called balanced equation. Chemical reaction should be balanced because only a balanced equation tells us the relative quantities of different reactants and products involved in the reaction.

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

Ans. During respiration, we inhale oxygen from the atmosphere which reacts with glucose in your body cells to produce carbon dioxide and water.

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

Heat is liberated in this process; hence respiration is considered an exothermic reaction.

5 Mark Questions

1. You are given with

(a) Iron Nails

(b) $CuSO_4$ solution

(c) $Bacl_2$
(d) Cu powder
(e) Ferrous sulphate crystal
(f) Quick lime.
Make five reactions that can take place from these materials.

Ans. (i) $BaCl_2(aq) + CuSo_4(aq) \rightarrow BaSo_4(s) + CuCl_2(aq)$

(ii) $2Cu(s) + O_2(g) \rightarrow 2CuO(s)$

(iii) $2FeSO_4(s) \xrightarrow{heat} Fe_2O_3 + SO_2 + SO_3$

(iv) $FeSO_4.7H_2O \xrightarrow{heat} Fe_2SO_3(s) + 7H_2O$

(v) $CaO(s) + H_2O \rightarrow Ca(OH)_2(s) + Heat$

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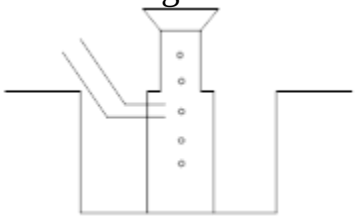
2. A metal is heated with dil H_2SO_4. The gas evolved is collected by the method shown in the figure: Answer the following



(a) Name the gas.
(b) Name the method of collection of gas.
(c) Is the gas soluble or insoluble in water?
(d) Is the gas lighter or heavier than air?
Ans. (a) H_2 gas
(b) Gas is collected over water by a method called downward displacement method.
(c) Since collected over water so it is insoluble.
(d) The gas is lighter than air.

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3. With the help of an activity show that iron is more reactive than copper?
Ans. First take some aqueous solution of $Cuso_4$ (blue is colour) and dip iron nails into it leave for half an hour the blue colour of the solution changes into light green. At the same time brown deposit appears on the nails. This happens because iron is placed above copper in reactivity series hence it displaces copper from $cuso_4$ solution. The brown deposit is of copper.

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

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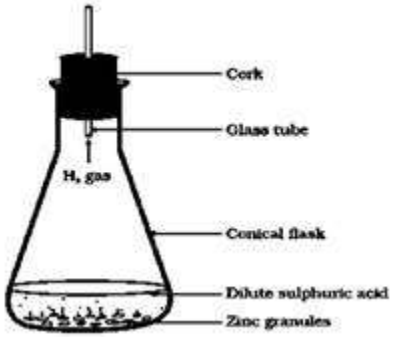
4. Observe the following activity & answer the questions



a. Do you observe anything happening around the zinc granules?
b. Is there any change in its temperature?

c. Why is glass tube not dipped in dil H_2SO_4 ?

d. How is H_2 gas collected by downward displacement or upward displacement of water?

e. Is H_2 gas soluble or insoluble in water?

f. Is H_2 gas heavier or lighter than air?

Ans. a. Bubbles of hydrogen gas.
b. Yes temperature will increase.

c. H_2SO_4 will rise in glass tube, preventing H_2 to evolve
d. downward displacement
e. Insoluble
f. lighter than air

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5. A reddish brown metal X when heated in presence of oxygen forms a black compound Y Which is basic in nature when heated with hydrogen gas gives back X.

Identify X & Y. Write the chemical reaction between Y & H_2 Identify the substance being oxidized & Reduced.

Ans. Oxygen reacts with copper to form copper oxides which has black colour

$$2Cu(s) + O_2(g) \rightarrow 2CuO(s)$$

Air Black

$$CuO + H_2 \xrightarrow{Heat} Cu + H_2O$$

The copper (II) ovide is losing oxygen and is being reduced. The hydrogen is gaining

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6. Why does the colour of copper sulphate solution change when an iron nail is dipped in it?
Ans. When iron nail is dipped in copper sulphate solution, than iron sulphate solution and copper solution and copper metal are formed:

$CuSO_4$ (aq) + Fe (s) $\rightarrow$ $FeSO_4$ (aq) + Cu (s)
In this reaction, iron displaces copper from copper sulphate solution. The deep blue colour of copper sulphate fades due to the formation of light green solution of iron sulphate.

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7. Identify the substances that are oxidized 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 $\rightarrow$ Cu (s) + H_2O (l)

Ans. (i) 4Na + O_2 $\rightarrow$ $2Na_2O$
In this reaction, Na is oxidized because it combines with O_2 to form Na_2O. O_2 is reduced because it is converted into Na_2O.

(ii) CuO + H_2 $\rightarrow$ Cu + H_2O
In this reaction, CuO is reduced because it loses oxygen. H_2 is oxidized because it combines with oxygen of CuO to form water

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8. 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 Sulpher dioxide.
(c) Barium chloride reacts with aluminum sulphate to give aluminum chloride and precipitate of barium sulphate

Ans. (a) H_2 +N_2 $\rightarrow$ NH_3

$3H_2$ +N_2 $\rightarrow$ $2NH_3$

(b) H_2S + O_2 $\rightarrow$ H_2O + SO_2

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

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

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

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

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

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9. Balance the following chemical equations:

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

(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. Balanced chemical equation are

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

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

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

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

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10. 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) Aluminum + Copper chloride → Aluminum chloride +Copper

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

Ans. Balanced chemical equation for reactions are

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

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

(c) $2Al + 3Cl_2 \rightarrow 2AlCl_3 + 3Cu$

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

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

(a) Potassium bromide (s) + 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. Balanced equations are

(a) $2KBr\ (aq) + BaI_2\ (aq) \rightarrow 2KI\ (aq) + Br_2$ (displacement reaction)

(b) $ZnO_3\ (s) \rightarrow ZnO\ (s) + CO_2\ (g)$ (decomposition reaction)

(c) $H_2\ (g) + Cl_2\ (g) \rightarrow 2HCl$ (combination reaction)

(d) $Mg\ (s) + 2HCl\ (aq) \rightarrow MgCl_2\ (aq) + H_2\ (g)$ (displacement reaction)

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

Ans. A reaction in which energy is released in the form of heat or light is called exothermic reaction. Example of exothermic reaction are:

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ + heat

$2Al + FeO_3 \rightarrow Al_2O_3 + Fe$ + heat

A reaction in which energy is absorbed from the surrounding and cooling is produced is called endothermic reaction. Example of exothermic reaction are:

a. $CaCO_3 \rightarrow CaO + CO_2$

b. $N_2 + O_2 \rightarrow 2NO$

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13. Why decomposition reactions are called the opposite of combination reactions? Write equations for these reactions.

Ans. $NH_4Cl\ (s) \rightarrow HCl\ (g) + NH_3\ (g)$

In a decomposition reaction, a single substance breaks down into two or more substance while in a combination reaction, two or more substances react to produce one substance. Therefore, decomposition reactions are called opposite of combination reactions.

Example of decomposition reaction: Example of combination reaction:

$CaO\ (s) + CO_2\ (g) \rightarrow CaCO_3\ (s)$

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14. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.
Ans. Decomposition by heat:

$CaCO_3(S) + \text{heat} \rightarrow CaO\ (s) + CO_2\ (g)$
Decomposition by electricity:

$2H_2O + \text{light} \rightarrow 2H_2\ (g) + O_2\ (g)$
Decomposition by light:

$2AgBr\ (s) + \text{light} \rightarrow 2Ag\ (s) + Br_2$

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15. What is difference between displacement and double displacement reactions? Write equations for these reactions.
Ans. In displacement reaction, more reactive element displaces the less reactive element from its compound. For example

$Zn\ (s) + CuSO_4\ (aq) \rightarrow ZnSO_4\ (aq) + Cu\ (s)$
But in double displacement reaction, exchange of ions takes place. For example

$HCl\ (aq) + AgNO_3\ (aq) \rightarrow AgCl\ (s) + HNO_3\ (aq)$

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16. Explain the following in terms of gain and loss of oxygen with two examples each?
a. Oxidation
b. Reduction
Ans. Oxidation- addition of oxygen or removal of hydrogen in a chemical reaction is called oxidation reaction. For example

$2Cu + O_2 \rightarrow 2CuO$

$4Al + 3O_2 \rightarrow 2Al_2O_3$
Reduction- addition of hydrogen or removal of oxygen in a chemical reaction is called oxidation reaction. For example

$CuO + H_2 \rightarrow Cu + H_2O$

$H_2S + Cl_2 \rightarrow 2HCl + S$

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17. Explain the following terms with one example each.
a. Corrosion
b. Rancidity.
Ans. Corrosion- action of air, water, acid or other substance on metal surface to form oxides and carbonates is called corrosion. Corrosion of iron is called rusting. Green coating on copper and black coating on silver is examples of corrosion.
Rancidity-change in smell of food item containing fat and oil when kept open for longer time due to oxidation is called rancidity. To prevent rancidity food items are flushed with nitrogen or kept in airtight containers.