

# Chemical Reactions and Equations

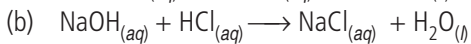
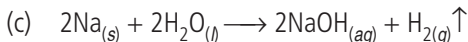
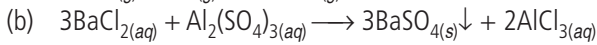
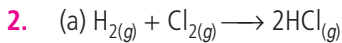


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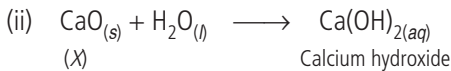
## ANSWERS

### Topic 1

1. Magnesium ribbon is cleaned before burning, so that coating of impurity (such as oxide) formed on its surface is removed and it becomes pure magnesium.

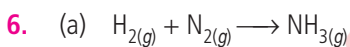


4. (i) The substance 'X' is calcium oxide (also called quick lime). Its formula is CaO.

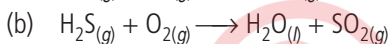
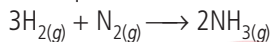


5. The chemical equation in which the number of atoms of each element on both the sides are equal is called a balanced equation.

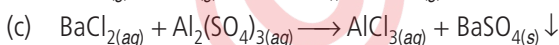
A chemical equation should be balanced because there is no loss or gain of any matter during a chemical reaction, *i.e.*, the law of conservation of matter must hold good for the reaction.



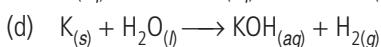
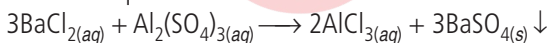
Balanced equation :



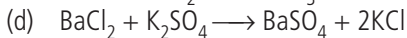
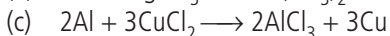
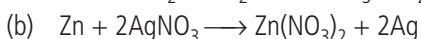
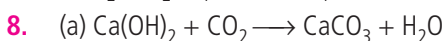
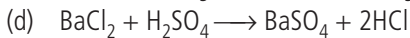
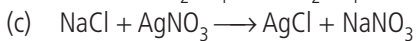
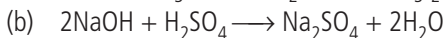
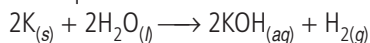
Balanced equation :



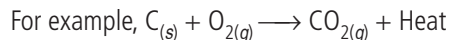
Balanced equation :



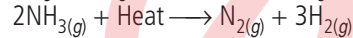
Balanced equation :



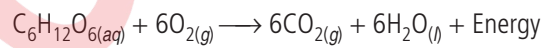
9. The chemical reactions which occur with the evolution of heat are called exothermic reactions.



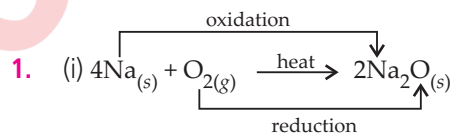
The chemical reactions which occur with the absorption of heat are called endothermic reactions. For example,



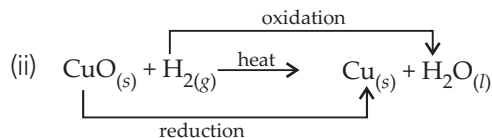
10. Rice, potatoes and bread contain carbohydrates. During digestion, these carbohydrates are broken down into simpler substances called glucose. This glucose combines with oxygen in the cells of our body and provides energy. The special name of this reaction is respiration. Thus, respiration is an exothermic process because energy is produced during this process.



### Topic 2



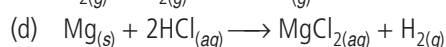
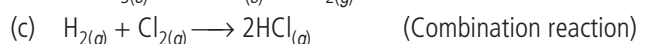
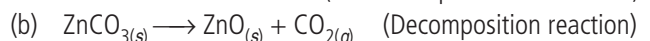
Sodium is oxidised and  $\text{O}_2$  is reduced.



$\text{H}_2$  is oxidised and CuO is reduced.



(Double displacement reaction)

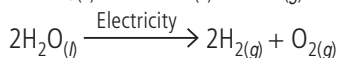
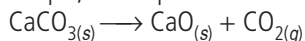


(Displacement reaction)

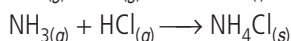
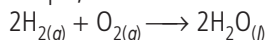
3. The decomposition reactions are those in which a compound breaks up into two or more simpler substances. On the other hand, combination reactions are those in which two or more substances combine to form single substance.

Thus, the decomposition reactions are opposite of the combination reactions.

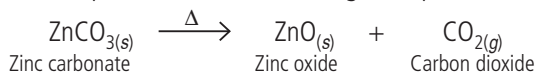
For example, decomposition reactions are :



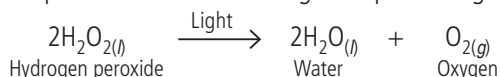
For example, combination reactions are :



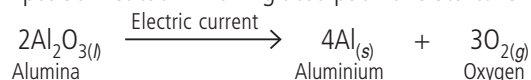
4. Decomposition reaction involving absorption of heat :



Decomposition reaction involving absorption of light :

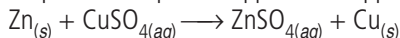


Decomposition reaction involving absorption of electrical energy :

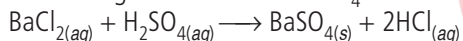


5. The chemical reactions in which one element displaces the another element from its compound is called displacement reaction.

For example : Zinc displaces copper from copper sulphate solution :

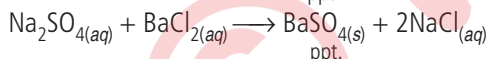
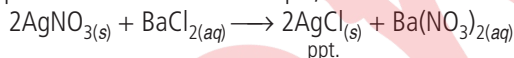


Double displacement reactions are those in which two compounds react to form two other compounds by mutual exchange of atoms or group of atoms. For example, in the reaction between barium chloride and sulphuric acid, barium chloride exchanges its  $\text{Cl}^-$  ions with  $\text{SO}_4^{2-}$  ions of  $\text{H}_2\text{SO}_4$ .

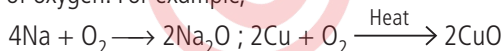


6.  $2\text{AgNO}_{3(aq)} + \text{Cu}_{(s)} \longrightarrow 2\text{Ag}_{(s)} + \text{Cu}(\text{NO}_3)_2(aq)$

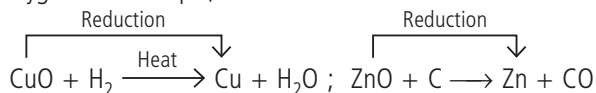
7. The reaction in which precipitates are formed are called precipitation reactions. For example,



8. (a) Oxidation is a reaction which involves addition or gain of oxygen. For example,

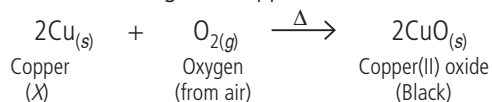


(b) Reduction is a reaction which involves loss or removal of oxygen. For example,



9. The element X is copper, Cu.

Black coloured coating is of copper oxide, CuO.



10. We apply paint on iron articles so as to prevent it from rusting. When the surface of iron is coated with paint, its surface does not come in contact with oxygen and moisture, therefore, rusting does not take place.

11. Oil and fats containing articles are flushed with nitrogen to prevent them from getting oxidised. This will protect them from becoming rancid.

12. (a) **Corrosion** : It is a process of deterioration of metals as a result of its reaction with air or water present in environment. Therefore, when metals are exposed to atmosphere, they react with air or water present in the environment and form undesirable compounds on their surfaces. This process is called corrosion. Almost all metals except noble metals such as gold, platinum and palladium get corroded. For example, when iron is exposed to moisture for a long time, its surface acquires a brown flaky substance called rust. Similarly, surface of copper acquires a green coating of basic copper carbonate, etc.

(b) **Rancidity** : When fats and oils are exposed to air, they get oxidised and become rancid and their smell and colour change. This phenomenon is called rancidity. To prevent rancidity of food materials containing fats and oils, certain substances (called antioxidants) are added which prevent oxidation and hence rancidity. Some food materials are stored in air tight containers or the bags containing the food materials (such as chips) are flushed with inert gas such as nitrogen to prevent them from getting oxidised.

13. (a)  $\text{Pb}_3\text{O}_4 + 8\text{HCl} \longrightarrow 3\text{PbCl}_2 + \text{Cl}_2 + 4\text{H}_2\text{O}$

$\text{Pb}_3\text{O}_4$  is an oxidising agent. It oxidises HCl to  $\text{Cl}_2$ .

(b)  $2\text{Mg} + \text{O}_2 \longrightarrow 2\text{MgO}$

$\text{O}_2$  is an oxidising agent. It oxidises Mg to MgO.

(c)  $\text{CuSO}_4 + \text{Zn} \longrightarrow \text{Cu} + \text{ZnSO}_4$

$\text{CuSO}_4$  is an oxidising agent. It oxidises Zn to  $\text{ZnSO}_4$ .

(d)  $\text{V}_2\text{O}_5 + 5\text{Ca} \longrightarrow 2\text{V} + 5\text{CaO}$

$\text{V}_2\text{O}_5$  is an oxidising agent. It oxidises Ca to CaO.

(e)  $3\text{Fe} + 4\text{H}_2\text{O} \longrightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$

$\text{H}_2\text{O}$  acts as an oxidising agent. It oxidises Fe to  $\text{Fe}_3\text{O}_4$ .

(f)  $\text{CuO} + \text{H}_2 \longrightarrow \text{Cu} + \text{H}_2\text{O}$

$\text{CuO}$  acts as oxidising agent. It oxidises  $\text{H}_2$  to  $\text{H}_2\text{O}$ .

14. (a)  $\text{N}_{2(g)} + 3\text{H}_{2(g)} \xrightarrow[773 \text{ K}]{\text{catalyst}} 2\text{NH}_{3(g)}$

(Combination reaction)

(b)  $\text{NaOH}_{(aq)} + \text{CH}_3\text{COOH}_{(aq)} \longrightarrow \text{CH}_3\text{COONa}_{(aq)} + \text{H}_2\text{O}_{(l)}$

(Double displacement reaction/Neutralisation reaction)

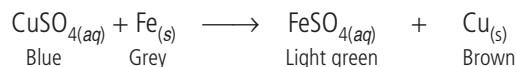
(c)  $\text{C}_2\text{H}_5\text{OH}_{(l)} + \text{CH}_3\text{COOH}_{(l)} \xrightarrow{\text{H}^+} \text{CH}_3\text{COOC}_2\text{H}_5_{(l)} + \text{H}_2\text{O}_{(l)}$

(Double displacement reaction)

(d)  $\text{C}_2\text{H}_{4(g)} + 3\text{O}_{2(g)} \longrightarrow 2\text{CO}_{2(g)} + 2\text{H}_2\text{O}_{(g)} + \text{heat} + \text{light}$

(Redox reaction/combustion reaction/ exothermic reaction)

15. The reaction between copper(II) sulphate and iron is represented as



In this displacement reaction, a more reactive element iron displaces less reactive element from its compound copper(II) sulphate. The brown copper metal gets deposited on the iron nails. The colour of the solution changes from blue to light green due to the formation of  $\text{Fe}^{2+}$  ions.

