INTRODUCTION TO TYPES OF CHEMICAL REACTIONS

We have learnt in Class IX that during a chemical reaction atom of one element do not change into those of another element. Nor do atoms disappear from the mixture or appear from elsewhere. Actually, chemical reactions involve the breaking and making of bonds between atoms to produce new substances. You will study about types of bonds formed between atoms in Chapters 3 and 4.

Types of chemical reactions

There are 5 types of chemical equations. They are as follows:

- i. Combination reaction
- ii. Decomposition reaction
- iii. Displacement reaction
- iv. Double displacement reaction
- v. Oxidation

COMBINATION REACTION

Activity 1.4:



Figure 1.3: Formation of slaked lime by the reaction of calcium oxide with water

- * Take a small amount of calcium oxide or quick lime in a beaker.
- * Slowly add water to this.
- * Touch the beaker as shown in Fig. 1.3.

Do you feel any change in temperature?

Calcium oxide reacts vigorously with water to produce slaked lime (calcium hydroxide) releasing a large amount of heat.

In this reaction, calcium oxide and water combine to form a single product, calcium hydroxide. Such a reaction in which a single product is formed from two or more reactants is known as a combination reaction.

Let us discuss some more examples of combination reactions

i. Burning of coal

 $C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$ (1.15)

ii. Formation of water from $H_2(g)$ and $O_2(g)$

 $2H_2(g) + O_2(g) \rightarrow 2H_2O(0)$ (1.16)

In simple language, we can say that when two or more substances (elements or compounds) combine to form a single product, the reactions are called combination reactions.

In Activity 1.4, we also observed that a large amount of heat is evolved. This makes the reaction mixture warm. Reactions in which heat is released along with the formation of products are called exothermic chemical reactions.

Other examples of exothermic reactions are -

i. Burning of natural gas

$CH_{4 (g)} + 2O_{2 (g)} \rightarrow CO_{2 (g)} + 2H_{2}O_{(g)}$ (1.17)

ii. Do you know that respiration is an exothermic process?

We all know that we need the energy to stay alive. We get this energy from the food we eat. During digestion, food is broken down into simpler substances. For example, rice, potatoes, and bread contain carbohydrates. These

carbohydrates are broken down to form glucose. This glucose combines with oxygen in the cells of our body and provides energy. The special name of this reaction is respiration, the process of which you will study in Chapter 6.

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C_6H_{12}O_{6(aq)} + 6O_{2(aq)} \rightarrow 6CO_{2(aq)} + 6H_2O_{(l)} + energy ----- (1.18)
(Glucose)
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iii. The decomposition of vegetable matter into compost is also an example of an exothermic reaction.

Identify the type of reaction taking place in Activity 1.1, where heat is given out along with the formation of a single product.

More to know

A solution of slaked lime produced by reaction 1.13 is used for whitewashing walls. Calcium hydroxide reacts slowly with the carbon dioxide in the air to form a thin layer of calcium carbonate on the walls. Calcium carbonate is formed after two to three days of whitewashing and gives a shiny finish to the walls. It is interesting to note that the chemical formula for marble is also CaCO₃.

Ca(OH) _{2 (aq)}	+	CO _{2 (g)}	→	CaCO _{3 (s)}	+	H ₂ O (1)(1.14)
(Calcium hydroxide)			(Calcium carbonate)			