UNIT - 2

ELEMENTS, COMPOUNDS AND MIXTURES

After studying this unit you :

- classify the substances into elements, compounds and mixtures.
- distinguish elements, compounds and mixtures.

There are different kinds of matter that we use in our daily life. Some of them will have substance of only one kind, others will have more than one substance present in them. Based on chemical nature, substances are classifed as elements, compounds and mixtures.

Elements :

Elements are those substances which cannot be subdivided chemically or cannot be synthesized out of other elements.

For many years, water was considered as an element since it cannot be decomposed on heating. But later on, water was produced by burning hydrogen in the presence of oxygen. Now water is considered as a compound where as, hydrogen and oxygen are elements. These cannot be prepared using other elements.

Elements known earlier were very few. Later on the list of elements was increased because of experimental techniques. Elements that are available in nature (underground) are copper, iron, gold etc. There are about 90 natural elements. Some elements can also be made artificially. For example, plutonium.

Elements exist in the form of solid, liquid and gas.

For Example,

a) Iron, gold, copper, aluminium and carbon are in solid form.

b) Mercury and bromine are in liquid form.

c) Oxygen, nitrogen, hydrogen and helium are in gaseous form.

Know this :

The elements like gold, silver are used in the preparation of ornaments. The elements like aluminium, copper are used in the preparation of utensils and in electric cables.

Activity 2.1 : *Make a list of the names of 10 elements you know.*

Compounds :

Compounds are those substances which can be decomposed into constituent elements or can be synthesized out of constituent elements.

Two or more elements chemically combine in a definite ratio to form a compound.

Compounds may be solids, liquids or gases.

Example :

a) Sugar and common salt which we use in our daily life are the examples for compounds in solid state.

b) Water is an example for compound in liquid state that contains hydrogen and oxygen combined chemically in the ratio 2:1.

c) Carbon dioxide, methane, carbon monoxide are examples for gaseous compounds under normal conditions.

A compound does not contain the properties of the elements from which it is made. For example, Sugar is a compound made from carbon, hydrogen and oxygen. We cannot find the properties of carbon, hydrogen or oxygen in it. The constituents of the compounds cannot be separated like that of mixtures.

Think :
Is it possible to separate the constituents of componds?

Activity 2.2 : *Make a list of the names of 10 compounds you know.*

Mixtures :

Mixtures are impure substances made up of two or more substances.

If two or more substances (elements or compounds or both) are mixed together in any proportion, such that they do not undergo any chemical change, but retain their individual properties, then the resulting mass is called mixture.

Mixtures may be solids, liquids or gases.

Example :

a) Soil is a mixture of sand, clay and various salts and remains of plants and animals.

b) Sea water is a mixture of several salts dissolved in it.

c) Air is a mixture of many gases.

Activity 2.3 : *With the help of your teacher prepare 5 mixtures and write the constituent substances for each.*

Differences between a compound and a mixture :

Compound	Mixture
1. A compound is formed by two or more elements combining chemically.	1. A mixture is formed by mixing two or more substances physically.
2. The compound generally will have constituent elements in a definite ratio.	2. The constituents in a mixture can be in any ratio.
3. Constituent elements in a compound do not retain their original properties.	3. Constituent elements in a mixture retain their original properties.
4. Constituents of a compound cannot be separated without chemical reactions.	4. Constituent elements in a mixutre can be separated by simple methods.

Remember :

- Based on chemical nature, substances are classified as elements, compounds and mixtures.
- Elements are those substances which cannot be subdivided chemically or cannot be synthesized out of other elements. Example : iron, gold, mercury and oxygen.
- Compounds are those substances which can be decomposed into constituent elements or can be synthesized out of constituent elements.
  Example : water, sugar and methane.
- A mixture is an impure substance made up of two or more elements or compounds mixed physically in any proportion. Example : air, soil and sea water.

Tips :

- Certain elements are very precious and we should use them properly.
- Air is a very important mixture and we should not pollute it.
- Elements / compounds / mixtures should not be tasted / touched unless we are sure of their properties.

Exercises :

I. Choose the most appropriate answer and put a tick (✓) mark against it :

1. Water is an example for
   a) element b) impure substance
   c) compound d) mixture
2. Air is a
   a) compound b) mixture
   c) element d) pure substance.

II. Fill in the blanks with suitable words :

1. Oxygen is an example for _____
2. Water contains hydrogen and oxygen in the ratio _____

III. Answer the following questions :

1. What are elements ?
2. What are compounds ?
3. What are mixtures ? Give two examples.
4. Write the differences between a compound and a mixture.
5. Classify the following into elements, compounds and mixtures.
   bromine, soil, water, iron, air, helium, sugar, lime juice, methane, carbon.