

**CHECK YOUR PROGRESS 2.1**

- Which of the following matter fall(s) in the category of substance?  
(i) Ice (ii) Milk (iii) Iron (iv) Air (v) Water (vi) Hydrochloric acid
- Which one of the following is solution?  
(i) Mercury (ii) Air (iii) Coal (iv) Milk

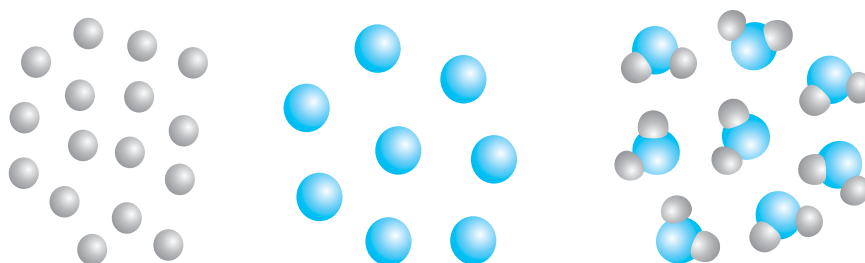
**2.3 DALTON'S ATOMIC THEORY**

In the fifth century B.C. Indian philosopher Maharshi Kanad postulated that if one goes on dividing matter (Padarth), he would get smaller and smaller particles and a limit will come when he will come across smallest particles beyond which further division will not be possible. He (Kanad) named the particles **Parmanu**. More or less during the same period Greek philosophers, Leuappus and Democritus suggested similar ideas. This idea was not accepted at that time but it remained alive. Not much experimental work could be done until Lavoisier gave his law: **Law of conservation of mass** and **law of constant proportions** sometimes in 1789. English scientist and school teacher, John Dalton (1766-1844) provided the basic theory about the nature of matter: *All matter whether element, compound or mixture is composed of small particles called atoms.*

Dalton's theory can be summarized as follows:

- Elements are composed of extremely small indivisible particles called atoms.
- All atoms of a given element are identical, having the same size, mass and chemical properties. The atoms of one element are different from the atoms of all other elements.
- Compounds are composed of atoms of more than one element. In any compound the ratio of the numbers of atoms of any two of the elements present is either an integer or a simple fraction.
- A chemical reaction involves only the separation, combination, or rearrangement of atoms; it does not result in their creation or destruction.

In brief, an atom is the smallest particle of an element that maintains its chemical identity throughout all chemical and physical changes. Most of the earlier findings and concepts related to law of conservation of mass and law of constant proportions (Fig. 2.4) could be explained to a great extent. Dalton's theory also predicted the **law of multiple proportions**. However, today we know that atoms are not truly indivisible; they are themselves made up of particles (protons, neutrons, electrons, etc), which you will learn later on.



Atoms of element X      Atoms of element Y      Compound of element X and Y  
Fig. 2.4 Law of constant proportions