3.5. CONDUCTORS AND INSULATORS

Substances can broadly be classified into two categories depending upon whether they conduct electricity or do not conduct electricity.

1. Conductors. ***Substances through which charges can easily pass are known as conductors.*** Metals, aqueous solutions of salts and ionized gases are all conductors.

In case of solid conductors, there are free electrons (also called the conduction electrons) which account for their ability to conduct electricity through them.

2. Insulators. ***Substances through which charges cannot pass are called insulators.*** Glass, porcelain, pure water and all gases are insulators. Insulators are also called ***dielectrics.*** In insulators, the electrons are strongly bound to their atoms and cannot get themselves freed. Thus, free electrons are absent in insulators. Insulators can easily be charged by friction. This is due to the reason that when an electric charge is given to an insulator, it is unable to move freely and remains localised. But this does not mean that conductors cannot be charged by friction. The only difference in their case is that the charge is not localised and flows to earth if it finds a conducting path (like our body). A metal rod can be charged by rubbing it with fur or silk if it is held in a handle of glass or amber (*i.e.*, an insulator).

Electricity is broadly classified as :

(*a*) Electrostatics or Static Electricity. This branch of electricity, the earliest discovered, deals with the study of charges (*i.e.*, electrons) at rest (*i.e.*, static). You will learn more about electrostatics in Class XII.

(*b*) Current Electricity. When charges are in motion, they constitute what is called an electric current or simply the current in the day-to-day language. Current electricity deals with the fundamental concepts and the physical effects of electric current and this is going to be the subject of our discussion in this chapter.