Conductometry

One of the oldest and in many ways simplest of the electrochemical methodologies is the measurement of electrolytic conductance. Conductometric analysis is based on the measurement of the electrical conductivity of the solution. The electrical conductivity is entirely due to the movement of ions. Thus, in a cell showing in Figure 8, the transport of positive charge from left to right can be obtained either by the movement of positive ions from left to right or the movement of negative ions in the reverse direction. Actually, such charge transport involves both these processes. The movement of the ions occurs in such a way that the solution remains electrically neutral throughout.
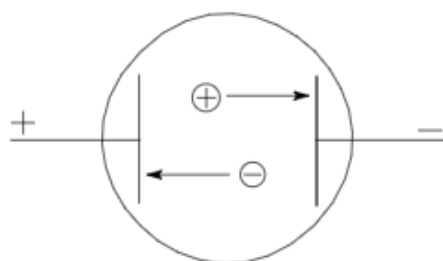

Figure 8: Transport of ions under the influence of a external electric field.

The ability of any ion to transport charge depends on the mobility of the ion. The mobility of an ion is essentially its rate of movement throughout the solution under the influence of an imposed force which could be an electric field or a concentration gradient. The mobility of an ion is affected by factors such as the charge, size, mass, and extent of solvation. The difference in rates of diffusion of ions gives rise to liquid junction potential.

Conductometry is used in direct and indirect methods of physico-chemical analysis. It is widely used in complexometric titrations, chemical kinetics, precipitation titrations, and plant laboratories.

►**Conductometry as an analytical tool**: Direct measurement of conductivity is potentially a very sensitive procedure for measuring ionic concentrations, but it must be used with caution since any charged species present in a solution will contribute to the total conductance.

Conductometric measurements can also be used to ascertain the end point in many titrations, but such use is limited to comparatively simple systems in which there are no excessive amounts of reagents present. Thus many oxidation titrations which require the presence of relatively large amounts of acids are not suited to