

## 1.2 Electric Discharges

An electric discharge is an electric current that flows through a gas. These discharges generally take a high voltage to initiate but once started they can carry considerable currents with very little voltage drop. A good example of such a discharge is the natural phenomenon of lightning. In an electric discharge the electric current is carried by electrons that have been removed from the gas atoms and ions that are gas atoms with one or more electrons removed. This is shown in Figure 30.

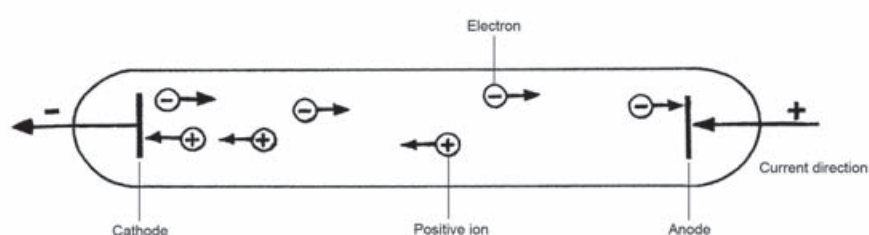


Figure 30  
Electric discharge through an ionised gas.

The negatively charged electrons tend to drift towards the anode whilst the positively charged ions drift towards the cathode. As the ions are several thousand times heavier than the electrons they tend to be less mobile.

## 1.3 Electroluminescence

Some materials will convert electricity into light directly. Two major physical processes account for the majority of the various electroluminescence phenomena. They are the recombination of current carriers in certain semi-conductors and via the excitation of luminescent centres in certain phosphors.

Pure semi-conductors have intrinsically a very high resistivity and it is only when they are

doped with other materials that it is possible to pass electricity through them. Some materials induce conduction by negatively charged carriers (n-type) and some by positively charged carriers (p-type). When charged carriers of different types recombine the energy released may be emitted as light.

See Chapter 2.10 and 2.11 of this part for more information on light emitting diodes.