(DC1-2) Study the I-V Characteristics of a Non Ohmic Resistance

Aim of experiment

Investigation of the I-V characteristic of non-Ohmic resistance.

Apparatus

Incandescent Lamp- Voltammeter – D.C Power Supply.

Theory of experiment

Let us select a particular sample of conducting material, apply a uniform potential difference across it, and measure the resulting current. If we plot the results, the experimental points clearly fall along straight line, which indicate that the ratio V/I is constant, *figure 1*. In this case, we say that the material obeys ohm's law, which states that:

A conducting device obeys ohm's law if the resistance between any pair of points is independent of the magnitude and polarity of the applied potential difference.

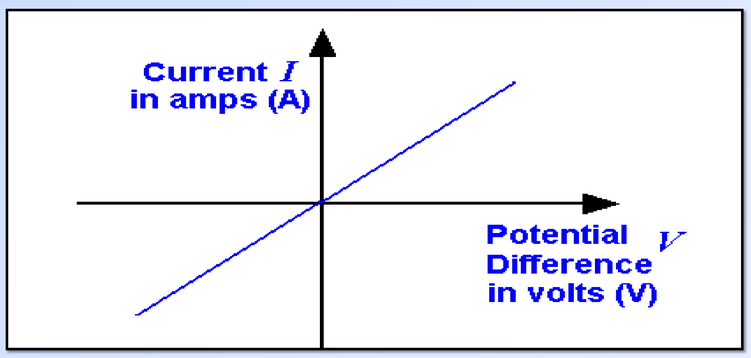

Figure 1 I-V characteristic of an Ohmic resistance

A material that obeys ohm's law is called Ohmic. There are some elements that do not obey ohm's law, where the current does not increase linearly with the voltage. Also note that these elements behave very differently for negative potential differences than it does for positive ones, *figure 2*.

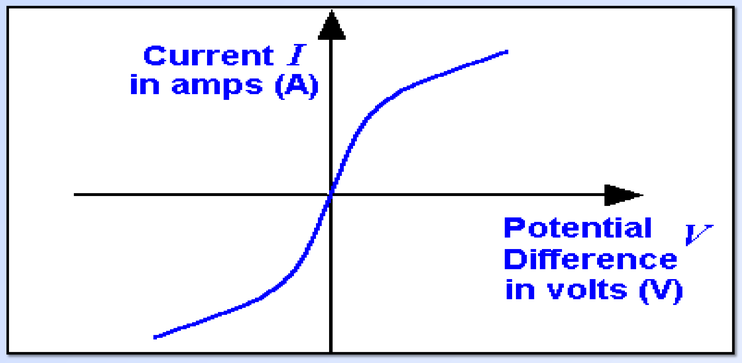

Figure 2 I-V characteristic of a non Ohmic resistance

If a current flows through a conductor, it will be heated, the greater the current, the higher becomes the temperature of the conductor. The rise in temperature is necessarily associated with an increase in the electrical resistance. In these cases, ohm's law cannot be satisfied.

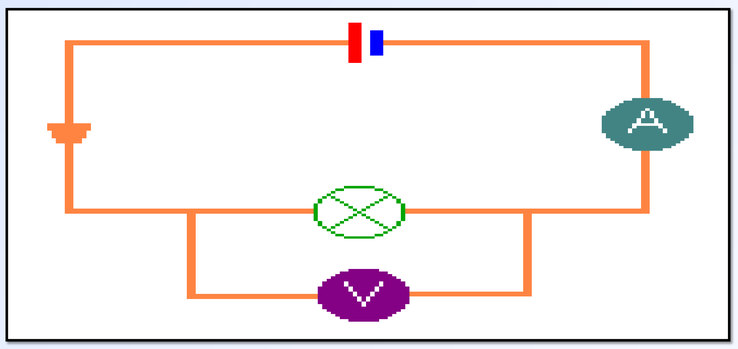

Figure 3 Circuit diagram for measuring lamp filament resistance

Procedures

1. Connect the circuit as shown in *figure 3*.
2. Switch on the power supply and apply a voltage ≈ 3Volt on the lamp and measure the corresponding current.
3. Increase the voltage in steps of 3Volt and measure the current in each case.
4. Repeat step 3 three successive times and tabulate your results. Before repeating measurement, make sure that the lamp temperature is same as that of the environment.
5. Draw a graph between the applied voltage, V, and current, I_{av}.

Results

V (Volt)					
I_1(A)					
I_2(A)					
I_3(A)					
$I_{av} \pm \Delta I$					

6. Comment on the obtained data