RESISTIVITY OF WIRES

Aim: To determine resistivity of a given wires by plotting a graph of potential difference versus current.

Apparatus: Two wires of unknown resistance, battery eliminator (0 to 3V), voltmeter (0-5 V), ammeter (0–5A), rheostat, plug key, connecting wires.

Principle:

Ohm's law states that the electric current flowing through a conductor is directly proportional to the potential difference across its ends, provided the physical state of the conductor remains unchanged.

Formula:

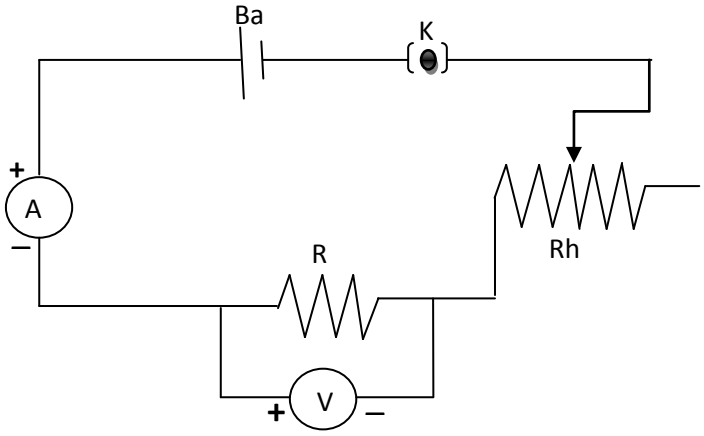
$$R = \frac{1}{slope} \quad \Omega .$$

Resistivity $\rho = \frac{RA}{L}$

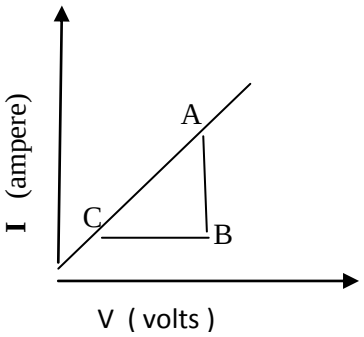
Procedure:

1. Connect various components – resistance wire, rheostat, battery, key, voltmeter and ammeter as shown in circuit diagram.
2. Note whether pointers in ammeter and voltmeter coincide with the zero mark on the measuring scale. If it is not so, adjust the pointer.
3. Insert the key K and slide the rheostat contact to one of its extreme ends, so that current passing through the resistance wire is minimum.
4. Note the ammeter and voltmeter readings.
5. Remove the key K and allow the wire to cool, if heated. Again insert the key. Shift the rheostat contact slightly to increase the applied voltage. Note the ammeter and voltmeter reading.
6. Repeat step 5 for five to six different settings of the rheostat. Record your observations in a tabular column.
7. Plot a graph between the potential difference across the wire *(V)* v/s current *(I).*
8. The resistance of the given wire is equal to the reciprocal of the slope.
9. Resistivity can be calculated by given formulae
10. We will repeat the procedure with one / two more wires

Circuit Diagram:



Nature of graph:



Where:

Ba – Battery, K – Plug Key, A – Ammeter, V – Voltmeter, Rh – Rheostat, R – Resistance of Given Wire

Observations:

Radius of given wire (r) =

Length of the given wire (*l*) = …….m

S No.	Applied Potential difference (V in volts)	Current through the wire (I in ampere)
1		
2		
3		
4		
5		
6		

Radius of given wire (r) =

Length of the given wire (l) = …….m

S No.	Applied Potential difference (V in volts)	Current through the wire (I in ampere)
1		
2		
3		
4		
5		
6		

Calculation:

First Wire

From graph, Slope = $\frac{AB}{BC}$ =

The Resistance of the given wire is R = $\frac{1}{Slope}$ = …….. Ω

Second Wire

From graph, Slope = $\frac{AB}{BC}$ =

The Resistance of the given wire is R = $\frac{1}{Slope}$ = …….. Ω

Result: resistivity of the given wires

First wire = …….. Ω-m

Second wire = …….. Ω-m

PRECAUTIONS:

1. The connections should be neat, clean and tight.
2. The rheostat should be moved smoothly.
3. Readings should be taken without any parallax error

Source of error:

1. Connections may be loose
2. The wire may not have uniform thickness.