

EXPERIMENT NO: 4

Aim : To determine the resistance per cm of a given wire by plotting a graph for potential difference verses current.

Apparatus : A resistance wire, a voltmeter, an ammeter, rheostat, battery or a power source, meter scale, connecting wires and a key.

Theory : According to Ohm's law, the current flowing through a conductor is directly proportional to the potential difference across the ends of the conductor, provided the physical conditions of the conductor remains the same.

$$I \propto V \text{ or}$$

$$I = \frac{1}{R} V$$

Or $V = IR$; where R is a constant for a given conductor, which depends on the material, temperature and dimensions of the conductor.

A graph between the potential difference V (along the x- axis) and current I (along the y- axis) will be a straight line, having a slope equal to $\frac{1}{R}$. From the measured value of slope of the straight line, the resistance per cm if the wire can be calculated.

Procedure :

1. Arrange the apparatus in the same manner as shown in the circuit diagram.
2. After cleaning the ends of the connecting wires, make neat and tight connections according to the circuit diagram, taking care of the polarity of the voltmeter and the ammeter.
3. Note down the least count and zero error (if any) of voltmeter and ammeter.
4. Insert the key and move the sliding contact of the rheostat so tht the voltmeter shows a small value of voltage (say 0.1 or 0.2 volt) and measure the corresponding current from the milli-ammeter.
5. Increase the potential difference slightly to the next possible value and again measure the current. Repeat this and take at least five sets of independent observations.

Result : The resistance per cm of the given wire is _____ $\Omega \text{ cm}^{-1}$

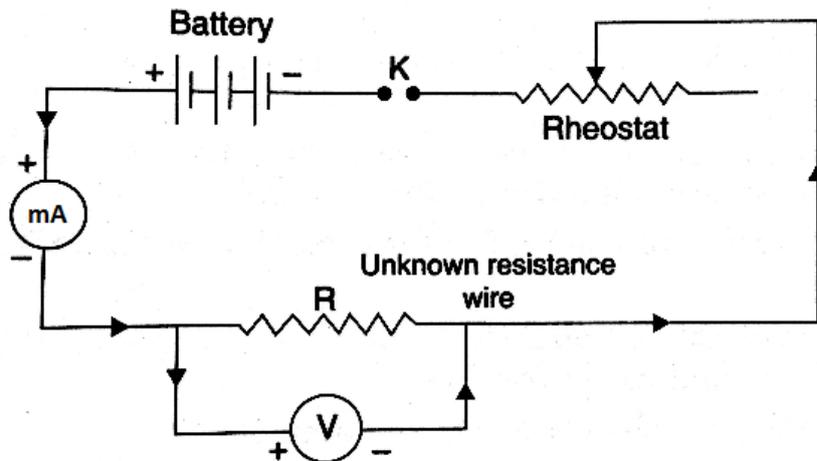
Precautions :

1. The connections should be clean and tight.
2. Voltmeter and ammeter should be of proper range
3. The key should be inserted only while taking observations to avoid the error due to heating.

Sources of error :

1. The screws and the connections may be loose.
2. There may be least count or parallax error.

Circuit Diagram:



Observations:

LC of voltmeter : _____ V

Zero error of voltmeter : _____ V

LC OF ammeter : _____ mA

Zero error of ammeter : _____ mA

Length of the given wire: _____ cm

Observation Table

Ser. No.	Voltmeter Reading (V)		Ammeter Reading (mA)	
	Observed	Corrected	Observed	Corrected
1				
2				
3				
4				
5				

Calculations :

From the graph slope $(1/R) = \text{_____ } \Omega^{-1}$

$$\therefore R = \text{_____ } \Omega$$

Length of the given wire : _____ cm

\therefore Resistance per centimetre of the wire = _____ $\Omega \text{ cm}^{-1}$