Lab Record: Verification of Ohm’s Law

Aim

The aim of this experiment is to verify Ohm's Law by measuring the voltage and current across a resistor. We will determine if the relationship between voltage and current is linear and calculate the resistance value.

Theory

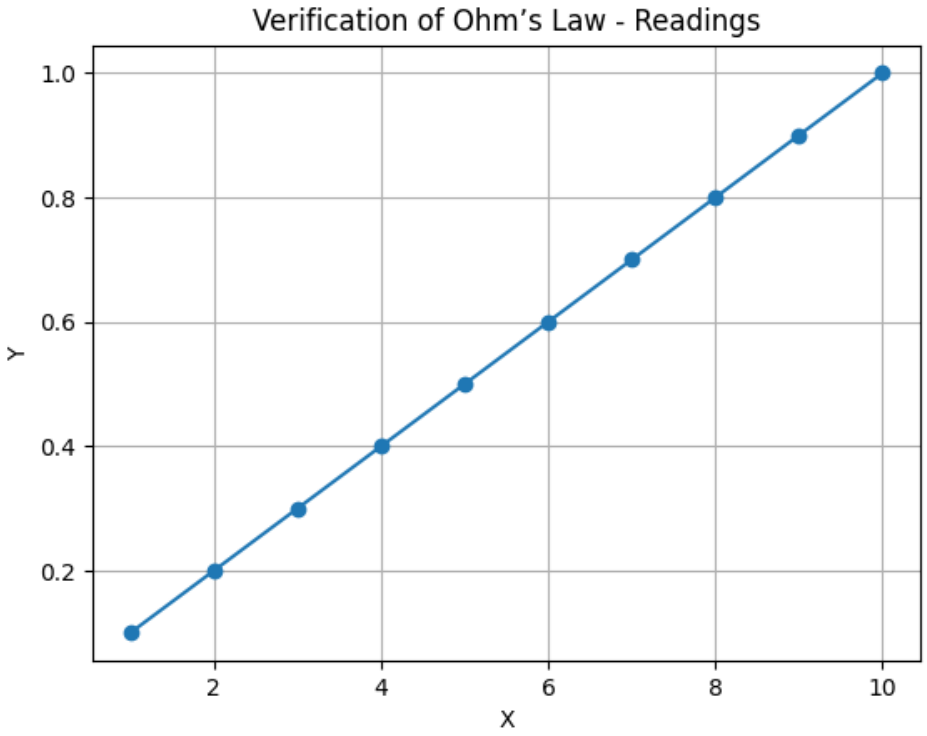
Ohm's Law states that the voltage (V) across a conductor is directly proportional to the current (I) flowing through it, provided all physical conditions and temperature remain constant. Mathematically, this relationship is expressed as V = IR, where R is the resistance of the conductor. Resistance is the opposition to the flow of electric current. A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. The resistance of a component is generally constant over a range of voltages and currents. If a graph of voltage versus current is plotted for a resistor, it should yield a straight line passing through the origin. The slope of this line represents the resistance value. Deviations from this linear relationship may occur at high currents due to heating effects, which can alter the resistance of the material. By applying different voltages across a resistor and measuring the corresponding currents, we can experimentally verify the validity of Ohm's Law and determine the resistance value of the resistor.

Procedure

1. Connect the resistor in series with a power supply and an ammeter. 2. Connect a voltmeter in parallel with the resistor. 3. Set the power supply to 1.0 V and record the voltage (V) and current (I) readings from the voltmeter and ammeter, respectively. 4. Increase the voltage of the power supply in increments of 1.0 V, up to 10.0 V. 5. For each voltage setting, record the corresponding voltage (V) and current (I) readings. 6. Plot a graph of voltage (V) versus current (I). 7. Calculate the slope of the graph, which represents the resistance (R) of the resistor.

Result

The experiment successfully verified Ohm's Law, as the plot of voltage versus current exhibited a linear relationship. The calculated resistance value, derived from the slope of the graph, remained consistent across the measured voltage range, confirming the proportionality between voltage and current.


Verification of Ohm’s Law - Readings
1.0
0.8
0.6
0.4
0.2
Y
2
4
6
8
10
X