مدونة المناهج السعودية

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الموقع التعليمي لجميع المراحل الدراسية

في المملكة العربية السعودية

اسم الطالب:	الرقم الجامعي:
رقم الشعبة :	رقم التسلسل:

Ohm's law experiment report

1 Objective:

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…….

2 Theoretical Background

In common practice, **Ohm's law** is written

V = ……..

V is……..

R is……..

I is……..

Unit of V is …….

Unit of R is …….

Unit of I is …….

3 Equipment

……

……....

4 Electric circuit

Draw the Circuit diagram.

5 Method

1. ……..……
2. ……
   ……
   ……
3. ……
   ……
4. ……
5. ……..

6 Results

You can fix the resistance value at 200 Ohm

V (V)	I (mA)
1	
2	
3	
4	
5	
6	

7 Graph

Plot the relation between I (on x axis) and V (on y axis) in sperate squares paper sheet.

8 Calculations

$$\text{Slope} = \frac{\Delta V}{\Delta I} = \frac{\ldots\ldots\ldots\ldots\ldots\ldots}{\ldots\ldots\ldots\ldots\ldots\ldots} =$$

slope = R =……

The true value (which used in your experiment), R_T =……

Errors Analysis:

$$\%\, Error(R) = \frac{|R - R_T|}{R_T} \times 100\%$$

. . . . . .

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Ohm's law experiment

1 Objective:

To study the relationship between electrical current, voltage, and resistance, known as Ohm's Law.

2 Theoretical Background

When a potential difference (V) is applied across a resistor, a current (I) in the resistor is found to be proportional to potential difference, **Vα I**. According to the relation **Vα I**, so the V = I R is known as Ohm's law. The resistance (R) of the material is defined as the ratio of the applied voltage and the resulting current, that is

$$R = V/I \quad \text{(definition of electrical resistance)}$$

For many materials, the resistance is constant, or at least approximately so, over a range of voltages. A resistor that has constant resistance is said to obey Ohm's law or to be "ohmic". Materials that do not obey Ohm's law are said to be "nonohmic" and have a nonlinear voltage-current relationship, such as semiconductors and transistors are nonohmic. Fromm the above equation, the unit of resistance is Volt/Ampere (V/A). However, the combined unit is called the ohm (Ω), in honor of George Ohm. Note that to avoid confusion with a zero, the ohm is abbreviated with a capital omega (Ω) instead of a capital "O".

A plot of V versus I for an ohmic resistance is a straight line (Fig. 1). In common practice, **Ohm's law** is written

$$V = IR$$

where it is understood that *R* is independent on *V*. Keep in mind that Ohm's law is not a fundamental law such as Newton's law of gravitation. It is a special case, there being no law that materials must have constant resistance.

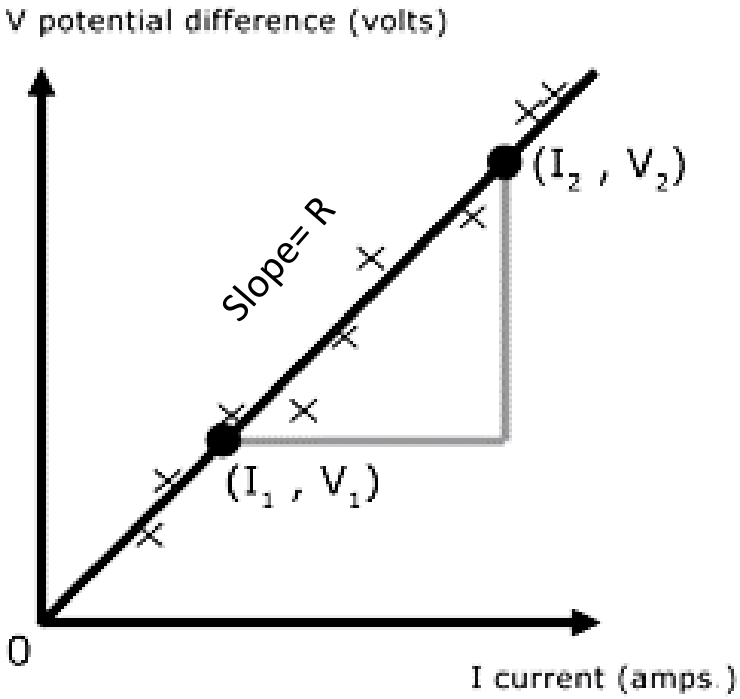

Fig. 1: A voltage-versus current graph for an ohmic resistance is a straight line, the slope of which is equal to the value of the resistance (R = V/I) for Ohmic resistance.

Consider the circuit diagram shown in fig. (2). This is a series circuit. The applied voltage is supplied by a power supply or battery V_t. R_h is a rheostat, a variable resistor that allows the voltage across the resistance R_s to be varied. (This combination is sometimes called a *voltage divider* because the rheostat divides the applied voltage across itself and R_s).

An ammeter (A) measures the current through the resistor R_s and a voltmeter (V) registers the voltage drop across both R_s and the ammeter A. *S* is a switch for closing and opening (activating and deactivating) the circuit.

Any component in a circuit that does not generate or supply a voltage acts as a resistance in the circuit. This is true for the connecting wires, the ammeter, and the voltmeter. However, the metallic connecting wires and the ammeter have negligibly small resistances, so they do not greatly affect the current.

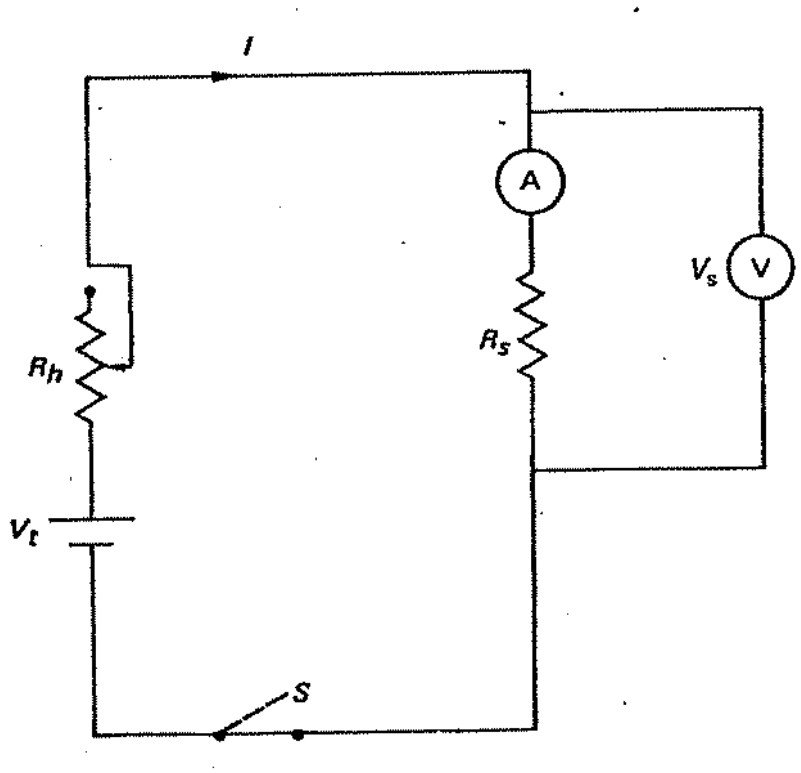

Fig. 2: Circuit diagram.

The voltmeter is connected in parallel across the ammeter and the resistance $R_{h,}$ is that of the rheostat (continuously variable resistor).

3 Equipment

D.C power supply, unknown resistance, ammeter, voltmeter, switch and rheostat.

4 Method

1. Connect the circuit as shown in fig. (2).
2. Adjust the rheostat to obtain the minimum value of potential difference (V), and record the corresponding value of the current (I).
3. By using the rheostat, increase the potential difference (*V*) gradually and in each time record the current (*I*).

4. Tabulate your results as follows in the table.
5. Draw the relation between V as Y-axis and I as X-axis, you will obtain a straight line where its slope is equal to the resistance of the resistor which in the circuit.

Note: you can also prove the laws of connecting resistors in series and in parallel.

5 Results

V	I

slope = R =

The true value, R_T =

Errors Analysis:

$$\% \, Error(R) = \frac{|R - R_T|}{R_T} \times 100\%$$

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