Ohm's Law

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1 Theoretical Background

1.1 Ohm's Law

Ohm's law states that the current through a conductor between two points is directly proportional to the voltage across the two points[].

$$V = IR, \tag{1}$$

where I is the current, V is the voltage and R is the resistance of the conductor. Theoretical values of a resistance is coded by colored lines on itself. Decryption for this code is given in Table (2). In our lab, there will be four color lines on the resistances. To read the resistance value hold the resistance as so the silver or gold line will be the last line (right-most line). Then write the numerical values of first three lines such as,

$$\underline{\text{1st code}}\ \underline{\text{2nd code}}\ e\ \underline{\text{3rd code}}.$$

Example: What is the numerical value of a resistance with blue, green, red, silver lines in order.

$$\left.\begin{array}{rl} blue & 6 \\ green & 5 \\ red & 2 \end{array}\right\} \quad 65e2\Omega = 65 \times 10'2\Omega = 6.5k\Omega.$$

Remember that, "$e2$" is actually "$\times 10^2$". At the last step the order of magnitude abbreviation is in use. To find these abbreviations you may check Table (1)

Table 1: Order of magnitudes.

Order	Mathematical Equivalent	Abbreviation	Order	Mathematical Equivalent	Abbreviation
15	$e15 = 10^{15}$	Peta, P-	-3	$e-3 = 10^{-3}$	milli, m-
12	$e12 = 10^{12}$	Tera, T-	-6	$e-6 = 10^{-6}$	micro, μ-
9	$e9 = 10^{9}$	Giga, G-	-9	$e-9 = 10^{-9}$	nano, n-
6	$e6 = 10^{6}$	Mega, M-	-12	$e-12 = 10^{-12}$	pico, p-
3	$e3 = 10^{3}$	kilo, k-	-15	$e-15 = 10^{-15}$	femto, f-

Table 2: Color codes for resistance values.

Color	Numerical Value	Color	Numerical Value
Black	0	Green	5
Brown	1	Blue	6
Red	2	Violet	7
Orange	3	Gray	8
Yellow	4	White	9

2 Procedure

2.1 Experimental Procedure

CAUTION!!!

Perform this experiment in a short period of time and do not forget to turn off the electrical supply while you are writing your data and making calculations.

1. Set the circuit given in Fig (1) with a resistance and two multimeters.

2. By using the source, adapt the source voltage to the 1st source voltage value at Table (3).

3. By reading from multimeters, note the current and voltage through the wire and write these values on Table (3).

4. Repeat the steps number 2 and 3 with other source values from Table (3).

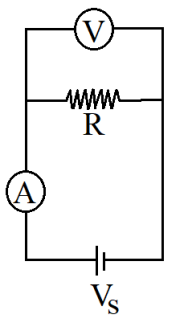

Figure 1: Circuit for the experiment.

2.1.1 Analysis Procedure

1. Using values on Table (3), plot the I-V graph.
2. Calculate the slope of the plot. This should yield the experimental resistance value.
3. By using color codes on the resistance, calculate the theoretical resistance value.
4. Calculate the percentage error.

3 Data & Analysis

Table 3: Table of voltage and current values.

#	V_s (V.)	V (___)	I (___)
1	1		
2	2		
3	3		
4	4		
5	5		

- The experimental resistance value:

- The colors on the resistance in order:

- The theoretical resistance value:

- The percentage error:

4 Conclusions

5 Notes