# Is ohms law obeyed when it is passed through a light bulb?

Knowledge and understanding

Ohms law is a group of formulas used to calculate Voltage (V), Current (I) and Resistance (R) in a circuit. It is used to calculate a missing value in a circuit. It was named after the German physicist Georg Simon Ohm, who was born in 1787 and died in 1854. The voltage is measured in volts, the current is measured in amperes and the resistance is measured in ohms.
An easy way to remember the formulas is by using the following diagram:
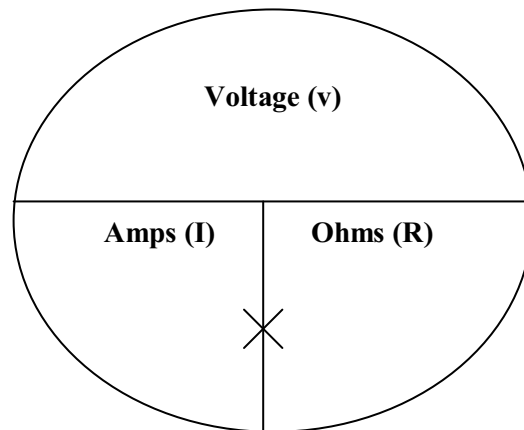
To find a missing value, cover it with your finger. The horizontal line in the middle means to divide the two remaining values. The "X" in the bottom section of the circle means to multiply the remaining values.

The formula for ohms law is:

$V = I \times R$

This means: The voltage is equal to the current multiplied to the resistance. Altogether there are three formulas. The other two formulas are :

$I = V/R$

This means that the current is equal to the voltage divided by the resistance.

R = V/I

The above means that the resistance is equal to the voltage divided by the current.

Here is a quote that I have found which describes ohms law:

"The amount of current flowing in a circuit made up of pure resistances is directly proportional to the electromotive forces impressed on the circuit and inversely proportional to the total resistance of the circuit."

Simply, ohms law means:

A steady increase in voltage, in a circuit with constant resistance, produces a constant linear rise in current – For example, a straight-line graph.

A steady increase in resistance, in a circuit with constant voltage, produces a progressively (not a straight-line if graphed) weaker current.

Metals conduct electricity in their solid state or when they are melted but they are not decomposed in the process. (I.e. - a chemical reaction does not occur) Metals can conduct electricity because in their structure, each metal atom gives up its outer shell electrons to form a sea of unlinked electrons. This means that the electrons are free to move through the metal's structure and therefore conduct electricity.

Prediction

I predict that ohms law will be obeyed if the wire is kept at a constant temperature because if the wire or bulb becomes hot the resistance is increased thus giving a curved line on the results chart. A curve to a certain degree will be acceptable.

Apparatus

Power pack
Voltmeter
Ammeter
Light bulb
Wires
Crocodile clips

Plan

After collecting the test equipment, the experiment was set up. This experiment as done to see if ohms law would be obeyed when it is passed through a light bulb. When the experiment was set up, it looked like as follows:

For this experiment the power pack was left on so as from my prediction a slight curve in the graph would be acceptable. To keep the test fair, the same power pack was used and the same light bulb. The test was carried out at intervals and results would be taken down after each change in the voltage. We tried to carry out the experiment as quick as possible for a better result on the graph. Same as the preliminary investigation, nine readings were taken down in sets of three so an average set could be produced to make a graph.

Results

Set 1

Voltage (volts)	Current(amps)
1.0	0.23
2.0	0.76
3.5	1.00
4.5	1.15
6.0	1.36
7.0	1.55
8.5	1.74
9.5	1.83
10.5	1.93

Set 2

Voltage (volts)	Current (amps)
0.8	0.46
2.0	0.75
3.5	1.04
4.5	1.17
6.0	1.38
6.8	1.52
8.5	1.70
9.5	1.85
10.5	1.96

Set 3

Voltage (volts)	Current (amps)
1.0	0.60
2.0	0.82
3.5	1.07
4.5	1.21
6.0	1.45
7.0	1.60
8.5	1.79
9.5	1.92
10.5	2.03

Average

Voltage (volts)	Current (amps)
0.9	0.43
2.0	0.77
3.5	1.03
4.5	1.17
6.0	1.39
6.9	1.55
8.5	1.74
9.5	1.86
10.5	1.97

Analysis

Looking at my results, I can see that the method that I had used to carry the experiment out had been done correctly in order to give me good results which would make an excellent mean to plot on the graph. If ohms law has been obeyed, the line on the graph would be straight. On the graph which shows my results, there is a curve. Ohms law has still been obeyed taking in mind that as the bulb gets hot which means the resistance is increased which further more slows down the current. As the bulb gets hot, particles find it hard to get through the wire, which slows them down, therefore the current slows down.

Evaluation

By comparing my results to my prediction, I have noticed that I must have carried the experiment out correctly and accurately to produce a straight and steady gradient on the graph. If I was to do the experiment again I would leave the light bulb for longer to make sure that it has dully cooled down.