Does

A

Light

Bulb

Obey

Ohms

Law

Aim:

My aim is to carry out an investigation to find out whether a filament light bulb obeys ohms law. I am carrying out an experiment to find the different resistances and currents created by a light bulb at different voltages. Because of the light bulb, it glows white-hot when fully on, the resistance will change at different voltages. When the voltage is low and the bulb is not very bright, it won't be as hot and therefore it will have less resistance. But when the current is high and the bulb is brighter, it will have a high resistance.

Theory:

Ohms law suggests that if you were to increase the P.D (potential difference) across a resistor then the current flowing through a resistor will increase. This means that the current would evenly go up as the P.D increases.

Definition:

Ammeter:

This is a device that measures the current of electrons in Amps. It has to be placed in series on the circuit.

Voltmeter:

This is a device for measuring the potential difference of the electrons in the circuit. They are measured in Volts and it is placed in parallel.

Hypothesis:

I think that the filament light bulb will not follow ohms law because if the temperature of the bulb increases then the resistance will increase. Ohms law is only true if the resistance stays the same

Plan:

In my experiment I am going to make a circuit containing the following equipment:

- 1 Ammeter
- 1 Voltmeter
- 1 Power Pack
- Wires
- 1 Bulb

I will put together the circuit by using the equipment I mentioned before. I will join the ammeter and voltmeter to the power pack using wires and join the light bulb to the ammeter and voltmeter using wires. I will record the results every 0.5 volts. I will record the results shown on the ammeter.

This is the circuit I will be using to perform my experiment:

Fair Testing:

To ensure my experiment is a fair test I will use all of the same equipment for the whole experiment. This is because each piece of equipment has their own faults in them. If I use a consistent set of equipment then I will have a more consistent group of results. I will measure each voltage three times so I can get a wider variety of results. Because we are working in a classroom there are some problems which may affect our results inaccurate equipment, old equipment, room temperature and lack of space to work with.

Results:

Analysis:

From my graph, it is clear that my hypothesis is correct. That when the voltage is low, the current and the resistance will be lower because when there is less voltage and there is no need for high resistance as there is less current. However when there is a high voltage, the resistance will be high as there is more current flowing through.

This relates to my results because when the voltage was at one volt, the amps and the Ohms were also very low, as there are not as many electrons passing the bulb at one time, so it means that there is less resistance. When the voltage was at six volts, the amps and the Ohms followed accordingly, as there were a few more electrons pass the bulb at once, needing higher resistance, but still very low.

From the conclusion if I keep adding voltages on, the resistance will carry on getting higher and higher as the electrons are passing through the bulb quicker and in greater number. When the voltage gets too high and there is not enough resistance, the filament will get too hot and reach its melting point.

Evaluation:

The procedure I used to carry out this investigation was a very good procedure because it has given me relevant results and has obtained me enough evidence to produce the above conclusion. The fact that I didn't have any anomalous results proved the above statement. The graphs I have drawn show a very clear upward curve, which has proved my hypothesis correct. Also, the results that have been grouped together for each voltage are very similar to each other, creating an average very close to the original results. I believe that the results were accurate and quite similar because I had carried out the experiment accurately and thoroughly throughout the test.

To improve the experiment, I would probably have to be really professional and a lot more scientifically precise in how I carry out the experiment. I would need to make sure there is a consistent classroom temperature, as changing temperatures may affect the filament's own temperature. If I had more time, I could try the investigation with different equipment to what I had already used. This could prove that the equipment I used doesn't matter in the experiment, and it's the fact that how I carry it out which is key.

To extend the project further, we could carry on the voltages to twenty, or twenty-five to see what happens to the results and graphs then. We even could carry the experiment on until the filament melts, and see how much voltage it can take. Also, we could add a lamp or two into the circuit and see if this affects the resistance in any way. Maybe instead of a power pack, replacing it with a couple of cells and also adding a variable resistor into the circuit.