Current and Resistance

Aim:
Investigate how the length of a wire affects the current and resistance of a wire.
Prediction and Hypothesis:
I think as you increase the length of the Constatan wire, you also increase the amount of resistance. The current is the flow of electrons; the current is dependent on the amount of voltage, which is applied. Voltage is the push given to the current. The current has to go through a circuit, which contains resistance so if you increase that push you also increase the flow of the current. All materials have a slight resistance to electricity factors affecting the resistance are: Length, Voltage & Temperature and Surface Area
Length
The diagram shows the happenings of a wire
the blue dots represent some of the negative
electrons which leads to a lower voltage output,
when the length is increased.
Voltage & Temperature
Temperature has an affect on the experiment as the voltage has control over the temperature. The more the temperature increases the more the particles vibrate leading to a reduction in output voltage although not by a huge amount this does have an affect.
Density
Density has a large affect on the amount of resistance. The resistance depends upon the amount of denseness e.g. a large surface area has less resistance because a small area has tightly packed atoms which in turn rebound many of these electrons.
Apparatus:
· Power Pack
· Constatan wire
· Leads
· Voltmeter
· Ammeter
Method:
1. Arrange apparatus as shown in the Diagram:
2. Cut wires to the following lengths:
· 30cm
· 60cm
· 90cm
· 120cm
· 150cm
3. Attach the wire to the crocodile-clip leads and set voltage to 5 volts or 1.5 Volts
4. Take the reading from the ammeter and record in results table.
5. Repeat 4 times for each length of wire and find the average.
6. Then work out the resistance using the formula V÷I=R
(Voltage ÷ Current = Resistance)
Preliminary Experiment
We carried out a preliminary experiment to see the other factors that could affect the experiment and also to see if we could improve any of the steps in the method. This showed that the wire was very weak if given more than 5 volts because the wire lets electricity flow faster and faster which then leads to the heat eventually breaking the wire. I found that if I decreased the voltage to a reading of 1.5 volts the wire stayed in tact enough to give a good reading and thereby giving better overall results.
Voltage used 5 Volts

Length	Current (1)	Current (2)	Current (3)	Current (4)	Average	Resistance
30cm	4.4	4.6	4.6	4.7	4.5	1.1
60cm	2.3	2.4	2.2	2.5	2.4	2.1
90cm	1.8	1.7	1.7	1.9	1.8	2.8
120cm	1.6	1.5	1.5	1.6	1.5	3.3
150cm	1.2	1.2	1.3	1.3	1.25	4

Voltage used 5 Volts

Length	Current (1)	Current (2)	Current (3)	Current (4)	Average	Resistance
30cm	4.2	4.6	4.3	4.4	4.4	1.1

60cm	3.3	3.2	3.1	3.1	3.2	1.6
90cm	2.1	2.4	2.2	2.2	2.5	2
120cm	1.7	1.8	1.6	1.6	1.7	2.9
150cm	1.3	1.2	1.4	1.4	1.3	3.8

The two tables above show the results given in the preliminary experiments they both seemed to heat up the wire to a substantial heat proven by the red glow on the 30cm wire (occasionally). The results obtained below show a much better picture of the happenings in the experiment.

Results

Voltage used 1.5 Volts

Length	Current (1)	Current (2)	Current (3)	Current (4)	Average	Resistance
30cm	1.7	1.6	1.8	1.7	1.7	0.9
60cm	0.9	1.0	1.1	1.0	1.0	1.5
90cm	0.5	0.6	0.6	0.6	0.6	2.5
120cm	0.4	0.5	0.4	0.4	0.4	3.8
150cm	0.3	0.5	0.4	0.4	0.4	3.8

The results above were the final results after the improvements made on the preliminary experiment

Conclusion

I came to a conclusion that the decrease in current is the increase in resistance this is because the current although less of it they collide with the resistance causing a decrease in the output voltage.

Evaluation

The experiment proved to be a success and it went very well although it could be improved by trying other lengths, different voltages but also a different type of wire to be able to compare the resistance difference this would make a more interesting experiment.