

WJEC (Wales) Physics A-level

SP2.2a - Investigation of the IV Characteristics of a Filament Lamp and Metal Wire

Practical Flashcards

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How can the current passing through a component be measured?



How can the current passing through a component be measured?

An ammeter can be connected in series with the component to measure the current passing through it.



How can the potential difference across a component be measured?



How can the potential difference across a component be measured?

A voltmeter can be connect in parallel with the component to measure the potential difference across it.



What is a rheostat?



What is a rheostat?

A rheostat is a type of variable resistor whose resistance can be changed throughout an experiment in order to vary the current in the circuit.



State Ohm's Law.



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Ohm's Law states that the current flowing through a component is directly proportional to the potential difference across it, assuming constant conditions (no temperature changes).



How can you obtain readings for negative voltages?



How can you obtain readings for negative voltages?

To obtain readings for negative voltages, reverse the polarity of your supply across the component.



Describe the I-V graph for an Ohmic component.



Describe the I-V graph for an Ohmic component.

Current and potential difference are directly proportional so the I-V graph will form a straight line that passes through the origin.



Why should the power source be switched off between readings?



Why should the power source be switched off between readings?

The temperature of the circuit should remain constant throughout the experiment.

Switching the power supply off between readings will help ensure this, by mitigating the effect of heating of the wire.



Suggest why the reading given by a voltmeter may differ slightly from the true value.



Suggest why the reading given by a voltmeter may differ slightly from the true value.

Voltmeters are assumed to have infinite resistance and so it is assumed that no current passes through them. In reality a very small current may pass, resulting in the reading differing slightly from the true value.



Suggest why the reading given by an ammeter may slightly differ from the true value.



Suggest why the reading given by an ammeter may slightly differ from the true value.

Ammeters are assumed to have zero resistance and so it is assumed that there is no voltage drop across them. In reality they may have a very small voltage drop across them, resulting in the reading differing slightly from the true value.



Why is it important that the surrounding temperature remains constant when carrying out this experiment?



Why is it important that the surrounding temperature remains constant when carrying out this experiment?

Temperature changes can affect the resistance of components, which may result in inaccurate characteristics being observed.



Why does temperature affect resistance?



Why does temperature affect resistance?

When temperature increases, the ions in the component gain energy and so vibrate more.

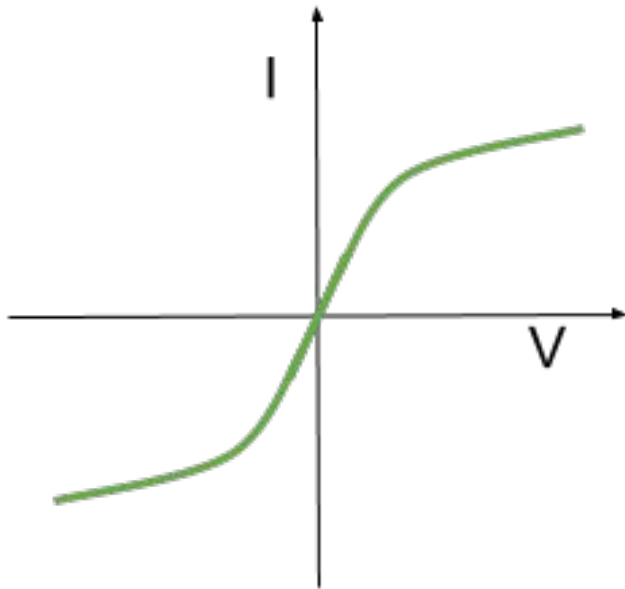
This makes it harder for the electrons (the current) to flow through the component, and so the resistance increases.



Draw the I-V curve for a filament lamp.



Draw the I-V curve for a filament lamp.



Why does a filament lamp not display a characteristic Ohmic behaviour?



Why does a filament lamp not display a characteristic Ohmic behaviour?

Filament lamps produce characteristically curved I-V graphs because the resistance does not remain constant as pd is varied, as in ohmic conductors. As more pd is applied across the filament, it heats up more, increasing its resistance and reducing the rate of increase of current flow with increasing pd. This explains the flattening of the curve.



What safety precautions should be taken when carrying out this experiment?



What safety precautions should be taken when carrying out this experiment?

Switch off the power supply when not in use, to prevent components becoming too hot.

Never touch exposed metal contacts and ensure the voltages being used don't exceed the ratings of the components.

