

WJEC (Wales) Physics A-level

SP2.2c - Investigation of the Variation of Resistance with Temperature for a Metal Wire

Practical Flashcards

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How does the resistance of a metal wire change as its temperature increases?



How does the resistance of a metal wire change as its temperature increases?

As temperature increases, the resistance of a metal wire also increases.



Why does resistance increase with temperature?



Why does resistance increase with temperature?

When the temperature of a metal increases, the metal ions gain kinetic energy and so vibrate more vigorously. These vibrations make it harder for the current of electrons to flow through, and so the resistance increases.



How can you help ensure that the temperature of the water bath is uniform throughout?



How can you help ensure that the temperature of the water bath is uniform throughout?

Continually stir the water throughout this experiment to ensure that the temperature of the water bath is uniform. It is particularly important that you do this before taking any temperature readings.



What should your graph of resistance against temperature look like for this experiment?



What should your graph of resistance against temperature look like for this experiment?

Your graph of resistance against temperature should form a straight line that passes through the origin. This demonstrates that the two quantities are directly proportional.



How could you obtain a resistance reading at 0°C ?



How could you obtain a resistance reading at 0°C ?

The tube containing a submerged wire in can be lowered into an ice-water mixture. The temperature can be checked using a thermometer.



What device can be used to measure the resistance of the wire directly?



What device can be used to measure the resistance of the wire directly?

An ohmmeter or multimeter, with a resistance setting, can be used to measure the resistance directly.



How can the resistance be determined from voltage and current readings?



How can the resistance be determined from voltage and current readings?

Resistance = Voltage/Current

$$R = V/I$$



What devices can be used to measure voltage and current and how must they be connected?



What devices can be used to measure voltage and current and how must they be connected?

A voltmeter should be connected in parallel with the wire to measure the potential difference across it. An ammeter should be connected in series with the wire to measure the current passing through it.



How should temperature readings be taken using a thermometer?



How should temperature readings be taken using a thermometer?

The liquid should be stirred with a stirrer before taking a reading to ensure accuracy. The thermometer should be read at eye level to avoid a parallax error.



What safety precautions should be taken when using a bunsen burner?



What safety precautions should be taken when using a bunsen burner?

Hair and loose clothing should be tied back. A heat proof matt should be used to prevent damage to the work surface, and you should avoid touching any exposed metal regions since they will be very hot. Use the safety-flame when not heating the water directly.



What further safety precautions should be taken in this experiment?



What further safety precautions should be taken in this experiment?

All circuitry should be sealed away from the water. Any spillages should be mopped up immediately and the power supply should be switched off when not in use. Avoid touching the water since it may cause scalding.



How does the resistance of a ntc thermistor compare to the resistance of a metal wire as temperature changes?



How does the resistance of a ntc thermistor compare to the resistance of a metal wire as temperature changes?

Where the resistance of a metal wire increases with increasing temperature, the resistance of an ntc thermistor decreases.



How could data loggers be used to improve the data you obtain?



How could data loggers be used to improve the data you obtain?

Electronic data loggers could be used to measure changes in resistance with temperature at much smaller increments than could be done manually. As a result a larger, much higher resolution dataset may be acquired, allowing a more accurate graph to be drawn.

