

OCR (B) Physics A-level

PAG 04.3 - Using Non-Ohmic Devices as Sensors

Practical Flashcards

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How does the resistance of a NTC thermistor vary with temperature?



How does the resistance of a NTC thermistor vary with temperature?

As temperature increases, the resistance of the NTC thermistor will decrease.



Why should you avoid heating the water too quickly?



Why should you avoid heating the water too quickly?

The thermistor and thermometer will have thermal inertia. If you try to heat the water too quickly, the temperature of the thermistor and thermometer won't be the same as that of the water.



What is the advantage of heating the water very slowly when carrying out this experiment?



What is the advantage of heating the water very slowly when carrying out this experiment?

By heating the water very slowly, you are allowing the thermistor and thermometer to become as close in temperature to the water as possible.



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 heatproof mat should be used to protect the work bench
- The safety flame should be used when not directly heating the water
- Avoid touching metal regions near the flame



What is the added risk when using wires near a bunsen burner?



What is the added risk when using wires near a bunsen burner?

You must ensure that the wires don't get caught on the bunsen burner or touch any hot components.



What does a potential divider do?



What does a potential divider do?

A potential divider is an arrangement that allows a desired output voltage to be produced by producing the required ratio of resistances.



How could you cool the thermistor down to zero degrees in this experiment?



How could you cool the thermistor down to zero degrees in this experiment?

The experiment can start with the thermistor placed in a beaker of ice. This can then be heated using a bunsen burner to produce resistance measurements from 0°C right up to 100°C .



What should you do when you add hot water to ensure the temperature is constant throughout?



What should you do when you add hot water to ensure the temperature is constant throughout?

You should use a stirrer to stir the water before taking temperature readings.



How should you take a reading from a thermometer?



How should you take a reading from a thermometer?

Thermometer readings should be taken at eye level to reduce parallax errors.



What graph could be plotted to obtain a calibration curve for temperature?



What graph could be plotted to obtain a calibration curve for temperature?

A graph of the output potential difference against temperature could be plotted. A curve of best fit can then be drawn in and this can be used as a calibration curve.



How does the resistance of an LDR vary with light intensity?



How does the resistance of an LDR vary with light intensity?

The resistance of an LDR increases as the light intensity decreases.



How can light intensity be measured?



How can light intensity be measured?

Light intensity can be measured using a digital light sensor.



Suggest a method for varying the light intensity incident on the LDR.



Suggest a method for varying the light intensity incident on the LDR.

A lamp connected to a dimmer switch can be shone at the LDR. If this is done in a darkened laboratory you should be able to achieve a good range of light intensities.



How the light sensor should be positioned in this experiment?



How the light sensor should be positioned in this experiment?

The light sensor should be positioned as close to the LDR as possible, without covering it. This is so that it is exposed to the same light intensity as the LDR itself.



What graph could be plotted to obtain a calibration curve for light intensity?



What graph could be plotted to obtain a calibration curve for light intensity?

A graph of the output potential difference against light intensity could be plotted. A curve of best fit can then be drawn in and this can be used as a calibration curve.



How can your calibration curve be used to determine an unknown light intensity?



How can your calibration curve be used to determine an unknown light intensity?

Move your LDR into a region of unknown light intensity and record the output potential difference. Draw a line across from this value on your graph to determine the corresponding light intensity.



When may it not be possible to accurately determine an unknown light intensity using your graph?



When may it not be possible to accurately determine an unknown light intensity using your graph?

If the unknown light intensity is beyond the range of values you have plotted, extrapolation will have to be used. This may not be appropriate, especially if it is significantly outside the range of your data.



What safety precaution should be taken when working in a darkened laboratory?



What safety precaution should be taken when working in a darkened laboratory?

Before starting the experiment, ensure that all trip hazards (such as bags and cables) are positioned out of the way.



Why is it important that the fixed resistor value isn't too high?



Why is it important that the fixed resistor value isn't too high?

If the fixed resistor is significantly larger than the thermistor resistance, changes in temperature won't result in a significant enough change in the output voltage. This will make it harder to measure how the output changes.



Why is it important that the fixed resistor value isn't too low?



Why is it important that the fixed resistor value isn't too low?

If the fixed resistor value is too low, it may result in the output voltage changing across too big a range of values. This range may exceed the range measurable using a voltmeter.

