

Edexcel Physics GCSE

Practical 4: Radiation and Absorption of Thermal Energy

Practical Flashcards

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Outline the basic steps of the practical.



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1. Clad four beakers with different materials, one matt black, one white, one silver and one any other colour
2. Fill each beaker with boiling water and insert a thermometer in each one
3. Start the stopwatch and record the temperature of each beaker at fixed intervals
4. Plot a graph of temperature against time



What is important to ensure when filling the beakers with water?



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That each beaker has the same volume of water since volume can affect the rate of cooling.



What other factors need to be controlled?



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The size of each beaker (so surface area remains the same), and the environmental temperature (so temperature gradient is the same).



How can you reduce heat loss from the top of the beakers?



How can you reduce heat loss from the top of the beakers?

Add lids with thermometer holes in.



How can you ensure that all temperature readings are taken at the same time?



How can you ensure that all temperature readings are taken at the same time?

Take a photo of all four beakers and their thermometers so the readings can be taken at the same instant.



If taking a photo of the beakers, what must you ensure in order to get accurate readings?



If taking a photo of the beakers, what must you ensure in order to get accurate readings?

The photo is taken straight on and not at an angle, otherwise the thermometer readings may be skewed (parallax error).



How could you further improve the resolution of the temperature readings?



How could you further improve the resolution of the temperature readings?

Using a digital thermometer.



Which beaker would you expect to cool down the quickest?



Which beaker would you expect to cool down the quickest?

The matt black beaker since matt black surfaces emit and absorb the most radiation.



Which beaker would you expect to cool down the slowest?



Which beaker would you expect to cool down the slowest?

The silver beaker since silver surfaces emit and absorb the least radiation.



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



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

- Take care when pouring boiling water so it doesn't splash and cause scalding
 - Avoid touching the beakers when hot

