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| logo  Name:  **HCC 11 Physics**  **Specific heat capacity prac test**  Topic Test 2014/15 |  |

Score: \_\_\_\_\_\_\_\_\_ / 20 \_\_\_\_\_\_\_\_\_\_\_\_\_\_%

TIME ALLOWED FOR THIS TEST

Working time: Double period

MATERIAL REQUIRED OR RECOMMENDED FOR THIS TEST

This question and answer booklet

Year 11 ATAR Physics Formula & Constants Sheet

Pens, pencils, eraser, rule, Mathaid or Math-o-Mat

Scientific calculator

INSTRUCTIONS

Answer all questions and write answers in the spaces provided.

Numerical answers should be evaluated to the appropriate number of significant figures unless otherwise stated and given in scientific notation.

When equal masses of different substances are heated in the same way, their temperatures rise by **different amounts.** The specific heat of a substance is the quantity of heat absorbed or released when the temperature of one kilogram of the substance rises or falls through one kelvin, or one degree Celsius. Different liquids have different values for specific heat capacity.

Aim: To measure the specific heat capacity of motor oil.

Apparatus:

* Stopwatch
* Electric hotplate
* Two 250 mL beakers
* Balance
* Water
* Motor oil

Safety considerations: Motor oil is flammable, and should not be poured down the sink.

Procedure:

1. Allow the hotplate to warm to a constant temperature by turning it on ten to fifteen minutes before beginning your experiment.
2. Pour 150 g of water into a 250 mL beaker and 150 g of motor oil into the other.
3. Record the initial temperature of each liquid.
4. Place both beakers onto the hotplate at the same time. Stir each gently with the thermometers and record the temperature after two minutes and each two minutes following. Continue measurements for a total of 10 minutes.
5. Remove the liquids from the hotplate after 10 minutes and continue to take readings for another 10 minutes.

Outline the principles by which this method will allow you to collect relevant data so that the specific heat capacity of motor oil can be calculated. (3 marks)

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Use this space to draw up a table which should include all your measured and calculated readings. (4 marks)

Use the grid below to plot a relevant graph of your findings. (4 marks)

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Explain which graph shows the liquid that heats/cools at the faster rate, and explain the differences between the heating/cooling rates.

(3 marks)

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Explain your results in terms of the specific heat capacity and the average kinetic energy of the molecules of each liquid. Consider in your response: which liquid experienced the greater increase in temperature; which liquid required more energy to raise the temperature of **one kilogram by one degree Celsius,** and account for the ‘missing’ energy in the liquid that achieved the lower temperature rise. (6 marks)

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