

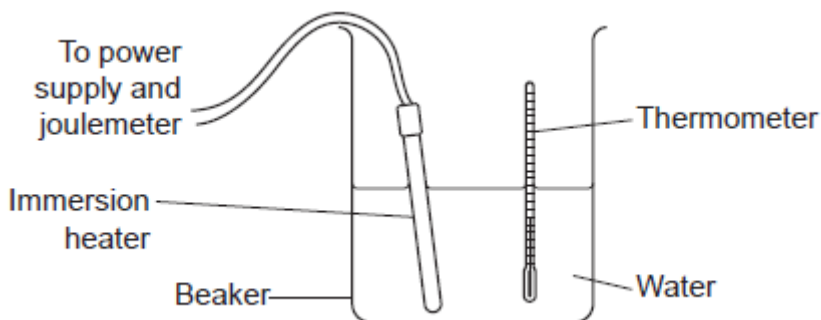
GCSE Physics A (Gateway)

J249/01 Physics A P1-P4 and P9 (Foundation Tier)

Question Set 3

1

A student completes an experiment to find the specific heat capacity of water.



He heats up 1 kg of water, using an immersion heater. He measures the temperature rise and calculates the specific heat capacity of the water.

Attempt	Energy supplied (J)	Temperature rise (°C)	Specific heat capacity (J/kg °C)
1	10 000	2	5000
2	21 000	4	5250
3	44 000	8	5500

(a) (i) Calculate the **mean** specific heat capacity.

$$\frac{5000 + 5250 + 5500}{3} = \frac{15750}{3} = 5250 \quad \text{Answer} = \dots\dots\dots 5250 \dots\dots\dots \text{J/kg}^\circ\text{C} \quad [1]$$

(ii) Describe the conclusions that can be drawn from the data [3]

1. AS temperature ^{rise} increases so does specific heat capacity (proportionally)
2. as the energy supplied increases so does the temperature rise
3. as energy increases so does the specific heat capacity.

(b) The actual value for the specific heat capacity of water is 4200 J/kg °C.

(i) Explain why the mean specific heat capacity calculated in (a)(i) is higher than the actual value.

It is higher than the actual value as there may have been energy losses where some of the energy was transferred to the environment instead of the water. [2]

$Q = mc\Delta T$ c is the specific heat capacity
 Q is energy supplied and ΔT is temperature rise

since temperature did not rise as much as expected, c is higher than actual value.

- (ii) Write down **two** problems with this experiment **and** suggest how they could be solved.

Use the diagram and results table to help you.

Problem 1 There is nothing covering
..... the beaker

Solution Use polystyrene cup instead of the beaker
..... and use lid.

Problem 2 The immersion heater is not fully submerged
..... in water - thus heat lost through air

Solution Ensure the water level is above the
..... immersion heater

[4]

Total Marks for Question Set 3: 10

OCR

Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge