

GCSE Physics A (Gateway)

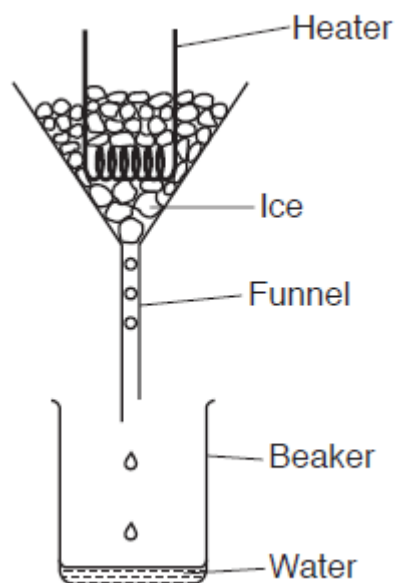
J249/03 Physics A P1-P4 and P9 (Higher Tier)

Question Set 6

1

Two students design an experiment to find the specific latent heat of water.

They set up their equipment as shown in the diagram.



The students also have access to a power supply, a voltmeter, an ammeter, a stop-clock and a top-pan balance.

(a)* Explain how the students could use this equipment to determine an accurate value for the specific latent heat of water.

1. The student needs to measure the weight of the empty beaker with the top-pan balance. [6]
2. Then the student needs to set up the equipment like in the diagram, and connect the heater to the power supply and connect the ammeter in series and voltmeter in parallel. Also put a lid on the funnel to prevent heat loss.
3. Turn the power supply so the heater is on and start the stop-clock.
4. Record the voltmeter and ammeter readings.
5. Turn off heater (make sure you have enough water)
6. Measure the new weight of the beaker and then subtract the original value to find weight of the melted ice.
7. Use the ammeter, voltmeter and time readings to calculate energy ($E = VIt$)
8. Calculate specific latent heat by doing E/m
9. Repeat this three more times to get an average

(b) The students find that 250g of ice takes 95kJ of energy to change state.

Calculate the specific latent heat.

$$L = \frac{E}{m} = \frac{95000}{250/1000} = 380000 = 3.8 \times 10^5$$

Answer = 3.8×10^5 J/kg

[3]

Total Marks for Question Set 6: 9

Equations in physics

$$(\text{final velocity})^2 - (\text{initial velocity})^2 = 2 \times \text{acceleration} \times \text{distance}$$

$$\text{change in thermal energy} = \text{mass} \times \text{specific heat capacity} \times \text{change in temperature}$$

$$\text{thermal energy for a change in state} = \text{mass} \times \text{specific latent heat}$$

$$\text{energy transferred in stretching} = 0.5 \times \text{spring constant} \times (\text{extension})^2$$

$$\text{potential difference across primary coil} \times \text{current in primary coil} = \text{potential difference across secondary coil} \times \text{current in secondary coil}$$

Higher tier only –

$$\text{force on a conductor (at right angles to a magnetic field) carrying a current} = \text{magnetic flux density} \times \text{current} \times \text{length}$$

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