

GCSE Physics

Worksheet: Specific latent heat

TIME 30 min	TOTAL 30 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Specific latent heat

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Stearic acid is a waxy solid used to make candles.

specific latent heat of fusion of stearic acid = 199 000 J/kg

0 1 . 1

Calculate the energy released when 0.40 kg of liquid stearic acid solidifies (freezes) at its melting point.

Use the equation:

thermal energy for a change of state = mass × specific latent heat

.....

.....

.....

.....

Energy = J

[2 marks]

0 1 . 2

State what happens to the temperature of the stearic acid while it is solidifying.

.....

.....

.....

[1 mark]

0 2

0 2 . 1

What is meant by the specific latent heat of a substance?

Tick (✓) **one** box.

The energy needed to change the state of 1 kg of the substance with no change in temperature ☐

The energy needed to raise the temperature of 1 kg of the substance by 1 °C ☐

The temperature at which the substance changes state ☐

The total energy of all the particles in the substance ☐

[1 mark]

0 2 . 2

What is the name of the specific latent heat for a change of state from liquid to vapour?

Tick (✓) **one** box.

Specific latent heat of condensation ☐

Specific latent heat of fusion ☐

Specific latent heat of vaporisation ☐

Specific heat capacity ☐

[1 mark]

0 2 . 3

Calculate the energy needed to melt 0.25 kg of ice at 0 °C.

specific latent heat of fusion of ice = 334 000 J/kg

Use the equation:

thermal energy for a change of state = mass × specific latent heat

.....

.....

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.....

Energy = J

[2 marks]

0 3

A 250 g ice cube at 0 °C is to be completely melted.
specific latent heat of fusion of ice = 334 000 J/kg

0 3 . 1

Convert 250 g to kilograms.

.....

.....

.....

Mass = kg

[1 mark]

0 3 . 2

Calculate the energy needed to melt the ice cube completely.
Give your answer in kJ.

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.....

Energy = kJ

[3 marks]

0 4

40 000 J of energy is used to melt some iron at its melting point.
specific latent heat of fusion of iron = 247 000 J/kg

0 4 . 1

Calculate the mass of iron that melts.
Use the Physics Equations Sheet.

.....

.....

.....

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.....

Mass = kg

[3 marks]

0 5

Table 1 shows the specific latent heat of fusion of four substances.

Table 1

Substance	Specific latent heat of fusion in J/kg
Ice	334 000
Aluminium	397 000
Lead	23 000
Copper	205 000

0 5 . 1

Which substance in Table 1 needs the least energy to melt 1 kg of it, once it has reached its melting point?

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.....

.....

.....

[1 mark]

0 5 . 2

Calculate the energy needed to melt 0.25 kg of aluminium, once it has reached its melting point.
Use the Physics Equations Sheet.

.....

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Energy = J

[2 marks]

0 5 . 3

A 0.25 kg block of lead and a 0.25 kg block of copper are both at their melting points.
Calculate how much **more** energy is needed to melt the copper block than the lead block.

.....

.....

.....

.....

Extra energy = J

[2 marks]

.....

0 6

205 000 J of energy completely melts 1 kg of copper at its melting point.

0 6 . 1

Calculate the specific latent heat of fusion of copper given by these data.
Use the Physics Equations Sheet.

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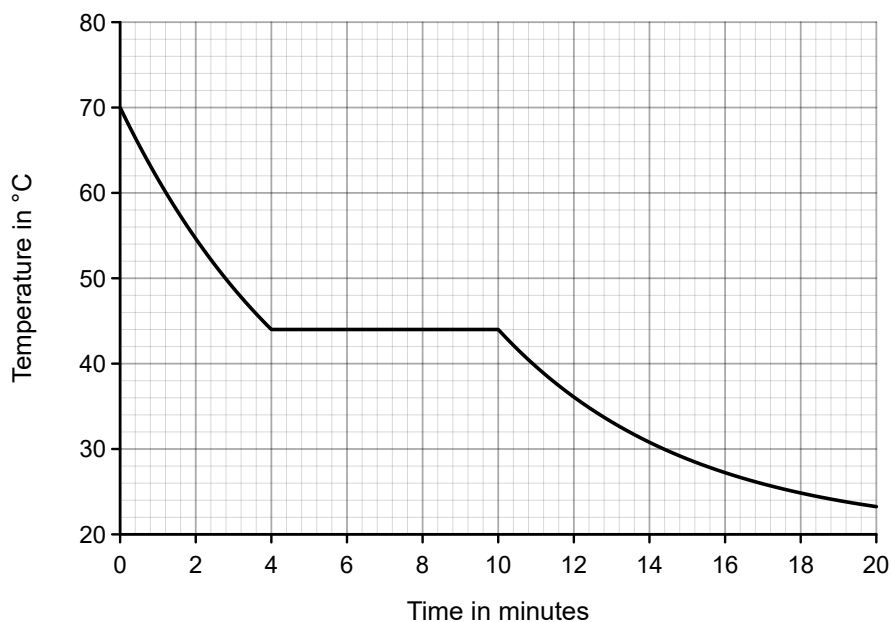
Specific latent heat of fusion = J/kg

[3 marks]

0 7

A student heated a test tube containing 0.020 kg of solid lauric acid until it had all melted. The student then let the liquid cool and measured its temperature every 30 seconds. Figure 1 shows the results.

Figure 1



0 7 . 1

What is the melting point of lauric acid?

.....

.....

.....

Melting point = °C

[1 mark]

0 7 . 2

Explain why the temperature of the lauric acid stayed constant between 4 minutes and 10 minutes, even though energy was being transferred to the surroundings.

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[3 marks]

0 7 . 3

specific latent heat of fusion of lauric acid = 180 000 J/kg
Calculate the energy transferred to the surroundings as the lauric acid changed from a liquid to a solid.
Use the Physics Equations Sheet.

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.....

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Energy = J

[2 marks]

0 7 . 4

Calculate the average rate at which energy was transferred to the surroundings while the lauric acid was solidifying.

.....

.....

.....

.....

Rate of energy transfer = W

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Physics · Worksheet: Specific latent heat · 30 marks

Question 1 (3 marks)

01.1 [2 marks]

Answer: 79 600 J

- $\Delta E = 0.40 \times 199\,000$ (1)
 - 79 600 (J) (1)
-

01.2 [1 mark]

Answer: It stays the same.

- it stays the same / constant (1)
-

Question 2 (4 marks)

02.1 [1 mark]

Correct: The energy needed to change the state of 1 kg of the substance with no change in temperature

02.2 [1 mark]

Correct: Specific latent heat of vaporisation

02.3 [2 marks]

Answer: 83 500 J

- $E = 0.25 \times 334\,000$ (1)
 - 83 500 (J) (1)
-

Question 3 (4 marks)

03.1 [1 mark]

Answer: 0.25 kg

- 0.25 (kg) (1)

03.2 [3 marks]

Answer: 83.5 kJ

- $\Delta E = 0.25 \times 334\,000 = 83\,500$ (J) (1)
- $83\,500 \div 1000$ (1)
- 83.5 (kJ) (1)

Question 4 (3 marks)

04.1 [3 marks]

Answer: 0.162 kg

- rearranging $\Delta E = mL$ gives $m = \Delta E \div L$ (1)
- $m = 40\,000 \div 247\,000$ (1)
- 0.162 (kg) (1)

Question 5 (5 marks)

05.1 [1 mark]

Answer: Lead.

- lead (1)

05.2 [2 marks]

Answer: 99 250 J

- $\Delta E = 0.25 \times 397\,000$ (1)
- 99 250 (J) (1)

05.3 [2 marks]

Answer: 45 500 J

- extra energy = $0.25 \times (205\,000 - 23\,000)$ (1)
 - = 45 500 (J) (1)
-

Question 6 (3 marks)

06.1 [3 marks]

Answer: 205 000 J/kg

- rearranging $\Delta E = mL$ gives $L = \Delta E \div m$ (1)
 - $L = 205\,000 \div 1$ (1)
 - 205 000 (J/kg) (1)
-

Question 7 (8 marks)

07.1 [1 mark]

Answer: 44 °C

- 44 (°C) (allow 43–45) (1)
-

07.2 [3 marks]

Answer: The lauric acid was freezing. The energy transferred to the surroundings came from the potential energy of the particles as bonds formed, not from their kinetic energy, so the temperature did not fall.

- the lauric acid was changing state / freezing / solidifying (1)
 - the energy transferred to the surroundings came from a decrease in the potential energy of the particles / internal energy (as bonds formed between the particles) (1)
 - the (average) kinetic energy of the particles did not change, so the temperature stayed the same (1)
-

07.3 [2 marks]

Answer: 3600 J

- $E = 0.020 \times 180\,000$ (1)
 - 3600 (J) (1)
-

07.4 [2 marks]

Answer: 10 W

- time = $6 \times 60 = 360$ (s) (1)
- $P = 3600 \div 360 = 10$ (W) (1)

Notes: Allow ECF from the energy calculated. Allow an answer in J/s.
