Latent heat Worksheet

Mr Charman

Exam question

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1) Calculate the energy needed to change the state of 3.5 kg of water into steam.

The specific latent heat for boiling water is 2 260 000 J/kg.

OCR, Gateway Physics A, Paper B751/02, Jun 2017.

Exam question

2) Susie researches information about water and ice.

Table 1 shows the information she collects. Susie heats a sample of ice.

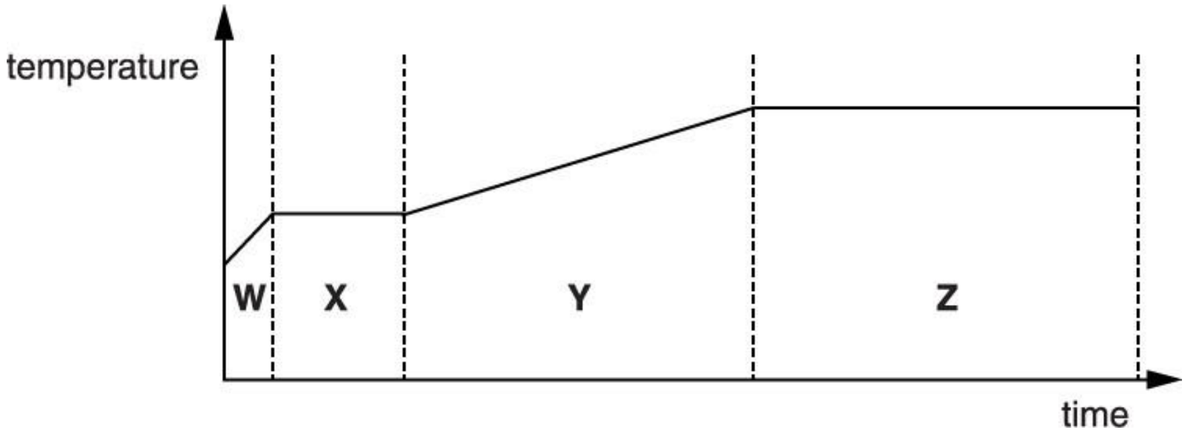
She measures the temperature of the ice as it heats up and changes state.

Look at the simple graph of her results.

a) Which section of the graph shows the temperature of **ice** rising? Choose from **W**, **X**, **Y** and **Z**.

b) Which section of the graph shows the **water** boiling?Choose from **W**, **X**, **Y** and **Z**.

	Specific heat capacity in J/kg °C	**Specific latent heat of fusion in kJ/kg**	**Specific latent heat of vaporisation in kJ/kg**
Water	4186	335	2272
Ice	2060	335	–



OCR, Gateway Physics A, Paper B751/01, Jun 2015.

Exam question

Susie researches information about water and ice.

Table 1 shows the information she collects. Susie heats a sample of ice.

She measures the temperature of the ice as it heats up and changes state.

Look at the simple graph of her results.

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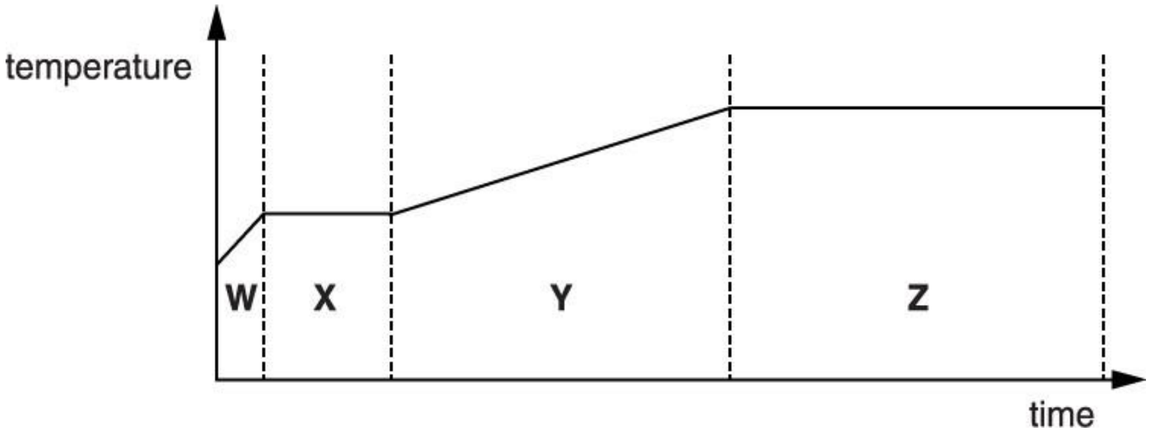


c) Section **W** is **steeper** than section **Y**. Use the information in Table 1 and the graph to explain why?

d) Suggest why section **Z** takes a **longer** time than section **X**. Use the information in Table 1 and the graph to explain your answer.

OCR, Gateway Physics A, Paper B751/01, Jun 2015.

Answers

Exam question - review

1) 7,910,000J / 7.91MJ / 7910kJ **(1)**

if incorrect or incomplete then:

3.5 × 2260000 **(1)**

2)

a) W **(1)**

b) Z **(1)**

c) W warms quicker than Y OR Y warms slower than W **(1)**

ice has lower specific heat capacity OR water has a higher specific heat capacity **(1)**

d) more energy / longer time needed to boil than melt **(1)**

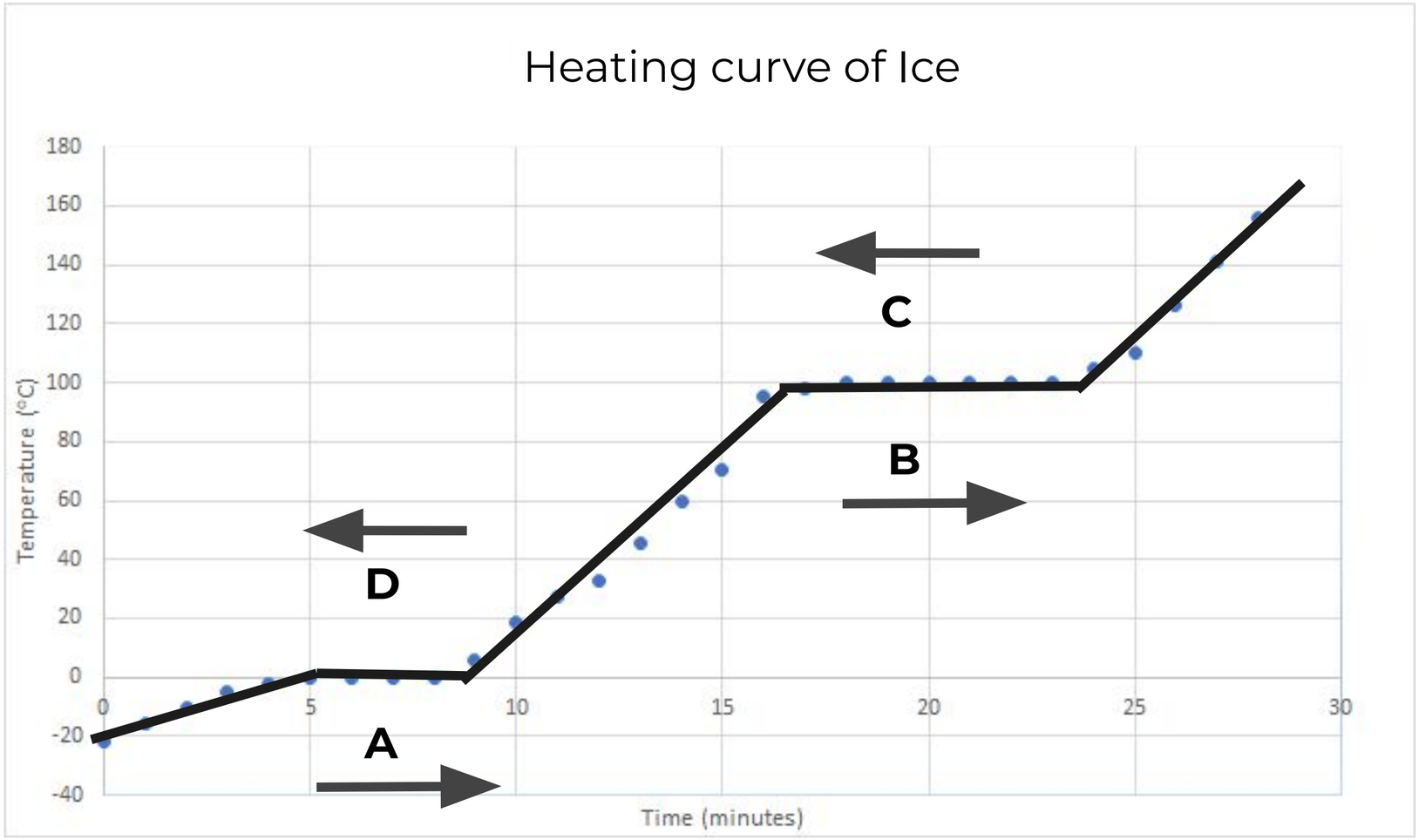
latent heat of vaporisation is higher than that for fusion **(1)**

In lesson questions

Warm up

1. List the 4 changes of state for each stage highlighted (A-D)
2. What is it called when a solid changes state directly into a gas?

Challenge - For each change of state (A - D), state whether the substance is gaining or giving out energy?



Image, Mr Charman

Pause the video to complete your task

Independent practice

1. When a substance changes from a solid to liquid, and liquid to gas, the particles _____ energy to overcome the _____ _____ of attraction. This energy is stored in the particle's _____ energy store.

   potential, gain, intermolecular forces

2. When a substance changes from a gas to liquid, and liquid to solid, the particle....

Resume once you're finished

Independent practice

1. Calculate the energy transferred for the following:
   a. Mass = 10 kg, specific latent heat = 20 000 J/kg
   b. m = 20 kg, L = 340 000 J/kg
2. How much energy is needed to change 4 kg of ice into water when the specific latent heat of fusion is 335 000 J/kg?
3. How much energy is needed to turn 5.00 kg of water into steam with a specific latent heat of vaporization 2 272 000 J/kg? **Challenge: Answer in standard form and appropriate significant figures.**
4. **Challenge:** How much energy is needed to melt 600 g of silver with a specific latent heat of fusion of 111 000 J/kg?

Answers

Review

Warm up

1. **A - melting, B - boiling, C - condensing and D - freezing.**

2. **Sublimation**

Challenge

A and B - energy is being transferred to the substance.

C and D - energy is being removed from the substance.

Review

1. Calculate the energy transferred for the following:
   a. Mass = 10 kg, specific latent heat = 20 000 J/kg **200 000 J**
   b. m = 20 kg, L = 340 000 J/kg **6 800 000 J**
2. How much energy is needed to change 4 kg of ice into water when the specific latent heat of fusion is 335 000 J/kg? **1 340 000 J**
3. How much energy is needed to turn 5.00 kg of water into steam with a specific latent heat of vaporization 2 272 000 J/kg? **Challenge: Answer in standard form and appropriate significant figures.**

   11 400 000 J, **1.14×10^8 J**

4. **Challenge:** How much energy is needed to melt 600 g of silver with a specific latent heat of fusion of 111 000 J/kg? **66 600 J**