

2.2 Thermal properties and temperature

Name: _____ Class: _____ Date: _____

Total: 9 marks

Objective

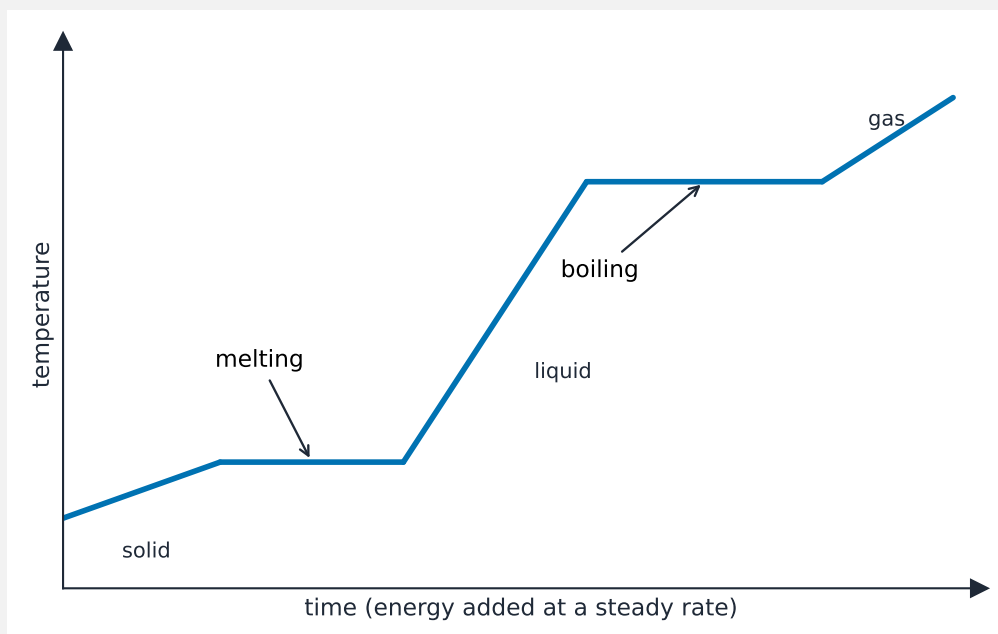
Build the skills to answer exam questions on **thermal properties** 热学性质—the kelvin scale, **thermal expansion** 热膨胀, **specific heat capacity** 比热容, and melting/boiling/evaporation.

You must be able to:

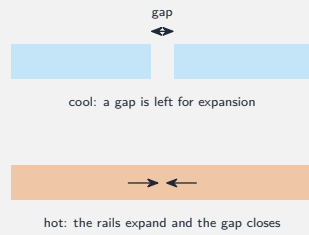
- convert between °C and kelvin ($T = \theta + 273$)
- use $\Delta E = mc \Delta\theta$
- describe state changes and explain cooling by evaporation

1 Worked examples

■ Specific heat capacity



During melting and boiling the temperature stays flat while energy is still added



Solids expand on heating — a gap is left so the track does not buckle

Heat 2.0 kg water by 50 °C ($c = 4200$): $\Delta E = mc\Delta\theta = 2.0 \times 4200 \times 50 = 420\,000$ J.

2 Practice

2.1 Convert 25 °C to kelvin. [1]

2.2 State why a liquid cools as it evaporates. [1]

3 Exam-style questions

3.1 While a pure solid is melting, its temperature: [1]

- **A** rises steadily
- **B** stays constant
- **C** falls
- **D** rises then falls

3.2 A 0.50 kg metal block is given 9000 J of energy and its temperature rises by 40 °C.

(a) Find the specific heat capacity of the metal. [3]

(b) State one reason the actual value might be higher than calculated. [1]

3.3 Explain, using the particle model, why evaporation cools the remaining liquid. [2]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **2.2 Thermal properties and temperature** past-paper sheet in the Library, or try this in **Practice mode**:

- 0625/21 N25 —Q13 (specific heat capacity)

Solutions

2.1 $25 + 273 = 298$ K.

2.2 the fastest particles escape, lowering the average energy of those left.

3.1 B. The temperature stays constant during a change of state.

3.2 (a) $c = \frac{\Delta E}{m \Delta\theta} = \frac{9000}{0.50 \times 40}$; = 450 J/(kg °C).

(b) some energy is lost to the surroundings, so more than 9000 J was really needed.

3.3 the most energetic particles leave the surface; so the average kinetic energy —and the temperature —of the remaining particles falls.