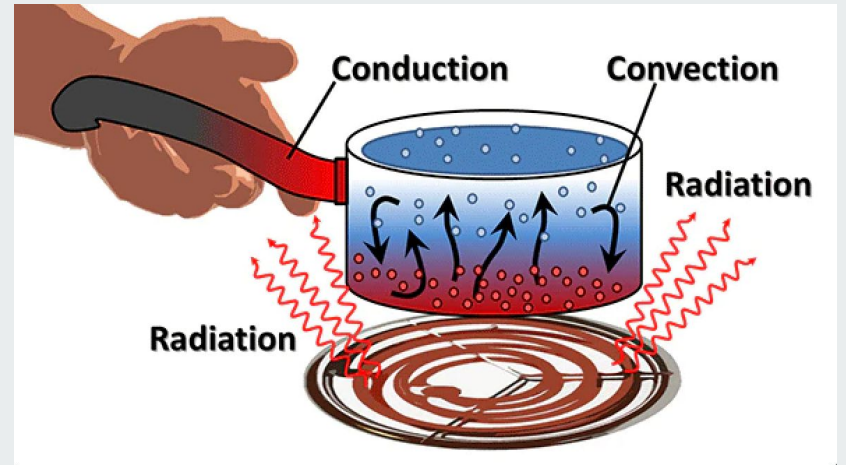

Conduction

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Conduction

- Definition: the way thermal energy moves through solids
- Two mechanisms:
 - Lattice vibrations: An atom's nucleus vibrates→energy is passed through nuclei nearby
 - Free electrons: Random motion of free electrons→ energy is transferred by collisions
- Rate of flow of energy (Q/t) depends on:
 - The temperature difference (ΔT) causing the heat to flow
 - The length (L) of the piece of solid
 - The cross-sectional area (A) of the piece of solid
 - The type of material.

$$\frac{Q}{t} = kA \frac{\Delta T}{L}$$

$$Q = mc\Delta T$$

$$Q = mL$$



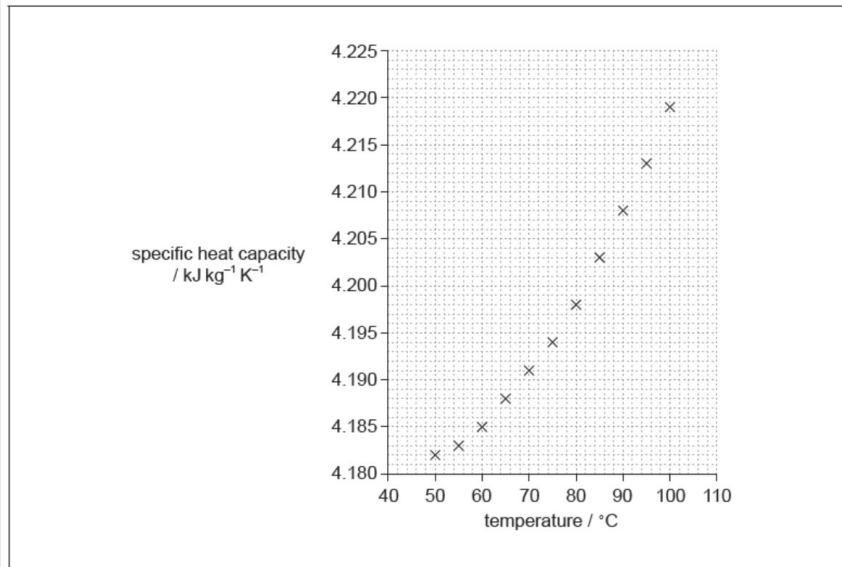
P1 Practice Problem

A sealed container contains water at $5\text{ }^{\circ}\text{C}$ and ice at $0\text{ }^{\circ}\text{C}$. This system is thermally isolated from its surroundings. What happens to the total internal energy of the system?

- A. It remains the same.
- B. It decreases.
- C. It increases until the ice melts and then remains the same.
- D. It increases.

In an experiment, data were collected on the variation of specific heat capacity of water with temperature. The graph of the plotted data is shown.

P2 Practice Problem



The uncertainty in the values for specific heat capacity is 5%.

Water of mass (100 ± 2) g is heated from (75.0 ± 0.5) °C to (85.0 ± 0.5) °C.

- Draw the line of best-fit for the data. [1]
- Determine the gradient of the line at a temperature of 80 °C. [3]
 - State the unit for the quantity represented by the gradient in your answer to (b)(i). [1]
- Calculate the energy required to raise the temperature of the water from 75 °C to 85 °C. [1]
 - Using an appropriate error calculation, justify the number of significant figures that should be used for your answer to (c)(i). [3]