

Heat Expansion

U78-10 When a piece of ice at $0\text{ }^{\circ}\text{C}$ is heated to become $8\text{ }^{\circ}\text{C}$ of water, its volume _____.

- A. increases, then decreases and finally increases
- B. increases, and then decreases
- C. decreases, and then increases
- D. decreases, then increases and finally decreases

U85-15 A piece of glass which has been heated to a high temperature is left to cool. If the glass cracks, it is most probably due to the _____ of the glass.

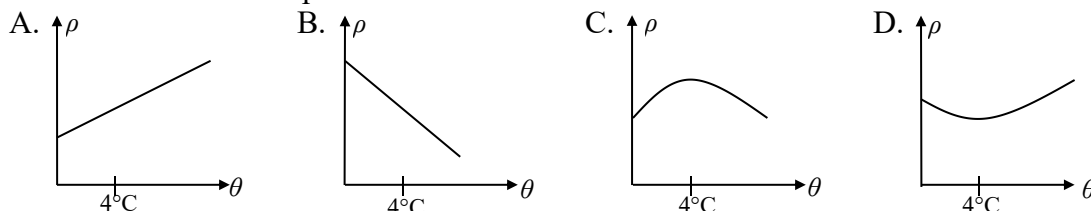
- A. low melting point
- B. high melting point
- C. low thermal conductivity
- D. high thermal conductivity
- E. unique specific heat capacity

U77-P6 Define the coefficient of linear expansion.

A wire has a coefficient of linear expansion α . The length of the wire is l_1 at a temperature T_1 and l_2 at a temperature T_2 . Using the definition of the coefficient of linear expansion find an expression for l_2 in terms of l_1 , α , T_1 and T_2 .

The lengths of an aluminium rod and an iron rod at $0\text{ }^{\circ}\text{C}$ are 50 cm and l respectively. If the difference between the lengths of these two rods remains constant while the temperature varies, find the value of l . (Take the coefficient of the linear expansion of aluminium to be $2.6 \times 10^{-5}\text{ K}^{-1}$ and that of iron, $1.2 \times 10^{-4}\text{ K}^{-1}$). [108.3 cm]

U98-12 Which of the graphs in Fig.U98-12 represents the density changes of water when it is heated from $0\text{ }^{\circ}\text{C}$ to room temperature?



U2k03-P3 (a) Briefly describe an experiment to show the linear expansion of an iron rod when temperature increases.

- (b) A S.G. bottle at $0\text{ }^{\circ}\text{C}$ can just be filled with 0.11 kg of a certain liquid. If the coefficient of apparent volume expansion of liquid is 0.001 K^{-1} , find the mass of the liquid overflow at $100\text{ }^{\circ}\text{C}$.
- (c) A gas of fixed mass is sealed in a container. If the pressure increment of the gas is $\frac{1}{100}$ of the initial pressure after the temperature increases by $5\text{ }^{\circ}\text{C}$, find the initial temperature of the gas. [0.01 kg; $227\text{ }^{\circ}\text{C}$]

U2k07-8 The ratio of the coefficient of volume expansion γ to the coefficient of area expansion β of a solid body, $\frac{\gamma}{\beta}$ is given by:

- A. 0.5
- B. 1.0
- C. 1.5
- D. 2.0

U2k10-11. At $30\text{ }^{\circ}\text{C}$ room temperature, a heat – resistance container can be fully filled with 100 ml of $0\text{ }^{\circ}\text{C}$ cold water. When the water in the container is heated to $80\text{ }^{\circ}\text{C}$, how much water will overflow? (the coefficient of apparent expansion of volume of water is $4.6 \times 10^{-4}\text{ K}^{-1}$)

- A. 2.30 ml
- B. 3.68 ml
- C. 10.24 ml
- D. 16.24 ml

U2k12-7 When the temperature of a copper sphere is increased by ΔT , its diameter increases by 0.15%. Under this condition, its volume increases by _____%.

- A. 0.05
- B. 0.15
- C. 0.20
- D. 0.45

U2k14-P5c A steel cylinder is fitted with an aluminium alloy piston as shown in Fig.U2k14-P5c. At $20\text{ }^{\circ}\text{C}$, its internal diameter is 10 cm, and there is uniform gap of 0.05 mm between the piston and the cylinder wall. At what temperature would the piston be perfectly fitted by the steel cylinder? [$\alpha_{\text{steel}} = 1.2 \times 10^{-5}\text{ K}^{-1}$ and $\alpha_{\text{Al}} = 1.6 \times 10^{-5}\text{ K}^{-1}$] [$271\text{ }^{\circ}\text{C}$]

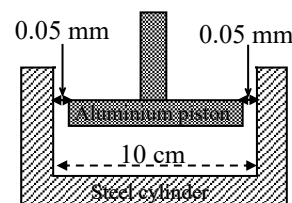


Fig.U2k14-P5c