

Answer on Question #72873-Physics-Other

1. A sheet of copper has an area of 500 cm² at 0^o C. Determine the area of the sheet at 80^o C?

Solution

$$A' = 500 \left(1 + 2(1.7 \cdot 10^{-5})(80 - 0) \right) = 501.36 \text{ cm}^2.$$

2. At 15^o C, a bare wheel has a diameter of 30.000 inch and the inside diameter of the steel rim is 29.930 inch. To what temperature must the rim be heated so as to slip over the wheel?

Solution

$$\frac{D}{d} = 1 + \alpha(T - T_0)$$

$$T = T_0 + \frac{1}{\alpha} \left(\frac{D}{d} - 1 \right) = 15 + \frac{1}{(1.1 \cdot 10^{-5})} \left(\frac{30}{29.93} - 1 \right) = 227^\circ\text{C}.$$

3. A glass beaker holds exactly 1L at 0^o C.

a. What is its volume at 50^o C

b. If the beaker is filled with Hg at 0^o C, what volume of Hg overflows when the temperature is raised to 50^oC.

Solution

a.

$$V = 1(1 + (27.6 \cdot 10^{-6})(50 - 0)) = 1.0014 \text{ L}.$$

b.

$$V' - V = 1(182 \cdot 10^{-6})(50 - 0) = 0.0091 \text{ L} = 9.1 \text{ mL}.$$

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