

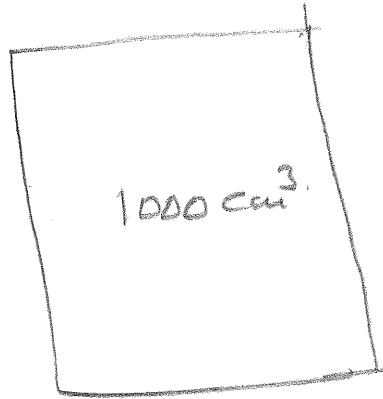
Problem 4a: A beaker of Aluminum is filled to the brim with 1000 cm^3 of water at 20°C . If its temperature is raised to 80°C how much water will spill out if $\alpha_{Al} = 23 \times 10^{-6} \text{ C}^{-1}$ (linear expansion) and $\beta_{Water} = 210 \times 10^{-6} \text{ C}^{-1}$. (volume expansion) (15)

Linear Expansion

$$L = L_0 [1 + \alpha (\theta_f - \theta_i)]$$

Vol. Expansion

$$V = V_0 [1 + \beta (\theta_f - \theta_i)]$$



For Aluminum

$$V_{80}^{Al} = V_{20} [1 + 3 \times 23 \times 10^{-6} (80 - 20)]$$

For Water

$$V_{80}^W = V_{20} [1 + 210 \times 10^{-6} (80 - 20)]$$

Spill

$$V_{\text{spill}} = V_{80}^W - V_{80}^{Al}$$

$$= 1000 [210 - 69] \times 10^{-6} \times 60 \text{ cm}^3$$

$$= 1000 \times 141 \times 6 \times 10^{-2} \text{ cm}^3$$

$$= \underline{8.5 \text{ cm}^3}$$

← CORRECTION