Answer on Question #48255-Physics-Other

The length of each side of a cube measured with verier callipers is 30mm. If the venier callipers can be read with an uncertainty of ±0 14 mm, what does this give for approximate uncertainty in the value of its volume?

Solution

The length of each side of a cube is $l = 30\ mm$. The uncertainty in length is $\Delta l = 0.14\ mm$. The percentage uncertainty in volume is

$$\frac{\Delta V}{V} = \frac{\Delta l}{l} + \frac{\Delta l}{l} + \frac{\Delta l}{l} = \frac{3\Delta l}{l} = 3 \cdot 0.1430 = 0.014.$$

The volume of a cube is

$$V = l^3 = 30^3 = 27000\ mm^3 = 27\ cm^3.$$

The uncertainty in the value of volume of a cube is

$$\Delta V = \frac{\Delta V}{V} \cdot V = 0.014 \cdot 27000 = 380\ mm^3 = 0.38\ cm^3.$$

Answer: $\mathbf{0.38\ cm^3}$.