

• Cálculo da densidade

$$\bar{\rho} = \frac{4\bar{M}}{\pi \bar{D}^2 \bar{H}} = \frac{4 \cdot 11,85}{\pi \cdot 15,951^2 \cdot 15,340} = \frac{47,4}{17362,54605} = 2,730014357 \cdot 10^{-3} \text{ g/mm}^3$$

• Cálculo da incerteza da densidade

$$\sigma_{\rho} = \bar{\rho} \cdot \sqrt{\left(\frac{\sigma_M}{\bar{M}}\right)^2 + \left(\frac{\sigma_D}{\bar{D}}\right)^2 + \left(\frac{\sigma_H}{\bar{H}}\right)^2}$$

$$\sigma_{\rho} = 2,730014357 \cdot 10^{-3} \cdot \sqrt{\left(\frac{0,01}{11,85}\right)^2 + \left(\frac{0,001}{15,951}\right)^2 + \left(\frac{0,001}{15,340}\right)^2}$$

$$\sigma_{\rho} = 2,730014357 \cdot 10^{-3} \cdot \sqrt{7,121365873 \cdot 10^{-7} + 2,77563459 \cdot 10^{-9} + 4,24961201 \cdot 10^{-9}}$$

$$\sigma_{\rho} = 2,315145263 \cdot 10^{-6} \text{ g/mm}^3$$

• Erro relativo

$$E\% = \frac{|X_m - X_v|}{X_v} \cdot 100 = \frac{|2,730014357 \cdot 10^{-3} - 2,7 \cdot 10^{-3}|}{2,7 \cdot 10^{-3}} \cdot 100$$

$$E\% = 1,135642852$$

• Incerteza Experimental relativa

$$\sigma_{\rho\%} = \frac{\sigma_{\rho}}{\bar{\rho}} \cdot 100 = \frac{2,315145263 \cdot 10^{-6}}{2,7 \cdot 10^{-3}} \cdot 100$$

$$\sigma_{\rho\%} = 0,08574612$$