A spherical drop of water has 2.5 mm radius .if the surface tension of water is 70 into 10 raise to power minus three N /m, then excess pressure inside the drop is?

Solution

The net upward force on the top hemisphere of the bubble is just the pressure difference times the area of the equatorial circle:

$$F_{up} = \Delta P * \pi r^2.$$

The surface tension force downward around:

$$F_{down} = \sigma * 2\pi r,$$

where σ - surface tension.

The net upward force is in equilibrium with the surface tension force:

$$F_{up} = F_{down} \rightarrow \Delta P * \pi r^2 = \sigma * 2\pi r.$$

The excess pressure inside the drop is

$$\Delta P = \frac{2\sigma}{r} = \frac{2 * 70 * 10^{-3}\frac{N}{m}}{2.5 * 10^{-3} m} = 56\frac{N}{m^2}.$$

Answer: $56\frac{N}{m^2}$.