In jaege's of internal diameter 5er's experiment, a capillary tube of internal diameter 0.0005 m dips 0.003m inside water contain in a beaker. This difference in level of water manometer when the bubble is released 0.09 m. calculate surface tension of water.

Solution:

We know that the excess pressure inside the bubble of radius r is

$\frac{2T}{r} = (H\rho g - h\sigma g)$ or $T = \frac{rg}{2}(H\rho - h\sigma)$.

Where H is the difference of levels of manometer when the bubble just detached from the orifice, h is the depth of orifice below the free surface of the liquid, ρ is the density of liquid inside the manometer and σ that of the experimental liquid.

Here $r = 2.5 * 10^{-4}m, H = 0.09m, h = 3 * 10^{-3}m = 0.003m, \rho = \sigma = 10^3 \frac{kg}{m^3}$ and

$g = 9.8 \frac{m}{s^2}$.

$$T = \frac{2.5 * 10^{-4} * 9.8}{2}(0.09 * 10^3 - 0.003 * 10^3) = 0.106 \frac{N}{m}$$

Answer: 0.106 $\frac{N}{m}$.