Answer on Question # 37151

Physics – Mechanics | Kinematics | Dynamics

Question:

There is small hole in a hollow sphere .the water enters in it when it is taken to depth of 40 cm under water .the surface tension of water is 0.07 N/m .the diamerter of hole is ?

Solution:

Additional pressure under the water:

$$p = \rho g h,$$

where $\rho = 1000\ kg/m^3$, $h = 0.4\ m$. Force, given by the surface tension:

$$F = \sigma d,$$

where $\sigma = 0.07\ N/m$, d is the diameter of the hole. Thus, pressure is

$$p = \frac{F}{S} = \frac{F}{\pi d^2/4} = \frac{4\sigma d}{\pi d^2} \equiv \rho g h \Rightarrow d = \frac{4\sigma}{\pi \rho g h} = \frac{4 \cdot 0.07}{\pi \cdot 1000 \cdot 9.8 \cdot 0.4} = 0.02 \cdot 10^{-3} m = 0.02\ mm$$

Answer:

$0.02\ mm$