Answer on Question #74136, Chemistry / Other

A hemispherical blown just float without sinking in a liquid of density 1.2×1000 kg/m^3.If outer diameter and the density of the bowl are 1m and 2× 10000 kg/m^3 respectively, then the inner diameter of the bowl will be.

Solution:

Weight of the bowl
$W = mg = V \rho_b g = 4/3\pi[(D/2)^3-(d/2)^3] \rho_b g$
Where D is outer diameter, d is Inner diameter, ρ_b is density of the bowl

Weight of the liquid displaced by the bowl
$W = V \rho_l g = 4/3\pi(D/2)^3 \rho_l g$
Where ρ_l is the density of the liquid.

$$\frac{4}{3}\pi \times \left(\frac{D}{2}\right)^3 \times \rho_l \times g = \frac{4}{3}\pi \times \left[\left(\frac{D}{2}\right)^3 - \left(\frac{d}{2}\right)^3\right] \times \rho_b \times g$$

$$d = D \sqrt[3]{1 - \frac{\rho_l}{\rho_b}}$$

$$d = 1 \times \sqrt[3]{1 - \frac{1.2 \times 10^3}{2 \times 10^4}} = 0.98\, m$$

Answer: 0.98 m