Answer on Question #38378, Physics, Mechanics

Question:

An irregular piece of metal weighs 10g in air 8g in water and 8.5g in oil what are the volumes of the metal and the density of oil

Answer:

Weigh of piece of metal in air equals its mass (neglecting buoyant force of air):

$$P_a = m$$

Weigh of piece of metal in water equals:

$$P_w = m - \frac{F_b}{g} = P_a - \rho_w V$$

Where F_b is buoyant force, ρ_w is density of water

Therefore volume of the metal equals:

$$V = \frac{P_a - P_w}{\rho_w} = 2 \; cm^3$$

Weigh of piece of metal in oil equals:

$$P_w = P_a - \rho_o V$$

Where ρ_o is density of oil

$$\rho_o = \frac{P_a - P_w}{V} = \frac{1.5}{2} \frac{g}{cm^3} = 0.75 \frac{g}{cm^3}$$

Answer: $V = 2 \; cm^3, \rho_o = 0.75 \frac{g}{cm^3}$