Answer on Question #52996 - Physics - Mechanics - Kinematics - Dynamics

If the specific gravity of given oil is $SG = 0.750$, find its density ρ and specific weight γ. It is given that the density and specific weight of the water at $4\,°\text{C}$ is $\rho_{H_2O} = 1000\,\frac{\text{kg}}{\text{m}^3}$ and $\gamma_{H_2O} = 9810\,\frac{\text{N}}{\text{m}^3}$ respectively.

Solution:

The specific gravity is given by

$$SG = \frac{\rho}{\rho_{H_20}}$$

Since $SG = 0.750$, and $\rho_{H_20} = 1000\,\frac{\text{kg}}{\text{m}^3}$, we obtain

$$\rho = SG \cdot \rho_{H_20} = 0.750 \cdot 1000\,\frac{\text{kg}}{\text{m}^3} = 750\,\frac{\text{kg}}{\text{m}^3}$$

The specific weight is given by

$$\gamma = g \cdot \rho,$$

where g – is the acceleration due to gravity. Therefore,

$$g = \frac{\gamma_{H_20}}{\rho_{H_20}}$$

and

$$\gamma = \frac{\gamma_{H_20}}{\rho_{H_20}} \cdot \rho = \frac{9810\,\frac{\text{N}}{\text{m}^3}}{1000\,\frac{\text{kg}}{\text{m}^3}} \cdot 750\,\frac{\text{kg}}{\text{m}^3} = 7357.5\,\frac{\text{N}}{\text{m}^3}$$

Answer: $\rho = 750\,\frac{\text{kg}}{\text{m}^3}$, $\gamma = 7357.5\,\frac{\text{N}}{\text{m}^3}$.