Answer on Question 52993, Physics, Mechanics | Kinematics | Dynamics

Question:

If $6m^3$ of oil weights $47kN$, calculate the specific weight, density, specific volume, and specific gravity. It is given that the specific weight of water at 4℃ is $9810\,N/m^3$.

Solution:

1) The specific weight of oil is its weight per unit volume:

$$\gamma = W/V = 47 \cdot 10^3 N/6m^3 = 7.833\,kN/m^3.$$

2) The density of oil is its mass per unit volume:

$$m = W/g = 47 \cdot 10^3 N/9.81\,m/s^2 = 4791kg,$$

$$\rho = m/V = 4791kg/6m^3 = 798.5\,kg/m^3\,.$$

3) The specific volume of oil is the ratio of its volume to its mass:

$$v = V/m = \rho^{-1} = (798.5\,kg/m^3)^{-1} = 0.00125\,m^3/kg.$$

4) The specific gravity is defined as the ratio of the specific weight of fluid to the specific weight of a standard fluid. For liquids, the standard fluid is taken water. So, let's obtain the specific gravity of oil:

$$s.g. = \gamma/\gamma_{water\ at\ 4℃} = 7.833 \cdot 10^3\ N/m^3/9.81 \cdot 10^3\ N/m^3 = 0.8.$$

Answer:

1) $\gamma = 7.833\,kN/m^3$.

2) $\rho = 798.5\,kg/m^3$.

3) $v = 0.00125\,m^3/kg$.

4) $s.g. = 0.8$.