

Exercise No. 1:

A.

$$\varpi = \rho \cdot g = (\rho_{\text{ref}} \cdot d) \cdot g = 1000 \cdot 0,85 \cdot 9,81 = 8338,5 \text{ N} / \text{m}^3 .$$

B.

$$\varpi = \frac{47 \cdot 10^3}{6} = 7830 \text{ N/m}^3 ,$$

$$\rho = \frac{\varpi}{g} = \frac{7830}{9,81} = 798 \text{ kg/m}^3 \quad \& \quad d = \frac{\rho}{\rho_{\text{ref}}} = \frac{798}{1000} = 0,798 \approx 0,8 .$$

C.

$$\nu = \frac{\mu}{\rho} = 0,01 \text{ g/(cm} \cdot \text{s)} \cdot \frac{1 \text{ kg}}{1000 \text{ g}} (100 \text{ cm/m}) / \rho = 0,001 \text{ kg/(m} \cdot \text{s)} / \rho = 10^{-6} \text{ m}^2 / \text{s} .$$

D.

$$P_0 = m \cdot g = (\rho \cdot V) \cdot g = (\rho_{\text{ref}} \cdot d) \cdot V \cdot g = 1000 \cdot 0,92 \cdot 3 \cdot 10^{-3} \cdot 9,81 = 27,08 \text{ N} .$$

Exercise No. 2:

$$1 \text{ poise} = \frac{10^{-5} \text{ N} \cdot \text{s}}{\text{cm}^2} = \frac{10^{-5} \text{ N} \cdot \text{s}}{(10^{-2} \text{ m})^2} = \frac{10^{-1} \text{ N} \cdot \text{s}}{\text{m}^2} = 10^{-1} \text{ Pa} \cdot \text{s}$$

a)  $\mu$  (en Pa·s) = 0,01008 x 0,1 = 1,008 x 10<sup>-3</sup> Pa·s

b)  $\nu$  en m<sup>2</sup>/s =  $\mu / \rho = 1,008 \times 10^{-3} / (0,998 \times 1000) = 1,01 \times 10^{-6} \text{ m}^2/\text{s}$ .

Exercise No. 3:

$$\nu = \frac{\mu}{\rho_{\text{eau}} \cdot d} = \frac{0,6 \cdot 10^{-3}}{1000 \cdot 0,76} = 7,895 \cdot 10^{-7} \text{ m}^2 / \text{s} = 7,895 \cdot 10^{-3} \text{ St} .$$

Exercise No. 4:

$$\tau = \mu \frac{du}{dy} \quad \tau = \mu \frac{V}{h} = 0,29 \frac{3}{0,02} = 43 \text{ kg/(m} \cdot \text{s}^2) = 43 \text{ N/m}^2 = 43 \text{ Pa}$$

Exercise No. 5:

$$\tau|_h = \mu \left. \frac{du}{dy} \right|_h = \mu \frac{3V}{h} = 1,915 \frac{3 \cdot 0,6096}{0,00508} = 689,4 \text{ N/m}^2$$