

E.3

$$\rho = 1.02 \text{ g/mL}$$

$$\rho_0 = 1.00 \text{ g/mL}$$

$$d = 150 \times 10^{-4} \text{ cm}$$

$$a = 75 \times 10^{-4} \text{ cm}$$

$$\mu = 0.011 \text{ g/cm s}$$

$$V_{\text{TANK}} = \frac{\pi}{4} d^2 h$$

$$(50 \text{ L}) \left(\frac{1000 \text{ cm}^3}{\text{L}} \right) = \frac{\pi}{4} (30 \text{ cm})^2 h$$

$$h = 70.7 \text{ cm}$$

$$a) \quad v_g = \frac{2a^2(\rho - \rho_0)g}{9\mu} = \frac{2(75 \times 10^{-4})^2(0.02)(981)}{9(0.011)}$$

$$v_g = \underline{0.0223 \text{ cm/s}}$$

$$b) \quad Re = \frac{d v_g \rho}{\mu} = \frac{(150 \times 10^{-4})(0.0223)(1.00)}{0.011}$$

$$\underline{Re = 0.03} \quad \text{DIMENSIONLESS!}$$

$$c) \quad t = \frac{70.7 \text{ cm}}{0.0223 \text{ cm/s}} = 3170 \text{ s} \approx \underline{\underline{52.8 \text{ min}}}$$