

3.3

$$(SG)_g = 0.7$$

$$a) \frac{50 \text{ L}}{1} \left| \frac{0.7 \times 10^3 \text{ Kg}}{\text{m}^3} \right| \frac{1 \text{ m}^3}{10^3 \text{ L}} = 35 \text{ Kg}$$

$$b) \frac{1150 \text{ Kg}}{\text{min}} \left| \frac{\text{m}^3}{0.7 \times 1000 \text{ Kg}} \right| \frac{1000 \text{ L}}{1 \text{ m}^3} \left| \frac{1 \text{ min}}{60 \text{ s}} \right| = 27 \frac{\text{L}}{\text{s}}$$

$$c) \frac{10 \text{ gal}}{2 \text{ min}} \left| \frac{1 \text{ ft}^3}{748 \text{ gal}} \right| \frac{0.70 \times 62.43 \text{ lb}_m}{1 \text{ ft}^3} \approx 29 \text{ lb}_m / \text{min}$$

d) Assume that 1 cm^3 Kerosene was mixed with $V_g (\text{cm}^3)$ gasoline

$$\frac{V_g (\text{cm}^3)}{1} \left| \frac{0.7 \text{ g}}{\text{cm}^3} \right| = 0.7 V_g (\text{g})$$

$$\frac{1 \text{ cm}^3 \text{ Kerosene}}{1} \left| \frac{0.82 \text{ g}}{\text{cm}^3} \right| = 0.82 \text{ g Kerosene}$$

$$\rho_{\text{blend}} = 0.78 = \frac{(0.7 V_g + 0.82) \text{ g blend}}{V_g + 1 (\text{cm}^3 \text{ blend})}$$

$$\therefore \boxed{V_g = 0.5 \text{ cm}^3}$$

$$\therefore \frac{V_g}{V_k} = \frac{0.5 \text{ cm}^3}{1 \text{ cm}^3} = 0.5 \text{ cm}^3 \text{ gasoline} / \text{cm}^3 \text{ Kerosene}$$

3.18

Time = 1 min

Mass of empty cylinder = 65 g

Mass of cylinder + collected slurry = 565 g

Volume Collected = 455 mL

Mass of cylinder after evaporation = 215 g.

$$M_{\text{suspension}} = 565 - 65 = 500 \text{ g}$$

$$M_{\text{CaCO}_3} = 215 - 65 = 150$$

$$a) \dot{Q} = \frac{455 \text{ mL}}{\text{min}}$$

$$\dot{m} = \frac{500 \text{ g}}{\text{min}}$$

$$b) \rho = \frac{\dot{m}}{\dot{Q}} = \frac{500 \text{ g}}{455 \text{ mL}} = 1.1 \text{ g/mL}$$

$$c) X_{\text{CaCO}_3} = \frac{150 \text{ g CaCO}_3}{500 \text{ g suspension}} = \frac{0.3 \text{ g CaCO}_3}{\text{g suspension}}$$

19 basis = 100 mol

Component	y_i	amount (mol)	MW $\frac{g}{mol}$	Mass (g)	fraction
ethyl alcohol	0.1	10	46.07	461	0.058
ethyl acetate	0.75	75	88.1	6608	0.83
acetic acid	0.15	15	60.05	901	0.112
				<hr/> 7970	

$$\overline{MW} = \frac{7970}{100} = 79.7 \frac{g}{mol}$$

$$\frac{25 \text{ kmol EA} \mid 100 \text{ kmol mix}}{75 \text{ kmol EA} \mid 1 \text{ kmol mix}} = 2660 \text{ kg mix}$$