3.15 **(a)** $\dot{m} = \dfrac{175\ \text{m}^3}{\text{h}} \left| \dfrac{1000\ \text{L}}{\text{m}^3} \right| \dfrac{0.866\ \text{kg}}{\text{L}} \left| \dfrac{1\ \text{h}}{60\ \text{min}} \right| = \underline{2526\ \text{kg/min}}$

(b) $\dot{n} = \dfrac{2526\ \text{kg}}{\text{min}} \left| \dfrac{1000\ \text{mol}}{92.13\ \text{kg}} \right| \dfrac{1\ \text{min}}{60\ \text{s}} = \underline{457\ \text{mol/s}}$

(c) Assumed density (SG) at T, P of stream is the same as the density at 20°C and 1 atm

3.16 **(a)** $\dfrac{200.0\ \text{kg mix}}{\text{kg mix}} \left| \dfrac{0.150\ \text{kg CH}_3\text{OH}}{\text{kg mix}} \right| \dfrac{\text{kmol CH}_3\text{OH}}{32.04\ \text{kg CH}_3\text{OH}} \left| \dfrac{1000\ \text{mol}}{1\ \text{kmol}} \right| = \underline{936\ \text{mol CH}_3\text{OH}}$

(b) $\dot{m}_{mix} = \dfrac{100.0\ \text{lb - mole MA}}{\text{h}} \left| \dfrac{74.08\ \text{lb}_m\ \text{MA}}{1\ \text{lb - mole MA}} \right| \dfrac{1\ \text{lb}_m\ \text{mix}}{0.850\ \text{lb}_m\ \text{MA}} = \underline{8715\ \text{lb}_m/\text{h}}$

3.17 $\overline{M} = \dfrac{0.25\ \text{mol N}_2}{\text{mol N}_2} \left| \dfrac{28.02\ \text{g N}_2}{\text{mol N}_2} \right. + \dfrac{0.75\ \text{mol H}_2}{\text{mol H}_2} \left| \dfrac{2.02\ \text{g H}_2}{\text{mol H}_2} \right. = 8.52\ \text{g/mol}$

$\dot{m}_{N_2} = \dfrac{3000\ \text{kg}}{\text{h}} \left| \dfrac{\text{kmol}}{8.52\ \text{kg}} \right| \dfrac{0.25\ \text{kmol N}_2}{\text{kmol feed}} \left| \dfrac{28.02\ \text{kg N}_2}{\text{kmol N}_2} \right. = \underline{2470\ \text{kg N}_2/\text{h}}$

3.18 $M_{suspension} = 565\ \text{g} - 65\ \text{g} = 500\ \text{g}$, $M_{CaCO_3} = 215\ \text{g} - 65\ \text{g} = 150\ \text{g}$

(a) $\dot{V} = \underline{455\ \text{mL/min}}$, $\dot{m} = \underline{500\ \text{g/min}}$

(b) $\rho = \dot{m}/\dot{V} = 500\ \text{g} / 455\ \text{mL} = \underline{1.10\ \text{g/mL}}$

(c) $150\ \text{g CaCO}_3 / 500\ \text{g suspension} = \underline{0.300\ \text{g CaCO}_3/\text{g suspension}}$

3.19 Assume 100 mol mix.

$m_{C_2H_5OH} = \dfrac{10.0\ \text{mol C}_2\text{H}_5\text{OH}}{\text{mol C}_2\text{H}_5\text{OH}} \left| \dfrac{46.07\ \text{g C}_2\text{H}_5\text{OH}}{\text{mol C}_2\text{H}_5\text{OH}} \right. = 461\ \text{g C}_2\text{H}_5\text{OH}$

$m_{C_4H_8O_2} = \dfrac{75.0\ \text{mol C}_4\text{H}_8\text{O}_2}{\text{mol C}_4\text{H}_8\text{O}_2} \left| \dfrac{88.1\ \text{g C}_4\text{H}_8\text{O}_2}{\text{mol C}_4\text{H}_8\text{O}_2} \right. = 6608\ \text{g C}_4\text{H}_8\text{O}_2$

$m_{CH_3COOH} = \dfrac{15.0\ \text{mol CH}_3\text{COOH}}{\text{mol CH}_3\text{COOH}} \left| \dfrac{60.05\ \text{g CH}_3\text{COOH}}{\text{mol CH}_3\text{COOH}} \right. = 901\ \text{g CH}_3\text{COOH}$

$x_{C_2H_5OH} = \dfrac{461\ \text{g}}{461\ \text{g} + 6608\ \text{g} + 901\ \text{g}} = \underline{0.0578\ \text{g C}_2\text{H}_5\text{OH / g mix}}$

$x_{C_4H_8O_2} = \dfrac{6608\ \text{g}}{461\ \text{g} + 6608\ \text{g} + 901\ \text{g}} = \underline{0.8291\ \text{g C}_4\text{H}_8\text{O}_2\ /\text{g mix}}$

$x_{CH_3COOH} = \dfrac{901\ \text{g}}{461\ \text{g} + 6608\ \text{g} + 901\ \text{g}} = \underline{0.113\ \text{g CH}_3\text{COOH / g mix}}$

$\overline{MW} = \dfrac{461\ \text{g} + 6608\ \text{g} + 901\ \text{g}}{100\ \text{mol}} = \underline{79.7\ \text{g/mol}}$

$m = \dfrac{25\ \text{kmol EA}}{75\ \text{kmol EA}} \left| \dfrac{100\ \text{kmol mix}}{1\ \text{kmol mix}} \right| \dfrac{79.7\ \text{kg mix}}{1\ \text{kmol mix}} = \underline{2660\ \text{kg mix}}$

solucionario reklaitis capítulo 3

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