

77. (a) diluted El Cheapo = $\frac{2}{5} \times 0.5 \text{ OJ} = 0.20 \text{ OJ}$
 (b) diluted Expensive = $\frac{3}{5} \times 1.0 \text{ OJ} = 0.60 \text{ OJ}$
 (c) total concentration = $0.20 \text{ OJ} + 0.60 \text{ OJ} = 0.80 \text{ OJ}$
 (d) total concentration = $\frac{5}{8} \times 1.0 \text{ OJ} + \frac{3}{8} \times 0.50 \text{ OJ} = 0.81 \text{ OJ}$
 (e) total concentration = $\frac{4}{11} \times 1.0 \text{ OJ} + \frac{7}{11} \times 0.50 \text{ OJ} = 0.68 \text{ OJ}$
78. $[\text{HBr}] = 0.75 \text{ M} \times \frac{20.0 \text{ mL}}{90.0 \text{ mL}} = \mathbf{0.17 \text{ M}}$
79. $[\text{KOH}]_{\text{DIL}} (\#1) = 0.15 \text{ M} \times \frac{55 \text{ mL}}{130 \text{ mL}} = 0.063 \text{ M}$
 $[\text{KOH}]_{\text{DIL}} (\#2) = 0.25 \text{ M} \times \frac{75 \text{ mL}}{130 \text{ mL}} = 0.14 \text{ M}$
 $[\text{KOH}] (\text{total}) = 0.063 + 0.14 = \mathbf{0.21 \text{ M}}$
80. $[\text{NaBr}] = 0.20 \text{ M} \times \frac{0.050 \text{ mL}}{100.05 \text{ mL}} = \mathbf{1.0 \times 10^{-4} \text{ M}}$
81. $[\text{HNO}_3]_{\text{DIL}} (\#1) = 3.5 \text{ M} \times \frac{5.0 \text{ mL}}{100 \text{ mL}} = 0.18 \text{ M}$
 $[\text{HNO}_3]_{\text{DIL}} (\#2) = 0.20 \text{ M} \times \frac{95 \text{ mL}}{100 \text{ mL}} = 0.19 \text{ M}$
 $[\text{HNO}_3] (\text{total}) = 0.18 + 0.19 = \mathbf{0.37 \text{ M}}$
82. $V_{\text{CONC}} = \frac{c_{\text{DIL}} \times V_{\text{DIL}}}{c_{\text{CONC}}} = \frac{0.375 \text{ M} \times 2.50 \text{ L}}{15.4 \text{ M}} = 0.0609 \text{ L}$
 Dilute 0.0609 L of concentrated HNO_3 to a total volume of 2.50 L.
83. $V_{\text{CONC}} = \frac{c_{\text{DIL}} \times V_{\text{DIL}}}{c_{\text{CONC}}} = \frac{0.0600 \text{ M} \times 45.0 \text{ L}}{14.6 \text{ M}} = 0.185 \text{ L}$
 Dilute 0.185 L of concentrated H_3PO_4 to a total volume of 45.0 L.
84. $[\text{KCl}] = \frac{\text{total moles}}{\text{total volume}}$, total mass KCl = $25.0 + 60.0 = 85.0 \text{ g}$
 $[\text{KCl}] = \frac{85.0 \text{ g}}{0.5500 \text{ L}} \times \frac{1 \text{ mol}}{74.6 \text{ g}} = \mathbf{2.07 \text{ M}}$
85. $[\text{NaCl}] = 0.750 \text{ M} \times \frac{500.0 \text{ mL}}{300.0 \text{ mL}} = \mathbf{1.25 \text{ M}}$
86. $V_{\text{CONC}} = \frac{c_{\text{DIL}} \times V_{\text{DIL}}}{c_{\text{CONC}}} = \frac{0.350 \text{ M} \times 0.2500 \text{ L}}{6.00 \text{ M}} = 0.0146 \text{ L} = 14.6 \text{ mL}$
 Dilute 14.6 mL of concentrated HCl to a total volume of 250.0 mL.
87. moles NaCl needed = $0.400 \frac{\text{mol}}{\text{L}} \times 0.5000 \text{ L} = 0.200 \text{ mol}$
 mass NaCl = $0.200 \text{ mol} \times \frac{58.5 \text{ g}}{1 \text{ mol}} = \mathbf{11.7 \text{ g}}$

$$88. [\text{NaOH}]_{\text{DIL}} (\#1) = 0.250 \text{ M} \times \frac{125.0 \text{ mL}}{325.0 \text{ mL}} = 0.0962 \text{ M}$$

$$[\text{NaOH}]_{\text{DIL}} (\#2) = 0.175 \text{ M} \times \frac{200.0 \text{ mL}}{325.0 \text{ mL}} = 0.108 \text{ M}$$

$$[\text{NaOH}] (\text{total}) = 0.0962 + 0.108 = \mathbf{0.204 \text{ M}}$$

$$89. V_{\text{CONC}} = \frac{c_{\text{DIL}} \times V_{\text{DIL}}}{c_{\text{CONC}}} = \frac{0.750 \text{ M} \times 3.00 \text{ L}}{12.0 \text{ M}} = \mathbf{0.188 \text{ L}}$$

$$90. [\text{CaCl}_2] = 0.550 \text{ M} \times \frac{80.0 \text{ mL}}{135.0 \text{ mL}} = 0.326 \text{ M}$$

$$91. [\text{MgCl}_2] = 0.250 \text{ M} \times \frac{350.0 \text{ mL}}{275.0 \text{ mL}} = 0.318 \text{ M}$$

$$92. [\text{NaCl}]_{\text{DIL}} (\#1) = 0.350 \text{ M} \times \frac{20.0 \text{ mL}}{60.0 \text{ mL}} = 0.117 \text{ M}$$

$$[\text{NaCl}]_{\text{DIL}} (\#2) = 0.875 \text{ M} \times \frac{75.0 \text{ mL}}{60.0 \text{ mL}} = 1.09 \text{ M}$$

$$[\text{NaCl}] (\text{total}) = 0.117 \text{ M} + 1.09 \text{ M} = \mathbf{1.21 \text{ M}}$$

$$93. [\text{NaCl}] = 0.400 \text{ M} \times \frac{150.0 \text{ mL}}{250.0 \text{ mL}} = 0.240 \text{ M}$$

$$94. [\text{Na}_3\text{PO}_4] = 0.200 \text{ M} \times \frac{75.0 \text{ mL}}{100.0 \text{ mL}} = 0.150 \text{ M}$$

$$95. (a) [\text{NaHCO}_3] = \frac{5.62 \text{ g}}{0.2500 \text{ L}} \times \frac{1 \text{ mol}}{84.0 \text{ g}} = \mathbf{0.268 \text{ M}}$$

$$(b) [\text{K}_2\text{CrO}_4] = \frac{0.1846 \text{ g}}{0.5000 \text{ L}} \times \frac{1 \text{ mol}}{194.2 \text{ g}} = \mathbf{1.901 \times 10^{-3} \text{ M}}$$

$$(c) [\text{H}_2\text{C}_2\text{O}_4] = \frac{0.584 \text{ g}}{0.1000 \text{ L}} \times \frac{1 \text{ mol}}{90.0 \text{ g}} = \mathbf{0.0649 \text{ M}}$$

$$96. (a) \text{ moles NaCl} = 0.100 \frac{\text{mol}}{\text{L}} \times 1.00 \text{ L} = 0.100 \text{ mol}$$

$$\text{mass NaCl} = 0.100 \text{ mol} \times \frac{58.5 \text{ g}}{1 \text{ mol}} = 5.85 \text{ g}$$

Dissolve 5.85 g of NaCl in less than 1 L and then dilute to 1.00 L.

$$(b) \text{ moles KBr} = 0.09000 \frac{\text{mol}}{\text{L}} \times 0.2500 \text{ L} = 0.02250 \text{ mol}$$

$$\text{mass KBr} = 0.02250 \text{ mol} \times \frac{119.0 \text{ g}}{1 \text{ mol}} = 2.678 \text{ g}$$

Dissolve 2.678 g of KBr in less than 250 mL and then dilute to 250.0 mL.

$$(c) \text{ moles Ca}(\text{NO}_3)_2 = 0.125 \frac{\text{mol}}{\text{L}} \times 0.5000 \text{ L} = 0.0625 \text{ mol} = \text{moles Ca}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$$

$$\text{mass Ca}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O} = 0.0625 \text{ mol} \times \frac{218.1 \text{ g}}{1 \text{ mol}} = 13.6 \text{ g}$$

Dissolve 13.6 g of $\text{Ca}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$ in less than 500 mL and dilute to 500.0 mL.