CHEM 210 • Solutions & Concentration 2 Name: Key

1) How many moles of $MgCl_2$ are present in 60.0 mL of 0.100 *M* $MgCl_2$ solution?

$0.100\ M = \frac{0.100\ mol}{L}$

$$\frac{60.0\ mL}{} \left| \frac{0.100\ mol}{1000\ mL} \right. = 0.00600\ mol = \boxed{6.00 \times 10^{-3}\ mol\ MgCl_2 = 6.00\ mmol}$$

2) Calculate the volume in mL required to provide 2.14 g of sodium chloride from a 0.270 *M* solution.

$M_m\ NaCl = 58.44\ g/mol$ $\quad 0.270\ M = 0.270\ mol/L$

$$\frac{2.14\ g\ NaCl}{} \left| \frac{1\ mol}{58.44\ g} \right| \frac{1\ L\ soln}{0.270\ mol\ NaCl} \left| \frac{1000\ mL}{1\ L} \right. = \boxed{136\ mL}$$

3) How many grams of KOH are present in 35.0 mL of a 5.50 *M* solution?

$$\frac{35.0\ mL}{} \left| \frac{5.50\ mol\ KOH}{1000\ mL} \right| \frac{56.11\ g}{1\ mol\ KOH} = \boxed{10.8\ g\ KOH}$$

4) A 35.2-mL, 1.66 *M* $KMnO_4$ solution is mixed with 16.7 mL of 0.892 *M* $KMnO_4$ solution. Calculate the concentration of the final solution. Assume volumes are additive.

$35.2\ mL \left| \frac{1.66\ mol}{1\ L} \right. = 58.\overline{43}\ mmol$

$16.7\ mL \left| \frac{0.892\ mol}{1\ L} \right. = 14.\overline{90}\ mmol$

$$\Sigma = \frac{73.\overline{33}\ mmol}{(35.2 + 16.7)\ mL} = 1.41\ M$$

5) Calculate the volume in mL required to provide 4.30 g of ethanol (C_2H_6O) from a 1.50 *M* solution.

$1.41\ M = 1.41\ \frac{mol\ KMnO_4}{L}$

$$\frac{4.30\ g\ C_2H_6O}{} \left| \frac{1\ mol\ C_2H_6O}{46.07\ g\ C_2H_6O} \right| \frac{1\ L\ soln}{1.50\ mol\ C_2H_6O} \left| \frac{1000\ mL}{1\ L} \right. = \boxed{62.2\ mL}$$

6) Water is added to 25.0 mL of a 0.866 *M* KNO_3 solution until the volume of the solution is precisely 500. mL. What is the concentration of the final solution?

$M_1V_1 = M_2V_2$

$(25.0\ mL)(0.866\ M) = M_2(500.0\ mL)$

$M_2 = \boxed{0.0433\ M\ KNO_3}$