

HONORS CHEMISTRY – SOLUTION PROBLEMS – MIXED REVIEW

1. Determine the mass of Barium Nitrate contained in a 0.800 m $\text{Ba}(\text{NO}_3)_2$ solution made with 250.0 g of water.
2. Describe how you would create 2.50 L of 0.800M $\text{Mg}(\text{OH})_2$ from a 1.00 M ~~$\text{Mg}(\text{NO}_3)_2$~~ solution.
 $\text{Mg}(\text{OH})_2$
3. Calculate the boiling point of solution made from 8.50 g $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ in 750. g of water.
4. What is the percent by mass of a solution made by adding 1.50 g of KHCO_3 to 15.0 ml of water?
5. 8.50 g of solute when added to 250.0 g of water froze at -0.920°C . What is the molar mass of the solute?
6. Determine the volume (in ml) of 0.500 M Li_3PO_4 solution that is required to react with 200.0 ml of 0.100 M $\text{Ca}(\text{NO}_3)_2$ solution.

1. $g \text{ Mg(NO}_3)_2$? $m = \frac{\text{mol Mg(NO}_3)_2}{\text{kg solvent}}$

$0.800 \text{ m Mg(NO}_3)_2$
 $250.0 \text{ g H}_2\text{O}$ $(m) (\text{kg solvent}) = \text{mol Mg(NO}_3)_2$
 $(0.800 \frac{\text{mol}}{\text{kg}}) (0.2500 \text{ kg H}_2\text{O}) = 0.200$

$\text{mol Ba(NO}_3)_2 \left(\frac{210.3 \text{ g Ba(NO}_3)_2}{1 \text{ mol Ba(NO}_3)_2} \right)$
 $= 52.3 \text{ g Ba(NO}_3)_2$

2. recipe for 2.50 L 0.800 M Mg(OH)_2 from 1.00 M Mg(OH)_2

$M_1 V_1 = M_2 V_2$

$V_1 = \frac{(0.800 \text{ M})(2.50 \text{ L})}{(1.00 \text{ M})} = 2.00 \text{ L } 1.00 \text{ M } \text{Mg(OH)}_2 + 0.50 \text{ L H}_2\text{O}$

3. Boiling Pt. of Soln. made from 8.50 g $\text{C}_2\text{H}_2\text{O}_4$ in 750. g H_2O .

$K_b = 0.51 \frac{^\circ\text{C}}{\text{m}}$

$K_f = -1.86 \frac{^\circ\text{C}}{\text{m}}$

$\Delta T_b = K_b m$

$\Delta T_b = (0.51 \frac{^\circ\text{C}}{\text{m}}) (0.033 \text{ m})$

$= 0.0166^\circ\text{C}$

$100.0^\circ\text{C} + 0.0166^\circ\text{C}$

100.02°C

$8.50 \text{ g C}_2\text{H}_2\text{O}_4 \left(\frac{1 \text{ mol C}_2\text{H}_2\text{O}_4}{342.3 \text{ g C}_2\text{H}_2\text{O}_4} \right)$

$= 0.0248 \text{ mol C}_2\text{H}_2\text{O}_4$

$m = \frac{\text{mol}}{\text{kg}} = \frac{0.0248 \text{ mol}}{0.750 \text{ kg}} = 0.0331 \text{ m}$

4. % of Soln. made from 1.50 g KHCO_3 added to 15.0 ml H_2O .

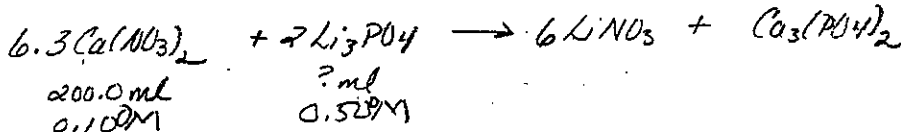
$\% \text{ KHCO}_3 = \frac{1.50 \text{ g KHCO}_3}{1.50 \text{ g KHCO}_3 + 15.0 \text{ g H}_2\text{O}} \times 100 = 9.09\% \text{ KHCO}_3$

5. 8.50 g solute added to 250.0 g H_2O freeze at -0.920°C .
 What is MM of solute?

$\text{MM} = \frac{8.50 \text{ g}}{0.124 \text{ mol}} = 68.5 \frac{\text{g}}{\text{mol}}$

$\Delta T_f = m K_f$

$-0.920^\circ\text{C} = \frac{-1.86^\circ\text{C}}{\text{m}} m$
 $m = \frac{-0.920^\circ\text{C}}{-1.86^\circ\text{C}/\text{m}} = 0.495 \frac{\text{mol}}{\text{kg}} (0.250 \text{ kg}) = 0.124 \text{ mol}$



$200.0 \text{ ml Ca(NO}_3)_2 \left(\frac{1.02}{100 \text{ mL}} \right) \left(\frac{0.10 \text{ mol Ca(NO}_3)_2}{1.0 \text{ L}} \right) \left(\frac{2 \text{ mol Li}_3\text{PO}_4}{3 \text{ mol Ca(NO}_3)_2} \right) \left(\frac{1.0 \text{ L}}{0.50 \text{ ml Li}_3\text{PO}_4} \right) \left(\frac{1000 \text{ ml}}{1 \text{ L}} \right) = 27 \text{ ml } 0.50 \text{ M Li}_3\text{PO}_4$