Name: ___KEY___   Period: _____

Chemistry 11
Solution Worksheet

Directions: Answer in the space provided and be sure to show ALL your work. Have fun ☺

1. Which of the following form ionic solutions?

   a. NaCl   b. SO_3 c. K_3PO_4 d. C_4H_{10} e. $(NH_4)_2SO_4$

   | ionic | | molecular | | ionic | | molecular | | ionic |

2. Which of the following is a conducting solution?

   a. $NaCl_{(aq)}$ b. $HCl_{(aq)}$ c. $CH_3COOH_{(aq)}$ d. $Ca(OH)_{2(aq)}$ e. $SO_{2(l)}$

   conducting   conducting   conducting   conducting   Not conducting

3. Calculate the molar concentrations of ALL the ions in solutions.

   a. 0.750 M $Na_3PO_{4(aq)} \rightarrow 3Na^+_{(aq)} + PO_4^{3-}{}_{(aq)}$

   $$[Na^+] = 3(0.750) = 2.25m$$ $$[PO_4^{3-}] = 0.750m$$

   b. 0.550 M $NaCl_{(aq)} \rightarrow 1Na^+_{(aq)} + Cl^-_{(aq)}$

   $$[Na^+] = 0.550m$$ $$[Cl^-] = 0.550m$$

   c. 0.650 M $Ca(OH)_{2(aq)} \rightarrow 1Ca^{2+}_{(aq)} + 2OH^-_{(aq)}$
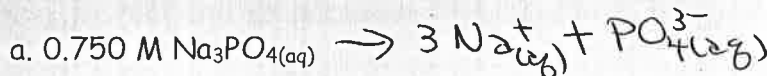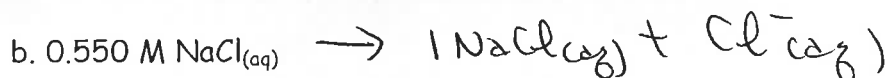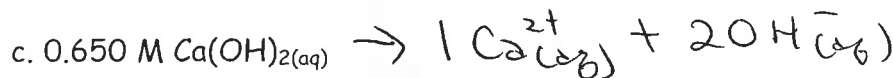
   $$[Ca^{2+}] = 0.650m$$ $$[OH^-] = 2(0.650) = 1.30m$$

   d. Mix 250.0 ml of 0.350 M NaCl with 375.0 mL of 0.550 M $CaCl_2$?

   $NaCl_{(aq)} \rightarrow Na^+_{(aq)} + Cl^-_{(aq)}$ $CaCl_{2(aq)} \rightarrow Ca^{2+}_{(aq)} + 2Cl^-_{(aq)}$
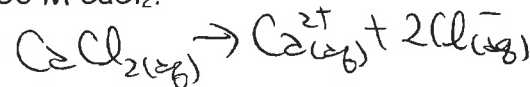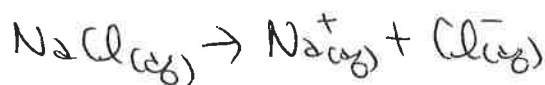
   $0.350m \times \dfrac{250.0mL}{625.0mL} = 0.140m\ NaCl_{(aq)}$ $0.550m \times \dfrac{375.0mL}{625.0mL} = 0.330m\ CaCl_{2(aq)}$

   $$[Na^+] = 0.140m$$ $$[Ca^{2+}] = 0.330m$$

   $$[Cl^-] = 0.140m + 2(0.330m) = 0.800m$$

Titrations

4. A 112.5 ml sample of vinegar (containing acetic acid, CH_3COOH) was titrated using 0.504 M NaOH. If the titration required 20.65 ml of the NaOH solution, what was the molar concentration of acetic acid in the vinegar?

$$CH_3COOH + NaOH \Longrightarrow NaCH_3COO + H_2O$$

$$M_A V_A = M_B V_B$$

$$M_A (0.1125 L) = (0.504 m)(0.02065 L)$$

$$M_A = \frac{(0.504 \frac{mol}{L})(0.02065 L)}{0.1125 L} = 0.0925 m$$

$\boxed{[acetic\ acid] = 0.0925 m}$

5. A 25.00 mL sample of an unknown H_2SO_4 solution was reacted with 0.650 M NaOH. Using the date below, calculate the concentration of H_2SO_4.

Volume of NaOH used:

Run #1 = 36.50 mL's

Run #2 = 36.54 mL's

Run #3 = 38.00 mL's Omit

$$V_B = \frac{36.50 mL + 36.54 mL}{2}$$

$$V_B = 36.52 mL$$

$$M_A V_A = M_B V_B$$

$$[H_2SO_4](25.00 mL) = (0.650 m)(36.52 mL)$$

$$[H_2SO_4] = \frac{(0.650 m)(36.52 mL)}{25.00 mL}$$

$\boxed{[H_2SO_4] = 0.950 m}$

6. A 10.00 ml sample of HCl was titrated with 0.750 M NaOH. Using the data below, calculate the HCl concentration.

Volume of NaOH used:

Run #1 = 6.50 mL's omit

Run #2 = 8.54 mL's

Run #3 = 8.60 mL's

$$V_B = \frac{8.54 mL + 8.60 mL}{2}$$

$$V_B = 8.56 mL$$

$$M_A V_A = M_B V_B$$

$$[HCl](10.00 mL) = (0.750 m)(8.56 mL)$$

$$[HCl] = \frac{(0.750 m)(8.56 mL)}{(10.00 mL)}$$

$\boxed{[HCl] = 0.642}$

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