CHM 151 Quiz 4c 25 Pts Fall 2004 Name: Key

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*(**Atomic masses**: H = 1.008, C = 12.01, N = 14.01, O = 16.00, Na = 23.00, S = 32.07, P = 30.97, Ca = 40.08)*

1. (6 Pts) Complete and balance each of the following:

a. $3\ H_2SO_4(aq) + 2\ Al(OH)_3(aq) \rightarrow 6\ H_2O + Al_2(SO_4)_3$

b. $2\ HNO_3(aq) + \_\_\_\_\ Na_2CO_3(aq) \rightarrow H_2CO_3 + 2NaNO_3 \rightarrow H_2O + CO_{2(g)} + 2NaNO_3$

2. (3 Pts) What volume of 12.0 *M* HNO_3 is required to prepare 900 mL of 2.0 *M* HNO_3 solution?

$M_1V_1 = M_2V_2$

$(12.0\,M)(V_1) = (2.0\,M)(900\,mL)$

$V_1 = 150\ mL$

3. (4 Pts) What mass of $Ca(OH)_2$ is present in 500 mL of 0.00500 molar $Ca(OH)_2$?

$$500\ mL \left| \frac{0.00500\ mol\ Ca(OH)_2}{1000\ mL} \right| \frac{74.1\ g}{mol} = 0.1853\ g\ Ca(OH)_2$$

4. (4 Pts) What is the molarity of 700 mL of solution containing 9.72 grams of nitric acid?

$$700 \times 10^{-3}\ L \left| \frac{9.72\ g\ HNO_3}{} \right| \frac{mol}{63.0\ g} = 0.2204\ \frac{mol\ HNO_3}{L}$$

5. (8 Pts) Calculate the molarity of an H_2SO_4 solution if 40.0 mL of the H_2SO_4 solution reacts with 0.212 g of Na_2CO_3. (Hint: start with a balanced chemical equation)

$H_2SO_4 + Na_2CO_3 \rightarrow Na_2SO_4 + H_2CO_3 (\rightarrow H_2O + CO_{2(g)})$

40.0 mL 0.212 g

$$40.0 \times 10^{-3}\ L_{H_2SO_4} \left| \frac{0.212\ g\ Na_2CO_3}{} \right| \frac{Na_2CO_3\ mol}{106\ g\ Na_2CO_3} \left| \frac{1\ mol\ H_2SO_4}{1\ mol\ Na_2CO_3} \right. = 0.0500\ \frac{mol\ H_2SO_4}{L_{H_2SO_4}}$$

CHM 151 Quiz 4d 25 Pts Fall 2004 Name: Key

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*(**Atomic masses**: H = 1.008, C = 12.01, N = 14.01, O = 16.00, Na = 23.00, S = 32.07, P = 30.97, Ca = 40.08)*

1. (6 Pts) Complete and balance each of the following:

a. 2 $Al(OH)_3(aq)$ + 3 $H_2SO_4(aq)$ → 6 H_2O + $Al_2(SO_4)_3$

b. 2 $HClO_4$ (aq) + ____ $Na_2CO_3(aq)$ → $H_2CO_3 + 2NaClO_4 \rightarrow H_2O(l) + CO_2(g) + 2NaClO_4$

2. (3 Pts) What volume of 10.0 *M* HNO_3 is required to prepare 900 mL of 3.0 *M* HNO_3 solution?

$M_1 V_1 = M_2 V_2$

$(10.0\,M)\,V_1 = (3.0\,M)(900\,mL)$

$V_1 = 270\,mL$

3. (4 Pts) What mass of $Ca(OH)_2$ is present in 400 mL of 0.00300 molar $Ca(OH)_2$?

$400\,mL \left| \frac{0.00300\,mol\,Ca(OH)_2}{1000\,mL} \right| \frac{74.1\,g}{mol} = 0.0889\,g\,Ca(OH)_2$

4. (4 Pts) What is the molarity of 700 mL of solution containing 7.72 grams of nitric acid? HNO_3

$700 \times 10^{-3}\,L \left| 7.72\,g\,HNO_3 \right| \frac{mol}{63.0\,g} = 0.175\,\frac{mol\,HNO_3}{L}$

5. (8 Pts) Calculate the molarity of an H_2SO_4 solution if 50.0 mL of the H_2SO_4 solution reacts with 0.223 g of Na_2CO_3. (Hint: start with a balanced chemical equation)

$H_2SO_4 + Na_2CO_3 \rightarrow Na_2SO_4 + H_2CO_3 \rightarrow H_2O(l) + CO_2(g)$

50.0 mL ? mol/L 0.223 g

$0.223\,g\,Na_2CO_3 \left| \frac{mol\,Na_2CO_3}{106\,g\,Na_2CO_3} \right| \frac{1\,mol\,H_2SO_4}{1\,mol\,Na_2CO_3} = 0.0421\,\frac{mol\,H_2SO_4}{L_{H_2SO_4}}$

$50.0 \times 10^{-3}\,L\,H_2SO_4$