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

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*(**Atomic masses:** H = 1.008, O =16.00, S = 32.07, P = 30.97, Ca = 40.08)*

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

a. $3\ HCl(aq) + \_\_\_\ Al(OH)_3(aq) \rightarrow 3H_2O + AlCl_3$

b. $\_\_\_\ Na_2CO_3(aq) + 2\ HCl(aq) \rightarrow H_2CO_3 + 2NaCl \Rightarrow H_2O_{(l)} + CO_{2(g)} + 2NaCl$

2. (3 Pts) What volume of 12.6 *M* HCl must be added to enough water to prepare 5.00 liters of 3.00 *M* HCl?

$$M_1 V_1 = M_2 V_2$$
$$(12.6\ M)(V_1) = (3.00\ M)(5.00\ L)$$
$$V_1 = 1.19\ L$$

3. (4 Pts) How many grams of $Ca(OH)_2$ are contained in 1500 mL of 0.0250 *M* $Ca(OH)_2$ solution?

$$1500\ mL \left| \frac{0.0250\ mol\ Ca(OH)_2}{1000\ mL} \right| \frac{74.096\ g}{mol} = 2.78\ g\ Ca(OH)_2$$

4. (4 Pts) What is the molarity of 600 mL of solution containing 6.72 grams of sulfuric acid? (H_2SO_4)

$$600 \times 10^{-3}\ L \left| \frac{6.72\ g}{98.086\ g} \right| \frac{mol}{L} = 0.114\ \frac{mol\ H_2SO_4}{L}$$

5. (8 Pts) If 20.0 mL of 0.010 *M* H_3PO_4 solution is completely neutralized by 60.0 mL of $Ca(OH)_2$ solution, what is the molarity of the $Ca(OH)_2$ solution? (Hint: start with a balanced chemical equation)

$$2\ H_3PO_{4(aq)} + 3\ Ca(OH)_{2(aq)} \rightarrow 6\ H_2O_{(l)} + Ca_3(PO_4)_{2(s)}$$

20.0 mL, 0.010 M mol/L — 60.0 mL, ? M mol/L

$$\text{☺} \left| \frac{20.0\ mL\ H_3PO_4}{\text{☺}} \right| \frac{0.010\ mol\ H_3PO_4}{1000\ mL\ H_3PO_4} \left| \frac{3\ mol\ Ca(OH)_2}{2\ mol\ H_3PO_4} \right| = 0.0050\ \frac{mol\ Ca(OH)_2}{L_{Ca(OH)_2}}$$

$60.0 \times 10^{-3}\ L\ Ca(OH)_2$

CHM 151 Quiz (4b) 25 Pts Fall 2004 Name: Key

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(Atomic masses: H = 1.008, O =16.00, S = 32.07, P = 30.97, Ca = 40.08)

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

a. 3 HBr(aq) + ___ $Al(OH)_3$(aq) → $3H_2O + AlBr_3$

b. 2 HCl(aq) + ___ Na_2CO_3(aq) → $2NaCl + H_2CO_3 \rightarrow 2NaCl + H_2O(l) + CO_2(g)$

2. (3 Pts) What volume of 11.6 *M* HCl must be added to enough water to prepare 6.00 liters of 5.00 *M* HCl?

$M_1V_1 = M_2V_2$

$(11.6\,M)V_1 = (5.00\,M)(6.00\,L)$

$V_1 = 2.586\,L$

3. (4 Pts) How many grams of $Ca(OH)_2$ are contained in 1800 mL of 0.0350 *M* $Ca(OH)_2$ solution?

$$1500\,\text{mL} \left| \frac{0.0350\,\text{mol}\,Ca(OH)_2}{1000\,\text{mL}} \right| \frac{74.09\,\text{g}}{\text{mol}} = 4.668\,\text{g}\,Ca(OH)_2$$

4. (4 Pts) What is the molarity of 700 mL of solution containing 9.72 grams of sulfuric acid? (H_2SO_4)

$$700 \times 10^{-3}\,\text{L} \left| \frac{9.72\,\text{g}}{98.08\,\text{g}} \right| \frac{\text{mol}}{} = 0.1416\,\frac{\text{mol}}{\text{L}}$$

5. (8 Pts) If 30.0 mL of 0.010 *M* H_3PO_4 solution is completely neutralized by 70.0 mL of $Ba(OH)_2$ solution, what is the molarity of the $Ba(OH)_2$ solution? (Hint: start with a balanced chemical equation)

$2H_3PO_4(aq) + 3Ba(OH)_2(aq) \rightarrow 6H_2O(l) + Ba_3(PO_4)_2(s)$

30.0 mL — 70.0 mL

0.010 M mol/L — ? M mol/L

$$\frac{30.0 \times 10^{-3}\,\text{L}\ H_3PO_4}{70.0 \times 10^{-3}\,\text{L}\ Ba(OH)_2} \left| \frac{0.010\,\text{mol}\ H_3PO_4}{1000\,\text{mL}\ H_3PO_4} \right| \frac{3\,\text{mol}\ Ba(OH)_2}{2\,\text{mol}\ H_3PO_4} = 0.00643\,\frac{\text{mol}\ Ba(OH)_2}{\text{L}\ Ba(OH)_2}$$