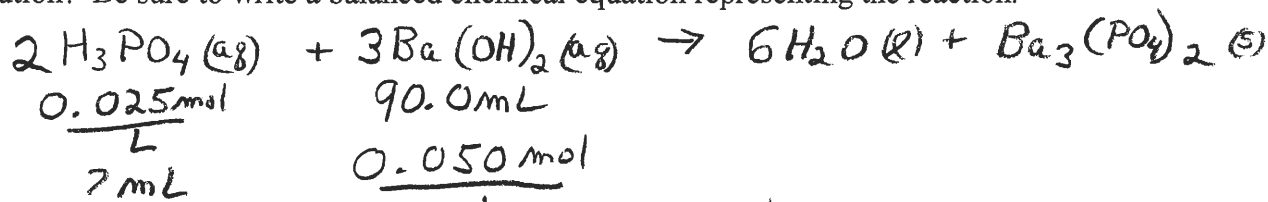CHM 151 Quiz #4a   25 Pts   Fall 2012   Name: _Key_

SHOW ALL WORK TO RECEIVE CREDIT.

INFORMATION: molar masses: H = 1.008, N = 14.007, O = 16.00, Ba = 137.3, Cl = 35.45, K = 39.10

1. (6 Pts) How many mL of 0.025 M H_3PO_4 solution are needed to neutralize 90.0 mL of 0.050 M $Ba(OH)_2$ solution? Be sure to write a balanced chemical equation representing the reaction.

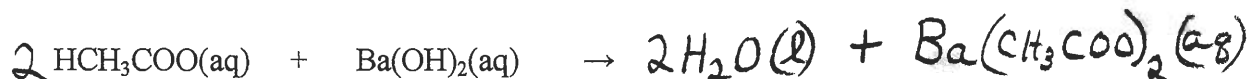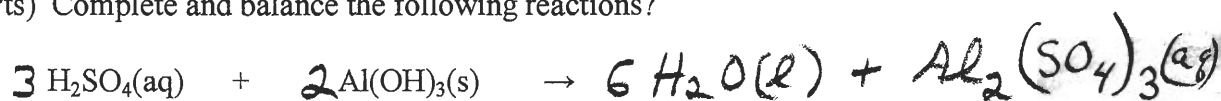$$2 H_3PO_4 (aq) + 3 Ba(OH)_2 (aq) \rightarrow 6 H_2O (l) + Ba_3(PO_4)_2 (s)$$

$\dfrac{0.025 \, mol}{L}$ 90.0 mL

? mL $\dfrac{0.050 \, mol}{L}$

$$\dfrac{90.0 \, mL \, Ba(OH)_2}{} \left| \dfrac{0.050 \, mol \, Ba(OH)_2}{1000 \, mL \, Ba(OH)_2} \right| \dfrac{2 \, mol \, H_3PO_4}{3 \, mol \, Ba(OH)_2} \left| \dfrac{1000 \, mL \, H_3PO_4}{0.025 \, mol \, H_3PO_4} \right| = \boxed{120 \, mL \, H_3PO_4}$$

2. (4 Pts) How many grams of $Ba(OH)_2$ are needed to prepare 500.0 mL of 0.050 M solution?

$$\dfrac{500.0 \, mL}{} \left| \dfrac{0.050 \, mol \, Ba(OH)_2}{1000 \, mL} \right| \dfrac{171.3 \, g}{mol} = \boxed{4.28 \, g \, Ba(OH)_2}$$
$$\underline{4.3 \, g}$$

3. (6 Pts) Complete and balance the following reactions?

$$3 \, H_2SO_4(aq) + 2 \, Al(OH)_3(s) \rightarrow 6 \, H_2O(l) + Al_2(SO_4)_3(aq)$$

$$2 \, HCH_3COO(aq) + Ba(OH)_2(aq) \rightarrow 2 \, H_2O(l) + Ba(CH_3COO)_2(aq)$$

4. (4 Pts) If 145 grams of KNO_3 were added to water to make 1,500 mL of solution, what would be the molarity of the resulting solution?

$$\dfrac{145 \, g \, KNO_3}{} \left| \dfrac{mol}{101.11 \, g} \right| \dfrac{1}{1.500 \, L} = \boxed{0.956 \, \dfrac{mol \, KNO_3}{L}}$$

5. (5 Pts) What volume of concentrated nitric acid (15.0 M) is required to make 600 mL of a 3.0 M nitric acid solution?
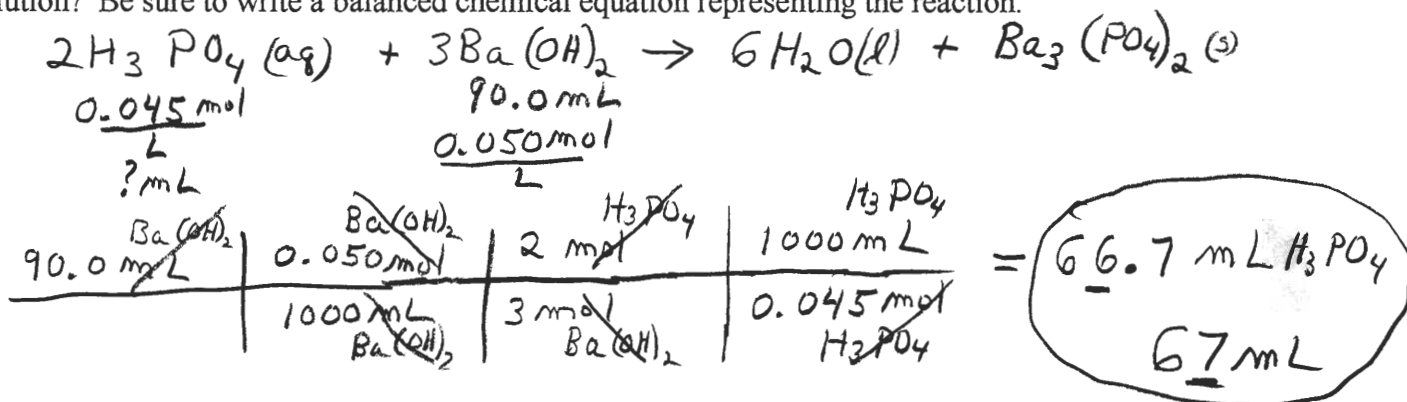
$$M_1 V_1 = M_2 V_2$$
$$(15.0 \, M) \, V_1 = (3.0 \, M)(600 \, mL)$$
$$\boxed{V_1 = 120 \, mL}$$

SHOW ALL WORK TO RECEIVE CREDIT.

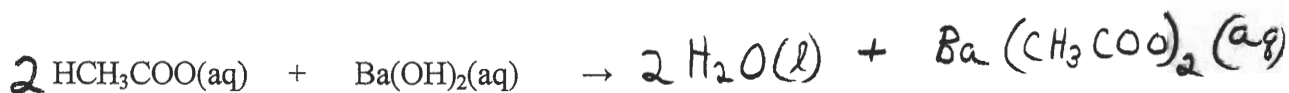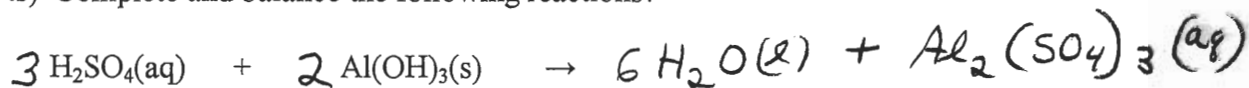INFORMATION: molar masses: H = 1.008, N = 14.007, O = 16.00, Ba = 137.3, Cl = 35.45, K = 39.10

1. (6 Pts) How many mL of 0.045 M H_3PO_4 solution are needed to neutralize 90.0 mL of 0.050 M $Ba(OH)_2$ solution? Be sure to write a balanced chemical equation representing the reaction.

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

0.045 mol/L
?mL

90.0 mL
0.050 mol/L

$$90.0 \ mL \ Ba(OH)_2 \left| \frac{0.050 \ mol \ Ba(OH)_2}{1000 \ mL \ Ba(OH)_2} \right| \frac{2 \ mol \ H_3PO_4}{3 \ mol \ Ba(OH)_2} \left| \frac{1000 \ mL \ H_3PO_4}{0.045 \ mol \ H_3PO_4} \right. = \boxed{66.7 \ mL \ H_3PO_4 \\ 67 mL}$$

2. (4 Pts) How many grams of $Ba(OH)_2$ are needed to prepare 600.0 mL of 0.080 M solution?

$$600.0 \ mL \left| \frac{0.080 \ mol \ Ba(OH)_2}{1000 \ mL} \right| \frac{171.3 \ g}{mol} = \boxed{8.2 \ g \ Ba(OH)_2}$$

3. (6 Pts) Complete and balance the following reactions?

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

$$2 \ HCH_3COO(aq) + Ba(OH)_2(aq) \rightarrow 2 \ H_2O(l) + Ba(CH_3COO)_2 (aq)$$

4. (4 Pts) If 165 grams of KNO_3 were added to water to make 2,500 mL of solution, what would be the molarity of the resulting solution?

$$165 \ g \ KNO_3 \left| \frac{mol}{101.1 \ g} \right| \frac{1}{2500 \times 10^{-3} \ L} = \boxed{0.653 \ \frac{mol \ KNO_3}{L}}$$

5. (5 Pts) What volume of concentrated nitric acid (15.0 M) is required to make 600 mL of a 4.0 M nitric acid solution?

$$M_1 V_1 = M_2 V_2$$

$$(15.0 M) V_1 = (4.0 M)(600 \ mL)$$

$$\boxed{V_1 = 160 \ mL}$$