CHM151 Quiz 3a 25 Pts Spring 2012 Name: Key

*********SHOW ALL WORK TO RECEIVE CREDIT***********

Atomic Masses: B 10.8, Na 23.0, O 16.0, Al 27.0, Cl 35.5

1. (5 Pts) What is the empirical formula for the substance with this analysis: Na 54.0%, B 8.50 %, and O 37.5%.

Using 100 grams.

Na: $\frac{54.0\ g \mid mol}{\mid 23.0\ g} = 2.35 \div 0.787 = 3$

B: $\frac{8.50\ g \mid mol}{\mid 10.8\ g} = 0.787 \div 0.787 = 1$

O: $\frac{37.5\ g \mid mol}{\mid 16.0\ g} = 2.35 \div 0.787 = 3$

Na_3BO_3

2. (5 Pts) How many **moles** of aluminum chloride can one obtain from 6.00 moles of barium chloride?

$$Al_2(SO_4)_3 + 3BaCl_2 \rightarrow 3BaSO_4 + 2AlCl_3$$

6.00 moles ? moles

$$\frac{6.00\ mol\ BaCl_2 \mid 2\ mol\ AlCl_3}{\mid 3\ mol\ BaCl_2} = 4.00\ mol\ AlCl_3$$

3. (6 Pts) How many **grams** of aluminum chloride can one obtain from 9.00 moles of barium chloride?

$$Al_2(SO_4)_3 + 3BaCl_2 \rightarrow 3BaSO_4 + 2AlCl_3$$

9.00 mol ? g

$$\frac{9.00\ mol\ BaCl_2 \mid 2\ mol\ AlCl_3 \mid 133.5\ g\ AlCl_3}{\mid 3\ mol\ BaCl_2 \mid 1\ mol\ AlCl_3} = 801\ g\ AlCl_3$$

4. (9 Pts) In the reaction below, 8.3 moles of calcium hydroxide were reacted with 5.8 moles of phosphoric acid. How many moles of water will be formed?

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

8.3 mol 5.8 mol ? mol

Based on $Ca(OH)_2$: $\frac{8.3\ mol\ Ca(OH)_2 \mid 6\ mol\ H_2O}{\mid 3\ mol\ Ca(OH)_2} = 16.6\ mol\ H_2O$

16.6 mol H_2O Based on Limiting Reactant

Based on H_3PO_4: $\frac{5.8\ mol\ H_3PO_4 \mid 6\ mol\ H_2O}{\mid 2\ mol\ H_3PO_4} = 17.4\ mol\ H_2O$

CHM151 Quiz 3B 25 Pts Spring 2012 Name: Key

*********SHOW ALL WORK TO RECEIVE CREDIT***********

Atomic Masses: B 10.8, Na 23.0, O 16.0, Al 27.0, Cl 35.5

1. (5 Pts) A compound is found to consist of 34.9% sodium, 16.4% boron and 48.6% oxygen. Determine its simplest (empirical) formula. Using 100 g

Na: $\frac{34.9\text{ g} \mid \text{mol}}{23.0\text{ g}} = 1.52 \div 1.52 = 1$

B: $\frac{16.4\text{ g} \mid \text{mol}}{10.8\text{ g}} = 1.52 \div 1.52 = 1$

O: $\frac{48.6\text{ g} \mid \text{mol}}{16.0\text{ g}} = 3.04 \div 1.52 = 2$

$NaBO_2$

2. (5 Pts) How many **moles** of aluminum chloride can one obtain from 12.00 moles of barium chloride?

$$Al_2(SO_4)_3 + 3BaCl_2 \rightarrow 3BaSO_4 + 2AlCl_3$$

12.00 mol ? mol

$$\frac{12.00\text{ mol } BaCl_2 \mid 2\text{ mol } AlCl_3}{3\text{ mol } BaCl_2} = 8.000\text{ mol } AlCl_3$$

3. (6 Pts) How many **grams** of aluminum chloride can one obtain from 6.00 moles of barium chloride?

$$Al_2(SO_4)_3 + 3BaCl_2 \rightarrow 3BaSO_4 + 2AlCl_3$$

6.00 mol ? g

$$\frac{6.00\text{ mol } BaCl_2 \mid 2\text{ mol } AlCl_3 \mid 133.5\text{ g } AlCl_3}{3\text{ mol } BaCl_2 \mid \text{mol } AlCl_3} = 534\text{ g } AlCl_3$$

4. (9 Pts) In the reaction below, 5.3 moles of calcium hydroxide were reacted with 4.8 moles of phosphoric acid. How many moles of water will be formed?

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

5.3 mol 4.8 mol ? mol

Based on $Ca(OH)_2$: $\frac{5.3\text{ mol } Ca(OH)_2 \mid 6\text{ mol } H_2O}{3\text{ mol } Ca(OH)_2} = 10.6\text{ mol } H_2O$ ← Based on Limiting Reactant

Based on H_3PO_4: $\frac{4.8\text{ mol } H_3PO_4 \mid 6\text{ mol } H_2O}{2\text{ mol } H_3PO_4} = 14.4\text{ mol } H_2O$