CHM151 Quiz 3b 25 Pts Fall 2012 Name: Key

SHOW ALL WORK TO RECEIVE CREDIT

Molar masses: C 12.01; N 14.01; O 16.00; Na 22.99; Al 26.98; S 32.06; Fe 55.85; I 126.9;

1. (3 Pts) Calculate the molar mass, in g/mol, of $Al_2(SO_4)_3$.

12 × 16.00 = 192.0
3 × 32.06 = 96.18
2 × 26.98 = 53.96
342.14 g/mol

2. (3 Pts) How many moles of iron are present in an iron cylinder that weighs 25 g?

$$25\ g \left| \frac{mol}{55.85\ g} \right. = 0.45\ mol$$

3. (5 Pts) How many moles of sodium nitrate would be produced from the complete reaction of 4.80 mol of lead nitrate?

$$2\ NaCl + Pb(NO_3)_2 \rightarrow 2\ NaNO_3 + PbCl_2$$

4.80 mol ? mol

$$4.80\ mol\ Pb(NO_3)_2 \left| \frac{2\ mol\ NaNO_3}{1\ mol\ Pb(NO_3)_2} \right. = 9.60\ mol\ NaNO_3$$

4. (5 Pts) What is the theoretical yield of PI_3 if 48.0 g of I_2 are reacted with an excess of phosphorus according to the following chemical equation?

$$2P(s) + 3I_2(s) \rightarrow 2PI_3(s)$$

48.0 g ? g

$$48.0\ g\ I_2 \left| \frac{mol\ I_2}{253.8\ g\ I_2} \right| \frac{2\ mol\ PI_3}{3\ mol\ I_2} = 0.126\ mol\ PI_3 \text{ or } 51.9\ g$$

5. (5 Pts) A sample of unknown ore was analyzed and found to contain 12.7% Al, 19.7% N, and 67.6% O. What is the empirical formula of this ore?

Al: $\frac{12.7\ g}{26.98\ g/mol} = 0.471 \div 0.471 = 1$

N: $\frac{19.7\ g}{14.01\ g/mol} = 1.41 \div 0.471 = 3$

O: $\frac{67.6\ g}{16.00\ g/mol} = 4.23 \div 0.471 = 9$

AlN_3O_9 or $Al(NO_3)_3$

6. (4 Pts) Calculate the percent composition by mass of sodium in Na_2CO_3.

molar mass = 105.99

$$\frac{2 \times 22.99}{105.99} \times 100 = 43.38\%\ Na$$