Name Answer Key Hour _____

Introduction to Stoichiometry

(Honors Chemistry)

Write and balance the equation, then use stoichiometry to answer the question. *Show all work!*

1. Nitrogen gas and hydrogen gas react to produce gaseous nitrogen trihydride, how many moles of hydrogen are needed to completely react with 2.4×10^7 moles of nitrogen? $N_2 + 3H_2 \rightarrow 2NH_3$

$$2.4 \times 10^7 \text{ mol } N_2 \left| \frac{3 \text{ mol } H_2}{1 \text{ mol } N_2} \right.$$

7.2×10^7 mol H_2

2. Solid Potassium chlorate decomposes into solid potassium chloride and oxygen gas, how many moles of oxygen are produced by the decomposition of 6.31×10^4 moles of potassium chlorate? $2KClO_3 \rightarrow 2KCl + 3O_2$

$$6.31 \times 10^4 \text{ mol } KClO_3 \left| \frac{3 \text{ mol } O_2}{2 \text{ mol } KClO_3} \right.$$

9.47×10^4 mol O_2

3. Solid zinc reacts with aqueous hydrochloric acid producing aqueous zinc chloride and hydrogen gas, how many moles of hydrogen are produced from the reaction of $3.56 \times 10_4$ moles of zinc with an excess of HCl? $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

$$3.56 \times 10^4 \text{ mol } Zn \left| \frac{1 \text{ mol } H_2}{1 \text{ mol } Zn} \right.$$

3.56×10^4 mol H_2

4. Liquid propane (C_3H_8) combusts with the oxygen gas in the air to produce gaseous carbon dioxide and water vapor, how many moles of oxygen are necessary to react completely with 4.78×10^9 moles of propane? $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

$$4.78 \times 10^9 \text{ mol } C_3H_8 \left| \frac{5 \text{ mol } O_2}{1 \text{ mol } C_3H_8} \right.$$

2.39×10^{10} mol O_2

5. Aqueous Potassium phosphate reacts with aqueous aluminum nitrate in a double replacement reaction, what mass of potassium nitrate can be produced from 5.91×10^{8} moles of potassium phosphate with an excess of aluminum nitrate?
$K_3PO_4 + Al(NO_3)_3 \rightarrow 3KNO_3 + AlPO_4$

5.91×10^{8} mol K_3PO_4 | 3 mol KNO_3 / 1 mol K_3PO_4 | 101-g / 1 mol KNO_3

1.79×10^{11} g KNO_3

6. Magnesium metal reacts with oxygen gas producing magnesium oxide, how much product (in grams) is produced from 4.81×10^{6} grams of oxygen gas with an excess of magnesium? **$2Mg + O_2 \rightarrow 2MgO$**

4.81×10^{6} g O_2 | 1 mol O_2 / 32-g | 2 mol MgO / 1 mol O_2 | 40-g / 1 mol MgO

1.20×10^{7} g MgO

7. Aqueous silver nitrate reacts with aqueous barium chloride in a double replacement reaction, how many grams of barium chloride are needed to produce 5.27×10^{16} g of silver chloride with an excess of silver nitrate?
$2AgNO_3 + BaCl_2 \rightarrow 2AgCl + Ba(NO_3)_2$

5.27×10^{16}-g AgCl | 1 mol AgCl / 143.5-g | 1 mol $BaCl_2$ / 2 mol AgCl | 208-g / 1 mol $BaCl_2$

3.82×10^{16} g $BaCl_2$

8. How many grams of water vapor is produced from the combustion of 2.65×10^{27} grams of ethane gas (C_2H_6) with an excess of oxygen? **$2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$**

2.65×10^{27} g C_2H_6 | 1 mol C_2H_6 / 30-g | 6 mol H_2O / 2 mol C_2H_6 | 18-g / 1 mol H_2O

4.77×10^{27} g H_2O

9. Aluminum metal reacts with aqueous Lead (II) nitrate in a single replacement reaction, what mass of lead metal is produced from 5.64×10^{14} grams of aluminum metal with an excess of lead (II) nitrate?
$2Al + 3Pb(NO_3)_2 \rightarrow 3Pb + 2Al(NO_3)_3$

5.64×10^{14} g Al | 1 mol Al / 27-g | 3 mol Pb / 2 mol Al | 207-g / 1 mol Pb

6.49×10^{15} g Pb