Name: Key Period: _____

Limiting Reagents Practice

Method 1

1) If 25 g of aluminum was added to 90 g of HCl, according to the following equation:

$2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2$

A. What is the limiting reagent? **HCl**

$\frac{25g\ Al}{} \left| \frac{1mol\ Al}{26.98g} \right. = .927mol\ Al$ $\quad \frac{90g\ HCl}{} \left| \frac{1mol\ HCl}{36.46g} \right. = 2.47mol\ HCl$

Used $\quad$ Need $\quad$ Compare

$\frac{.927mol\ Al}{} \left| \frac{6mol\ HCl}{2mol\ Al} \right. = 2.781mol\ HCl$

HCl is LR because it runs out first.

B. What mass of H_2 will be produced? **2.49 g H_2**

$\frac{2.47mol\ HCl}{} \left| \frac{3mol\ H_2}{6mol\ HCl} \right| \frac{2.02g\ H_2}{1mol\ H_2} =$

2) If you have 20.0 g of nitrogen and 5.0 g of hydrogen, which is the limiting reagent? How many grams of NH_3 could you produce? **LR: N_2, 24.3 g NH_3**

$N_2 + 3H_2 \rightarrow 2NH_3$

$\frac{20.0g\ N_2}{} \left| \frac{1mol\ N_2}{28.02g} \right. = .714mol\ N_2$

$\frac{5g\ H_2}{} \left| \frac{1mol\ H_2}{2.02g\ H_2} \right. = 2.48mol\ H_2$

Used $\quad$ LR $\quad$ Need

$\frac{.714mol\ N_2}{} \left| \frac{3mol\ H_2}{1mol\ N_2} \right. = 2.14mol\ H_2$

$\frac{.714mol\ N_2}{} \left| \frac{2mol\ NH_3}{1mol\ N_2} \right| \frac{17.04g\ NH_3}{1mol\ NH_3} = 24.3g\ NH_3$

3) What mass of aluminum oxide is formed when 10.0 g of aluminum is burned in 20.0 g of oxygen? **18.9 g Al_2O_3**

$2Al + 3O_2 \rightarrow Al_2O_3$

LR

$\frac{10g\ Al}{} \left| \frac{1mol\ Al}{26.98g} \right. = .371mol\ Al$

Used $\quad$ Need

$\frac{20g\ O_2}{} \left| \frac{1mol\ O_2}{32g} \right| \frac{2mol\ Al}{3mol\ O_2} = .417mol\ Al$

Al is LR

$\frac{.371mol\ Al}{} \left| \frac{1mol\ Al_2O_3}{2mol\ Al} \right| \frac{101.96g}{1mol} = 18.9g\ Al_2O_3$

4) When C_3H_8 burns in oxygen, CO_2 and H_2O are produced. If 15.0 g of C_3H_8 reacts with 60.0 g of O_2, how many moles of CO_2 are produced? **1.02 mol CO_2**

$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

15g $\quad$ 60g $\quad$?mol

$\frac{.340mol\ C_3H_8}{} \left| \frac{3mol\ CO_2}{1mol\ C_3H_8} \right. = 1.02mol\ CO_2$

$\frac{15g\ C_3H_8}{} \left| \frac{1mol\ C_3H_8}{44.11g} \right. = .340mol\ C_3H_8$

$\frac{60g\ O_2}{} \left| \frac{1mol}{32g} \right| \frac{1mol\ C_3H_8}{5mol\ O_2} = .375mol\ C_3H_8$