In-class exercise #6a:

**Sample reaction 1**

C3H8 + 5O2--------🡪 3CO2 + 4H2O

 44 32 44 18 g/mol

 m= w/MW **moles (m)** m=N/6.0\*1023

 **w** = m\****MW*** N= m\**6.0\*1023*

 **weights (w) molecule (atom) count (N)**

 MW = mass of species/mol = **M**olecular **W**eight

 **1) moles to moles** How many moles of O2 will burn to form 0.60 moles of CO2  ?

**2) moles to weight** How many grams of CO2 are generated if 0.00757 moles of C3H8 are burned?

**3) weight to moles** How many moles of H2O form if 11 g of C3H8 are burned ?

 **4) weight to weight** How many grams of O2 are needed to burn 0.275 g C3H8 ?

**5) weight to count** How many molecules of CO2 form if 0.398 g H2O results ?

**6) count to weight** How many grams of O2 are needed to form 1.50\*1022 molecules of H2O ?

**Sample Reaction 2**

6HCl + 2Al -----🡪 2AlCl3 + 3H2

 36 27 123 2 g/mol

1) **moles to moles:** How many moles of Al must be added to produce 15 moles of H2 ?

2)**moles to weight:** How many grams of H2 are created by reacting 10 moles of HCl ?

3) **weight to moles:** How many moles of HCl can combine with 90 g of Al ?

**4) weight to weight:** How many grams of Al must react to form 1.1111 grams of H2 ?

5**) weight to count:** How many molecules of HCl are needed to make 68.33 g AlCl3?

**6) count to weight:** how many grams of Al produce 3.333 \*1023 molecules of H2 ?

**In-class exercise #6b:** Limiting Reagents And % Yield

1. How many grams of CO2 will be produced if 68.4 grams of sucrose sugar C12H22O11, is

 combined with 72.73 grams of O2 according to the balance equation below ?

 *sucrose*

 C12H22O11 + 12O2 --------🡪 12CO2 + 11H2O

MW 342 g/mol 32 g/mol 44 g/mol 18 g/mol

wexp (g) **68.4 72.73 ?? g**

1. Gasoline (C8H18) burns according to the reaction below. If you started with 76 g

 of gasoline and 247 g of O2, how many grams of water, H2O can be produced ?

 (hint: first find out which reactant is limiting.)

 *gasoline*

 2 C8H18 + 25 O2 --------🡪 16 CO2 + 18 H2O

MW 114 g/mol 32 g/mol 44 g/mol 18 g/mol

 wexp (g) 76 g 247 g x ?? g

1. A college student consumes a 12 oz can of Coors beer (breakfast of champions). The

 alcohol in the beer (C2H­6O=ethanol) is metabolized to water and formic acid (CH2O2)

% Yield

Problem

 according to the balanced reaction below. Given that a 12 oz can of beer contains 17 g

 of alcohol, and that 25.5 g formic acid result, what is the `efficiency’ = % yield

 of the student’s body in converting ethanol assuming ethanol is limiting ? (e.g. we have

 an excess of O2)

 *ethanol formic acid*

 C2H6O + 2O2---🡪 2CH2O2  + H2O

MW 46 g/mol 32 g/mol 46 g/mol 18 g/mol

wexp(g) 17 g xs 25.5