**Homework #6: Chemistry 1013 Spring 2015**

**Due Wednesday 1 April**

**\_\_\_\_\_/25**

**Your name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 1 pt**

**Show work for all problems or you will receive no credit/ 2 pts per problem**

Balanced Reaction 1

C3H8 + 5O2--------🡪 3CO2 + 4H2O

44 32 44 18 g/mol

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

**5 Mol O2/3 mol CO2 = x/0.6**

**0.6\*5/3=1 mol O2**

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

are burned?

**3 mol CO2/1 mol C3H8= x/0.00757**

**X=0.00757\*3=0.0221 mol CO2**

**Multiply down for mass: 0.0221 mol CO2\*44 g /mol=1 g**

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

**Convert 11 g🡪 mole=> divide up: 11 g/44 g mol-1 =0.25 mol C3H8**

**4 Mol H2O/1 mol C3H8= x/0.25**

**0.25\*4= 1 mol H2O**

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

**Convert 0.275 g🡪 mol=> divide up: 0.275/44=0.00625**

**5 Mol O2/mol C3H8==x/0.00625**

**0.00625\*5=x=mol O2=0.03125**

**Multiply down for mass: 0.03125\*32=1 g O2**

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

**Convert 0.398 g🡪 mol=> divide up: 0.398/18=0.02211**

**3 Mol CO2/4 mol H2O=x/0.02211**

**X=0.02211\*3/4=0.0166 mol CO2**

**Multiply down for count: 0.0166\*6\*1023 =1\*1022 molecules CO2**

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

**Convert count🡪 mol=> 1.5\*1022/6\*1023=0.025 mol H2O**

**5 mol O2/4 mol H2O=x/0.25**

**0.25\*5/4=0.3124 mol O2**

**Multiply down for mass: 0.03125\*32=1 g O2**

Balanced Reaction 1

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 mol Al/3 mol H2 =x/15

15\*2/3=10 mol Al=x

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

3 mol H2/6 mol HCl=x/10

10\*3/6=5 mol H2=x

Multiply down for mass: 2 g/mol \* 5 mol= 10 g

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

Convert mass to mole first: 90 g Al/27=3.333 mol Al

6 Mol HCl/2 mol Al = x/3.333

3.333\*6/2= mol HCl=10

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

Convert mass to mole first: 1.111 g H2 /2=0.5555 mol H2

2 mol Al/3 mol H2 =x/0.5555

0.555\*2/3=x=0.37 mol Al

Multiply down for mass: 2 g/mol \* 5 mol= 10 g

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

Convert mass-> mol: 68.33/123=0.5555 mol AlCl3

6 mol HCl/2 mol AlCl3= x/0.5555

0.55556\*6/2=1.6666 mol HCl

Multiply down for count: 6\*1023 \*1.666=10\*1023

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

**Convert count to mol: 3.333\*1023/6\*1023= 0.5555 mol H2**

**2 mol Al/3 mol H2 = x/0.5555**

**0.555\*2/3=0.3704 mol Al**

Multiply down for mass: 27 g/mol \* 0.03704 mol= 10 g