

## Chemistry Notes 9/11/13

### Stoichiometry (amounts)

- $N_2 + 3H_2 \rightarrow 2NH_3$ 
  - Says that 1 molecule of Nitrogen reacts with 3 molecules of Hydrogen and makes 2 molecules of Ammonia
  - Also, says that 1 mole of Nitrogen reacts with 3 moles of Hydrogen and makes 2 moles of Ammonia
  - 28g of N reacts with 6g of H makes 34g of  $NH_3$
- If you want to make 4 moles of  $NH_3$ , how many moles of Hydrogen and Nitrogen do you need?
  - $2N_2 + 6H_2 \rightarrow 4NH_3$ 
    - Double all of the quantities
- If you want to make 1 mole of  $NH_3$ , how many moles of Hydrogen and Nitrogen do you need?
  - $.5N_2 + 1.5H_2 \rightarrow NH_3$
- If you start with 10.5 moles of Hydrogen, how many moles of Ammonia can you produce?
  - $10.5/3 = 3.5$
  - $3.5 * (2) = 7$  moles of Ammonia
- How many grams of  $NH_3$  is produced from 10.5 moles of Hydrogen?
  - 1 mol of  $NH_3 = 17.0g$
  - $17.0 * 7 = 119g$
- How many moles of  $H_2$  are needed to make 6.25 moles of water by the combustion of  $H_2$ ?
  - $2H_2 + O_2 \rightarrow 2H_2O$
  - $H_2/H_2O = 2/2$
  - **6.25 moles of  $H_2$  are needed**
- ( $2H_2 + O_2 \rightarrow 2H_2O$ ) If you begin with 50.0g of  $H_2$ , how many grams of  $H_2O$  can be produced?
  - $50.0g H_2 \times (1 \text{ mol } H_2/2.0g H_2) \times (2 \text{ mol } H_2O/2 \text{ mol } H_2) \times (18.0g H_2O/1 \text{ mol } H_2O) = 450g H_2O$
- How many grams of water will be formed when 3.00 moles of  $N_2H_4$  react?
  - $N_2H_4 + O_2 \rightarrow 2 H_2O + 2N_2$ 
    - $N_2H_4 = 32.0g$
    - $O_2 = 32.0g$
    - $H_2O = 18.0g$
    - $N_2 = 28.0 g$
  - $3N_2H_4 + 3O_2 \rightarrow 6H_2O + 2N_2$
  - $(32.0g) + (32.0g) = 2(18.0g) + 2(28.0g)$ 
    - $3(32.0) + 3(32.0) = 6(18.0) + 6(28.0)$
    - $108g * 2$  because of ratios (**216g of  $H_2O$** )
- Methane gas ( $CH_4$ ) burns in oxygen to form carbon dioxide and water. If you begin with 96.0g of  $O_2$ , how many grams of carbon dioxide are made?
  - $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ 
    - $CH_4 = 16.0g$

- $2\text{O}_2 = 64.0\text{g}$
- $\text{CO}_2 = 44.0\text{g}$
- $2\text{H}_2\text{O} = 36.0\text{g}$

- o  $96.0\text{g}/64.0\text{g} = 1.5$
- o  $44.0\text{g} * 1.5 = 66.0\text{g}$