Stoichiometry

Objectives

- Construct mole ratios
- Use ratios in stoichiometric calculations

Stoichiometry

- Stoich—calculating quantities in chemical reactions
- $N_2 + 3H_2 \rightarrow 2NH_3$
- Use mole ratios

$$\frac{1 \text{ mol } N_2}{3 \text{ mol } H_2} \qquad \frac{2 \text{ mol } NH_3}{1 \text{ mol } N_2} \qquad \frac{3 \text{ mol } H_2}{2 \text{ mol } NH_3}$$
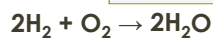
4

$2H_2 + O_2 \rightarrow 2H_2O$

- How many moles of water are produced when 8.9 moles of oxygen react?
- How many moles of hydrogen are needed to react with 4.3 moles oxygen?
- 3.8×10^{-3} moles of hydrogen react with an excess of oxygen. How many moles of water are produced?
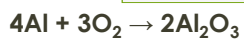

5

$4Al + 3O_2 \rightarrow 2Al_2O_3$

- What mass of aluminum is needed to produce 3.7 g of aluminum oxide?
  - Remember you MUST be in moles to go from one thing to another
- 0.833 g oxygen reacts with an excess of aluminum. How much product (in g) is produced?
- What mass of oxygen is required to react with 6.1×10^2 g Al?

6

$N_2\,(g) + 3H_2\,(g) \rightarrow 2NH_3\,(g)$

- What volume of hydrogen will produce 30 L ammonia? Assume STP.
- How many liters of ammonia will be created when 0.004 L nitrogen reacts with an excess of hydrogen (assume STP)?
- How many molecules of nitrogen are needed to react with 6.42×10^{25} molecules of hydrogen?
- What mass of hydrogen (in g) will produce 7.3 L ammonia (assume STP)?