Limiting Reactants

Limiting Reactants

- A chemical reaction will stop when you run out of one of your _____
- _____– limits the extent of the reaction.
  - Determines the amount of product that is formed.
  - It runs out first
- _____– left over reactant

Limiting Reactant Problems

- A limiting reactant problem can be easily identified because you have TWO givens
- You basically are just going to do 2 stoichiometry problems

Steps

1. Write the _____
2. Start with given #1 and go to desired product
3. Start with given #2 and go to the same product
4. The one that formed the _____ amount of grams is the limiting reactant

Example

- $S_8 + 4Cl_2 \rightarrow 4S_2Cl_2$
- 200.00 g of S_8 and 100.00 g of Cl_2 are combined in a flask. How much S_2Cl_2 will you get?

Other questions

- What was the limiting reactant?
- What was the excess reactant?
- How much excess did we have left over after the reaction was completed?

Another Example

- $P_4 + 5O_2 \rightarrow P_4O_{10}$
- If we used 25.4 g P_4 and 50.0 g O_2 answer the following questions.
  1. What is the limiting reactant?
  2. What is the excess reactant?
  3. How much P_4O_{10} will you get?
  4. How much excess did you use?
  5. How much excess will you have left over?

Another Example

1. What is the limiting reactant?
2. What is the excess reactant?
3. How much P_4O_{10} will you get?
4. How much excess did you use?
5. How much excess will you have left over?

% Yield

- Remember
- % = (part / whole) x 100
- When performing an experiment, things do not always go exactly perfect
- Some product may get spilled, some may get sneezed on, or the reaction may not have gone to completion

% Yield

- _____– the amount of product you should get if the experiment went perfectly. You get this number from stoichiometry
- _____– this is what you actually got in the lab. You measure this on a balance
- _____– how close you were to the correct answer

- % yield = (actual / theoretical) x 100

% Yield Example

- $K_2CrO_4 + 2AgNO_3 \rightarrow Ag_2CrO_4 + 2KNO_3$
- What is the theoretical yield of Ag_2CrO_4 formed from 0.500 g $AgNO_3$?

- What is the % yield if 0.455 g is actually formed?