General Steps for Solving Stoichiometry Problems

1. Start with a balanced equation.
2. Convert all units to moles.
3. Decide: Is this a limiting reactant problem?
   - No: Use the coefficient mole ratio and convert as needed.
   - Yes: Use a BCA table to determine the limiting reactant, excess reactant, and amount of product formed.
4. Convert to grams or other units, if required.

General BCA Table Tips

1. All units must be in moles before using a BCA table.
2. One of the reactants will be limiting and will end up as zero in the "after" row because it is completely used up. If you are not sure which one this is, try both of them to see which makes more sense. (Hint: If the "after" shows negative moles, you picked the wrong limiting reactant!)
3. The numbers in the "change" row should have the same lowest whole number ratio as the balanced equation coefficients.

Part 1: Limiting Reactant Review

Consider the reaction $\mathbf{N_2 + 3H_2 \rightarrow 2NH_3}$…

1. How many moles of ammonia can be formed if _____ moles of nitrogen react with sufficient hydrogen?

2. How many moles of nitrogen are needed when _____ moles hydrogen react?

3. How many moles of excess reactant are leftover when _____ moles nitrogen react with ____ moles hydrogen?

Part 2: Limiting and Excess Reactants

Assume you have 0.608 g Mg in a balloon. This balloon is placed over 0.100 moles of HCl in a flask. These react to form hydrogen gas as well as magnesium chloride.

$$Mg + 2HCl \rightarrow MgCl_2 + H_2$$

1. Identify the limiting reactant and use it to determine the number of moles of H_2 produced.

2. Determine the number of moles of excess reactant leftover.

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Part 3: Mass Conservation

Assume you have 5.00 g of Mg and 10.0 g of CO_2 available. You allow them to react to form solid magnesium oxide and carbon.

1. Determine the masses of both products produced.
2. Determine the mass of excess reactant leftover.
3. Prove that mass has been conserved.