Gases are another branch of reactions that use the same strategy:

* 1. Write the reaction. ( predict products if necessary but these are harder for you to predict at this point)
  2. Balance the reaction. Reactions Still occur in definite mole ratios.
  3. Find the limiting reactant iff necessary.
  4. Predict the amount of products based on the limiting amounts. If the product is also a gas, you may express the amounts of product with volume, mass or even pressure.

**Example:**

3.00 L of propene at 1.25 atm is in a container at 25 C. Oxygen is added until the total pressure becomes 6.34 atm at the same temperature.

C3H6 (g) + O2 (g) 🡪 CO2 (g) + H2O (g)

1. Find the limiting reactant
2. find the number of moles of excess reactant
3. find the number of carbon dioxide product.

Problem type 2. Gas changes T, P, n or V. The second ideal gas form

**Example:** A sample of helium gas fills a weather balloon until the volume reaches 10.5 m3 at atmospheric pressure (760.0 mm Hg) and 25.0 C ( not this weekend obviously) The balloon released into the upper atmosphere where the temperature is -15.2 C and the pressure is 525 mg Hg. What is the volume of the balloon?

Problem type 3 . Standard stoichiometry of gases ( lab style)

**Example:**

2 KClO3 (S) 🡪 2 KCl (S) + 3 O2 (g)

Potassium Chlorate decomposed when heated with manganese dioxide iinto potassium chloride and oxygen. If I wanted to collect 800.0 ml of Oxygen over water at 25 C and 1.00 atm, how much potassium chlorate should be used?

Problem type 4 : molecular weight of a vapor.

**Example:**

AT a pressure of 1.00 atm, A volatile liquid is placed into an empty 280. mL flask and placed into boiling water where it vaporizes and fills the flask. Excess vapor escapes. When the flask is removed and cooled again, the flask is 1.32 g heavier than it was empty. (The vapor condensed.)

1. Find the molecular weight of this vapor.

If 0.127 g of the compound is heated over CuO, ( dumas method for nitrogen analysis) 55.7 ml of dry Nitrogen gas is collected at 730 mmHg and 25 C.

1. Find the mass percentage of nitrogen in the compound.
2. If the mass percentage of hydrogen in the compound is 10.4 %, find the mass percentage of Carbon
3. What is the empirical formula for the compound?
4. Use the molecular weight you determined in part a) to determine the molecular formula.