9.12.1: Lecture Demonstration

Draw 4 mL of any gas (A) into a 10 cc syringe (a colored gas such as nitrogen dioxide is ideal, but not necessary). Draw 6 mL of a second gas (B) into the syringe.

Now, for the two gases in the syringe,

1. What is the volume of A?

    (10 cc) (all gases expand to fill their containers).

2. What is the volume of B?

    (10 cc)

The amounts of the two gases cannot be distinguished by their volumes!

3. What is the pressure of A, since it expanded from 6 to 10 mL?

Boyle's law tells us:

$(1Atm)(6\ mL) = P_B\ (10\ mL)$

$P_2 = 0.6\ Atm$

4. What is the pressure of B?

Dalton's Law tells us: If the pressure of A is 0.6 Atm, and the total pressure is 1.0 Atm, the pressure of B must be 0.4 Atm.

5. Use Avogadro's Law to derive other useful forms of Dalton's Law.

$P_A / P_{tot} = n_A / n_{tot}$