**The Ideal Gas Law / Boyle’s**

**PV = nRT.**

**The Ideal Gas Law models the behavior of ideal gases. Other gas laws can be derived from the Ideal Gas Law for wither one set of conditions or for two sets of conditions (initial and final).**

**To derive gas laws for two sets of conditions, solve the Ideal Gas Law for R:**

**PV / nT = R.**

**If the Ideal Gas Law is correct, the above would apply under any set of conditions of P, V, n, and T given (where 1 represents the initial conditions and 2 represents the final conditions):**

**Equation 1.) Ideal Gas Law for 2 sets of conditions.**

**P1V1 P2V2**

**=R=**

**n1 T1 n2T2**

**Boyle’s Law says that when N and T are constant, the following equations apply:**

**1 set of conditions:**

**PV = k = NRT (Pressure times volume = constant value)**

**2 sets of conditions:**

**P1V1 = P2V2 (When n1 = n2 and T1 = T2 these quantities algebraically cancel from equation 1).**

**Example:**

**Caculate the final pressure when a system with an initial pressure of 1.0 atm and an initiaon volume was 2.0 L was expanded to 4.0 L.**

**Solution: Because the temperature and moles are not mentioned in the problem, one must presume that the system was closed (no change in moles) and there was no change in temperature between the initial and final conditions.(If this was not true, than there is no possible solution using the Ideal Gas Law)**

**Using n and T as constant gives you P1V1 = P2V2 so:**

**1atm x 2.0 L = P2 x 4.0 L**

**P2 = .5 atm.**