Chapter 5 – Gases

Michael Brodskiy
Instructor: Mr. Morgan

October 22, 2020

- Gases – Uniformly fill any container; Easily compressed; Mixes completely with other gases; Exert pressure.
- Units: [atm] = 60[mmHg] = 760[torr] = 14.69[psi] = 1.013[bar] = 101325[Pa]
- Boyle's Law – Pressure and volume are inversely related
- Charles's Law – Volume directly proportional to temperature
- Avogadro's Law – Volume directly proportional to moles
- Ideal Gas Law: $PV = nRT$; $R = .0821\left[\frac{\text{L ATM}}{\text{mol K}}\right]$
- Standard Temperature and Pressure (STP) – 273[K] and 1[ATM]
- At STP, one mole of a gas occupies 22.4[L]
- Note: Hydrogen, Nitrogen, Oxygen, and Halogens are diatomics
- Gay-Lussac Law – The volume ratio of any two gasses in a reaction at constant pressure and temperature is equal to the mole ratios
- The above law means that the type of molecule does not matter, only the amount of molecules. When asked for partial pressure, it may be found using the equation (1)

$$P_{total} = P_a + P_b + \cdots + P_n \tag{1}$$

- When asked for the mole fraction, use formula (2), where x_a is the mole fraction.

$$P_a = x_a P_{total} \tag{2}$$