Chapter 12 - Gases

Theory:
- Boyle's Law: \( P_1 V_1 = P_2 V_2 \) \( \text{const} \ n, T \)
- Charles' Law: \( \frac{V_1}{T_1} = \frac{V_2}{T_2} \) \( \text{const} \ n, P \)
- Combined Gas Law: \( \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \) \( \text{const} \ n \)
- Avogadro's Law: \( \frac{V_1}{n_1} = \frac{V_2}{n_2} \) \( \text{const} \ P, T \)
- Ideal Gas Law: \( P \cdot V = n \cdot R \cdot T \)

STP: 0°C + 1 atm (760 torr) pressure

Kinetic Molecular Theory

Ideal vs Real Gases
- Real gases behave like ideal at high T, low P

Calculations (must work in Kelvin):
- All laws above
- Density of gases: \( \text{MW} = \frac{\text{DRT}}{P} \)
- Dalton's Law: \( P_{\text{total}} = P_A + P_B + \ldots \)
- Standard molar volume = 22.4 L per mole gas
- Stoichiometry
- Collecting gas over water: \( P_{\text{gas}} = P_{\text{barometric}} - P_{H_2O} \)
- Rates of effusion