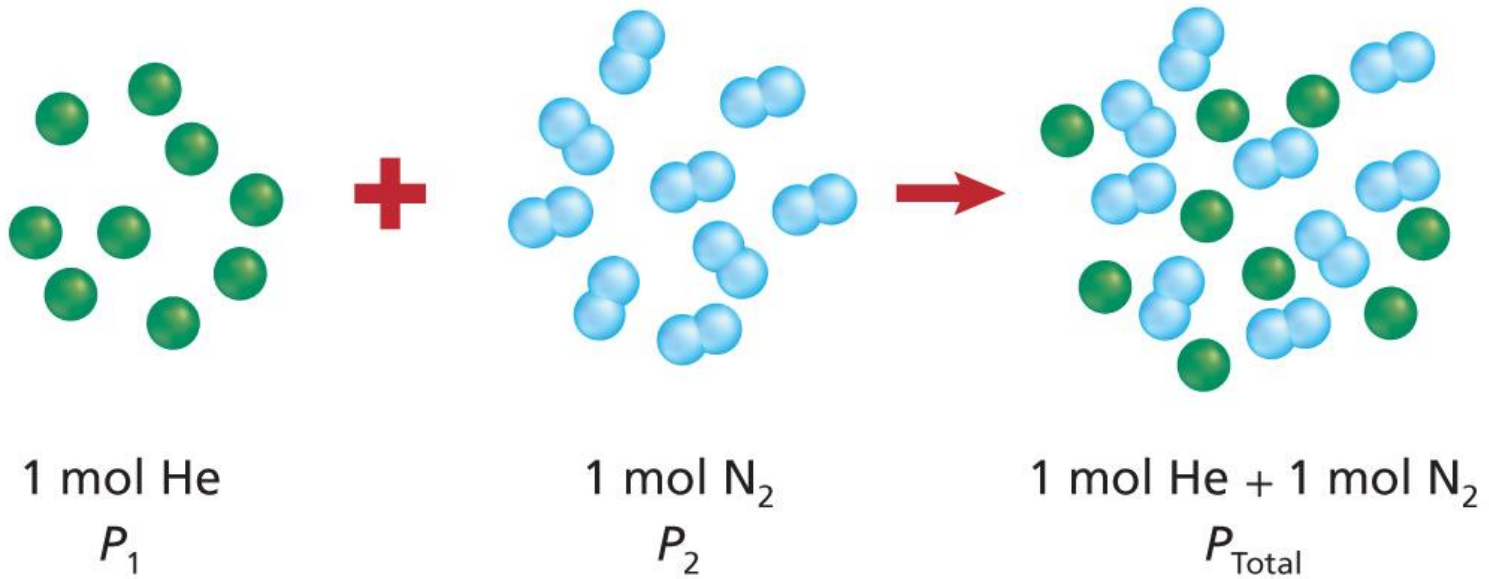


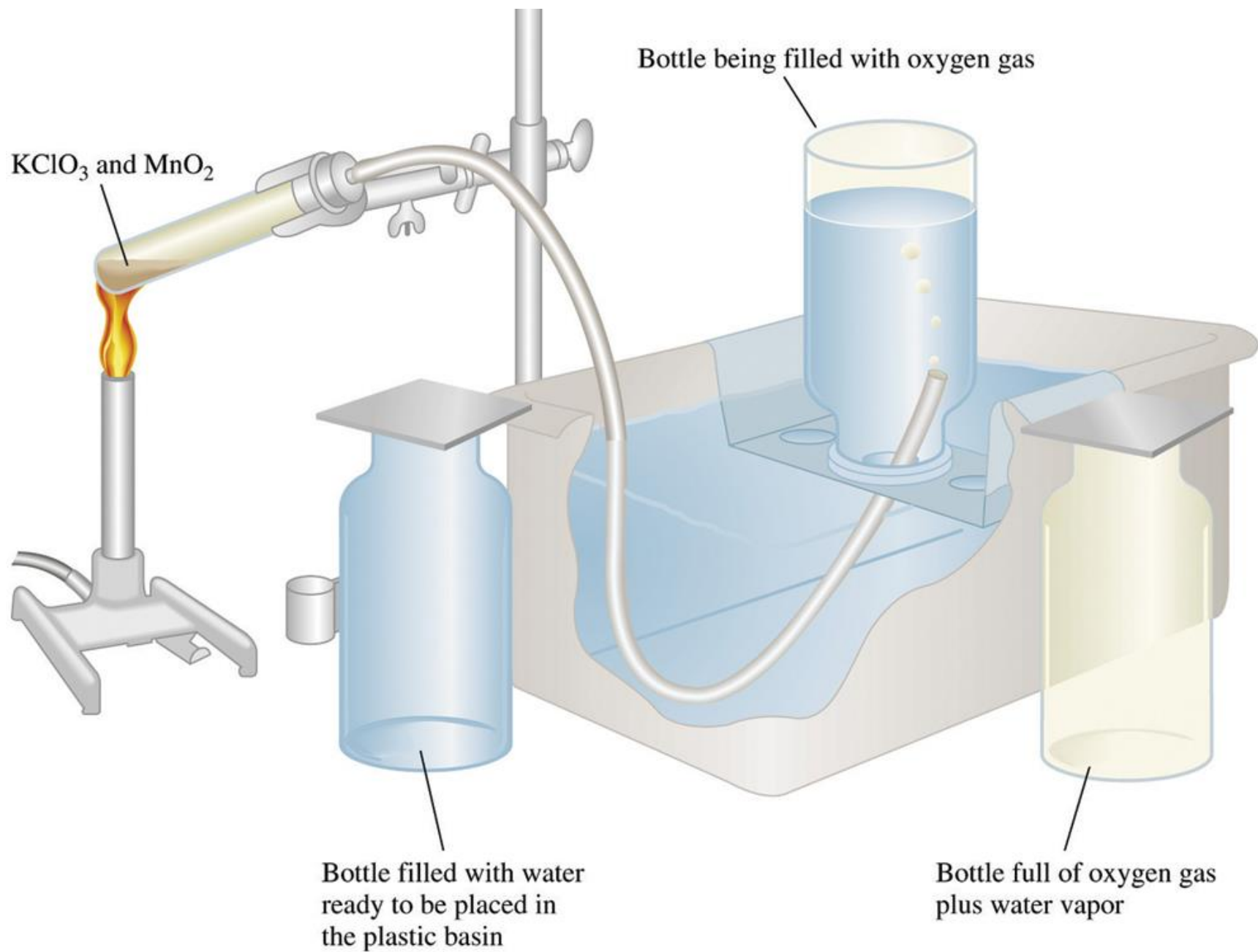
Gas Laws

Dalton's Law of Partial Pressures

- The total pressure of a mixture of gases is the sum of the *partial pressures* of the *individual* gases
- $P_T = P_1 + P_2 + P_3 + \dots$

Dalton's Law





Dalton's Law of Partial Pressures

- When collecting a gas by bubbling it through water, TWO gases are being collected, the intended gas AND water vapor
- $P_{\text{air}} = P_{\text{gas}} + P_{\text{H}_2\text{O}}$
- $P_{\text{gas}} = P_{\text{air}} - P_{\text{H}_2\text{O}}$

Effusion

- Effusion is the movement of gas molecules through an extremely tiny opening into a region of lower pressure
 - helium escaping a balloon
 - air leaking from a tire

Diffusion

- Diffusion is the tendency of molecules to move toward areas of lower concentration until the concentration is uniform throughout the system
 - mixing of gases

Graham's Law of Effusion

- The rate of effusion (or diffusion) of a gas is inversely proportional to the square root of its molar mass (at constant T and P).
- Molecules of lower molar mass diffuse and effuse faster.

- Due to kinetic energy considerations ($KE = 1/2mv^2$), when two bodies of different mass have the same kinetic energy (\sim same T), the lighter body moves faster.

Gas Laws