

7.1 Real Gases and Ideal Gases

- ideal gas equation of state can be sufficiently accurate for P-V-T relationships of real gases.
at low densities and high temps this works
at higher densities and low temp molecular interactions cannot be neglected.
- $PV = nRT$
Ideal Gas Law
- K_p in terms of partial pressure using ideal gas law
- P-V relationship for water read $P + v$ within $\pm 10\%$ only for $T > 1300K$

7.2 Equations of State for Real Gases and Their Range of Applicability

- several equations of state for real gases and range of variables P, V , and T over which they accurately describe a real gas are discussed. Most exhibit P-v-T behavior identical for that of ideal gas at low density. Also deviations similar that real gases exhibit at moderate + higher densities
- Van der Waals equation of state:
$$P = \frac{RT}{V_m - b} - \frac{a}{V_m^2} = \frac{nRT}{V - nb} - \frac{n^2a}{V^2}$$
- Redlich-Kwong equation of state:
$$P = \frac{RT}{V_m - b} - \frac{a}{\sqrt{T} V_m(V_m + b)} = \frac{nRT}{V - nb} - \frac{n^2a}{\sqrt{T} V(V + nb)}$$

*values a and b diff for diff gases