$$PV = nRT$$

$$P(V - nb) = nRT$$

$$\left(P + a\frac{n^2}{V^2}\right)(V - nb) = nRT$$

$$P_{\text{total}} = P_{\text{A}} + P_{\text{B}} + P_{\text{C}} + \cdots$$

$$x_{\text{A}} = \frac{P_{\text{A}}}{P_{\text{total}}}$$

$$E_{\text{k}} = U = \tfrac{3}{2}RT$$

$$v_{\text{rms}} = \sqrt{\frac{3RT}{M}}$$

$$c = \lambda \cdot \nu$$

$$E = h\nu$$

$$E_{\text{k}} = \tfrac{1}{2}mv^2 = h\nu - \Phi$$

$$E_{\text{n}} = -\mathscr{R}\left(\frac{1}{n^2}\right)$$

$$\Delta E = \mathscr{R}\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

$$E_{\text{P}} \propto \frac{q_1 q_2}{r}$$

$$\Delta U = q + w$$

$$w = -P\Delta V \qquad w = -\Delta nRT$$

$$H = U + PV$$

$$\Delta U = \Delta H - P\Delta V$$

$$\Delta U = \Delta H - \Delta nRT$$

$$q_{\text{sys}} = -q_{\text{cal}}$$

$$q_{\text{cal}} = q_{\text{water}} + q_{\text{hardware}}$$

$$\Delta U = q_{\text{v}} \qquad \Delta H = q_{\text{p}}$$

$$q = nC_{\text{m}}\Delta T \qquad q = mC_{\text{s}}\Delta T$$

$$q = n\Delta H_{\text{trans}} \qquad q = m\Delta H_{\text{trans}}$$

$$\Delta H_{\text{rxn}} = \Delta H_1 + \Delta H_2 + \Delta H_3 + \cdots$$

$$\Delta H^\circ_{\text{rxn}} = \sum n\Delta H^\circ_{\text{f}}(\text{prod}) - \sum n\Delta H^\circ_{\text{f}}(\text{react})$$

$$\Delta H_{\text{rxn}} = \sum BE(\text{breaking}) - \sum BE(\text{making})$$

$$\Delta G^\circ_{\text{rxn}} = \sum n\Delta G^\circ_{\text{f}}(\text{prod}) - \sum n\Delta G^\circ_{\text{f}}(\text{react})$$

$$\Delta S^\circ_{\text{rxn}} = \sum nS^\circ(\text{prod}) - \sum nS^\circ(\text{react})$$

$$G = H - TS \qquad S = k\ln\Omega$$

$$\Delta G = \Delta H - T\Delta S$$

$$\Delta S = \frac{q_{\text{rev}}}{T}$$

$$\Delta S_{\text{trans}} = \frac{\Delta H_{\text{trans}}}{T_{\text{trans}}}$$

$$\Delta S = nC\ln\left(\frac{T_2}{T_1}\right)$$