热力学与统计物理常用公式

$$pV = NRT \qquad dU = đQ + đW$$

$$đW = -p \cdot dV \qquad C_V = \left(\frac{\partial U}{\partial T}\right)_V$$

$$C_p = \left(\frac{\partial H}{\partial T}\right)_p \qquad \eta = 1 - \frac{T_2}{T_1}$$

$$\sum_{i=1}^{n} \frac{Q_i}{T_i} \leq 0 \qquad đQ = T\,dS$$

$$dU = T\,dS - p\,dV \qquad H = U + pV$$

$$F = U - TS \qquad G = U - TS + pV$$

$$\begin{cases} \delta S = 0 \\ \delta^2 S < 0 \\ \delta U = 0, \quad \delta V = 0, \quad \delta N = 0 \end{cases}$$

$$\sum_\lambda a_\lambda = N \qquad \sum_\lambda \varepsilon_\lambda a_\lambda = E$$

$$\bar{a}_\lambda = g_\lambda e^{-\alpha - \beta\varepsilon_\lambda} \qquad Z = \sum_\lambda g_\lambda e^{-\beta\varepsilon_\lambda}$$

$$\alpha = \ln\frac{Z}{N} \qquad \beta = \frac{1}{kT} \qquad E = -N\frac{\partial}{\partial\beta}\ln Z$$

$$Y_l = -\frac{N}{\beta}\frac{\partial}{\partial y_l}\ln Z \qquad đQ = \sum_\lambda \varepsilon_\lambda\, d\bar{a}_\lambda$$

$$C_V = \left(\frac{\partial \bar{E}}{\partial T}\right)_V \qquad S = k\ln W$$

$$\bar{a}_\lambda = \frac{g_\lambda}{e^{\alpha+\beta\varepsilon} \pm 1}$$

$$\Xi = \prod_\lambda \left(1 - e^{-\alpha-\beta\varepsilon_\lambda}\right)^{-g_\lambda}$$

$$\bar{N} = -\frac{\partial}{\partial\alpha} \ln \Xi$$

$$\bar{E} = -\frac{\partial}{\partial\beta} \ln \Xi$$

$$\bar{Y}_i = -\frac{1}{\beta} \frac{\partial}{\partial y_i} \ln \Xi$$

$$e^{-\alpha} \ll 1 \qquad e^{-\alpha} < 1 \qquad e^{\alpha} \ll 1$$

$$Z_N = \sum_s e^{-\beta E_s}$$

$$\bar{E} = -\frac{\partial}{\partial\beta} \ln Z_N$$

$$\bar{Y}_i = -\frac{\partial}{\partial y_i} \ln Z_N$$