$\boldsymbol{R} = 0{,}082\ atm\ l\ mol^{-1}K^{-1} = 1{,}98\ cal\ mol^{-1}K^{-1} = 8{,}3144\ J\ mol^{-1}K^{-1}$ $\quad 1\ cal = 4{,}18\ Joules$
$1\ Pa\ m^3 = 1\ J \quad 1\ atm\ l = 101{,}325\ J \quad 1\ atm = 760\ mmHg = 101325\ Pa \quad 1\ cmHg = 1333{,}22\ Pa$
$1\ bar = 750\ mmHg \quad \boldsymbol{A(H_2O, 25ºC)} = 0{,}509 \quad \boldsymbol{F} = 96500\ Cmol^{-1} \quad 1N = 10^5 dyn \quad 1N\ m^{-1} = 10^3 dyn\ cm^{-1}$

CAPÍTOL 0

$$\left(p + \frac{a \cdot n^2}{V^2}\right) \cdot (V - n \cdot b) = n \cdot R \cdot T \qquad \ln x = \ln 10 \cdot \log_{10} x \qquad \frac{d \ln p}{dT} = \frac{1}{p} \cdot \frac{dp}{dT}$$

$$W = -\int_{P_1}^{P_2} P_{ext}\, dV \qquad q = -\int_{T_1}^{T_2} n \cdot C_n\, dT \qquad \Delta U = q + w \qquad \Delta H = \Delta U + \Delta(pV)$$

CAPÍTOL 1

$$\alpha = \frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_p \qquad \kappa_T = -\frac{1}{V}\left(\frac{\partial V}{\partial p}\right)_T \qquad C_v = \left(\frac{\partial U}{\partial T}\right)_V \qquad C_p = \left(\frac{\partial H}{\partial T}\right)_p$$

$$dU \le TdS - pdV \quad dH \le TdS - Vdp \quad dG \le -SdT + Vdp \quad dA \le -SdT - pdV$$

$$\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial p}{\partial S}\right)_V \qquad \left(\frac{\partial T}{\partial p}\right)_{\boldsymbol{S}} = \left(\frac{\partial V}{\partial S}\right)_p \qquad \left(\frac{\partial V}{\partial T}\right)_p = -\left(\frac{\partial S}{\partial p}\right)_T \qquad \left(\frac{\partial p}{\partial T}\right)_v = \left(\frac{\partial S}{\partial V}\right)_{\boldsymbol{T}}$$

$$\left(\frac{\partial U}{\partial V}\right)_T = T\left(\frac{\partial p}{\partial T}\right)_V - p \qquad \left(\frac{\partial H}{\partial p}\right)_T = -T\left(\frac{\partial V}{\partial T}\right)_p + V \qquad \left(\frac{\partial S}{\partial T}\right)_V = \frac{C_v}{T}$$

$$\left(\frac{\partial S}{\partial T}\right)_p = \frac{C_p}{T} \qquad C_p - C_v = T\left(\frac{\partial p}{\partial T}\right)_V \left(\frac{\partial V}{\partial T}\right)_p$$

$$\Delta Z(T,p) = \int_{T_1}^{T_2} \left(\frac{\partial Z}{\partial T}\right)_p dT + \int_{p_1}^{p_2} \left(\frac{\partial Z}{\partial p}\right)_T dp \qquad \Delta Z(T,V) = \int_{T_1}^{T_2} \left(\frac{\partial Z}{\partial T}\right)_V dT + \int_{p_1}^{p_2} \left(\frac{\partial Z}{\partial V}\right)_T dV$$

CAPÍTOL 2

$$\frac{dp}{dT} = \frac{\Delta_{\alpha\to\beta}S}{\Delta_{\alpha\to\beta}V} = \frac{\Delta_{\alpha\to\beta}H}{T \cdot \Delta_{\alpha\to\beta}V} \qquad \frac{d\ ln\ p_v}{dT} = \frac{\Delta_{c\to g}}{RT^2} \qquad ln\left(\frac{P_{v(T_2)}}{P_{v(T_1)}}\right) = \frac{\Delta_{c\to g}}{R} \cdot \left(\frac{1}{T_1} - \frac{1}{T_2}\right)$$

$$\emptyset = \frac{p_{H_2O}}{p^*_{H_2O}} \cdot 100$$

CAPÍTOL 3

$$p_i = x_i^{(g)} \cdot p \qquad P_T = \sum P_i \qquad \frac{P_i}{x_i^{(l)}} = P_i^* \qquad \frac{P_2}{x_2^{(l)}} = K_{H,x} \qquad \frac{P_2}{m_2} = K_{H,m} \qquad \frac{P_2}{c} = K_{H,c}$$

$$V_i^* = V_m = \frac{V}{n_i}\ Z(p,T,n_1,n_2,\dots,n_c) \qquad Z_i = \left(\frac{\partial Z}{\partial n_i}\right)_{p,T,n_{j\neq i}} \qquad Z = \sum_{i=1}^{c} n_i \cdot Z_i$$

$\Delta_{mix}Z = \sum_{i=1}^{c} n_i \cdot Z_i - \sum_{i=1}^{c} n_i \cdot Z_i^* = \sum_{i=1}^{c} n_i \cdot (Z_i - Z_i^*) \quad \Delta_{dis}H = n_2 \cdot Q_2 + n_1 \cdot Q_1 \quad \overline{\Delta_{mix}Z} \sum_{i=1}^{c} x_i \cdot (Z_i - Z_i^*)$

$$L_1 = Q_1 \qquad L_2 = H_2 - H_2^\infty \neq Q_2 \qquad \Delta_{dis}H^\infty = n_2 \cdot (Q_2 - L_2) = -L \quad \Delta_{dil}H^\infty = \Delta_{dis}H^\infty - \Delta_{dis}H$$

CAPÍTOL 4

$a_{id}^{i} = {}^{p}/_{pº}$ $\quad a_{id}^{i\,(l)} = x_i^{(l)} \cdot a_i^{*}$ $\quad a_{c,id}^{i\,(l)} = {}^{c_i}/_{c^o} = a_{m,id}^{i\,(l)} = {}^{m_i}/_{m^o}$ $\quad \varphi = a_{real} \cdot pº$

$a_i^{(l)} / a_i^{*(l)} = a_i^{(v)} / a_i^{*(v)}$ $\quad a_i^{(l)} = {}^{p_i}/_{p_i^*} \cdot a_i^{*(l)}$ $\quad a_c^{i\,(l)} = {}^{p_i}/_{K_{H,c}}$ $\quad a_m^{i\,(l)} = {}^{p_i}/_{K_{H,m}}$

$d_T\mu_i^* = R \cdot T \cdot d_T ln a_i^* = V_i^* dp$ $\quad \int_{a_{i,p\to 0}^*}^{a_i^*} R \cdot T \cdot ln\, a_i^* = \int_{p\to 0}^{p} V_i^* dp$ $\quad \gamma = {}^{a_i}/_{a_i^{id}}$

$\overline{\Delta_{mix} G} = RT \sum_{i=1}^{c} x_i \cdot \ln(\gamma_i \cdot x_i)$ $\quad \overline{\Delta_{mix} S} = -R \sum_{i=1}^{c} x_i \cdot \ln(x_i)$ $\quad l = c + 2 - f$

CAPÍTOL 5

$\log_{10} \gamma_{\pm,i} = \frac{-A|Z^+Z^-|\sqrt{I}}{1+\sqrt{I}}$ $\quad I = \frac{1}{2} \cdot \sum C_i \cdot Z_i^2$

CAPÍTOL 6.1

$p_{T=ct} = \frac{p_1^* p_2^*}{p_1^* + (p_2^* - p_1^*) \cdot x_1^{(g)}}$ $\quad p_{T=ct} = p_2^* + x_1^{(l)} \cdot (p_1^* - p_2^*)$ $\quad n_{(l)} \cdot d_{p-L} = n_{(v)} d_{p-v}$

CAPÍTOL 6.2

$\Pi = c_2 \cdot i \cdot R \cdot T$

$\Delta T_e = T_{b,1} - T_{b,1}^* = K_e \cdot i \cdot m_2$ $\quad K_e = \frac{R \cdot (T_{b,1}^*)^2 \cdot mM_1}{\Delta vap H_1^*}$ $\quad x_2^{(l)} = \frac{\Delta vap H_1^*}{R \cdot (T_{b,1}^*)^2} \cdot \Delta T_e$

$\Delta T_c = T_{c,1}^* - T_{c,1} = K_c \cdot i \cdot m_2$ $\quad K_c = \frac{R \cdot (T_{c,1}^*)^2 \cdot mM_1}{\Delta fus H_1^*}$ $\quad x_2^{(l)} = \frac{\Delta fus H_1^*}{R \cdot (T_{c,1}^*)^2} \cdot \Delta T_c$

CAPÍTOL 6.3

$\frac{d \ln K(T)}{dT} = \frac{\Delta_r Hº(T)}{RT^2}$ $\quad ln\left(\frac{K_{(T_2)}}{K_{(T_1)}}\right) = \frac{\Delta_r Hº}{R} \cdot \left(\frac{1}{T_1} - \frac{1}{T_2}\right)$

$({}^{\delta G}/_{\delta \xi})_{T,p} = \sum \nu_i \mu_i \le 0$ $\quad \xi = \frac{n_i - n_o}{\nu_i} = n_o \cdot \alpha$ $\quad \alpha = {}^{x}/_{n_o}$ $\quad K = e^{(\frac{-\Delta r Gº}{RT})} = \frac{\prod a_p^{\nu_i}}{\prod a_r^{\nu_i}}$

CAPÍTOL 6.4

$E_{pia}^o = E_{càtode}^o - E_{ànode}^o$ $\quad E = E^o - RT \cdot \ln\left(\Pi a_i^{\nu_i}\right)$ $\quad \Delta G^o = -nFE^o = -RT \cdot \ln(K)$ $\quad \Delta S^o = nF(\frac{\delta E^o}{\delta T})$

CAPÍTOL 7

$dG = \gamma_{\alpha,\beta} \cdot dA_\alpha$ $\quad p_{in} - p_{out} = {}^{2 \cdot \gamma_{\alpha,\beta}}/_{r}$ $\quad cos\theta = \frac{\gamma_{s-g} - \gamma_{l-s}}{\gamma_{l-g}}$ $\quad h = \frac{2\gamma_l \cdot cos\theta}{(\rho_l - \rho_v) \cdot g \cdot a}$ $\quad \gamma_l = \frac{\rho_l g h a}{2}$

$\gamma_l = \frac{\rho_{H_2O} \cdot V_e \cdot g}{2\pi a \cdot N_g}$ $\quad m_g = \frac{V_e \cdot \rho_{H_2O}}{N_g}$ $\quad \Gamma_2^{(l)} = -\frac{c_2}{RT}\left(\frac{\delta\gamma}{\delta C_2}\right)_T$ $\quad \theta = \frac{N_{c,a}\ ocupats}{N_{c,a}\ totals} = \frac{b \cdot c}{1 + b \cdot c} = \frac{\Gamma_{màx}}{\Gamma} = \frac{a_{màx}}{a} = \frac{V_{màx}}{V}$

$\Gamma = \frac{\Gamma_{màx} \cdot b \cdot c}{1 + b \cdot c}$ $\quad a = \frac{a_{màx} \cdot b \cdot c}{1 + b \cdot c}$ $\quad V = \frac{V_{màx} \cdot b \cdot p}{1 + b \cdot p}$ $\quad \frac{1}{a} = \frac{1}{a_{màx} \cdot b} \cdot \frac{1}{c} + \frac{1}{a_{màx}}$

$\theta_A = \frac{N_{c,a}\ ocupats\ per\ A}{N_{c,a}\ totals} = \frac{b_A \cdot p_A}{1 + b_A \cdot p_A + b_B \cdot p_B}$