FORMULARIO CURSO 22/23: Parte 1

$R = 8{,}314 \text{ J K}^{-1}\text{mol}^{-1} = 0{,}08206 \text{ L atm K}^{-1}\text{mol}^{-1}$

$1 \text{ atm} = 101325 \text{ Pa}$ $1 \text{ atm·L} = 101'325 \text{ J}$

$1 \text{ bar} = 10^5 \text{ Pa}$

$$1 = \left(\frac{\partial x}{\partial y}\right)_z \left(\frac{\partial y}{\partial x}\right)_z$$

$$\left(\frac{\partial x}{\partial y}\right)_z \left(\frac{\partial y}{\partial z}\right)_x \left(\frac{\partial z}{\partial x}\right)_y = -1$$

$$\mathrm{d}V = \alpha V \mathrm{d}T - k_T V \mathrm{d}P$$

$$\mathrm{d}P = \frac{\alpha}{k_T}\mathrm{d}T - \frac{1}{k_T V}\mathrm{d}V$$

$$\mathrm{d}T = \frac{1}{\alpha V}\mathrm{d}V + \frac{k_T}{\alpha}\mathrm{d}P$$

$$\beta = \frac{1}{P}\left(\frac{\partial P}{\partial T}\right)_V$$

$$\alpha = P\beta\, k_T$$

$$\overline{C}_V \approx 3R/2$$

$$\overline{C}_P \approx 5R/2$$

$$\overline{C}_V \approx 5R/2$$

$$\overline{C}_P \approx 7R/2$$

$$C_P = C_V + l\alpha V$$

$$h = -l k_T V$$

$$C_P = \lambda \alpha V$$

$$h = \mu - \lambda k_T V$$

$$l = \frac{C_P - C_V}{\alpha V}$$

$$\lambda = \frac{C_P}{\alpha V}$$

$$h = -l k_T V = -\left(\frac{C_P - C_V}{\alpha V}\right) k_T V = (C_V - C_P)\frac{k_T}{\alpha}$$

$$\mu = h + \lambda k_T V = (C_V - C_P)\frac{k_T}{\alpha} + \frac{C_P}{\alpha V} k_T V = \frac{C_V k_T}{\alpha}$$

$$P^{1-k} T^k = \mathrm{C}$$

$$V^{k-1} T = \mathrm{C}$$

$$W = \frac{P_b V_b - P_a V_a}{k-1}$$

$$W = -\int_{a(\Pi)}^{b} \left(\overline{\alpha} PV \mathrm{d}T - \overline{k}_T PV \mathrm{d}P\right)$$

$$\mathrm{d}U = C_V \mathrm{d}T + \left(T\left(\frac{\partial P}{\partial T}\right)_V - P\right)\mathrm{d}V = C_V \mathrm{d}T + \left(\frac{\alpha T}{k_T} - P\right)\mathrm{d}V$$

$$đQ_{rev} = T\mathrm{d}S = C_V \mathrm{d}T + T\left(\frac{\partial P}{\partial T}\right)_V \mathrm{d}V = C_V \mathrm{d}T + \frac{\alpha T}{k_T}\mathrm{d}V =$$

$$= C_V \mathrm{d}T + \left[\left(\frac{\partial U}{\partial V}\right)_T + P\right]\mathrm{d}V$$

$$\mathrm{d}U = \left[C_P - P\left(\frac{\partial V}{\partial T}\right)_P\right]\mathrm{d}T - \left[T\left(\frac{\partial V}{\partial T}\right)_P + P\left(\frac{\partial V}{\partial P}\right)_T\right]\mathrm{d}P =$$

$$= \left[C_P - P\alpha V\right]\mathrm{d}T - \left[T\alpha V + P\left(\frac{\partial V}{\partial P}\right)_T\right]\mathrm{d}P$$

$$đQ_{rev} = T\mathrm{d}S = C_P \mathrm{d}T - T\left(\frac{\partial V}{\partial T}\right)_P \mathrm{d}P = C_P \mathrm{d}T - T\alpha V \mathrm{d}P =$$

$$= C_P \mathrm{d}T + \left[\left(\frac{\partial U}{\partial V}\right)_T + P\right]\left(\frac{\partial V}{\partial P}\right)_T \mathrm{d}P =$$

$$= C_P \mathrm{d}T + \left[\left(\frac{\partial H}{\partial P}\right)_T - V\right]\mathrm{d}P$$

$$C_P - C_V = \frac{\alpha^2 T V}{k_T} = P\,\beta\,\alpha\,T\,V = T\left(\frac{\partial P}{\partial T}\right)_V \left(\frac{\partial V}{\partial T}\right)_P$$

$$\eta_C = 1 - \frac{T_2}{T_1} \qquad \varepsilon_C = \frac{T_2}{T_1 - T_2} \qquad \nu_C = \frac{T_1}{T_1 - T_2}$$

$$\eta = \frac{|W|}{|Q_{\text{Absorbido por el sistema}}|}$$

$$\varepsilon = \frac{|Q_{\text{Absorbido por el sistema}}|}{|W|}$$

$$\nu = \frac{|Q_{\text{Cedido por el sistema}}|}{|W|}$$