Clase 46 17 Noviembre 2020

Título de la nota 17/11/2020

Mezclado de gases es no reactivo

Sistema cerrado

Isotérmico ✓ ideal

Mezclado { Ley de Dalton (presión parcial)
Ley de Amagat (volumen parcial)

Fracción mol. (x_i, y_i)

$$y_i = \frac{n_i}{n_{totales}}$$ variable intensiva

$$\sum_{i=1}^{n} y_i = 1$$

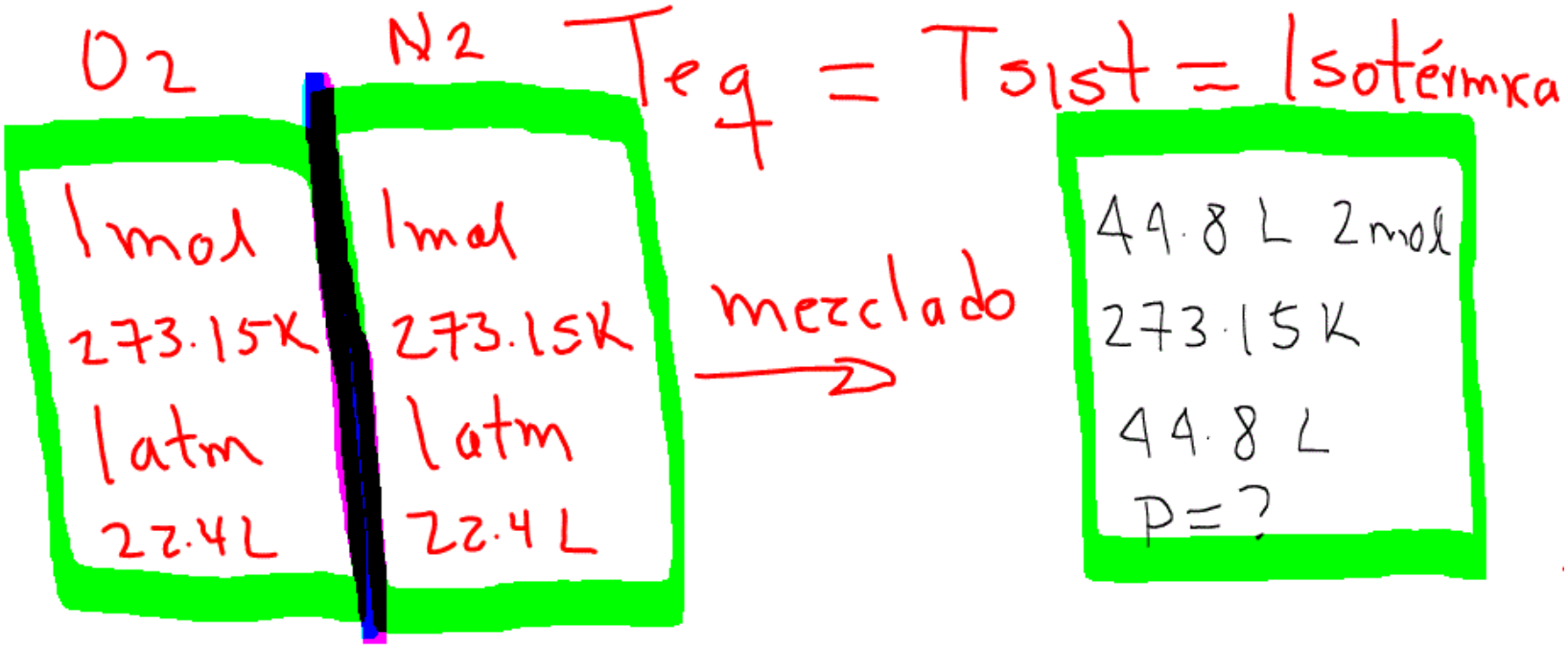
Dalton $p_{total} = \sum_{i=1}^{n} p_i$

$$p_i = p_{total} y_i$$

Amagat $V_{total} = \sum_{i=1}^{n} V_i$

$$V_i = V_{total} y_i$$

$$P_{total} V_{total} = n_{total} R T_{eq}$$



$T_{eq} = T_{sist} =$ Isotérmica

$$P_{total} = \frac{n_{total} R T_{eq}}{V_{total}} = \frac{(2\,mol)\left(0.082\,\frac{atm\,L}{mol\,K}\right)(273.15\,K)}{49.8\,L} = 1\,atm$$

$p_{O_2} = p_{total}\, y_{O_2} = 1\,atm\,(0.5) = 0.5\,atm$

$p_{N_2} = 1\,atm\,(0.5) = 0.5\,atm$

$y_{N_2} = \frac{1}{2} = 0.5$

$y_{O_2} = \frac{1}{2} = 0.5$

$1\,atm$

$$M_M = \sum_{i=1}^{n} M_i y_i$$

$$\overline{C}_{pM} = \sum_{i=1}^{n} \overline{C}_{pi}\, y_i \qquad \overline{C}_{vM} = \sum_{i=1}^{n} \overline{C}_{vi}\, y_i$$

$\Delta S_M = +$ expansión

$q_M = w_M = \Delta S_M T_{eq} = +$

$\Delta S_M = \frac{q_M}{T_{eq}} = +$

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

$\Delta H = 0$

$\Delta G_M = \Delta H_M - T\Delta S_M$

$\Delta G_M = -T\Delta S_M = -$ espontáneo

$$\Delta S = nR \ln \frac{V_2}{V_1} \quad \text{ó} \quad nR \ln \frac{P_1}{P_2}$$

$$\Delta S_M = \Delta S_I + \Delta S_{II}$$

$$= n_{O_2} R \ln \frac{V_{tot.}}{V_{O_2}} + n_{N_2} R \ln \frac{V_{tot.}}{V_{N_2}}$$

$$y_i = \frac{n_i}{n_{total}}$$

Avogadro $V \propto n$

$$\Delta S_M = n_{O_2} R \ln \left(\frac{n_{total}}{n_{O_2}} \right) + n_{N_2} R \ln \left(\frac{n_{total}}{n_{N_2}} \right)$$

$$\Delta S_M = n_{O_2} R \ln \frac{1}{y_{O_2}} + n_{N_2} R \ln \frac{1}{y_{N_2}}$$

$$\Delta S_M = -\left[n_{O_2} R \ln y_{O_2} + n_{N_2} R \ln y_{N_2} \right]$$

$$y_i = \frac{n_i}{n_{total}} \qquad y_{O_2} = \frac{n_{O_2}}{n_{total}} \qquad n_{O_2} = y_{O_2} n_{total}.$$

$$n_{N_2} = y_{N_2} n_{total}$$

$$\Delta S_M = -\left[y_{O_2} n_{total} R \ln y_{O_2} + y_{N_2} n_{total} R \ln y_{N_2} \right]$$

$$\Delta S_M = -\left[n_{total} R \left(y_{O_2} \ln y_{O_2} + y_{N_2} \ln y_{N_2} \right) \right]$$

$$\Delta S_M = -n_{total} R \sum_{i=1}^{n} y_i \ln y_i$$

$$= -(\text{mol})\left(8.314\ J/\text{mol}\,K\right)\left[-\right]$$

$$= +\ J/K$$

$$\Delta G_M = -T\Delta S_M$$

$$= -\left[T\, n_{total} R \sum_{i=1}^{n} y_i \ln y_i\right] = -$$