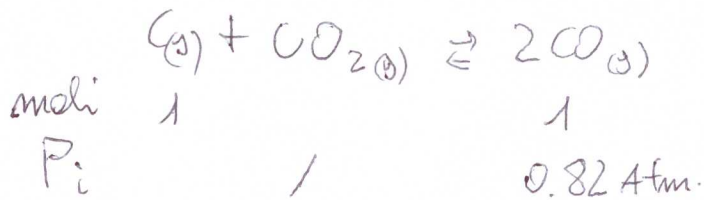


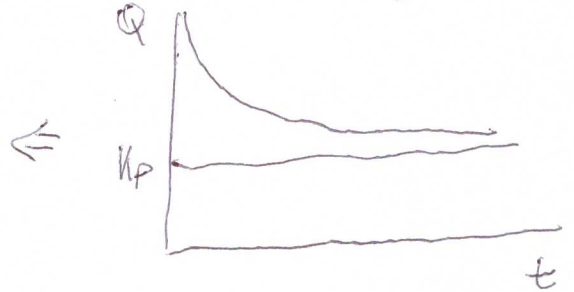
# ESERCIZIO 3



QUOZIENTE DI REAZIONE  $Q_i$ :

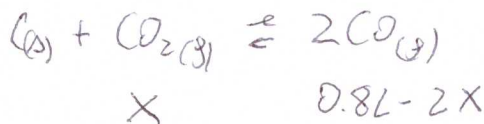
$$Q_i = \frac{P_{\text{CO}}^2}{P_{\text{CO}_2}} = \infty$$

le reazioni si spostano verso sinistra



$$PV = nRT$$

$$P'_{\text{CO}} = \frac{1 \cdot 0,0821 \cdot 1000}{100} = 0.82 \text{ Atm.}$$



$$1,8 = \frac{(0.82 - 2X)^2}{X} = 4 \frac{(0.41 - X)^2}{X} \Rightarrow 0.45X = (0.41 - X)^2$$

$$0.45X = 0.1681 - 0.82X + X^2 \Rightarrow X^2 - 1.27X + 0.1681 = 0$$

$$X = \frac{1.27 \pm \sqrt{1.27^2 - 4 \cdot 0.1681}}{2} = \frac{1.27 \pm \sqrt{0.9405}}{2} \Rightarrow \begin{array}{l} X_1 = 1,12 \text{ Atm} \\ X_2 = 0,15 \text{ Atm} \end{array}$$

$$P_{\text{CO}_2} = 0.15 \text{ Atm} \quad P_{\text{CO}} = 0.52 \text{ Atm} \quad P_{\text{TOT}} = 0.67 \text{ Atm.}$$

$$\ln \frac{K_2}{K_1} = \frac{163500}{8.31} \left[ \frac{1}{1000} - \frac{1}{1300} \right] = \frac{163500}{8.31} \cdot \frac{300}{1000 \cdot 1300} = 4.54 \Rightarrow K_2 \approx 169$$

$$P'_{\text{CO}} = \frac{1 \cdot 0,0821 \cdot 1300}{100} = 1,06 \text{ Atm.}$$

SE STO A 1300 K DEVO RICAZZOCARMI LA  $P_{\text{CO}}$  INIZIALE.

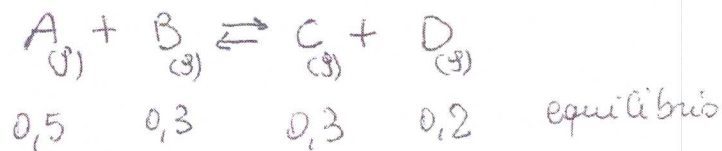
$$K_2 = 169 = \frac{(1,06 - 2X)^2}{X} = 4 \frac{(0.53 - X)^2}{X} \Rightarrow 42,25X = 0,281 - 1,06X + X^2$$

$$X^2 - 43,31X + 0.281 = 0; \quad X = \frac{43,31 \pm \sqrt{(43,31)^2 - 1,124}}{2} = \frac{43,31 \pm 43,29}{2}$$

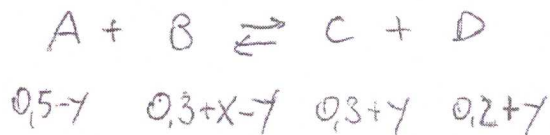
$$X = 6,49 \cdot 10^{-3} \text{ Atm.} \Rightarrow P_{\text{CO}} = 1,047 \text{ Atm.} \Rightarrow \left( \frac{1,047}{1300} - \frac{0,52}{1000} \right) \cdot \frac{100}{0,0821} = 0,347$$

$$m_2 - m_1 = \frac{P_2 V}{T_2 R} - \frac{P_1 V}{T_1 R} = \frac{V}{R} \left( \frac{P_2}{T_2} - \frac{P_1}{T_1} \right)$$

# ESERCIZIO



$$K_c = K_p = \frac{0,3 \cdot 0,2}{0,5 \cdot 0,3} = 0,4$$



$$K_c = 0,4 = \frac{0,5 \cdot 0,4}{0,3 - (0,1 + X)} \Rightarrow \boxed{X = 1,56}$$

QUOTIENTE DI REAZIONE

$$\frac{0,3 \cdot 0,2}{0,5 \cdot 0,3 + X} \equiv Q_i < K_p$$



aggiungo X di B e  
la reazione si sposta  
verso destra di  $\gamma$

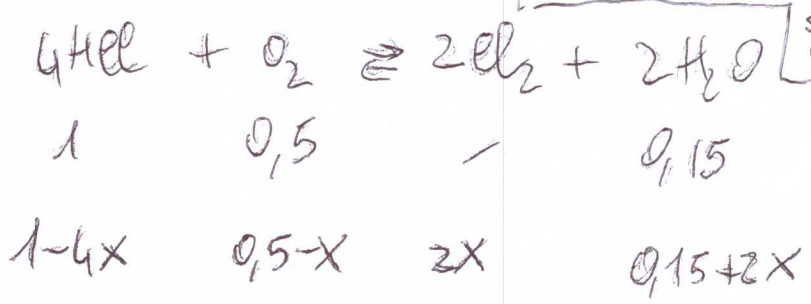
Ma poiché  $0,2 + \gamma = 0,4$   
 $\gamma = 0,2$



# Esercizio 5

$Q_i = 0$  perché  $\Delta G = 0$   
 QUINDI LA REAZIONE SI  
 SPosta VERSO  
 DESTRA

$V = 10 \text{ L}$   
 $T = 400^\circ \text{C}$   
 $P = 8 \text{ Atm}$



$N_{\text{tot}} = 1-4x + 0,5-x + 2x + 0,15 + 2x = 1,65 - x$

$PV = nRT$

$8 \cdot 10 = (1,65 - x) \cdot 0,0821 \cdot 673,15$

$(1,65 - x) = 1,44$

$x = 0,20$

- $1 - 4 \times 0,20 = 0,20$  mol He equilibrio
- $0,5 - 0,2 = 0,30$  mol  $\text{O}_2$  equilibrio
- $2 \times 0,2 = 0,40$  mol  $\text{O}_2$  equilibrio
- $0,15 + 2 \times 0,2 = 0,55$  mol  $\text{H}_2\text{O}$  equilibrio

$\frac{0,2}{1,45} \cdot 100 = 13,79\% \text{ He}$  ;  $\frac{0,3}{1,45} \cdot 100 = 20,68\% \text{ O}_2$  ;

$\frac{0,4}{1,45} \cdot 100 = 27,58\% \text{ O}_2$  ;  $\frac{0,55}{1,45} \cdot 100 = 37,93\% \text{ H}_2\text{O}$

$K_p = \frac{1}{P_{\text{tot}}} \cdot \frac{x_{\text{H}_2\text{O}}^2 \cdot x_{\text{O}_2}^2}{x_{\text{He}}^4 \cdot x_{\text{O}_2}} = \frac{0,3793^2 \cdot 0,2758^2}{0,1379^4 \cdot 0,2068} \cdot \frac{1}{8}$

$K_p = 18,3$

ESERCIZIO 7

$$\Delta H_{\text{REAZ}} = 4 \Delta H_f^\circ(\text{H}_2\text{O}) + 7 \Delta H_f^\circ(\text{CO}_2) - \Delta H_f^\circ(\text{C}_7\text{H}_8)$$

$$= 4 \cdot (-285,85) + 7 \cdot (-393,5) - 14,54$$

$$-1143,4 - 2754,5 - 14,54 = -3912,44 \text{ kJ/mol}$$

$$\frac{10}{92,06} = 0,1086 \text{ moli di toluene}$$

$$Q = 3912,44 \cdot 0,1086 = 424,98 \text{ kJ}$$

$$\text{moli di CO}_2 = 7 \times 0,1086 = 0,7602$$

$$V = \frac{0,7602 \cdot 0,0821 \cdot 298,15}{2,5} = 7,44 \text{ l}$$