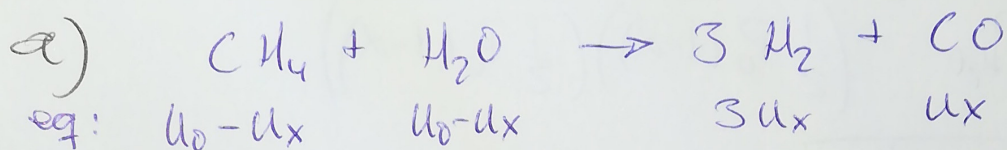


EXUUBRIO | OLIMPIADAS VALENCIA



$$u_{\text{Teq}} = u_0 - u_x + u_0 - u_x + 3u_x + u_x = \boxed{2(u_0 + u_x) = u_{\text{Teq}}}$$

b) $K_P = 28,6$
 $u_0(\text{CH}_4) = u_0(\text{H}_2\text{O}) = 1,0 \cdot 10^3 \text{ mol}$
 $P_0 = 1,6 \text{ atm}$

$$\alpha = \frac{u_x}{u_0} ; K_P = \frac{P_{\text{H}_2}^3 P_{\text{CO}}}{P_{\text{CH}_4} P_{\text{H}_2\text{O}}} ; P_i = P_T X_i$$

$$\frac{P_{\text{Teq}} V}{P_0 V} = \frac{u_{\text{Teq}} RT}{u_0 RT} \rightarrow P_{\text{Teq}} = \frac{2(u_0 + u_x)}{2u_0} P_0 = \boxed{(1 + \alpha) P_0 = P_T}$$

$$P_{\text{H}_2} = P_T X_{\text{H}_2} = (1 + \alpha) P_0 \cdot \frac{3u_x}{2(u_0 + u_x)} = (1 + \alpha) P_0 \frac{3}{2(\frac{1}{\alpha} + 1)}$$

$$P_{\text{H}_2} = (1 + \alpha) P_0 \frac{3}{2(\frac{1 + \alpha}{\alpha})} = \cancel{(1 + \alpha) P_0} \frac{3\alpha}{2(1 + \alpha)}$$

$$\boxed{P_{\text{H}_2} = \frac{3}{2} P_0 \alpha} \quad \boxed{P_{\text{CO}} = \frac{1}{2} P_0 \alpha}$$

$$P_{\text{CH}_4} = P_{\text{H}_2\text{O}} = (1 + \alpha) P_0 \frac{u_0 - u_x}{2(u_0 + u_x)} = \cancel{(1 + \alpha) P_0} \frac{1 - \alpha}{2(1 + \alpha)}$$

$$P_{\text{CH}_4} = P_{\text{H}_2\text{O}} = \frac{1}{2} P_0 (1 - \alpha)$$

$$K_P = \frac{P_{H_2}^3 P_{CO}}{P_{CH_4} P_{H_2O}} = \frac{\left(\frac{3}{2} P_0 \alpha\right)^3 \left(\frac{1}{2} P_0 \alpha\right)}{\left(\frac{1}{2} P_0 (1-\alpha)\right) \left(\frac{1}{2} P_0 (1-\alpha)\right)}$$

$$\sqrt{K_P} = \sqrt{\frac{27}{4} P_0^2 \frac{\alpha^4}{(1-\alpha)^2}} \rightarrow \sqrt{K_P} - \sqrt{K_P} \alpha = \frac{\sqrt{27}}{2} P_0 \alpha^2$$

$$\frac{\sqrt{27}}{2} P_0 \alpha^2 + \sqrt{K_P} \alpha - \sqrt{K_P} = 0$$

$$4,16 \alpha^2 + 5,35 \alpha - 5,35 = 0$$

$$\alpha = \frac{-5,35 \pm \sqrt{5,35^2 + 4 \cdot 4,16 \cdot 5,35}}{8,32} = \frac{-5,35 \pm 10,85}{8,32} = 0,661$$

$$\boxed{\alpha (\%) = 66,1 \%}$$

$$c) P_T = (1+\alpha) P_0 = (1+0,661) 1,6 = \boxed{2,7 \text{ atm} = P_T}$$