

Soluzioni delle Prove Scritte del 12/06/2018

COMPITO B

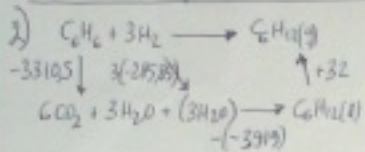
$$1) \pi = \frac{n}{M \cdot V} RT \rightarrow M = \frac{nRT}{\pi V} = \frac{0.404 \cdot 0.0821 \cdot 313.15}{\left(\frac{365.4}{760}\right) \cdot 0.2}$$

$$= 108.4 \text{ g/mol}; n_{C_2H_4O_2} = \frac{0.404 \text{ g}}{108.4 \text{ g/mol}} = 0.00374 \text{ mol}; n_{CO_2} = n_c = \frac{1.152 \text{ g}}{44.01 \text{ g/mol}}$$

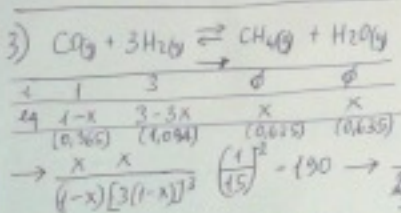
$$= 0.0262 \text{ mol}; n_H = 2n_{H_2O} = 2 \cdot \frac{0.27 \text{ g}}{18.02 \text{ g/mol}} = 0.0300 \text{ mol}$$

$$C_2H_4O_2 = x : y = 1 : 7 : 8 \rightarrow C_7H_{14}O_8 \quad m_0 = 108.4 - (7 \cdot 12.01 + 8 \cdot 16.00) = 15.96 \text{ g}$$

formula MOLECOLARE MINIMA = $C_7H_{14}O_8$ $\leftarrow z = \frac{m_0}{M_0} = \frac{15.96}{16.00} = 1$



$$x = \Delta H_f^\circ = -33105 + 3(-28585) + 3919 + 32 = -2080 \text{ kJ}$$

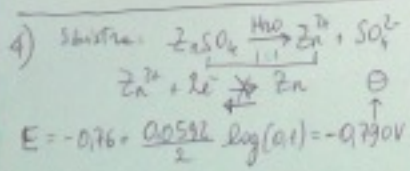


$$\Delta n = -2; n_{tot} = 4 - 2x = 2.729 \text{ mol} (*)$$

$$K_c = \frac{n_{CH_4} \cdot n_{H_2O}}{n_{CO} \cdot (n_{H_2})^3} \left(\frac{1}{V}\right)^2 = 190 \rightarrow$$

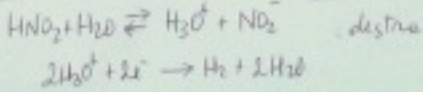
$$\rightarrow \frac{x \cdot x}{(1-x)[3(1-x)]^3} \left(\frac{1}{0.5}\right)^2 = 190 \rightarrow \frac{x^2}{27(1-x)^4} \cdot 25 = 190; \sqrt{\frac{190 \cdot 2}{25}}(1-2x) = x$$

$$x = 0.635 \text{ mol}; x_{CO} = \frac{0.365}{2.729} = 0.134; x_{H_2} = \frac{1.094}{2.729} = 0.401; x_{CH_4} = x_{H_2O} = \frac{0.635}{2.729} = 0.233$$



$$E = -0.76 + \frac{0.0592}{2} \log(a_1) = -0.790 \text{ V}$$

$$\Delta E = E_{destra} - E_{sinistra} = -0.18 - (-0.790) = -0.609 \text{ V} \approx 0.61 \text{ V}$$



$$K_a = 7.1 \cdot 10^{-4} \gg 10^{-7} \rightarrow [H_3O^+]^2 = K_a [HNO_2] = 8.88 \cdot 10^{-4} \text{ M} \quad \oplus$$

$$E = 0 + \frac{0.0592}{2} \log \frac{(8.88 \cdot 10^{-4})^2}{1} = -0.181 \text{ V}$$