

Soluzioni della Prova Scritta di Chimica del 24 Gennaio 2022

BGER - Conole HZ - da Renato

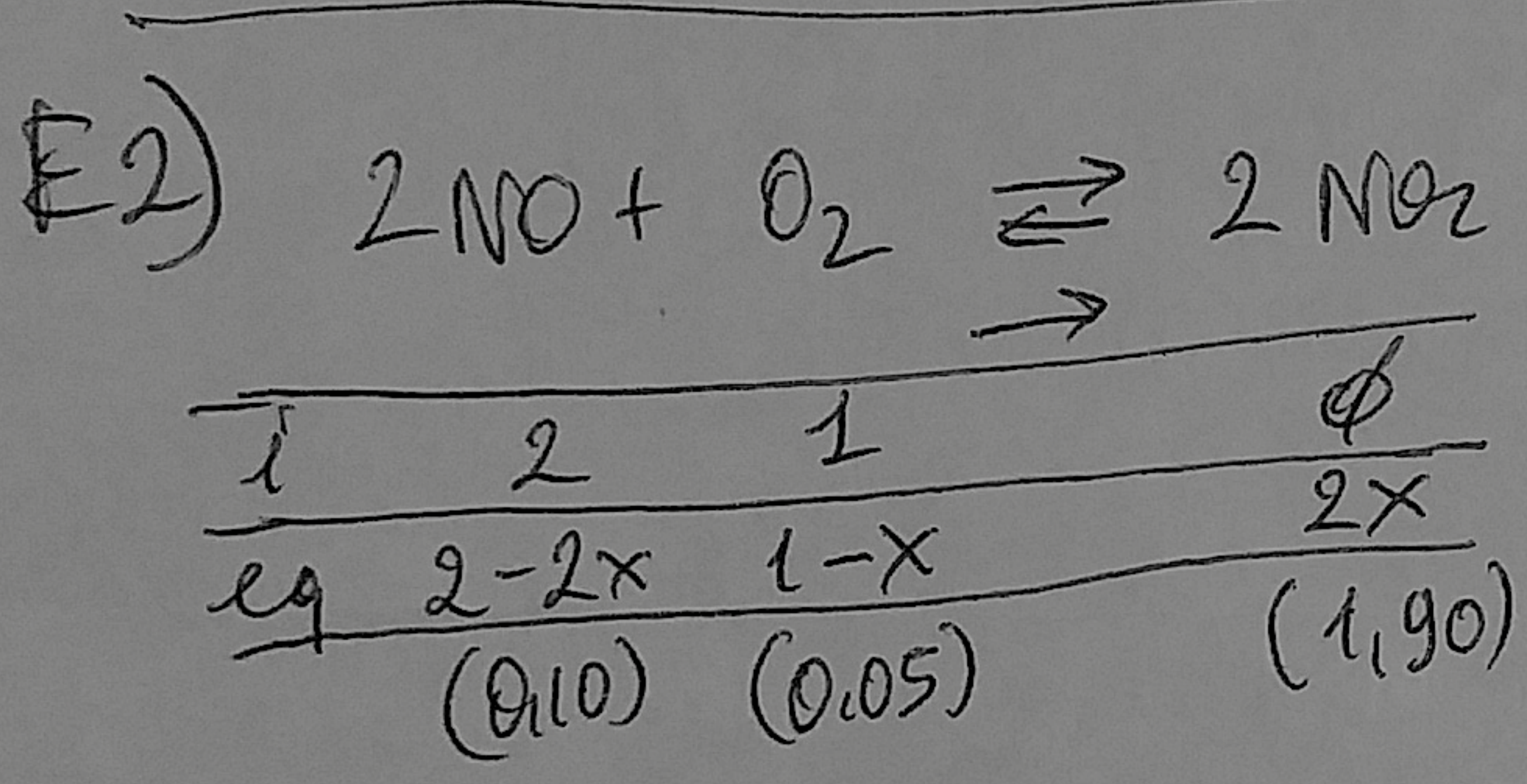
B1) $n_C = n_{CO_2} = \frac{3.70 \text{ g}}{44.01 \text{ g/mol}} = 0.250 \text{ mol}$; $n_H = 2 \cdot n_{H_2O} = 2 \cdot \frac{2.7 \text{ g}}{18.02 \text{ g/mol}} = 0.300 \text{ mol}$

$m_C = n \cdot M = 0.250 \text{ (mol)} \times 12.011 \text{ (g/mol)} = 3.00 \text{ g}$; $m_H = n \cdot M = 0.300 \text{ (mol)} \times 1.008 \text{ (g/mol)} = 0.30 \text{ g}$

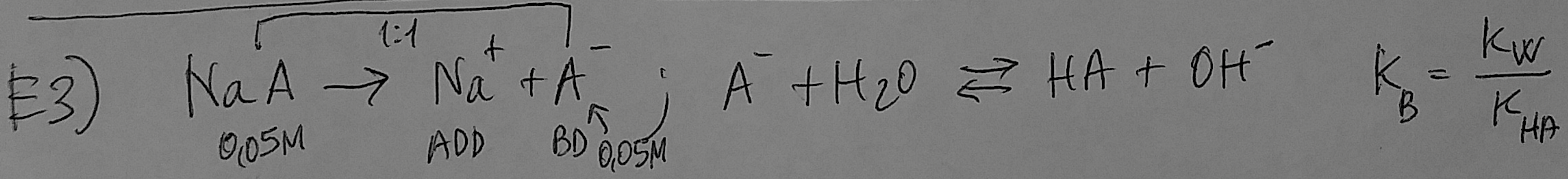
$m_O = m_{C_xH_yO_z} - (m_C + m_H) = 3.70 - (3.00 + 0.30) = 0.40 \text{ g}$; $n_O = \frac{0.40 \text{ g}}{15.999 \frac{\text{g}}{\text{mol}}} = 0.025 \text{ (mol)}$

C: $\frac{0.250}{0.025} = 10$; H: $\frac{0.300}{0.025} = 12$; O: $\frac{0.025}{0.025} = 1 \rightarrow C_{10}H_{12}O$

$M_{C_{10}H_{12}O} = 148.21 \text{ g/mol} \rightarrow$ formula MINIMA = formula MOLECOLARE



$\Delta n = -1$ $2x = 1.9 \rightarrow x = 0.95 \text{ mol}$
 $n_{tot} = 3 - x = 2.05 \text{ mol}$
 $K_p = P_{tot}^{-1} \cdot \left(\frac{1}{P_{tot}}\right)^{-1} \cdot \frac{n_{NO_2}^2}{n_{NO}^2 \cdot n_{O_2}} \rightarrow$
 $K_p = \frac{1}{0.80} \cdot 2.05 \cdot \frac{(1.90)^2}{(0.1)^2 \cdot 0.05} = 1.85 \times 10^{-4}$



$HA = [H_3O^+] = \frac{K_W}{[H_3O^+]} + \frac{CK_A}{[H_3O^+] + K_A}$ $pH = 2.5 \rightarrow [H_3O^+] = 10^{-2.5} \gg 10^{-7}$

$K_A \approx \frac{[H_3O^+]^2}{C - [H_3O^+]} = \frac{10^{-5}}{0.02 \times 10^{-2.5}} = 5.94 \cdot 10^{-4} \rightarrow K_B = \frac{K_W}{K_A} = \frac{10^{-14}}{5.94 \times 10^{-4}} = 1.68 \times 10^{-11}$

$A^- = [OH^-] = \frac{K_W}{[OH^-]} + \frac{CK_B}{[OH^-] + K_B}$ $K_B = 1.68 \times 10^{-11} \ll 10^{-7} \leq [OH^-]$; $CK_B = 5 \cdot 10^{-2} \cdot 1.68 \cdot 10^{-11} = 8.42 \times 10^{-13}$

$[OH^-]^2 - K_W - CK_B = 0 \rightarrow [OH^-] = \sqrt{K_W + CK_B} = \sqrt{(1 + 8.42) \cdot 10^{-14}} = 9.23 \cdot 10^{-7} \text{ M} \rightarrow$

$pOH = -\log[OH^-] = 6.0 \rightarrow pH = 14 - pOH = 8.0$