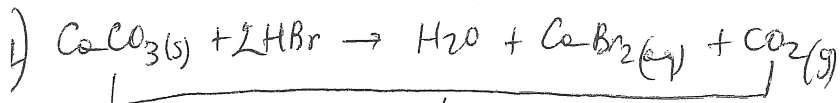
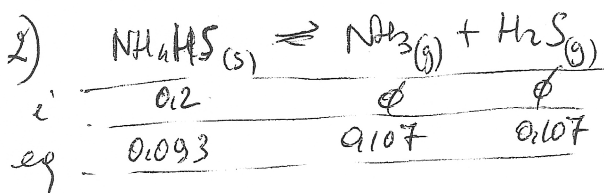


# Soluzione della 3<sup>a</sup> Esercitazione Maggio 2011



$$n_{\text{CO}_2} = \frac{pV}{RT} = \frac{(1520/760) \cdot 70}{0.0821 \cdot 298.15} = 5.72 \text{ mol} = n_{\text{CaCO}_3}$$

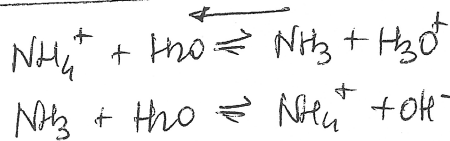
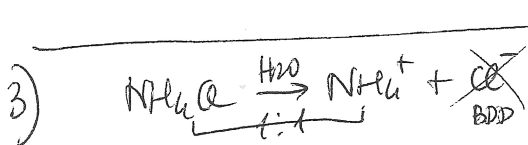
$$m_{\text{CaCO}_3} = n_{\text{CaCO}_3} \cdot M = 5.72 \cdot 100.09 = 574.5 \text{ g} \quad \% = \frac{574.5 \cdot 100}{1000} = \underline{57.24}$$



$$n_{\text{NH}_4\text{HS}} = \frac{10.222 \text{ g}}{51.1 \text{ g/mol}} = 0.2 \text{ mol}$$

$$n_{\text{NH}_4\text{HS}} = \frac{4.753 \text{ g}}{51.1 \text{ g/mol}} = 0.093 \text{ mol}$$

$$K_c = \left(\frac{0.107}{8}\right)^2 = 1.79 \cdot 10^{-4}$$



$$K_a = 5.5 \cdot 10^{-10}$$

$$K_b = 1.8 \cdot 10^{-5}$$

$$n_{\text{NH}_4\text{Cl}} = n_{\text{NH}_4^+} = x$$

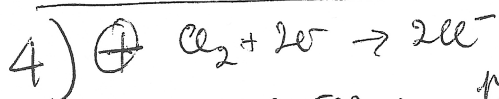
$$pK_a = 9.26 \quad \left( \begin{array}{l} \text{capacità tamponante} \\ 8.26 < \text{pH} < 10.26 \end{array} \right)$$

$$[\text{H}_3\text{O}^+] = K_a \cdot \frac{[\text{NH}_4^+]}{[\text{NH}_3]}$$

Sostituendo:

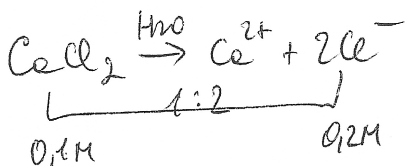
$$10^{-9.8} = 10^{-9.26} \cdot \frac{x}{\frac{0.2}{x}} \rightarrow x = \frac{1}{5} \cdot 10^{-0.54} = 0.058 \text{ mol}$$

$$m_{\text{NH}_4\text{Cl}} = n_{\text{NH}_4\text{Cl}} \cdot M = 0.054 \cdot 53.49 = 3.085 \text{ g}$$

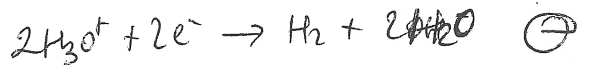


$$E = 1.36 + \frac{0.0592}{2} \log \frac{[\text{Ce}^{2+}]}{[\text{e}^-]^2} =$$

$$= 1.36 + \frac{0.0592}{2} \log \frac{0.4}{(0.2)^2} = 1.39 \text{ V}$$

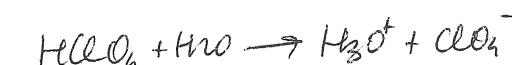


$$\Delta E = 1.39 - (-0.12) = \underline{1.51 \text{ V}}$$



$$E = 0 + \frac{0.0592}{2} \log \frac{[\text{H}_3\text{O}^+]^2}{[\text{H}_2]} =$$

$$= 0 + \frac{0.0592}{2} \log \frac{(10^{-2})^2}{1} = -0.12 \text{ V}$$



$$C = 0.10 > 10^{-7}$$

$$[\text{H}_3\text{O}^+] = 10^{-2} \text{ M}$$

$$E = -0.06 = \frac{0.0592}{2} \log x^2$$

$$0.06 = 0.06 \text{ pH} \rightarrow \text{pH} = 1$$