

B) a) $C_A V_A = C_B V_B$

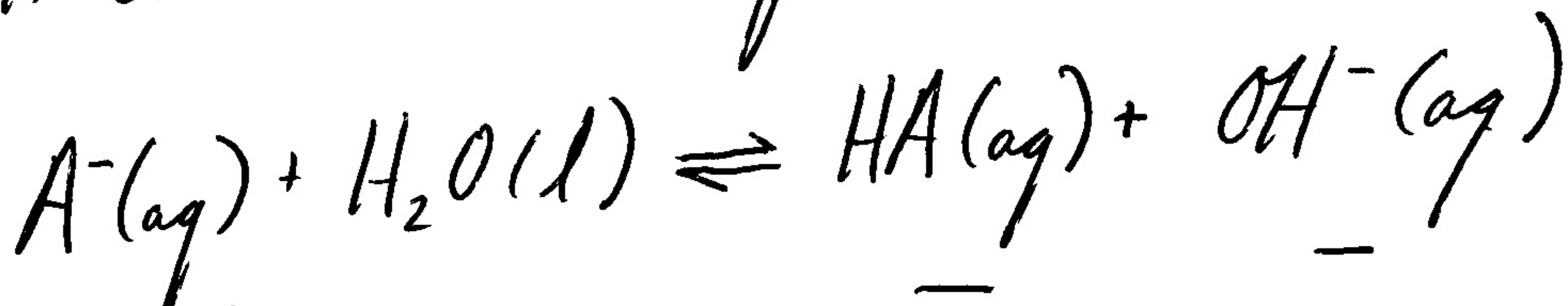
$$C_A = \frac{C_B V_B}{V_A} = \frac{(0.250 \text{ M})(17.7 \text{ mL})}{(25.0 \text{ mL})} = 0.177 \text{ M}$$

$$MM = \frac{\text{masse HA}}{\text{moles HA}} = \frac{1.44 \text{ g}}{\underbrace{(0.177 \text{ mol/L})(0.025 \text{ L})}_{0.004425 \text{ mol}}} = \underline{\underline{325 \text{ g/mol}}}$$

b) au point d'équivalence, on a 0.004425 mol de A^- et un volume de $25.0 + 17.7 = 42.7 \text{ mL}$

$$[A^-]_0 = \frac{0.004425 \text{ mol}}{0.0427 \text{ L}} = 0.1036 \text{ M}$$

le pH est 9.88 donc $p^{\text{OH}} = 4.12$ et $[\text{OH}^-] = 10^{-4.12} = 7.59 \times 10^{-5} \text{ M}$



i: 0.1036

c: -7.59×10^{-5}

e: 0.1035

$+7.59 \times 10^{-5}$

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7.59×10^{-5}

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$$K_b = \frac{[\text{HA}][\text{OH}^-]}{[A^-]} = \frac{(7.59 \times 10^{-5})^2}{0.1035} = 5.57 \times 10^{-8}$$

$$K_a K_b = 1.0 \times 10^{-14} \Rightarrow K_a = \frac{1.0 \times 10^{-14}}{5.57 \times 10^{-8}} = \underline{\underline{1.8 \times 10^{-7}}}$$

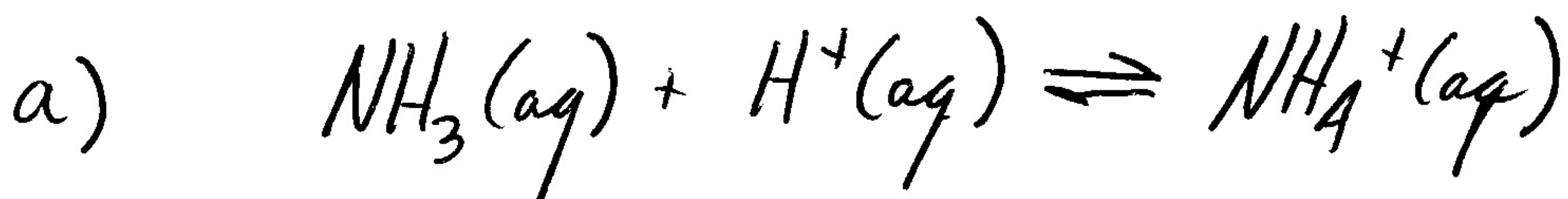
A) Cl_2

$$B) n_{\text{NH}_3} = \frac{12.1 \text{ g}}{[14.01 + (3)(1.008)] \text{ g/mol}} = 0.7103 \text{ mol}$$

$$n_{\text{HCl}} = \frac{6.2 \text{ g}}{[35.45 + 1.008] \text{ g/mol}} = 0.1701 \text{ mol}$$

N.B. l'acide est NH_4^+ (la base est NH_3 et son $K_b = 1.8 \times 10^{-5}$)

$$K_a = \frac{1.0 \times 10^{-14}}{1.8 \times 10^{-5}} = 5.56 \times 10^{-10} \Rightarrow \text{p}K_A = 9.255$$



$$i: \quad 0.7103 \quad 0.1701 \quad -$$

$$c: \quad -0.1701 \quad -0.1701 \quad +0.1701$$

$$e: \quad 0.5402 \quad - \quad 0.1701$$

$$\text{pH} = \text{p}K_A + \log \left(\frac{[\text{NH}_3]}{[\text{NH}_4^+]}\right) = 9.255 + \log \left(\frac{0.5402}{0.1701} \right) = \underline{\underline{9.76}}$$

b) 1.00 g de NaOH (0.0250 mol) consomme 0.0250 mol de NH_4^+ et produit 0.0250 mol de NH_3

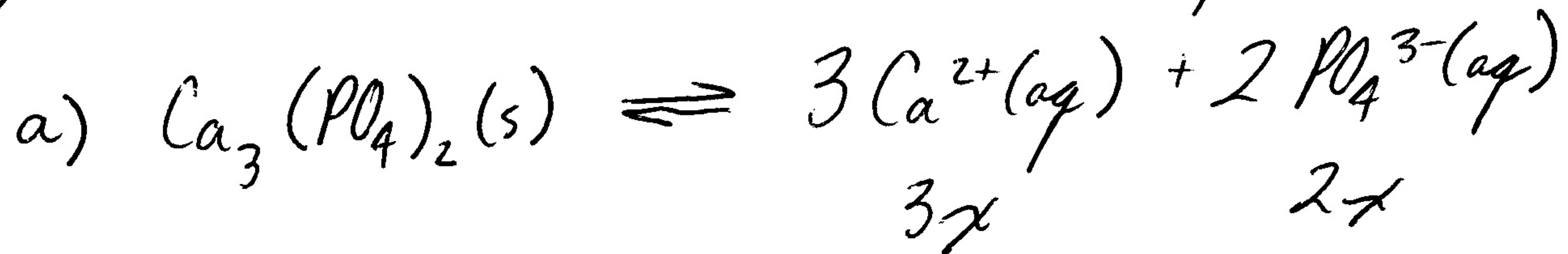
$$\text{pH} = 9.255 + \log \left(\frac{0.5402 + 0.0250}{0.1701 - 0.0250} \right) = \underline{\underline{9.85}}$$

c) 1.00 g de HCl (0.0274 mol) consomme 0.0274 mol de NH_3 et produit 0.0274 mol de NH_4^+

$$\text{pH} = 9.255 + \log \left(\frac{0.5402 - 0.0274}{0.1701 + 0.0274} \right) = \underline{\underline{9.68}}$$

A) I^-

B) soit x le montant de $Ca_3(PO_4)_2$ qui se dissout



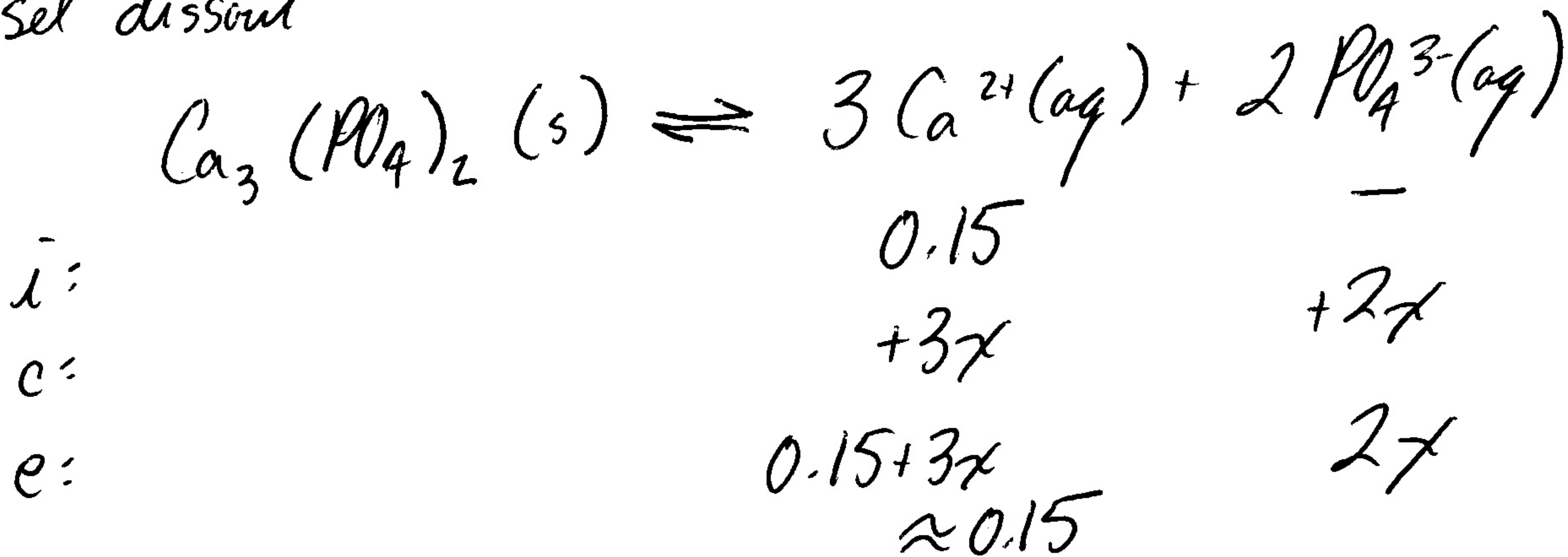
$$K_{sp} = [Ca^{2+}]^3 [PO_4^{3-}]^2$$

$$2.1 \times 10^{-33} = (3x)^3 (2x)^2 = 108x^5 \Rightarrow x = \sqrt[5]{\frac{2.1 \times 10^{-33}}{108}} = 1.142 \times 10^{-7}$$

• multiplié par la masse molaire de $Ca_3(PO_4)_2$ (310.18 g/mol)

$$\text{solubilité} = (1.142 \times 10^{-7} \text{ mol/L}) (310.18 \text{ g/mol}) = \underline{\underline{3.5 \times 10^{-5} \text{ g/L}}}$$

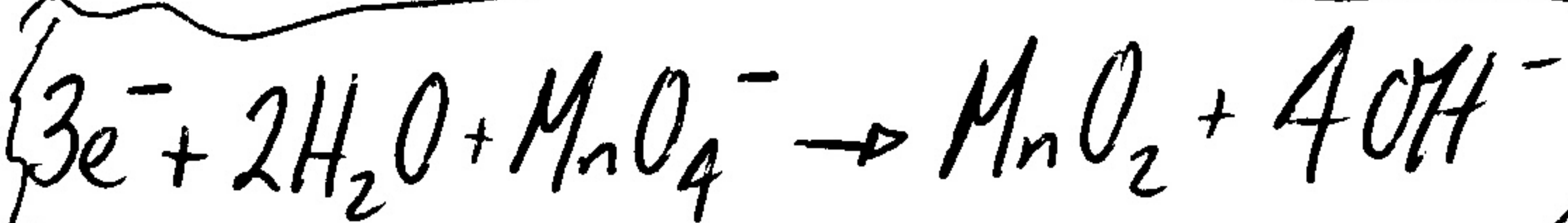
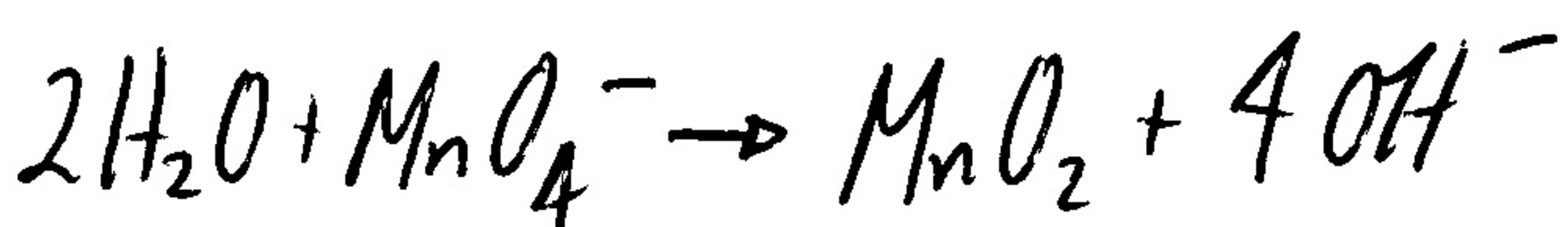
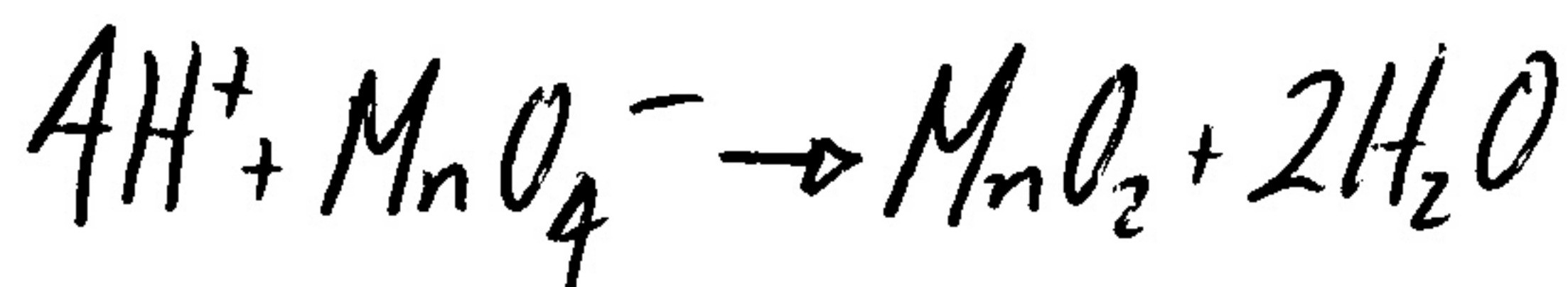
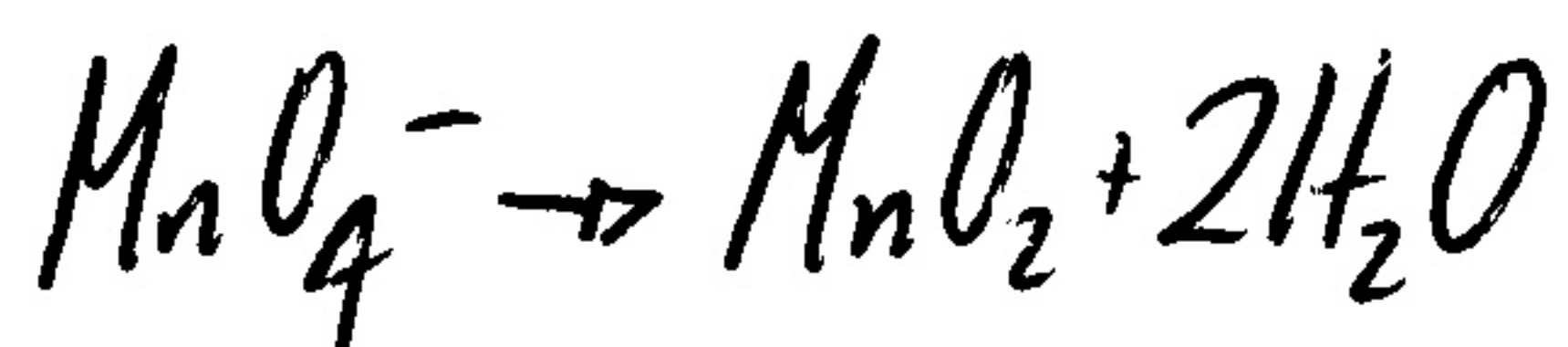
b) la concentration de Ca^{2+} est déjà 0.15M avant que le sel dissout



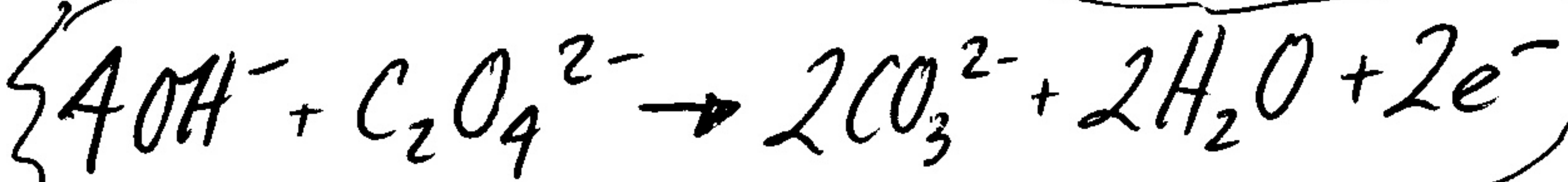
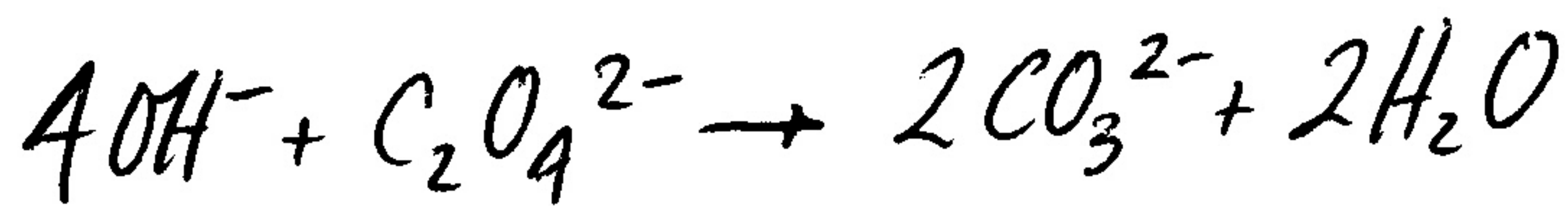
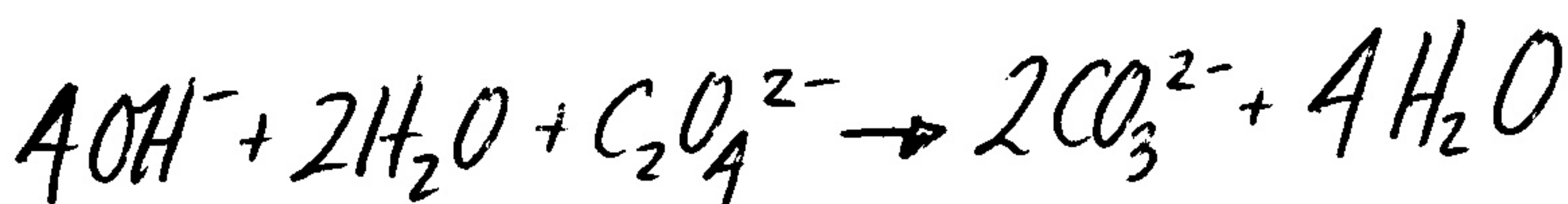
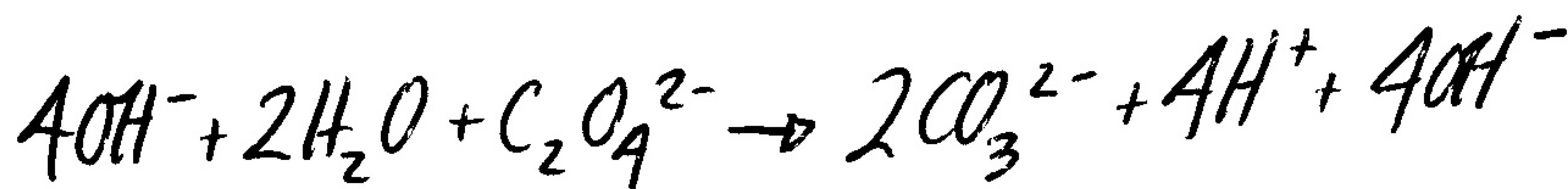
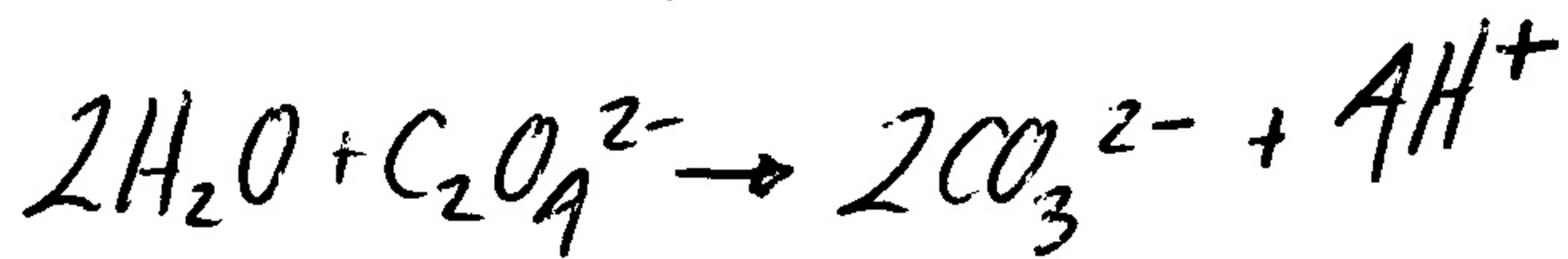
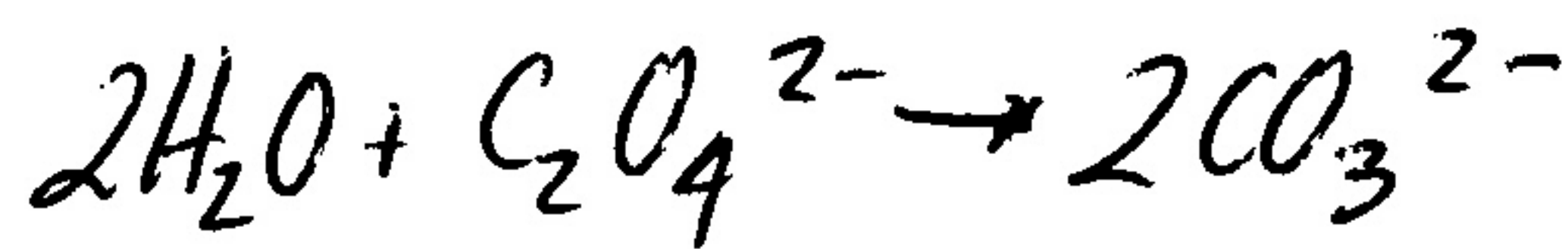
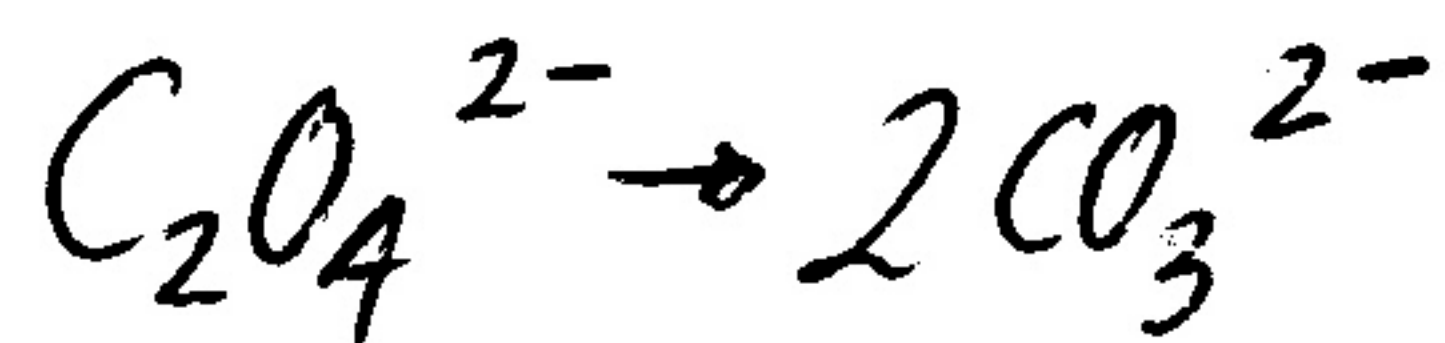
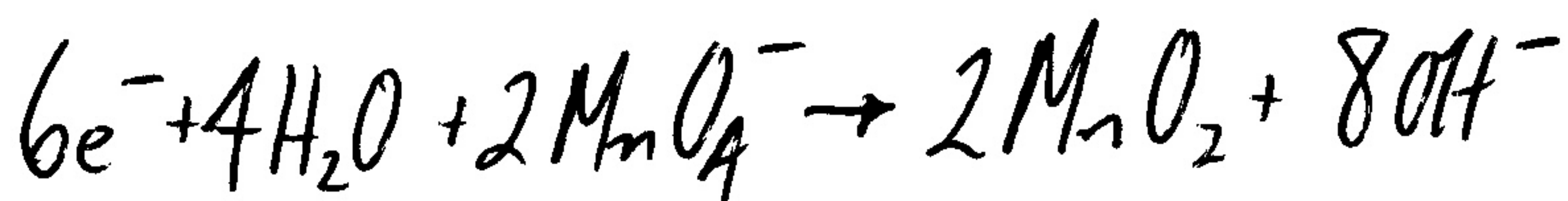
$$2.1 \times 10^{-33} = (0.15)^3 (2x)^2 \Rightarrow x = \sqrt{\frac{2.1 \times 10^{-33}}{(0.15)^3 (4)}} = 3.944 \times 10^{-16}$$

$$\text{solubilité} = (3.944 \times 10^{-16} \text{ mol/L}) (310.18 \text{ g/mol}) = \underline{\underline{1.2 \times 10^{-13} \text{ g/L}}}$$

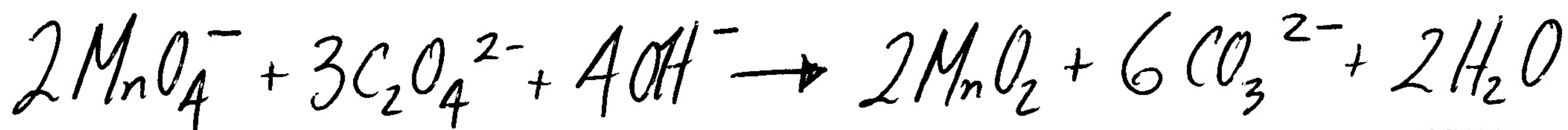
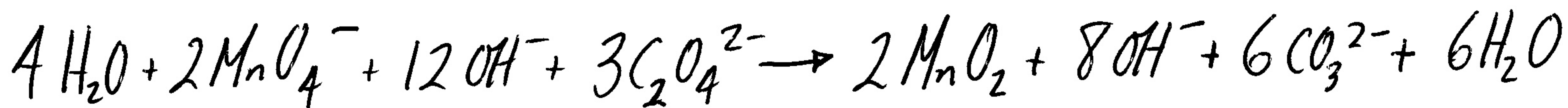
A) $\text{pH} > 7$



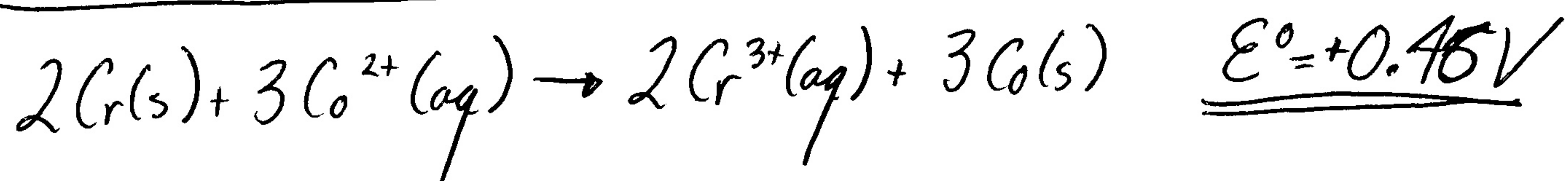
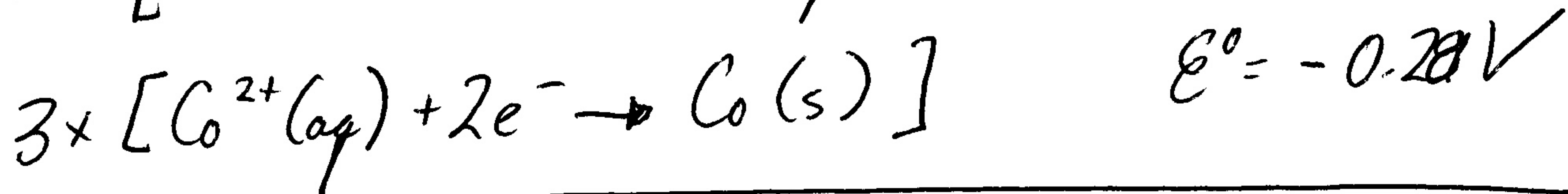
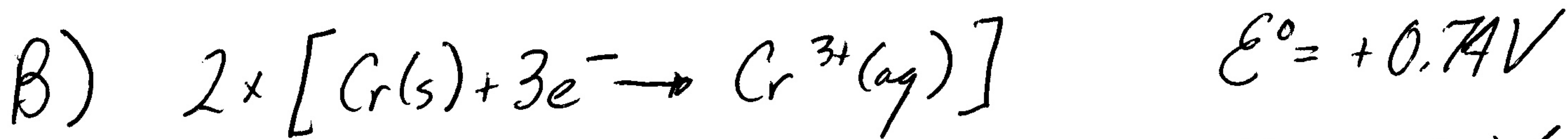
$\times 2$



$\times 3$



A) +3



$$\Delta G^\circ = -nFE^\circ = -(6 \text{ mol})(96487 \text{ C/mol})(+0.46V) = -266304 \text{ J}$$

$$\underline{\underline{\Delta G^\circ = -2.7 \times 10^5 \text{ J}}}$$

• trouvez la concentration de Co^{2+} qui rend la réaction spontanée (ΔG atteint une valeur qui est infinitésimalement plus petite que zéro)

$$\Delta G = 0 = \Delta G^\circ + RT \ln Q$$

$$0 = -266304 \text{ J} + (8.3145 \text{ J/Kmol})(298.15 \text{ K}) \ln Q$$

$$\ln Q = 105.00 \Rightarrow Q = e^{105.00} = 4.009 \times 10^{45}$$

$$4.009 \times 10^{45} = \frac{[Cr^{3+}]^2}{[Co^{2+}]^3} \Rightarrow [Co^{2+}] = \sqrt[3]{\frac{(0.150)^2}{4.009 \times 10^{45}}}$$

$$[Co^{2+}] = \underline{\underline{1.8 \times 10^{-16} \text{ M}}}$$