

I/1) Avant dernière colonne $\Rightarrow 7$ électrons de valence
Donc n.o. (Cl) $\in [VII; -I]$

2) ΔCl_2 : n.o. (Cl) = 0

ΔClO_4^- : n.o. (O) = $-II \Rightarrow$ n.o. (Cl) - $4 \times 2 = -1$

\Rightarrow n.o. (Cl) = III

ΔHOC : $\left. \begin{array}{l} \text{n.o. (H)} = +I \\ \text{n.o. (O)} = -II \end{array} \right\} \Rightarrow \text{n.o. (Cl)} = +I$

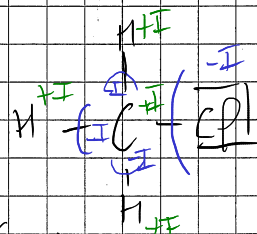
ΔClO_3^- : n.o. (Cl) - $6 = -1 \Rightarrow$ n.o. (Cl) = $+V$

ΔClO^- : n.o. (Cl) - $2 = -1 \Rightarrow$ n.o. (Cl) = $+I$

ΔCH_3Cl : n.o. (H) = $+I$; or, donc

n.o. (C) = $-3 + 1 = -2$, et

n.o. (Cl) = $-3 + 2 = -I$



3) $\Delta Cr_2O_7^{2-}$: $2 \text{ n.o. (Cr)} + 7 \cdot \text{n.o. (O)} = -2$

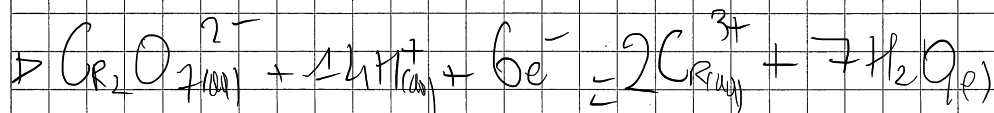
$\Rightarrow 2 \text{ n.o. (Cr)} = -2 + 14 = 12$

$\Rightarrow \text{n.o. (Cr)} = +VI$

ΔCr^{3+} : n.o. (Cr) = $+III$

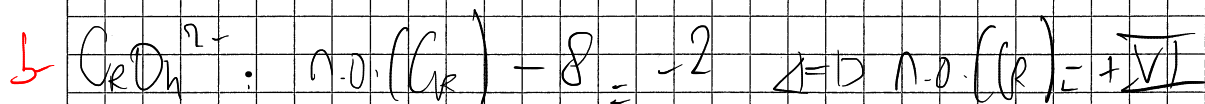
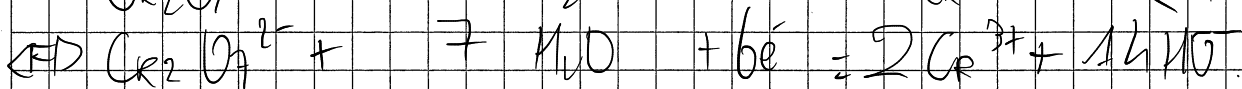
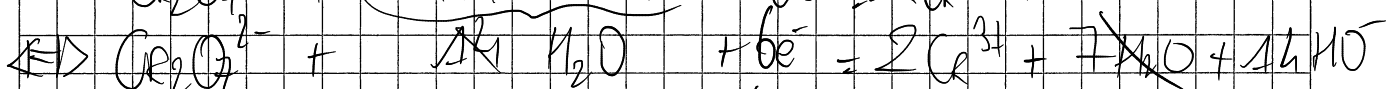
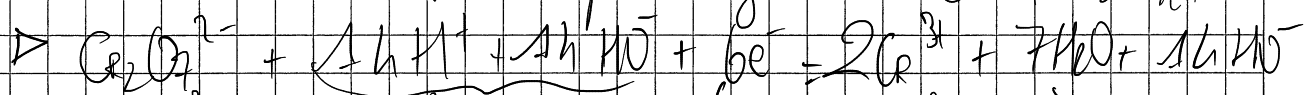
Le chrome se trouve dans des degrés d'oxydation différents, et peuvent donc faire partie d'un couple Redox via échange d'électrons.

Lors d'une oxydation, n.o. \uparrow : Cr^{3+} se fait oxyder en $Cr_2O_7^{2-}$; c'est donc le réducteur, et $Cr_2O_7^{2-}$ s'oxydant.



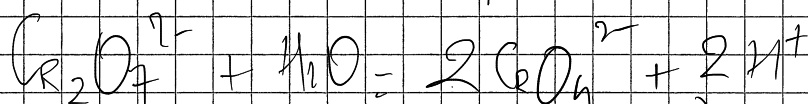
Pour passer en milieu basique, on ajoute autant de HO^- à gauche et à droite qu'il y a de H^+ .

H^+ et HO^- se combinent pour former de $H_2O(l)$.

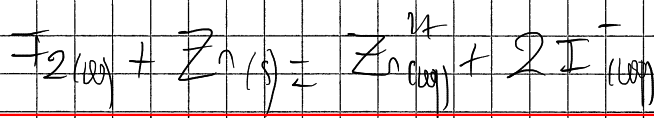
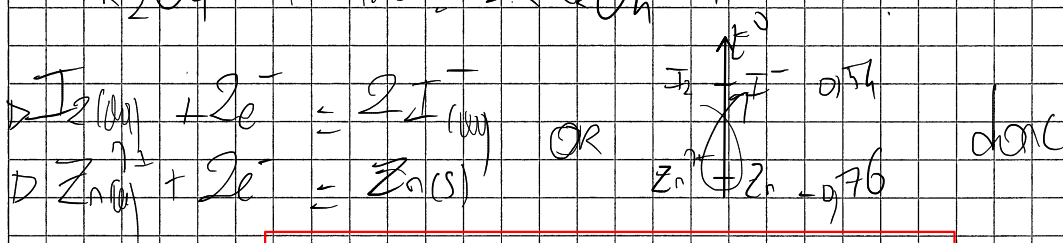


Pas de chgt de n.o., pas Redox.

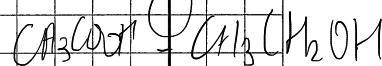
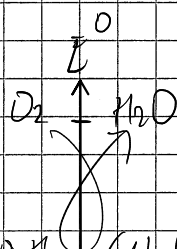
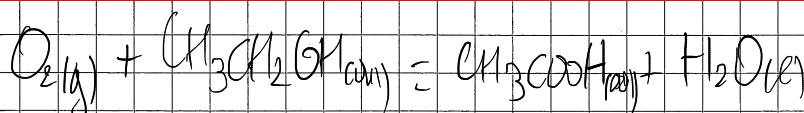
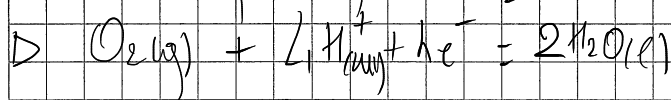
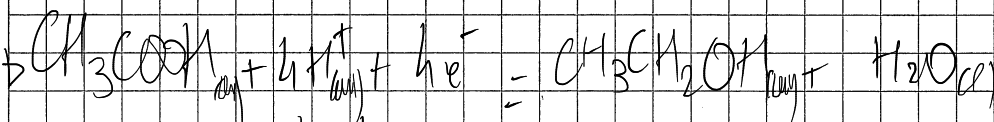
C'est un couple acide-base car CrO_4^{2-} réagit avec l'eau en libérant un proton :



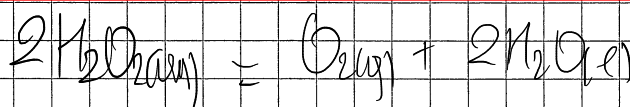
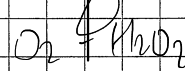
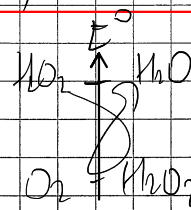
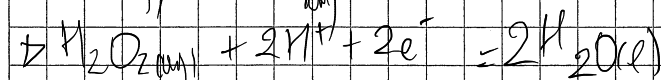
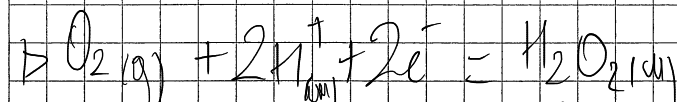
II/1)

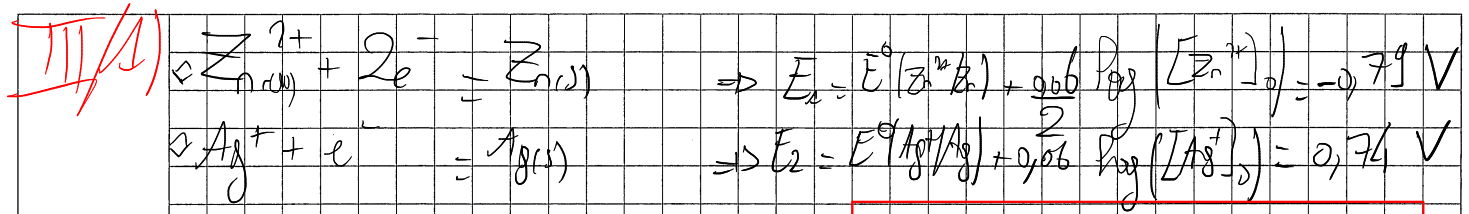


2)



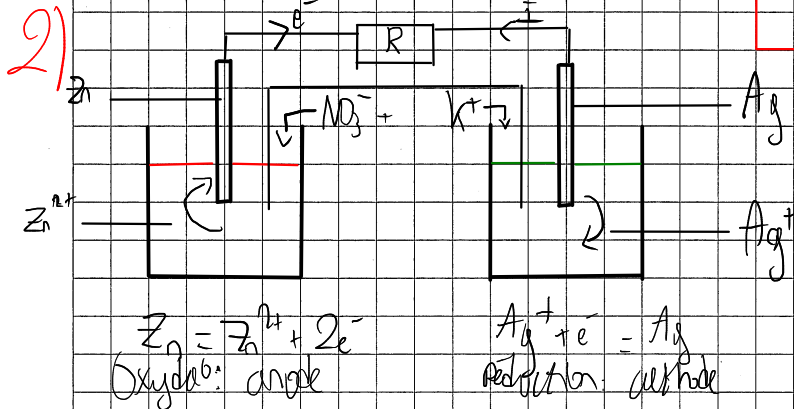
3)





Borne $\oplus = \text{Ag}^+/\text{Ag}$, cathode;
 Borne $\ominus = \text{Zn}^{2+}/\text{Zn}$, anode

! Fem. à vide donc pas de
 $\times 2$ pour Ag^+/Ag !



3)

E°	Ag^+/Ag	Zn^{2+}/Zn	Zn^{2+}/Zn	Ag^+/Ag
E.I	0,74	✓	0,74	✓
E.F	0,74	✓	0,74	✓

À l'équilibre, $E_1 = E_2 \Rightarrow E^\circ(\text{Ag}^+/\text{Ag}) - E^\circ(\text{Zn}^{2+}/\text{Zn})$

$$\Rightarrow \frac{0,06 - \log}{(0,06 - \log)^2} = 10^{\frac{1}{0,03} (E^\circ(\text{Ag}^+/\text{Ag}) - E^\circ(\text{Zn}^{2+}/\text{Zn}))} = 10^{\frac{0,03}{0,03} \log \left(\frac{[\text{Zn}^{2+}]}{[\text{Ag}^+]^2} \right)} = K = 10^{52}$$

La réaction est donc totale, et $\xi_{\text{eq}} = \xi_{\text{max}} = \frac{0,06}{2} = 2,5 \cdot 10^{-2} \text{ mol.L}^{-1}$

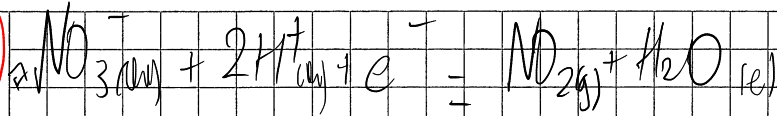
Donc $[\text{Ag}^+]_{\text{eq}} = 0 \text{ mol.L}^{-1}$
 $[\text{Zn}^{2+}]_{\text{eq}} = 0,15 \text{ mol.L}^{-1}$

1) $Q = 2 \xi_{\text{eq}} F = 4,8 \cdot 10^3 \text{ C}$

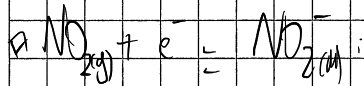
$i = \frac{Q}{\Delta t}$ so i constant, donc

$i = 2,7 \text{ A}$

IV/1)



$$E_1 = E_1^0 + 0,06 \log \frac{[\text{NO}_3^-][\text{H}^+]^2}{P_{\text{NO}_2}}$$

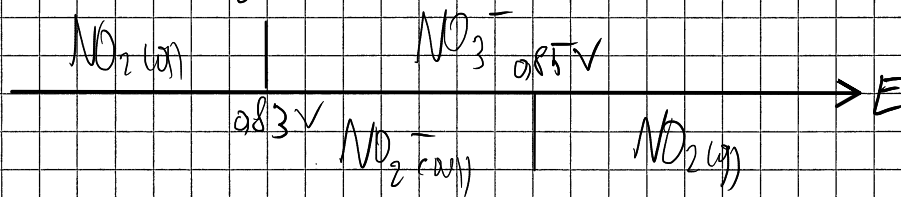


$$E_2 = E_2^0 + 0,06 \log \frac{P_{\text{NO}_2}}{P^0[\text{NO}_2^-]}$$

2)

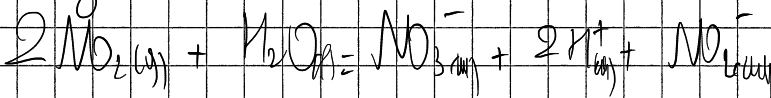
$$E_{1, \text{gr}} = E_1^0 + 0,06 \log 1 = 0,83 \text{ V}$$

$$E_{2, \text{gr}} = E_2^0 + 0,06 \log 1 = 0,85 \text{ V}$$



Disproportion \Rightarrow instable. Proches en E de PCV favorise.

3)



4)

$$E_1 = E_2 \quad \text{CED} \quad K = 10^{\frac{E_2^0 - E_1^0}{0,06}} = 2,15$$

"Expérience" à démontrer.