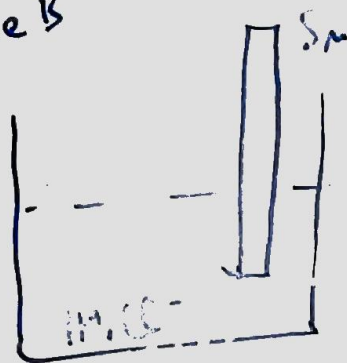


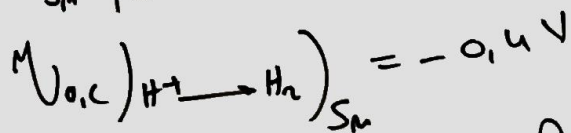
Partie B



$$[Sm^{2+}]_0 = 10^{-6} \text{ mol/L}$$

$$pH = 1$$

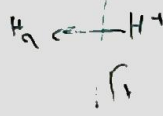
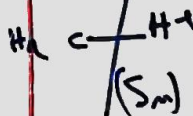
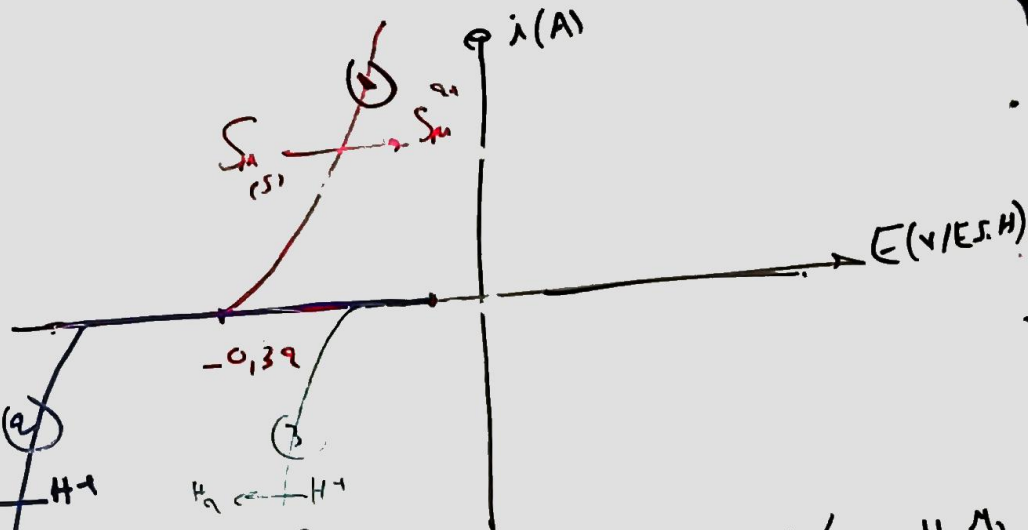
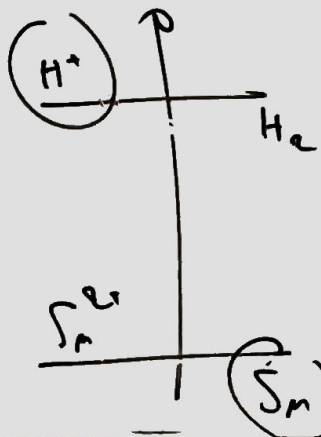
$$E_{Sm^{2+}/Sm}^{\ominus} = -0,14 \text{ (V/E.S.H)}$$



$$E_{eq}(Sm^{2+}/Sm) = E_{Sm^{2+}/Sm}^{\ominus} + \frac{0,06}{2} \log [Sm^{2+}]_0$$

$$= -0,14 - 0,18 = -0,32 \text{ V}$$

$$E_{H^+/H_2} = -0,06 pH = -0,06 \text{ V}$$



la réduction de  $H^+ \rightarrow H_2$  est observée si  $E < -906 pH + 0,06$

$$E < (-0,06 - 0,4) = -0,46$$

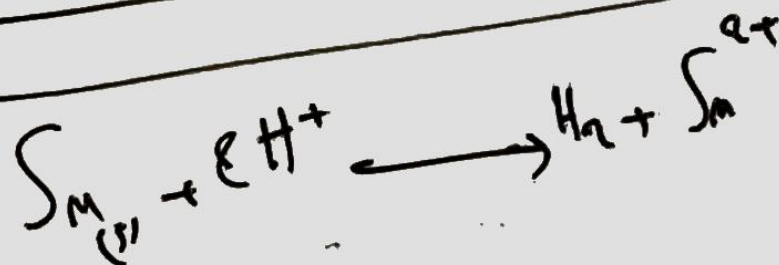
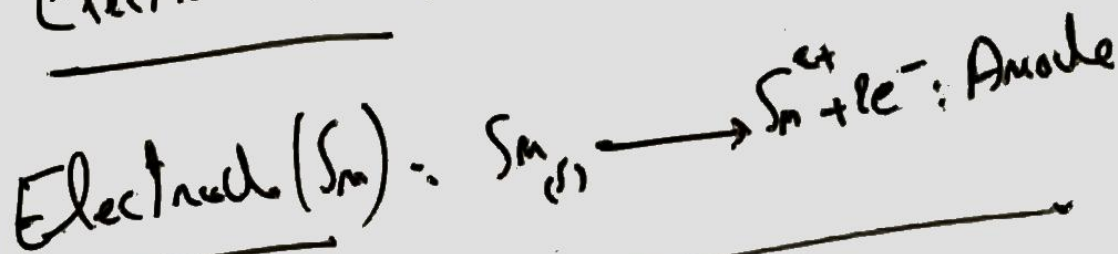
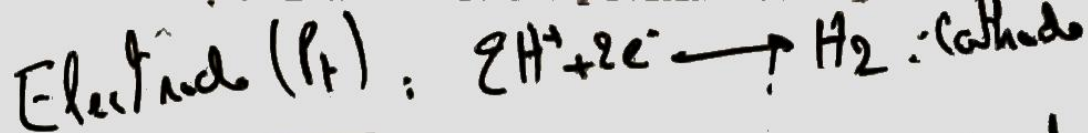
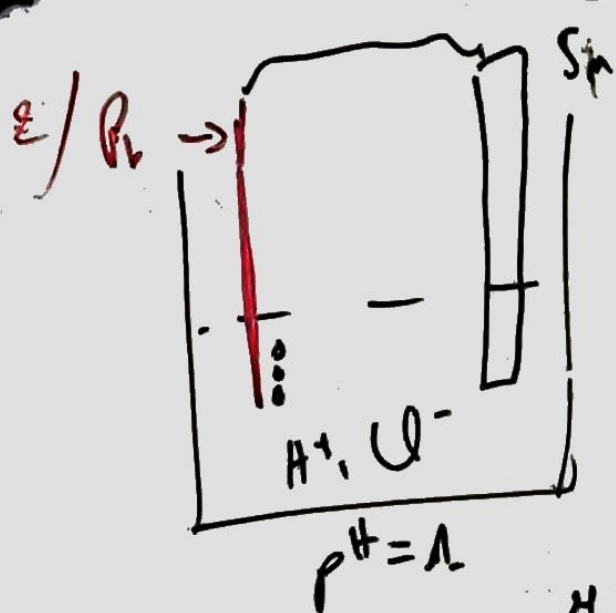
les courbes (a) et (b) ont un point commun pour donner

$$i_a = -i_c = 0 \text{ A}$$

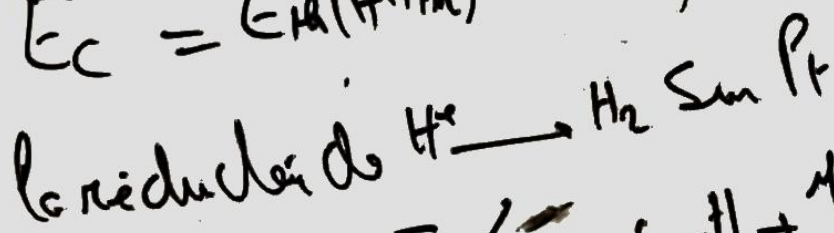
$\Rightarrow$  l'oxydation de  $Sm$  n'est pas observée.

Car la réduction de  $H^+ \rightarrow H_2$   $Sm(Sm)_{sd} 0$

en un blocage cinétique  $(M_{(O.C)} \Big|_{Sm})$  n'est élevée



$E_c = E_{H(H^+/H_2)} + \eta_{0,c}$



Si observez si  $E < (-0,06 pH + \eta_{0,c})_{Pt}$

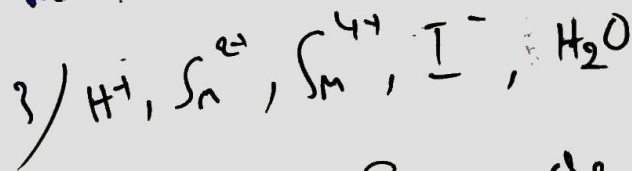
$E < -0,06 - 0,1$  dans  $E < -0,16$

Les courbes (1) et (3) montrent une zone commune

$\Rightarrow$  présence d'un pont de fonctionnement qui

montre  $(i_a = -i_c) \neq 0$  dans l'oxydation de  $Sn_{(s)}$  es/observée.

Task 2 B



Sys  $I_2 / I^-$  on Pt: rapid

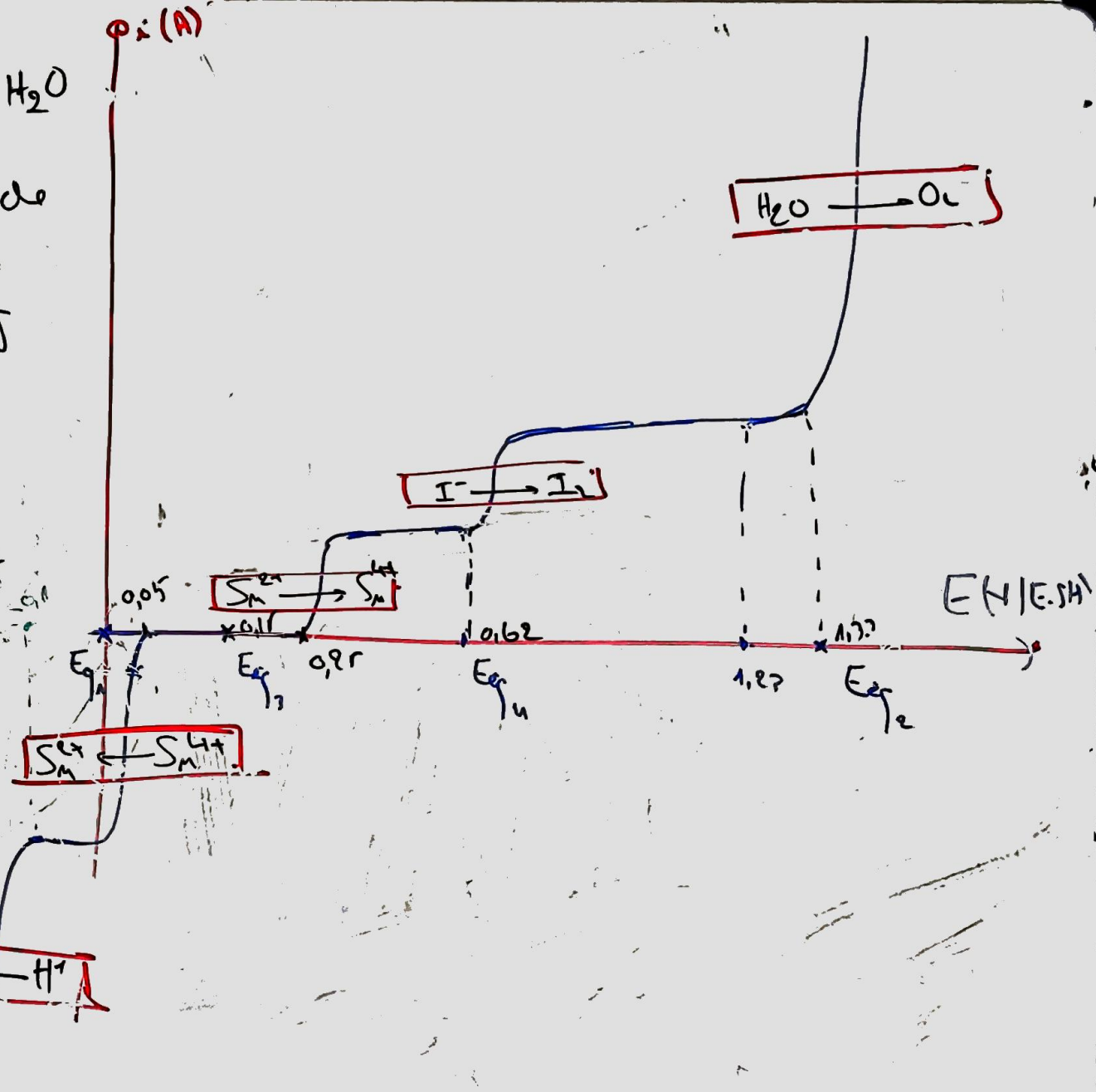
Sys  $S_n^{4+} / S_n^{2+}$  on Pt: lent

Sys  $H^+ / H_2$  on Pt: lent

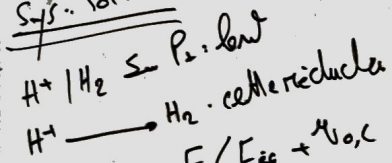
C/e  $H_2O$  on Pt: lent

$$\eta_{O_2} = 0,1 V$$

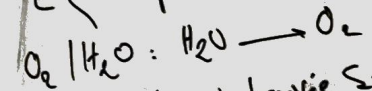
$$\eta_{H_2} = -0,1 V$$



Sys. Solvant.



On observe  $E(E_{eq} + V_{0,c})$   
 $E(-0,06 pH + V_{0,c}) : E(-0,1 V)$

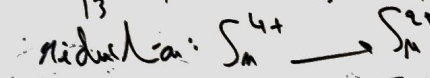


Cette oxydation observée  $\Sigma$

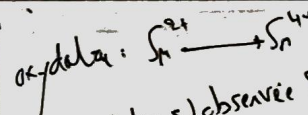
$E(E_{eq}(O_2/H_2O) + V_{0,a})$   
 $E(1,23 - 0,06 pH + V_{0,a}) = 1,33$

Sys ( $S_M^{4+} / S_M^{2+}$  sur Pt): lent

$E_{eq}(S_M^{4+} / S_M^{2+}) : E_4 = E_{S_M^{4+}/S_M^{2+}} + \frac{0,06}{2} \log \frac{[S_M^{4+}]_0}{[S_M^{2+}]_0} = E_{S_M^{4+}/S_M^{2+}}$

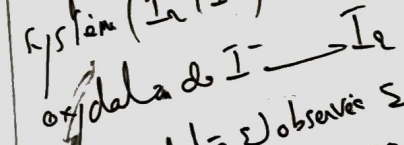


Cette réduction observée  $\Sigma$   $E(E_{eq} + V_{0,c} = 0,11 - 0,1 = 0,05$



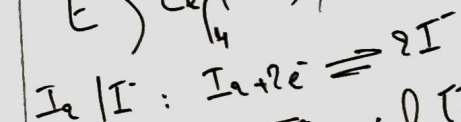
Cette oxydation observée  $\Sigma$

$E(E_{eq} + V_{0,a}) = 0,11 + 0,1 = 0,21 V$   
 système ( $I_2 / I^-$ ) sur Pt: rapide



Cette oxydation observée  $\Sigma$

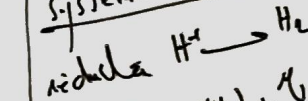
$E(E_{eq}(I_2 / I^-)) = E_{I_2 / I^-} = 0,62$



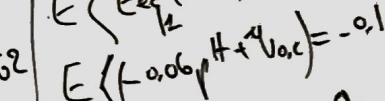
$E_{I_2} = E^0 + \frac{0,06}{2} \log \frac{[I_2]_0}{[I^-]_0^2}$

1/b) Solution ( $P^H=0$ )  
 $H^+, I^- ; S_M^{4+}, H_2O$

système solvant (lent)

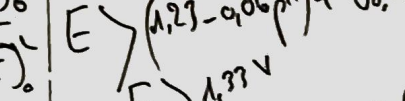
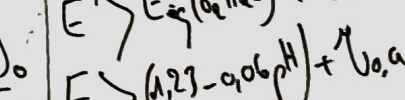


$E(E_{eq}(H^+/H_2) + V_{0,c})$   
 $E(-0,06 pH + V_{0,c}) = -0,1$



$E(E_{eq}(O_2/H_2O) + V_{0,a})$   
 $E(1,23 - 0,06 pH + V_{0,a})$

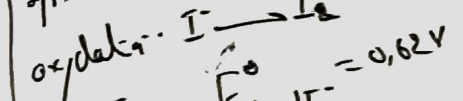
$\Rightarrow E_{1,33 V}$



$E(E_{eq} + V_{0,c})$

$E(0,11 - 0,1) = 0,05 V$

système  $I_2 / I^-$  sur Pt: rapide



$E(E_{eq}(I_2 / I^-)) = E_{I_2 / I^-} = 0,62 V$

$\Rightarrow$  branch anodique avec  
 palier de diffusion ( $[I^-]_0$ ) faible

$\Rightarrow$  branch cathodique  
 palier de diffusion ( $[S_M^{4+}]_0$ ) faible

Janice B

3/  $H^+$ ,  $S_n^{2+}$ ,  $S_n^{4+}$ ,  $I^-$ ,  $H_2O$

Sys  $I_2$   $I^-$  on Pt: rapid

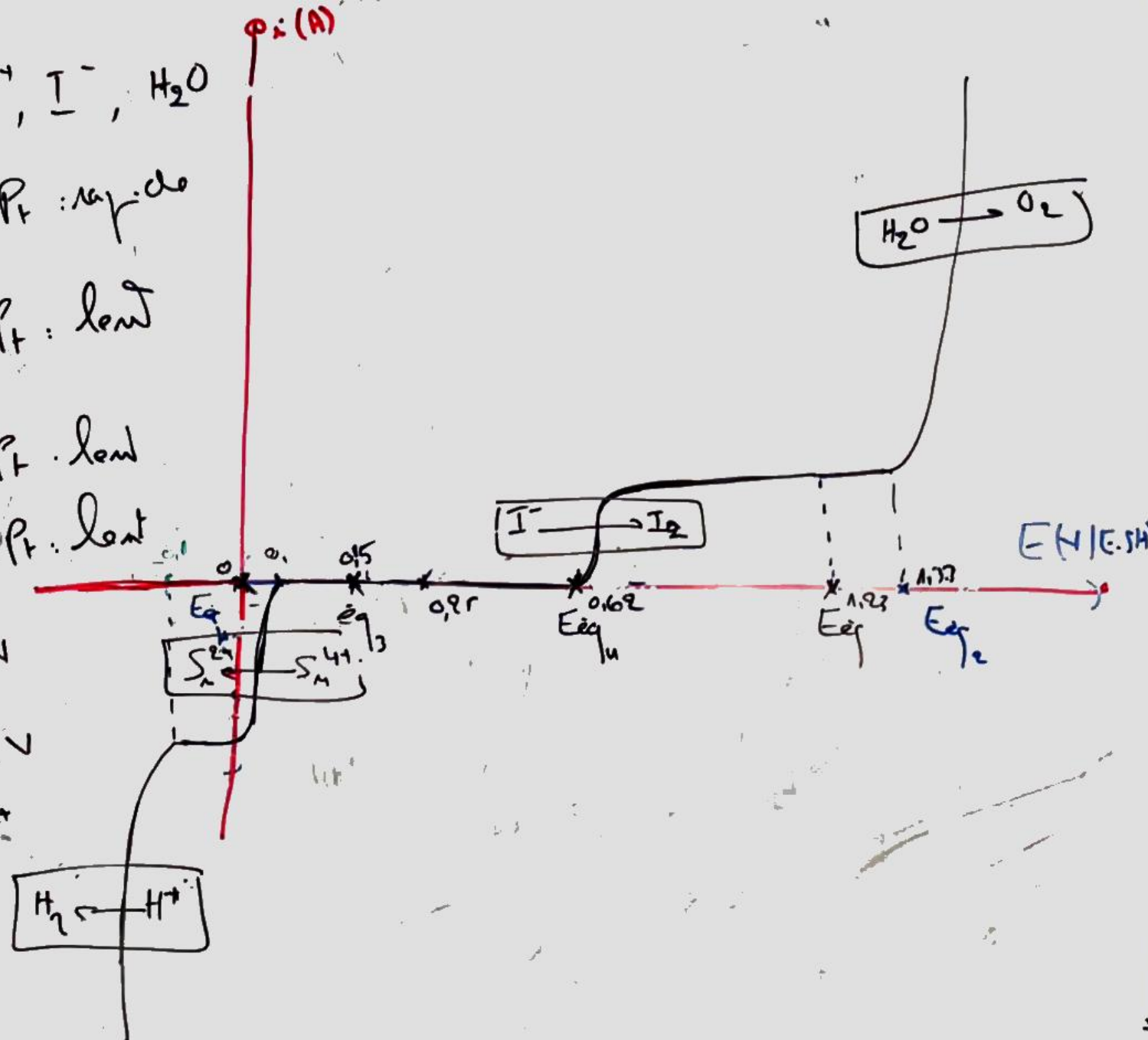
Sys  $S_n^{4+}$   $S_n^{2+}$  on Pt: lent

Sys  $H^+$   $H_2$  on Pt: lent

C/c  $H_2O$  on Pt: lent

$$U_{O_2/H_2O} = 0,1 \text{ V}$$

$$U_{H_2/H^+} = -0,1 \text{ V}$$



PT 2018

cristal  $K_2[SnBr_6]_2$

① \* Les anions  $SnBr_6^{2-}$  occupent les sommets et les centres des faces :  
arrangement CFC (a)

\* Les cations  $K^+$  occupent la totalité des sites tétraédriques :  
arrangement cubique simple ( $\frac{a}{2}$ )

②  $K_2[SnBr_6]_2$  cristallise selon la structure antifluorine  $M_2X$

$$③ Z(K^+) = 8 \times 1 = 8$$

$$Z(SnBr_6^{2-}) = 8 \times \frac{1}{8} + 6 \times \frac{1}{2} = 4$$

par maille ( $8 K^+$ ,  $4 SnBr_6^{2-}$ )

$$4 (2 K^+, SnBr_6^{2-})$$

$$4 K_2[SnBr_6]$$

$$g.f: K_2[SnBr_6] \begin{cases} u=2 \\ v=1 \end{cases}$$

nb de g.f par maille : 4

$$④ \rho_c = 3,55 \text{ g.cm}^{-3}$$

$$\rho_c = \frac{nb(g.f) \times M_{(g.f)}}{N_A V_{maille}} = \frac{4 \times M_{K_2[SnBr_6]}}{N_A a^3}$$

$$a = \left( \frac{4 \times M_{K_2[SnBr_6]}}{N_A \rho_c} \right)^{\frac{1}{3}}$$

$$1 \text{ pm} = 10^{-12} \text{ m}$$

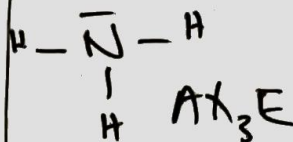
$$= 10^{-10} \text{ cm}$$

$$1 \text{ \AA} = 10^{-10} \text{ m}$$

$$= 10^{-8} \text{ cm}$$

$$1 \text{ nm} = 10^{-9} \text{ m}$$

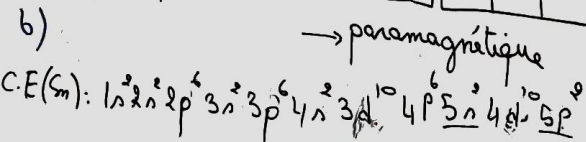
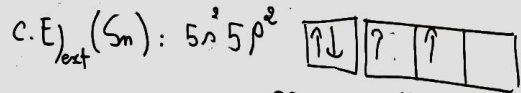
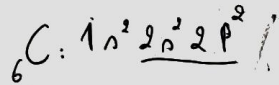
$$= 10^{-7} \text{ cm}$$



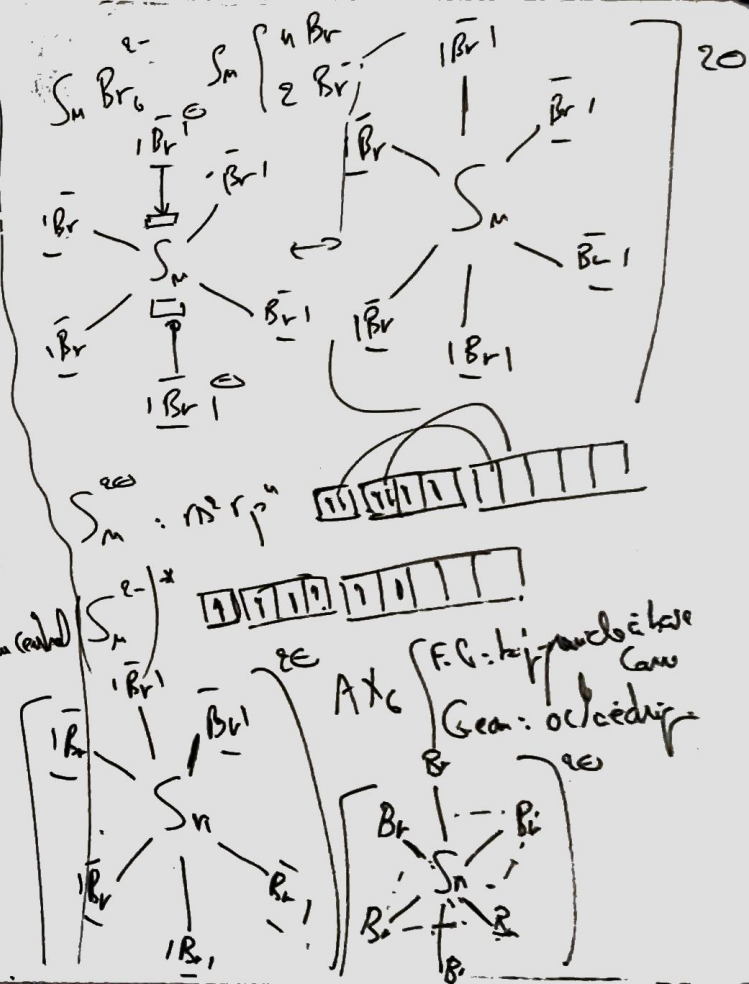
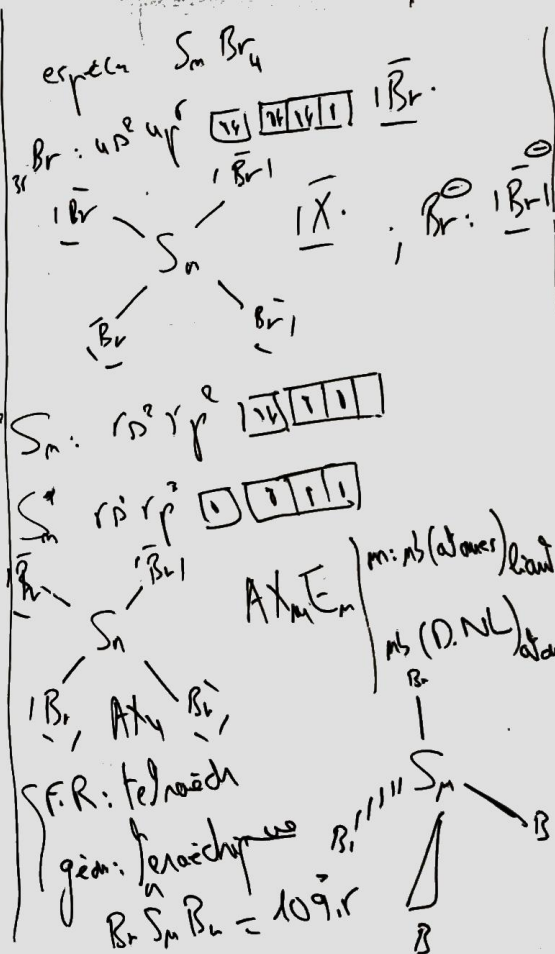
AN:  $a = \left( \frac{4 \times 676,3}{6,02 \cdot 10^{23} \times 3,55} \right)^{\frac{1}{3}} = 1,082 \cdot 10^{-4} \text{ cm}$   
 $= 10,82 \cdot 10^{-8} \text{ cm}$   
 $= 10,82 \text{ Å}$   
 $= 1082 \text{ pm}$

⑤  $\text{Sn} \in \begin{cases} 5^{\text{ème}} \text{ ligne} \\ \text{in colonne de } 6 \end{cases}$

a) 2 éléments  $\in$  à la m. colonne + in couche de valence



c)  $Z(\text{Sn}) = 50$ : Sn est le 50<sup>ème</sup> élément du tableau périodique



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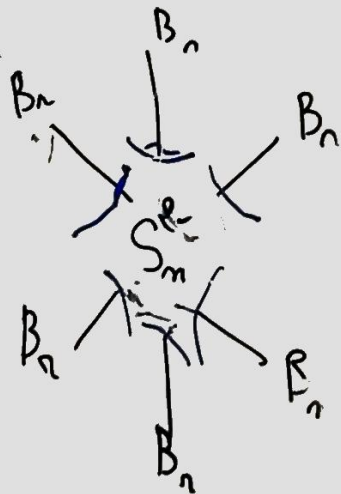


$\text{m.o.}(\text{Br}) = -\text{I}$  (car le Br est un atome liant)

$\sum \text{m.o.} = \text{charge totale}$

$$x + 6 \times (-1) = -2 \quad x = 4$$

$$\text{m.o.}(\text{Sn}) = +\text{IV}$$



$$\text{m.o.}(\text{Sn}) = +\text{IV}$$

$$\text{m.o.}(\text{Br}) = -\text{I}$$

⑧ a)  $P(hkl)$  : coupe  $\begin{cases} \text{OX en } \frac{a}{h} : \text{en } \vec{a} : h=1 \\ \text{OY en } \frac{b}{k} : \text{en } -\vec{b} : k=-1 \\ \text{OZ en } \frac{c}{l} : \text{en } -\vec{c} : l=-1 \end{cases}$

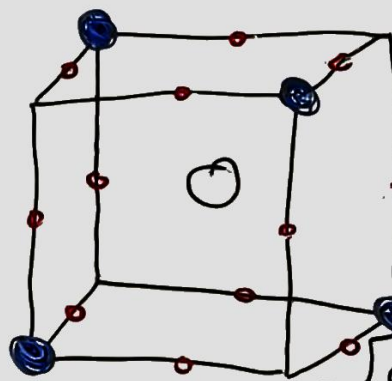
$$(hkl) = (1 \bar{1} \bar{1}) : (\bar{1} 1 1)$$

Rangé  $[uvw]$  :  $\vec{R} = \vec{OH} = u\vec{a} + v\vec{b} + w\vec{c}$

avec  $u, v$  et  $w$  premiers entre eux

$$\vec{R} = \vec{a} + \vec{b} + 0\vec{c} : R [110]$$

⑨



$\bullet$  :  $\text{Sn}^{4+}$

$\circ$  :  $\text{Br}^-$

$\bigcirc$  :  $\text{K}^+$

$$N_c(\text{Sn}^{4+}) = 6$$

chaque  $\text{Sn}^{4+}$  est entouré par 6  $\text{Br}^-$  à la m distance  $= \frac{a}{4}$

$$N_c(\text{K}^+) = 12$$

car chaque  $\text{K}^+$  est entouré par 12  $\text{Br}^-$  à la m distance  $= \frac{a\sqrt{3}}{4}$