

OXYDO REDUCTION (sur la base du sujet ESA 2024)

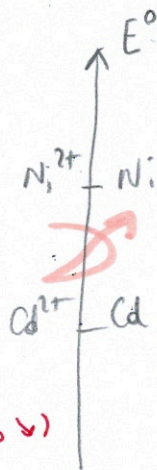
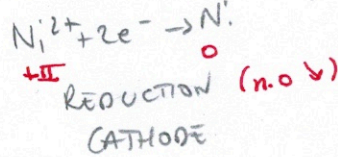
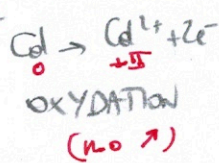
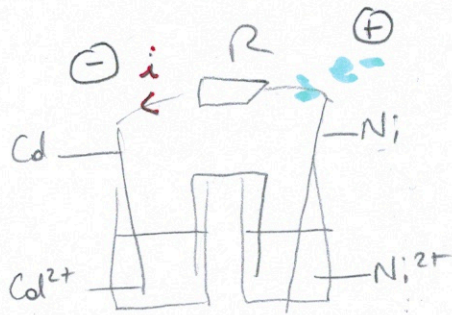
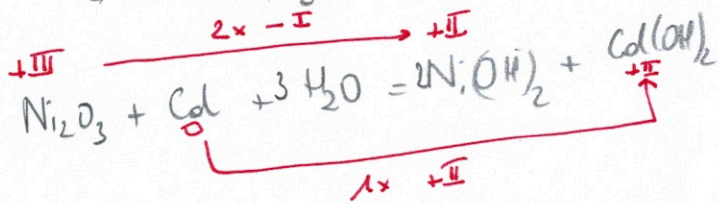
Degrés d'oxydation

$$\text{Ni}_2\text{O}_3 : 2x + 3(-\text{II}) = 0$$

↳ Ni au degré +III dans Ni_2O_3

$$\text{Ni}(\text{OH})_2 : x + 2 \times (-\text{II}) + 2 \times (+\text{I}) = 0$$

↳ Ni au degré +II dans $\text{Ni}(\text{OH})_2$



fem

$$\text{Ni}^{2+} + 2e^- = \text{Ni}$$

$$E_+ = E_+^0 + \frac{0,06}{2} \log([\text{Ni}^{2+}])$$

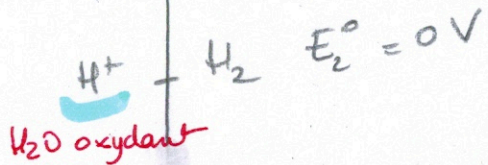
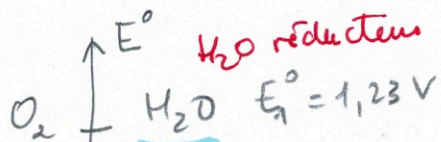
$$\text{Cd}^{2+} + 2e^- = \text{Cd}$$

$$E_- = E_-^0 + \frac{0,06}{2} \log([\text{Cd}^{2+}])$$

$$E_+ - E_- = E_+^0 - E_-^0 + 0,03 \log \left(\frac{[\text{Ni}^{2+}]}{[\text{Cd}^{2+}]} \right)$$

À 6 fin $E_+ = E_-$

Couples de l'eau



$$\left. \begin{aligned} \text{O}_2 + 4\text{H}^+ + 4e^- &= 2\text{H}_2\text{O} \\ E_1 &= E_1^0 + \frac{0,06}{4} \log \left(\frac{P_{\text{O}_2} (\text{H}^+)^4}{P_-} \right) \\ 2\text{H}^+ + 2e^- &= \text{H}_2 \\ E_2 &= E_2^0 + \frac{0,06}{2} \log \left(\frac{(\text{H}^+)^2 P_+}{P_{\text{H}_2}} \right) \end{aligned} \right\}$$

Bilan de fonctionnement

$E^0 > 0,06 \text{ V}$
⇒ réaction quantitative

$$\text{Ni}^{2+} + \text{Cd} \xrightarrow{+2e^-} \text{Ni} + \text{Cd}^{2+} + 2e^-$$

initial	n_1		n_2
final	$n_1 - x$	SOLIDE	$n_2 + x$

Avancement final $x_f = n_1$ (Ni^{2+} limitant)

Capacité de la pile: $Q = 2 \times x_f \times F$

$F = e N_A$ charge d'1 mol d'électrons