

Clase 13 8 Enero 2021

Título de la nota

08/01/2021

Ecuación de Nernst:

$$\Delta G = nRT \ln K_{eq}$$



$$\Delta G = -nFE$$

$$\Delta G = \Delta G^{\circ} + nRT \ln K_{eq}$$

$$\frac{-nFE}{-nF} = \frac{-nFE^{\circ}}{-nF} + \frac{nRT \ln K_{eq}}{-nF}$$

$$\mathcal{E} = \mathcal{E}^{\circ} - \frac{RT}{F} \ln K_{eq}$$

$$R = 8.314 \text{ J/molK}$$

$$T = 298.15 \text{ K}$$

$$F = 96500 \text{ C/mol.}$$

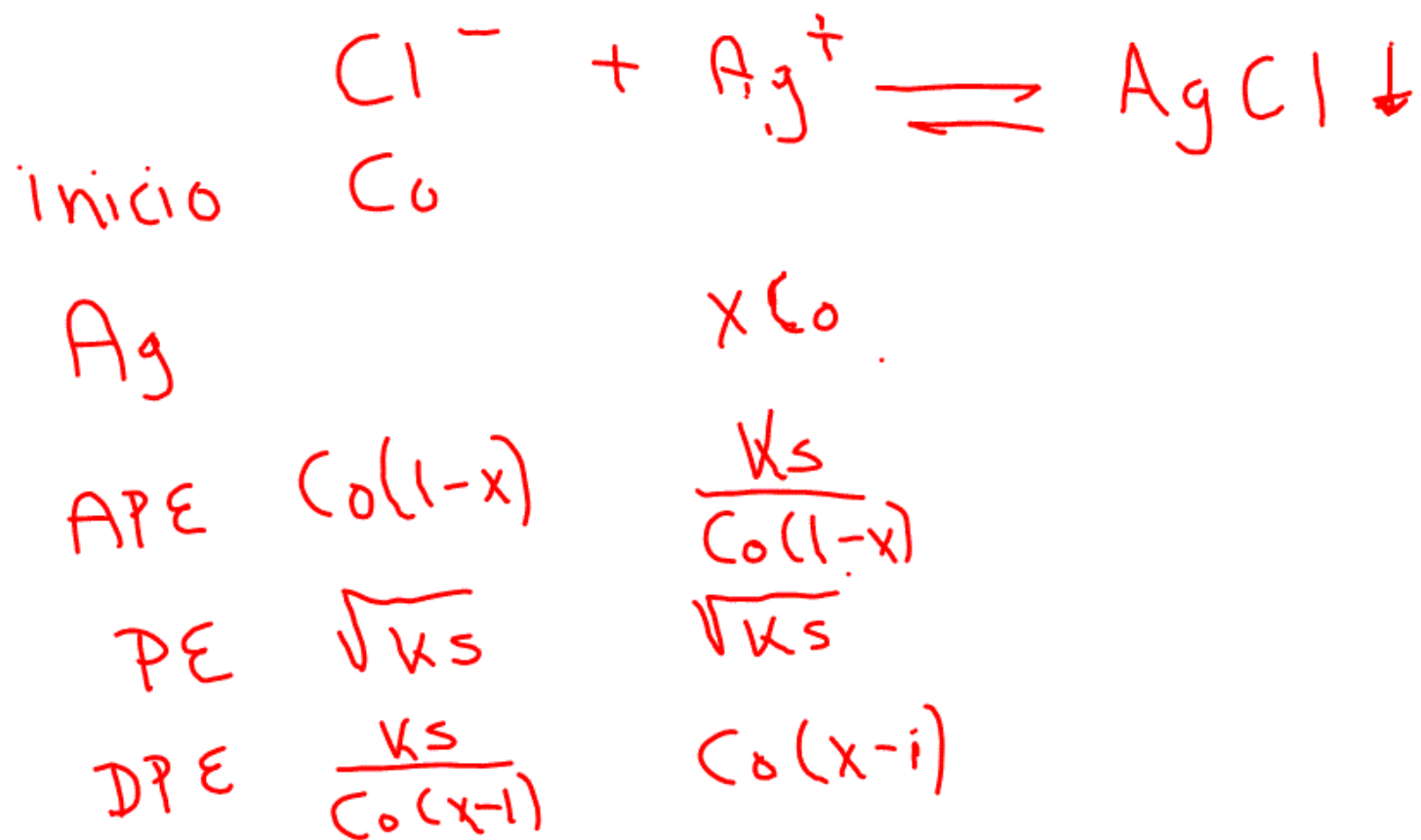
$$(\log 10)(2.303) = \ln$$

$$\mathcal{E} = \mathcal{E}^{\circ} - \frac{2.303(R)(T) \log K_{eq}}{F}$$

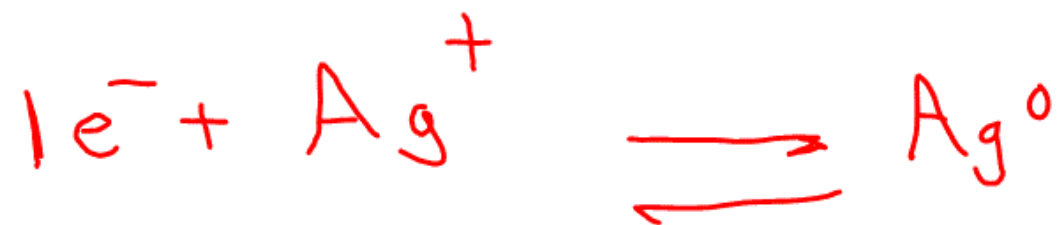
$$\mathcal{E} = \mathcal{E}^{\circ} - \frac{2.303 RT}{F} \log \frac{[\text{red}]}{[\text{ox}]}$$

$$\mathcal{E} = \mathcal{E}^{\circ} + \frac{2.303 RT}{F} \log \frac{[\text{ox}]}{[\text{red}]}$$

$$\mathcal{E} = \mathcal{E}^{\circ} + \frac{0.059}{n} \log \frac{[\text{ox}]}{[\text{red}]}$$



pH=0 Electrodo de plata $\text{Ag}^+/\text{Ag}^0 = 0.799 \text{ V}$



$$E = 0.799 \text{ V} + \frac{0.059}{1} \log \frac{[\text{Ag}^+]}{[\text{Ag}^0]}$$

$$E = 0.799 \text{ V} + 0.059 \log [\text{Ag}^+]$$

$$10^{-2} \text{ M}$$

X	E (V)
0	incalculable
0.5	
1.0	
1.5	
2.0	

$$x = 0$$

$$\varepsilon = 0.799 \text{ V} + 0.059 \log [\text{Ag}^+]$$

in calculable

$$x = 0.5$$

$$\varepsilon = 0.799 \text{ V} + 0.059 \log \frac{K_s'}{C_0(1-x)}$$

$$[\text{Ag}^+] \propto \text{Ag} = \frac{[\text{Ag}^+]' }{[\text{Ag}^+]_L}$$

$$[\text{Ag}^+]_L = \frac{[\text{Ag}^+]' }{\propto \text{Ag}(\text{OH})}$$

$$K_s' = K_s \propto [Ag^+] \propto Cl^-(H_3O^+)$$

$$E = E^\circ + \frac{0.059}{1} \log \left\{ \frac{[Ag^+]}{\propto Ag(OH)} \right\}$$

$$E = E^\circ + \frac{0.059}{1} \log \frac{K_s'}{C_0(1-x)} \quad pH = 7$$

$$K_s' = 10^{-9.8}$$

$$E = 0.799V + 0.059 \log \frac{10^{-9.8}}{10^{-2}(1-0.3)}$$

$$\begin{aligned} \xi &= 0.799 \text{ V} + 0.059 \log \left(\frac{10^{-9.8}}{5 \times 10^{-3}} \right) \\ &= 0.3566 \text{ V} \end{aligned}$$

$$\chi = 1$$

$$\xi = 0.799 \text{ V} + 0.059 \log \sqrt{Ks'}$$

$$\xi = 0.799 \text{ V} + 0.059 \log \sqrt{10^{-9.8}}$$

$$\xi = 0.799 \text{ V} + 0.059 \log 10^{-4.9}$$

$$\begin{aligned} \xi &= 0.799 \text{ V} + 0.059(-4.9) \\ &= 0.5099 \text{ V} \end{aligned}$$

$$x = 1.5$$

$$\varepsilon = 0.799 \text{ V} + 0.059 \log \left\{ \frac{[\text{Co}(x-1)]}{\alpha \text{Ag}(\text{OH})} \right\}$$

$$\text{pH} = 7$$

$$\alpha \text{Ag}(\text{OH}) = 1$$

$$\varepsilon = 0.799 \text{ V} + 0.059 \log [10^{-2} (1.5-1)]$$

$$\varepsilon = 0.799 \text{ V} + 0.059 \log 5 \times 10^{-3}$$

$$\varepsilon = 0.6632 \text{ V}$$

$$x = 2$$

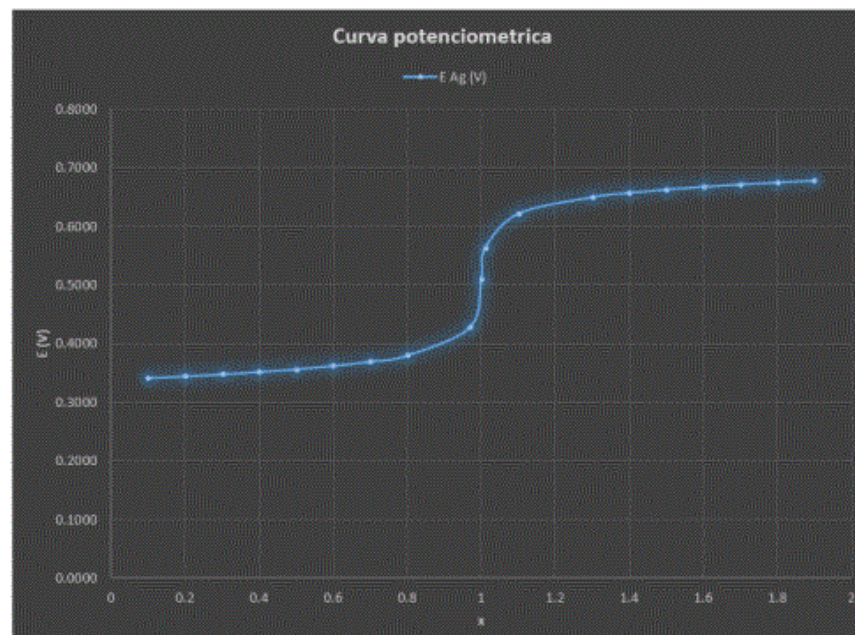
$$\xi = 0.799V + 0.059 \log [10^{-2}(2-1)]$$

$$\xi = 0.799V + 0.059 \log 10^{-2}$$

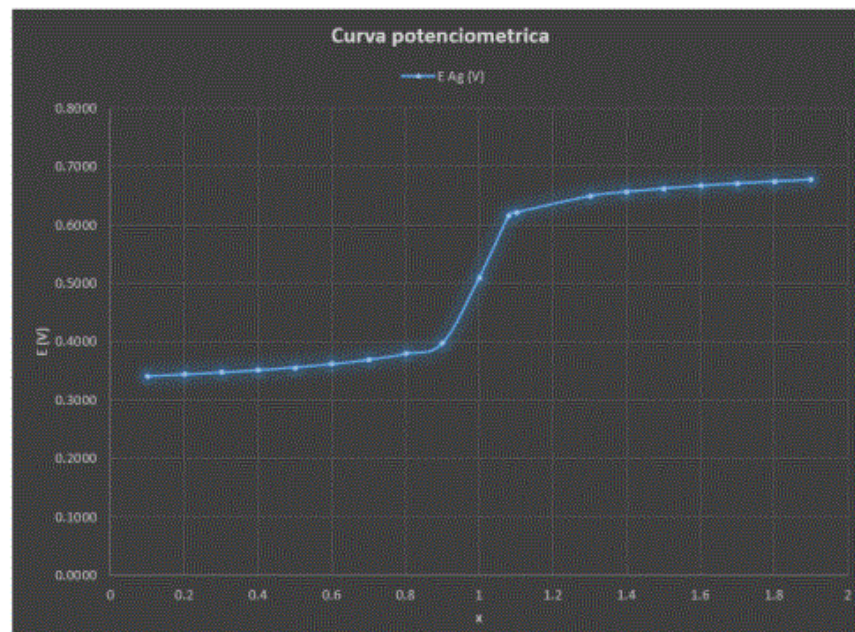
$$\xi = 0.799V + 0.059(-2)$$

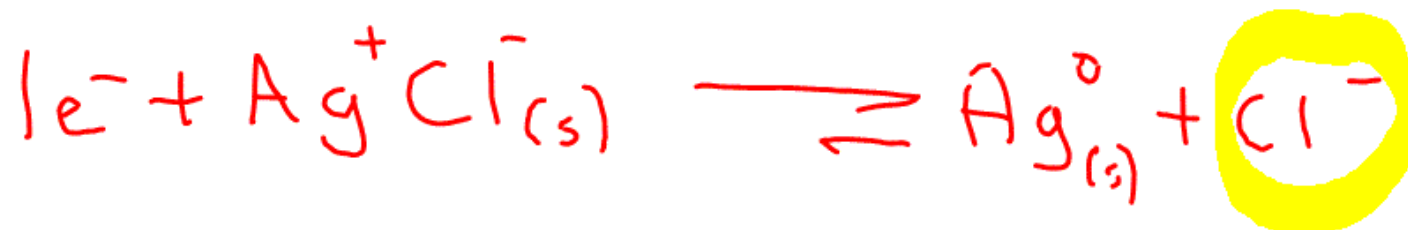
$$\xi = 0.6810V$$

Potenciales electrodo (V)	X	E Ag (V)
Ag+/Ag	0,799	0
	0.1	0.3415
	0.2	0.3445
	0.3	0.3479
	0.4	0.3519
	0.5	0.3566
	0.6	0.3623
	0.7	0.3696
	0.8	0.3800
	0.97	0.4286
	1	0.5099
	1.01	0.5630
	1.1	0.6220
	1.3	0.6502
	1.4	0.6575
	1.5	0.6632
	1.6	0.6679
	1.7	0.6719
	1.8	0.6753
	1.9	0.6783
	2	0.6810



Potenciales electrodo (V)	X	E Ag (V)
Ag+/Ag	0	INCALC
	0.1	0.3415
	0.2	0.3445
	0.3	0.3479
	0.4	0.3519
	0.5	0.3566
	0.6	0.3623
	0.7	0.3696
	0.8	0.3800
	0.9	0.3978
	1	0.5099
	1.08	0.6163
	1.1	0.6220
	1.3	0.6502
	1.4	0.6575
	1.5	0.6632
	1.6	0.6679
	1.7	0.6719
	1.8	0.6753
	1.9	0.6783
	2	0.6810





$$0.222V = E^0_{AgCl/Ag^0}$$

$$E = 0.222V + \frac{0.059}{1} \log \frac{[AgCl(s)]}{[Ag^0][Cl^-]}$$

$$E = 0.222V + 0.059 \log \frac{1}{[Cl^-]}$$

$$E = 0.222V - 0.059 \log [Cl^-]$$

X	$\xi (v)$
0	
0.5	
1	
1.5	
2.0	

$$\xi = \xi^{\circ} - 0.059 \log [Cl^{-}] \quad X = 0$$

$$\xi = \xi^{\circ} - 0.059 \log C_0$$

$$\xi = 0.222V - 0.059 \log 10^{-2}$$

$$\xi = 0.222V - 0.059(-2) = 0.34V$$

$$\chi = 0.5$$

$$\begin{aligned} \xi &= 0.222 \text{ V} - 0.059 \log [10(1-\chi)] \\ &= 0.222 \text{ V} - 0.059 \log [10^{-2}(1-0.5)] \\ &= 0.222 \text{ V} - 0.059 \log 5 \times 10^{-3} \\ &= 0.3577 \text{ V} \end{aligned}$$

$$\chi = 1$$

$$\begin{aligned} \xi &= 0.222 \text{ V} - 0.059 \log \sqrt{Ks'} \\ \xi &= 0.222 \text{ V} - 0.059 \log \sqrt{10^{-9.8}} \\ \xi &= 0.222 \text{ V} - 0.059 \log 10^{-4.9} \end{aligned}$$

$$\begin{aligned} \mathcal{E} &= 0.222 \text{ V} - 0.059 (-4.9) \\ &= 0.511 \text{ V} \end{aligned}$$

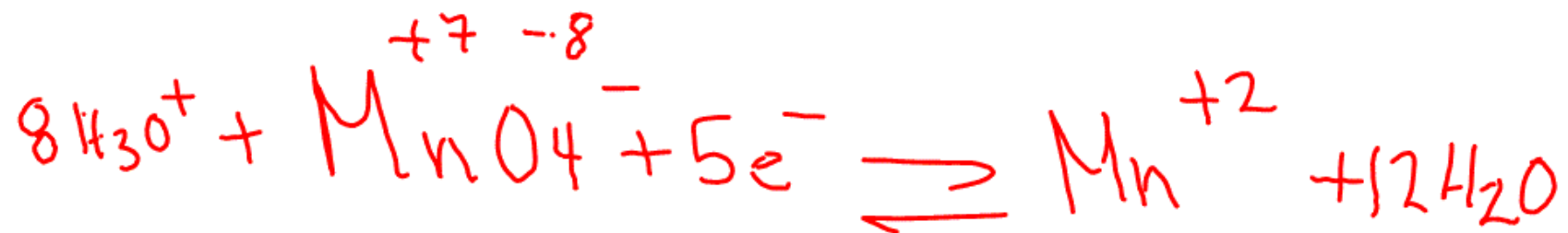
$$\begin{aligned} \chi &= 1.5 & [\text{Cr}^-] &= \frac{Ks'}{C_0(\chi-1)} \\ \mathcal{E} &= 0.222 \text{ V} - 0.059 \log \left[\frac{Ks'}{C_0(\chi-1)} \right] \\ &= 0.222 \text{ V} - 0.059 \log \left[\frac{10^{-9.8}}{10^{-2}(1.5-1)} \right] \\ &= 0.222 \text{ V} - 0.059 \log \left(\frac{10^{-9.8}}{5 \times 10^{-3}} \right) \\ &= 0.6644 \text{ V} \end{aligned}$$

$$X=2$$

$$\xi = 0.222V - 0.059 \log \frac{10^{-9.8}}{10^{-2}(2-1)}$$

$$\xi = 0.222V - 0.059 \log 10^{-7.8}$$

$$\xi = 0.222V - 0.059(-7.8) = 0.6822V$$



$$\mathcal{E} = \mathcal{E}^\circ + \frac{0.059}{5} \log \frac{[\text{MnO}_4^-][\text{H}_3\text{O}^+]^8}{[\text{Mn}^{2+}]}$$

$$\mathcal{E}_{\text{MnO}_4^-/\text{Mn}^{2+}} = 1.51 \text{ V}$$

$$\mathcal{E} = \mathcal{E}^\circ + \frac{0.059}{5} \log [\text{H}_3\text{O}^+]^8 + \frac{0.059}{5} \log \frac{[\text{MnO}_4^-]}{[\text{Mn}^{2+}]}$$

$$\mathcal{E}^{\circ'} = \mathcal{E}^\circ - \frac{8(0.059)}{5} \cdot \text{pH}$$

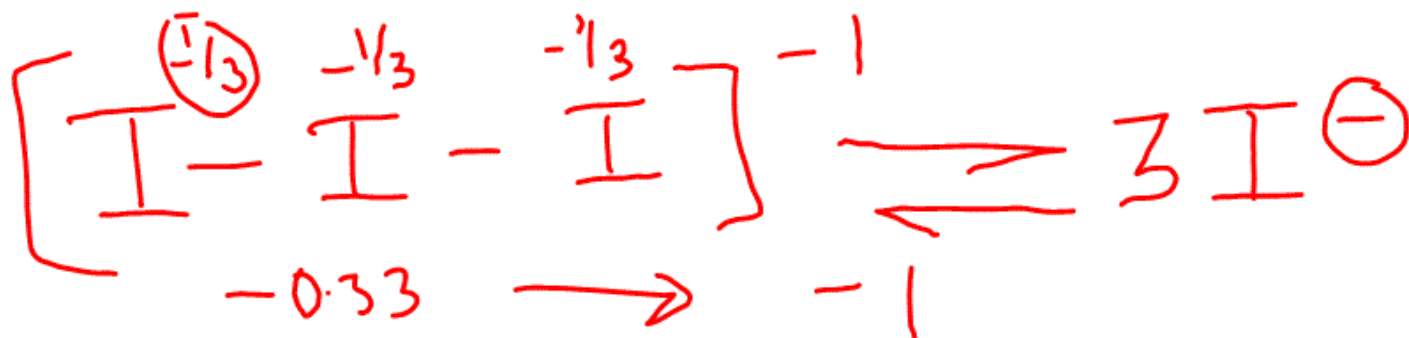
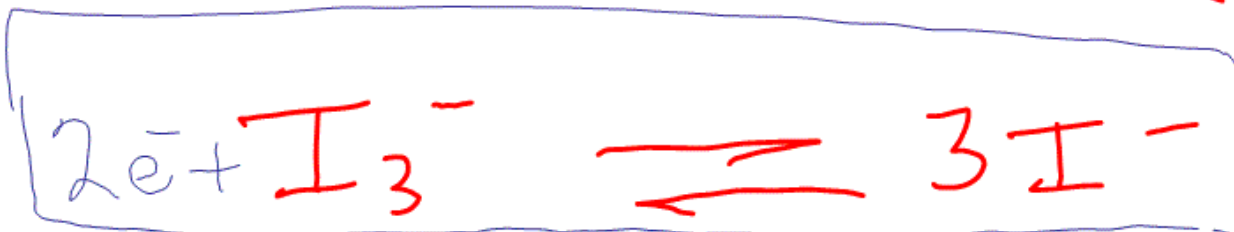
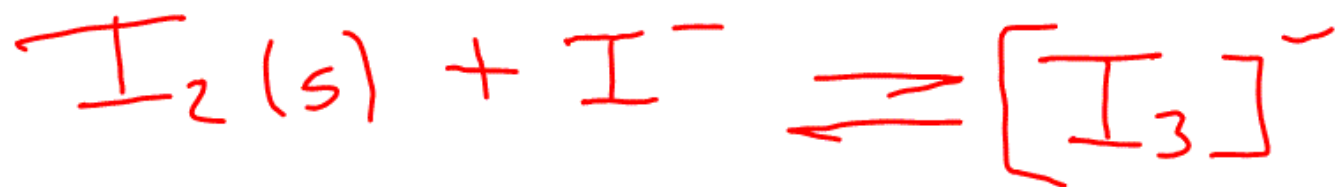
$$\text{pH} = -\log [\text{H}_3\text{O}^+]$$

ξ^0	pH
1.510	0
1.4156	1
1.3212	2
1.2268	3
1.1324	4
1.038	5

$$\xi^0 = 1.51 \text{ V}$$

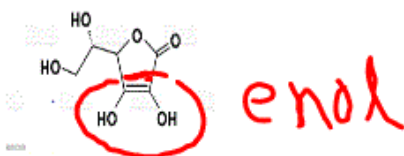
$$\xi^0 = 1.51 \text{ V} - \left[\frac{8 (0.059) (1)}{5} \right] \text{ pH} = 1$$

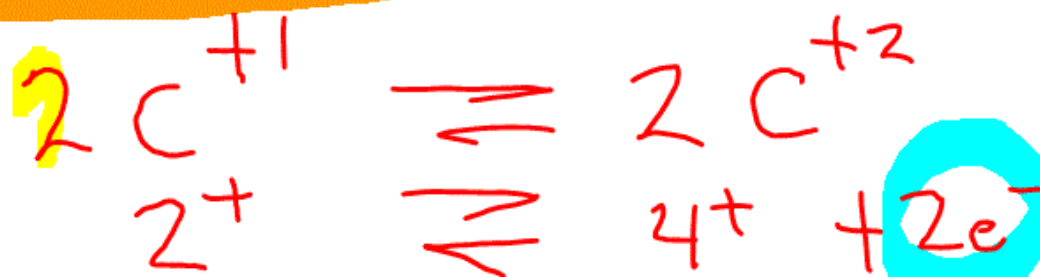
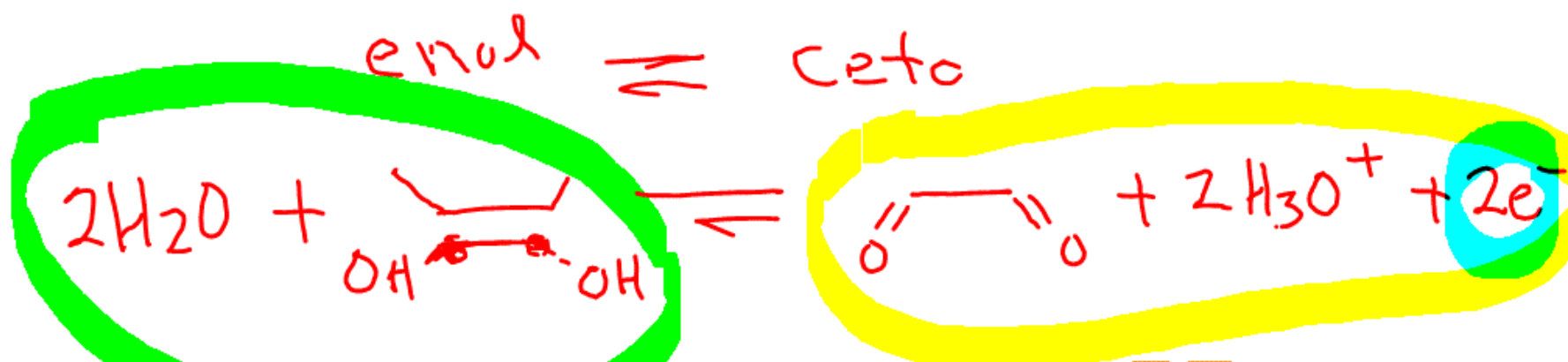
$$= 1.4156 \text{ V}$$



Acido Ascórbico \rightleftharpoons Ac. dehidroascórbico
 Reductor Oxidante.

ASCORBIC ACID - Vitamin C





$$E = E^{\circ} + \frac{0.059}{2} \log \frac{[\text{dehidro}][\text{H}_3\text{O}^+]^2}{[\text{asc.}]}$$

$$E_{\text{Asc/dehidro}} = -0.14 \text{ V}$$

$$E^{\circ'} = E^{\circ} - \frac{0.059 (z)}{z} \text{ pH}$$

$E^{\circ'} (V)$	pH
-0.14	0
-0.199	1
-0.258	2
-0.317	3
-0.553	7