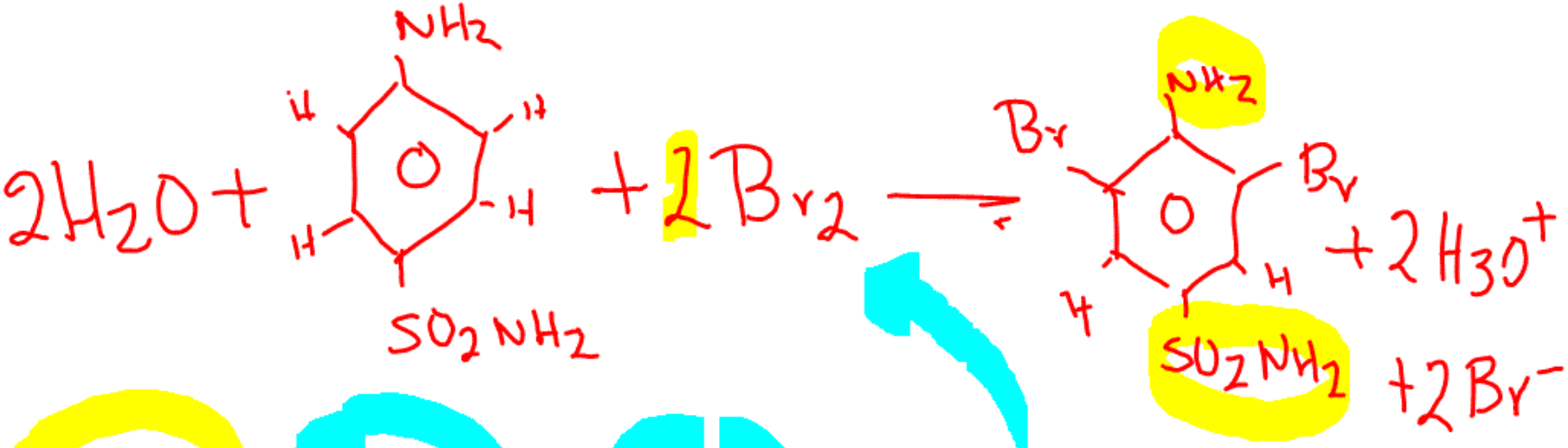
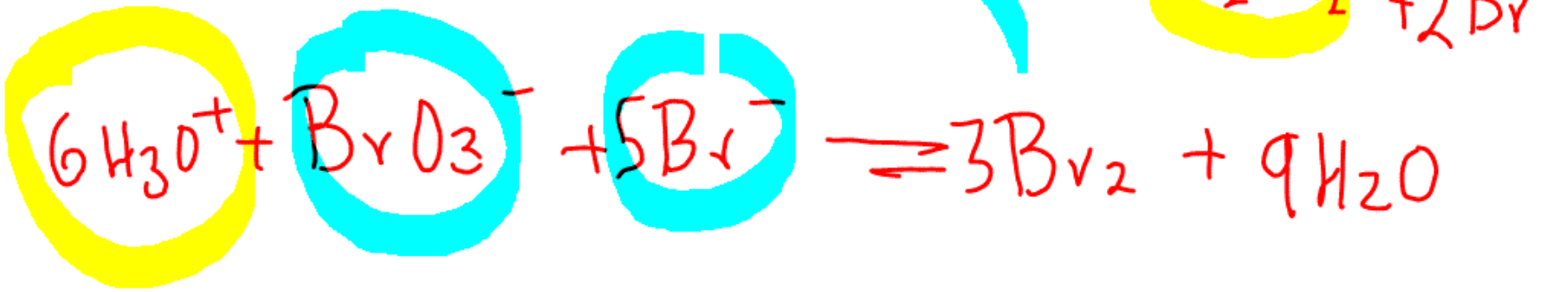
Clase 15 22 Enero 2021

Título de la nota 22/01/2021





1) Calcular Br_2 total.

$$(25\ \cancel{mL}\ \cancel{KBrO_3})\left(1.767\times10^{-2}\ \frac{mmol}{\cancel{mL}}\right)\left(\frac{3\ \cancel{mmol}\ Br_2}{1\ \cancel{mmol}\ \cancel{KBrO_3}}\right)$$

$$\text{mmol } Br_2 \text{ total} = 1.3252 \text{ mmol}$$

$$\text{mmol } Br_2 \text{ reaccionan} = \text{mmol Total } Br_2 - \text{mmol } Br_2 \text{ exceso}$$

$$Br_2 + 3I^- \rightleftharpoons 2Br^- + I_3^-$$

$$2e^- + Br_2 \rightleftharpoons 2Br^-$$

$$3I^- \rightleftharpoons I_3^- + 2e^-$$

$$Br_2 + 3I^- \rightleftharpoons 2Br^- + I_3^-$$

$$I_3^- + 2S_2O_3^{-2} \rightleftharpoons S_4O_6^{-2} + 3I^-$$

$$\text{mmol } Br_2 \text{ exceso} = (12.9\ \text{mL}\ S_2O_3^{-2})\left(1.215 \times 10^{-1}\ \frac{\text{mmol}}{\text{mL}}\right)\left(\frac{1\ \text{mmol } I_3^-}{2\ \text{mmol } S_2O_3^{-2}}\right)$$

$$= 0.7836\ \text{mmol } Br_2 \text{ exceso}$$

$$\text{mmol } Br_2 \text{ que reaccionan} = 1.3252\ \text{mmol} - 0.7836\ \text{mmol}$$

$$= 0.5416\ \text{mmol } Br_2$$

$0.5416\ mmol\ Br_2$

$$\text{Cantidad de Sulfa} = (0.5416\ mmol\ Br_2)\left(\frac{1\ mmol\ Sulfa}{2\ mmol\ Br_2}\right)$$

$$= 0.2708\ mmol\ Sulfa$$

$$= (0.2708\ mmol\ Sulfa)\left(\frac{172\ mg}{mmol}\right)$$

$$= 46.5776\ mg\ Sulfa$$

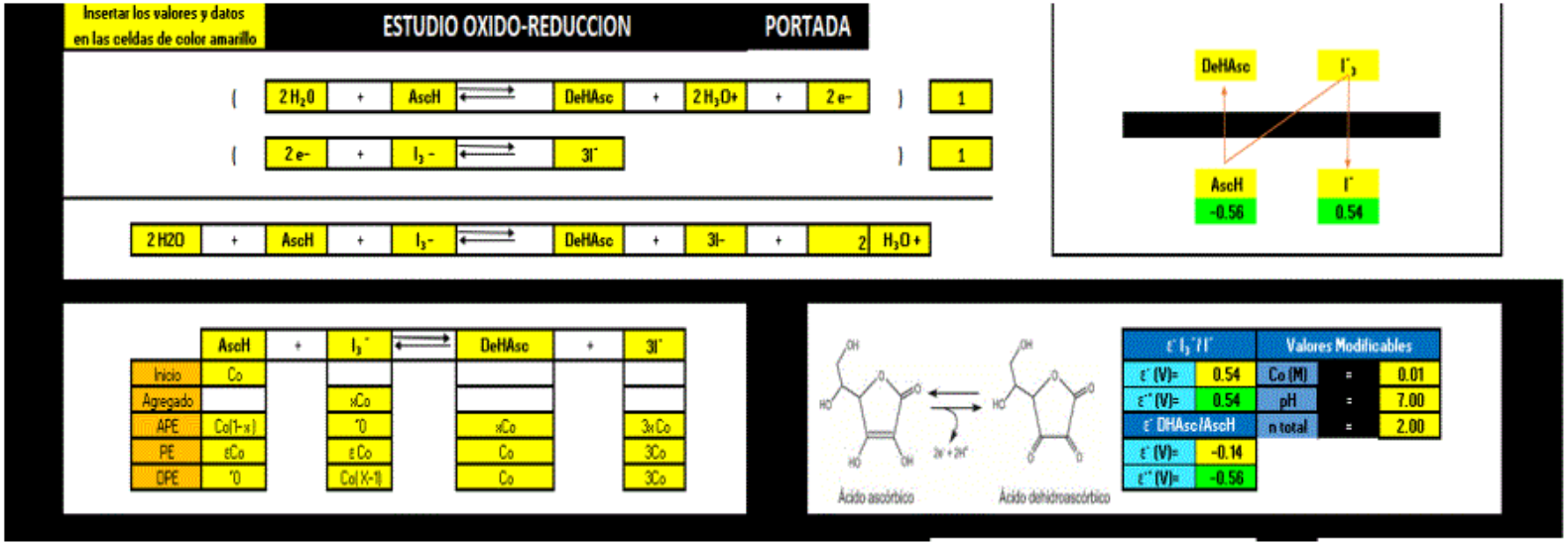
$0.27\ g$ muestra

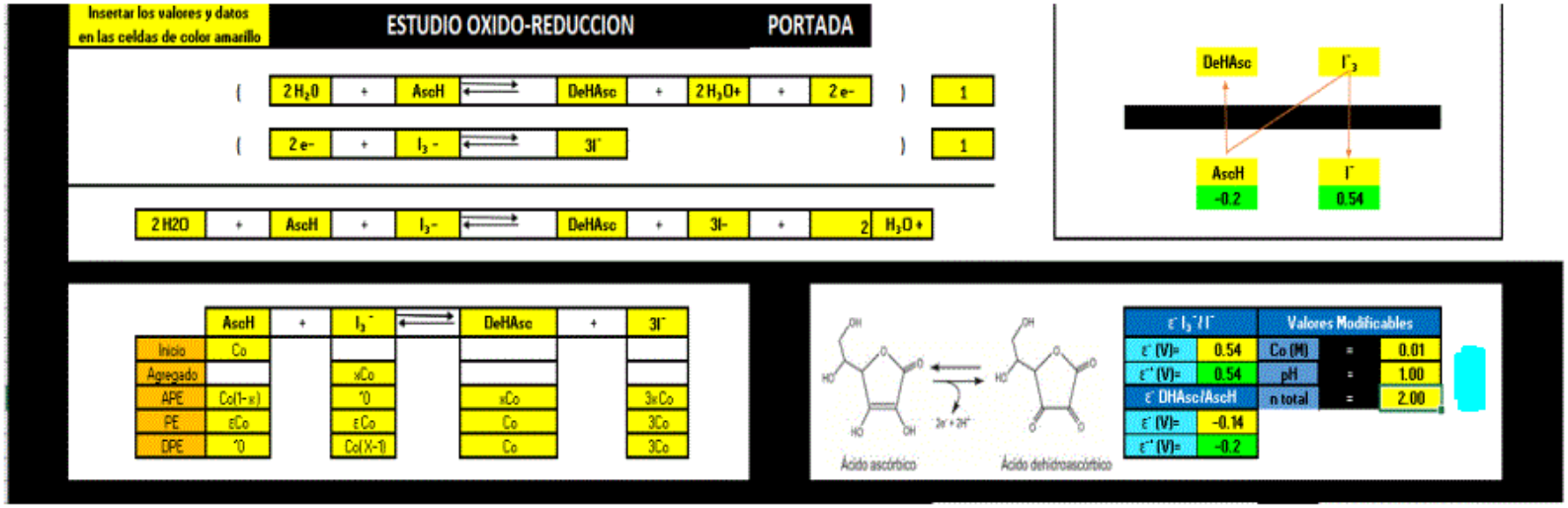
$$\left(46.5776\ mg\ sulfa\right)\left(\frac{100\ mL}{20\ mL}\right)$$

$$= 232.88\ mg\ sulfa$$

$$\%\ sulfa\ en\ la\ muestra = \frac{232.88\ mg}{270\ mg} \times 100$$

$$= 86.25\ \%$$


Insertar los valores y datos en las celdas de color amarillo
ESTUDIO OXIDO-REDUCCION
PORTADA
2 H2O + AscH ⇌ DeHAsc + 2 H3O+ + 2 e-) 1
(2 e- + I3 - ⇌ 3I-) 1
2 H2O + AscH + I3- ⇌ DeHAsc + 3I- + 2 H3O +
DeHAsc
I-3
AscH
-0.56
I-
0.54
AscH + I3- ⇌ DeHAsc + 3I-
Inicio Co
Agregado xCo
APE Co(1-x) "0 xCo 3x Co
PE εCo ε Co Co 3Co
DPE "0 Co(X-1) Co 3Co
Ácido ascórbico
Ácido dehidroascórbico
2e- + 2H+
ε° I3-/I- Valores Modificables
ε° (V)= 0.54 Co (M) = 0.01
ε°' (V)= 0.54 pH = 7.00
ε° DHAsc/AscH n total = 2.00
ε° (V)= -0.14
ε°' (V)= -0.56


Insertar los valores y datos en las celdas de color amarillo
ESTUDIO OXIDO-REDUCCION
PORTADA
2 H2O + AscH ⇌ DeHAsc + 2 H3O+ + 2 e-) 1
(2 e- + I3 - ⇌ 3I-) 1
2 H2O + AscH + I3- ⇌ DeHAsc + 3I- + 2 H3O +
DeHAsc
I-3
AscH
-0.2
I-
0.54
AscH + I3- ⇌ DeHAsc + 3I-
Inicio Co
Agregado xCo
APE Co(1-x) 0 xCo 3xCo
PE εCo εCo Co 3Co
DPE 0 Co(X-1) Co 3Co
Ácido ascórbico
Ácido dehidroascórbico
ε° I3-/I- Valores Modificables
ε° (V)= 0.54 Co (M) = 0.01
ε°' (V)= 0.54 pH = 1.00
ε° DHAsc/AscH n total = 2.00
ε° (V)= -0.14
ε°' (V)= -0.2

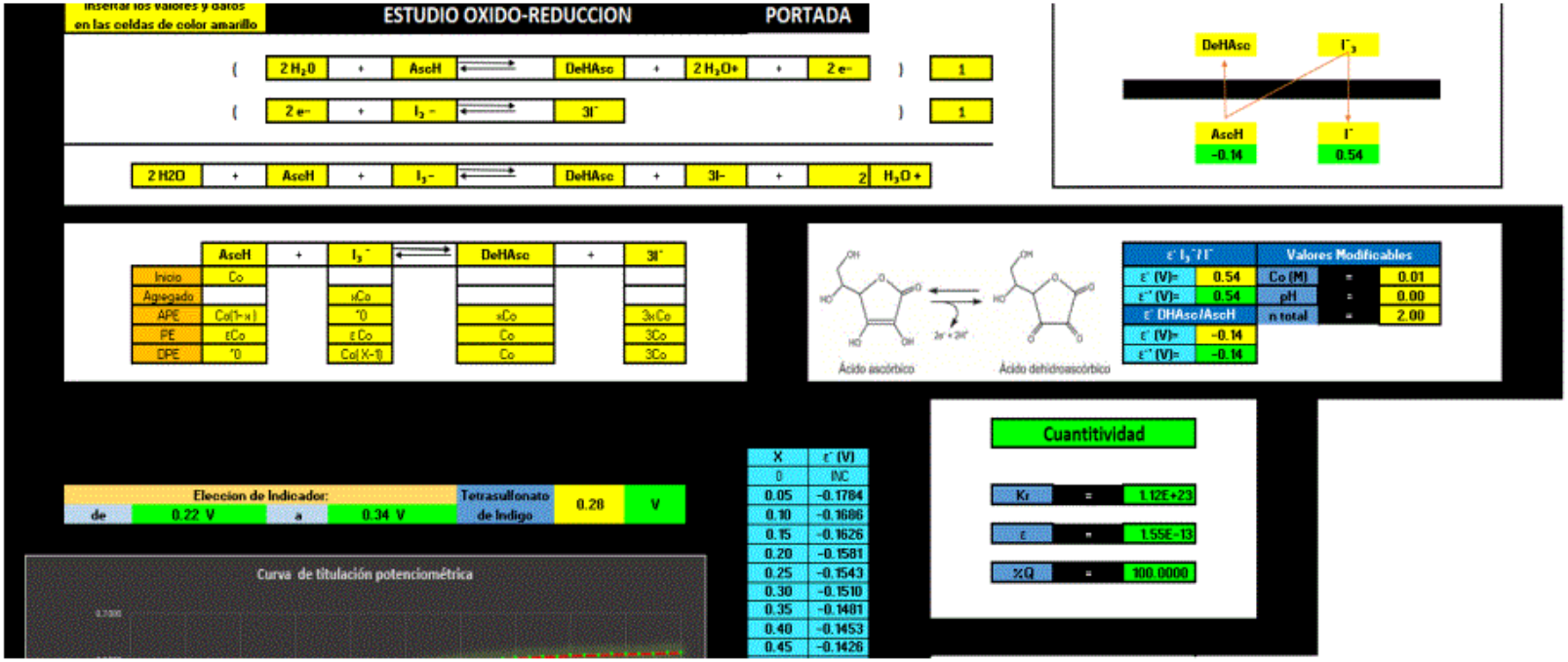
pH = 0

K_{eq}

$$K_{eq} = 10^{\frac{(\mathcal{E}_{ox} - \mathcal{E}_{red})n_r}{0.059}}$$

$$= 10^{\frac{[0.54 - (-0.14)]2}{0.059}}$$

$$= 1.12 \times 10^{23}$$



X	ε (V)
0	Incalculable
0.5	
1	
1.5	
2	

$$X = 0.5$$

$$\mathcal{E} = \mathcal{E}^{0'}_{\text{HdehidroHAsc}} + \frac{0.06}{2} \log \frac{[\text{HDehid.o}]}{[\text{HAsc}]}$$

$$\mathcal{E}^{0'} = \mathcal{E}^{0}_{\text{H dehidro/HAsc}} + \frac{0.06}{2} \log [H_3O^+]^2$$

$$= -0.14\,V - 0.06\,pH$$

$$= -0.14V - 0.06(0) = -0.14\,V$$

$$\mathcal{E} = \mathcal{E}^\circ + \frac{0.06}{n} \log \frac{[ox]\,[H_3O^+]^z}{[red]}$$

$$\mathcal{E}^{\circ\prime} = \mathcal{E}^\circ + \frac{0.06}{n} \log [H_3O^+]^z$$

$$= \mathcal{E}^\circ - \frac{0.06\, pH(z)}{n}$$

$$\mathcal{E} = \mathcal{E}^\circ + \frac{0.06}{n} \log \frac{[ox]}{[red]\,[H_3O^+]^z}$$

$$\mathcal{E}^{\circ\prime} = \mathcal{E}^\circ + \frac{0.06\, pH(z)}{n}$$

$$X = 0.5$$

$$\xi = \xi^{o'} + \frac{0.06}{2} \log \frac{[\text{Aldehído}]}{[\text{HASC}]}$$

$$= -0.14\,V + 0.03 \log \left[\frac{X C_0}{C_0 (1 - X)} \right]$$

$$= -0.14\,V + 0.03 \log \left[\frac{0.5\, C_0}{C_0 (1 - 0.5)} \right]$$

$$= -0.14\,V + 0.03 \log 1$$

$$= -0.14\,V$$

$$x = 1$$

$$\mathcal{E} = \frac{n_{Ox}\xi_{o} + n_{Red}\xi_{r}}{n_{ox} + n_{red}}$$

$$= \frac{2(0.54V) + 2(-0.14V)}{4}$$

$$= 0.2\,V$$

$$x = 1.5$$

$$\mathcal{E} = \mathcal{E}^{\circ}_{I_3^-/I^-} + \frac{0.06}{2} \log \frac{[I_3^-]}{[I^-]^3}$$

$$\mathcal{E} = \mathcal{E}^\circ_{I_3^-/I^-} + \frac{0.06}{2} \log \frac{[I_3^-]}{[I^-]^3} \qquad 10^{-2}\,M$$

$$= 0.54V + 0.03 \log \left[\frac{C_0 (x-1)}{(3C_0)^3} \right]$$

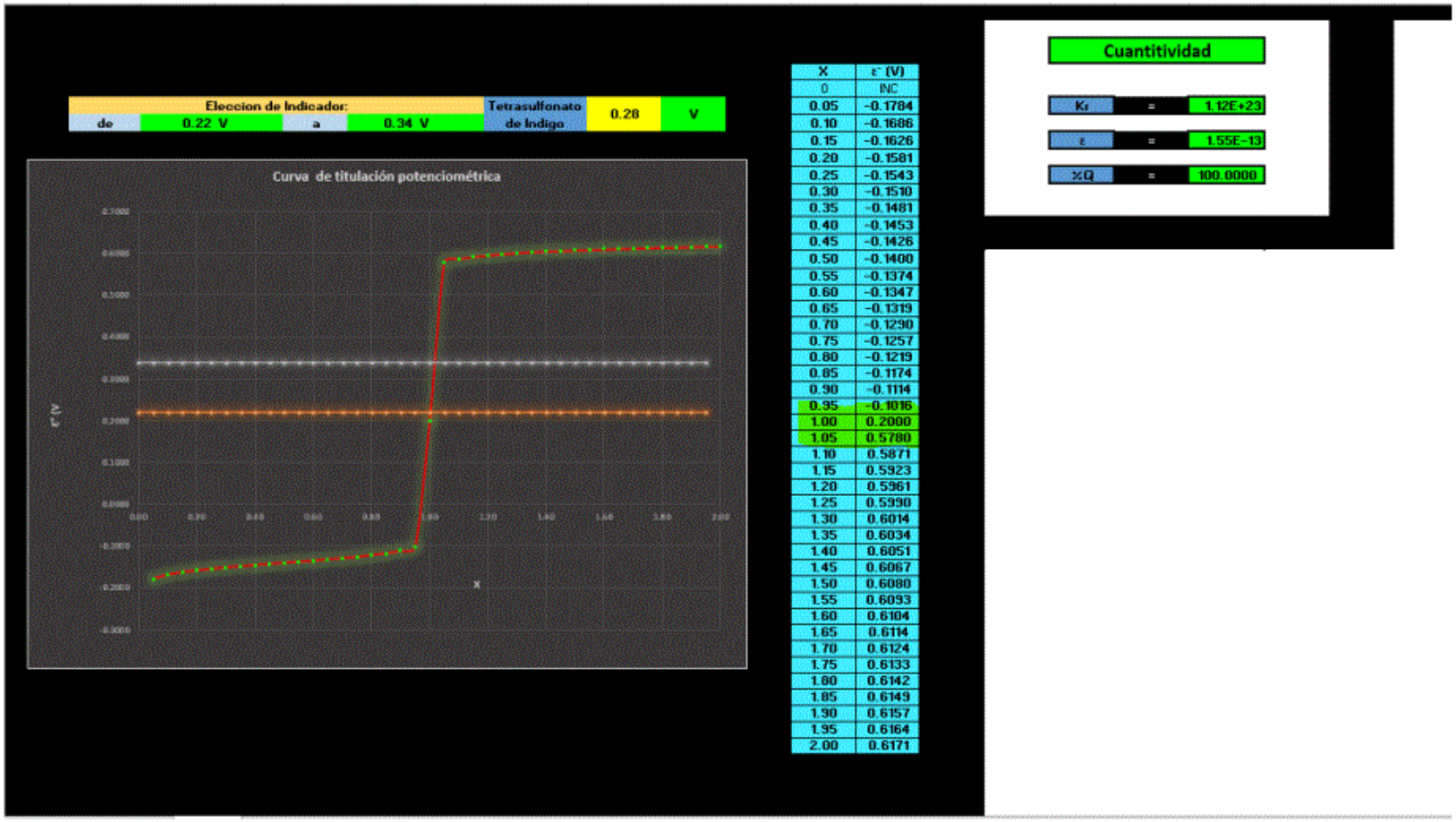
$$= 0.54\,v + 0.03 \log \left[\frac{10^{-2}(1.5-1)}{(3\,10^{-2})^3} \right]$$

$$= 0.6080\,V \simeq 0.61\,V$$

$$x = 2$$

$$\mathcal{E} = 0.54\,v + 0.03 \log \left[\frac{10^{-2}(2-1)}{(3x10^{-2})^3} \right]$$

$$=$$



X	ε' (V)
0	INC
0.05	-0.1784
0.10	-0.1686
0.15	-0.1626
0.20	-0.1581
0.25	-0.1543
0.30	-0.1510
0.35	-0.1481
0.40	-0.1453
0.45	-0.1426
0.50	-0.1400
0.55	-0.1374
0.60	-0.1347
0.65	-0.1319
0.70	-0.1290
0.75	-0.1257
0.80	-0.1219
0.85	-0.1174
0.90	-0.1114
0.95	-0.1016
1.00	0.2000
1.05	0.5780
1.10	0.5871
1.15	0.5923
1.20	0.5961
1.25	0.5990
1.30	0.6014
1.35	0.6034
1.40	0.6051
1.45	0.6067
1.50	0.6080
1.55	0.6093
1.60	0.6104
1.65	0.6114
1.70	0.6124
1.75	0.6133
1.80	0.6142
1.85	0.6149
1.90	0.6157
1.95	0.6164
2.00	0.6171

Tablas de indicadores Redox

$\mathcal{E}$ (V)	# e
0.28	1

$$\mathcal{E} + \frac{0.06}{n} \qquad \mathcal{E} - \frac{0.06}{n}$$

$$0.28\,V + \frac{0.06}{1} \qquad 0.28\,V - \frac{0.06}{1}$$

$$\boxed{0.34\,V \quad - 0.22\,V}$$

p.e. ant. $= 0.2\,V$