EJERCICIOS BLOQUE III

REDOX

7) $Au^0 + H_2O_2 \xrightarrow{HCl \rightarrow 0{,}04M} ?$

Sol:

SON 1 REACCIONES:

$2 \times (Au^0 \rightarrow Au^{3+} + 3e^-)$ R. OXID.

$3 \times (H_2O_2 + 2H^+ + 2e^- \rightarrow 2H_2O)$ R. RED

$2Au^0 + 3H_2O_2 + 6H^+ \rightarrow 2Au^{3+} + 6H_2O$

$2Au^0 + 3H_2O_2 + 6HCl \rightarrow 2AuCl_3 + 6H_2O$

$E^\circ_{cel} = E^\circ_{cátodo} - E^\circ_{ánodo}$ ($\rightarrow H_2O_2$; $\rightarrow Au$)

$E^\circ_{cel} = 1{,}763\,V - 1{,}498\,V = 0{,}265\,V$

ESP.

¡NO TODAS LAS CONCENTRACIONES ESTÁN A 1 M!

$E_{cel} = E^\circ_{cel} - \frac{0{,}059}{n} \log Q$

(real)

$$E_{cel} = 0{,}265(V) - \frac{0{,}059}{3\times 2} \log \frac{\overset{\to 1M}{(Au^{3+})^2} \; \overset{\to \text{disolvente}}{(H_2O)^6}}{\underset{\text{sólido}}{Au^0} \; \underset{1M}{(H_2O_2)^3} \; \underset{(0{,}04)^6}{(H^+)^6}}$$

$$E_{cel} = 0{,}265\,(V) - \frac{0{,}059}{6} \log \frac{1}{(0{,}04)^6}$$

$E_{cel} = 0{,}142\,(V)$ ESP.

EL Au^0 SE OXIDA EN H_2O_2 A pH = 1,4,

8) $Al^0 + KIO_3 \xrightarrow{HCl \to 0{,}02M}$ ¿?

DATOS: $E^0(Al^{3+}/Al^0) = -1{,}66\,V$

$E^0(IO_3^-/I_2) = 0{,}25\,V \to q = I \to x = +5$

$Al^0 \to Al^{3+} + 3e^-$ R.OXD

$12H^+ + 10e^- + 2\overset{+5}{I}O_3^- \to I_2^0 + 6H_2O$ R.RED

$10Al^0 + 36H^+ + 6IO_3^- \to 10Al^{3+} + 3I_2 + 18H_2O$

$10Al^0 + 36HCl + 6KIO_3 \to 10AlCl_3 + 3I_2 + 18H_2O + 6KCl$

$$E^\circ_{cel} = E^\circ_{cat} - E^\circ_{an} = 0{,}25\ (V) - (-1{,}66\ (V))$$

$$E^\circ_{cel} = 1{,}91\ V \quad \text{ESP}$$

$$E_{cel} = E^\circ_{cel} - \frac{0{,}059}{30} \log \frac{\overset{1M}{(Al^{3+})^{10}}\ \overset{\text{sólido}}{(I_2)^3}\ \overset{\text{disolv}}{(H_2O)^{17}}\ \overset{1M}{(KCl)^6}}{\underset{\text{sólido}}{(Al^\circ)^{10}}\ \underset{(0{,}02)^{36}}{(HCl)^{36}}\ \underset{1M}{(KIO_3)^6}}$$

$$E_{cel} = 1{,}91\ V - 0{,}12$$

$$E_{cel} = 1{,}79\ V \quad \text{ESP}$$

NO ES ESTABLE EL Al EN KIO_3

A pH = 1,7

9) $Pb^\circ + O_{2(g)} \rightarrow Pb^{2+}_{(sol)}$ — pH = 0 / pH = 2

$Pb^\circ \rightarrow Pb^{2+} + 2e^-$ R. OXID

$4e^- + O_2^\circ + 4H^+ \rightarrow 2H_2O^{(-2)}$ R. RED

$2Pb^\circ + O_2 + 4H^+ \rightarrow 2Pb^{2+} + 2H_2O$ pH = 0

$$E^\circ_{cel} = E^\circ_{cat} - E^\circ_{an} = 1{,}23\ V - (-0{,}13\ V)$$

$E^\circ_{cel} = 1{,}36\ V$ ESP → SE CONSIGUE A pH = 0

A $pH = 2 \rightarrow [H^+] = 10^{-2}\ M$

$$E_{cal} = 1{,}36\,V - \frac{0{,}059}{2} \log \frac{\overset{\Delta M}{(Pb^{2+})^2}\ \overset{d\,sol}{(H_2O)^2}}{\underset{sol}{(Pb^0)^2}\ \underset{\Delta atm}{(O_2)}\ \underset{(\Delta O^{-2})^4}{(H^+)^4}}$$

$$E_{cal} = 1{,}36\,V - 0{,}236 = 1{,}124\,V$$

SE CONSIGUE TB A

$pH = 2$