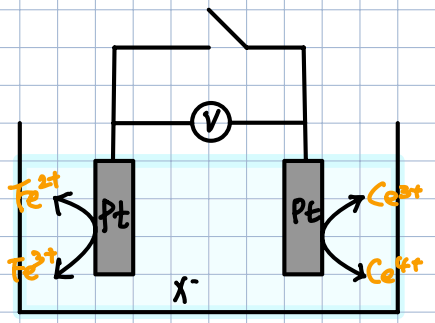
9. Quiz

1 Quiz ①



$Fe^{2+}(aq) + Ce^{4+}(aq) = Fe^{3+}(aq) + Ce^{3+}(aq)$

$Pt/Fe^{2+}, Fe^{3+} // Ce^{3+}, Ce^{4+}/Pt$

$Fe^{2+} \rightarrow Fe^{3+} + e^-$, $E^\circ = 0.77V$ (NHE)

$Ce^{4+} + e^- \rightarrow Ce^{3+}$, $E^\circ = 1.72V$ (NHE)

※ assumption : (initial activity) = 0

① Open-circuit voltage?

$E_{cell} = E^\circ_c - E^\circ_a$

$= 1.72V - 0.77V = 0.95V$

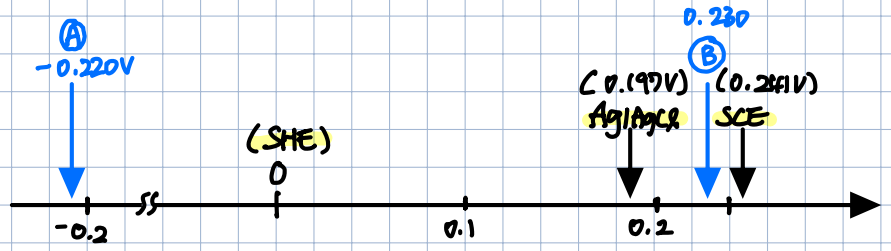
② How about "closed" circuit?

$E_{anode} = E^\circ(Fe^{2+}, Fe^{3+}) + \frac{RT}{nF}\ln\frac{(a_{Fe^{3+}})}{(a_{Fe^{2+}})}$

$E_{cathode} = E^\circ(Ce^{3+}, Ce^{4+}) + \frac{RT}{nF}\ln\frac{(a_{Ce^{4+}})}{(a_{Ce^{3+}})}$

$\therefore$ "$E_{cell} = E_c - E_a = 0$" 으로 approach

2 Quiz ②



① point A : -0.220V from SHE

-0.417V from Ag|AgCl : 0.197 + 0.22 = 0.417

-0.461V from SCE : 0.241 + 0.22 = 0.461

② point B : 0.230V from SHE

0.033V from Ag|AgCl : 0.230 - 0.197 = 0.033

-0.011V from SCE : 0.241 - 0.230 = 0.011

3 Quiz 2

$$t_i = \frac{|z_i| u_i c_i}{\sum_j |z_j| u_j c_j} = \frac{\lambda_i}{\Lambda} = \frac{\lambda_+}{\lambda_+ + \lambda_-}$$

using Λ (conductivity per unit concentration of charge)

$= F(u_+ + u_-) = \lambda_+ + \lambda_-$

Q: For HCl solution, t_{H^+} & t_{Cl^-} ?

A: using table of λ_0 & u,

Ion	λ_0	u
H^+	349.82	3.625E-3
⋮	⋮	⋮
Cl^-	76.34	0.912E-4

$$t_{H^+} = \frac{\lambda_{H^+}}{\lambda_{H^+} + \lambda_{Cl^-}} = \frac{349.82}{349.82 + 76.34} = 0.82$$

$$t_{Cl^-} = \frac{\lambda_{Cl^-}}{\lambda_{H^+} + \lambda_{Cl^-}} = \frac{76.34}{349.82 + 76.34} = 0.18$$