# 6. Reference electrode

Ⅰ Review
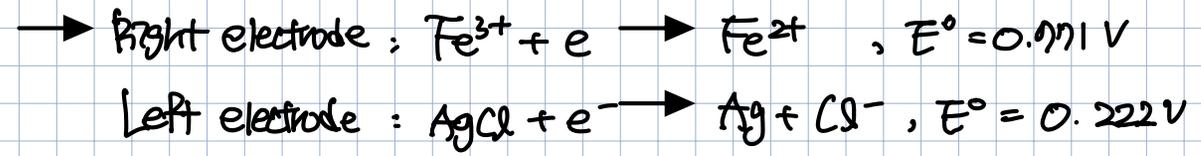
→ Standard electrode potential & Formal potential $\left( E_{eq} = E^{0\prime} + \dfrac{RT}{nF} \ln \dfrac{C_O}{C_R} \right)$

Ⅱ Reference electrode

→ 

1) A가 2칸 길어졌다 (X)
2) A가 3칸 길어졌다 (O)

↳ A & B 들 사이의 차를 이용해 길값을 판단하면 안되고, "기준"을 잡은후 비교해야 함

WE ←→ CE
→ Working electrode (= Indicator electrode)
: 관심있는 반응이 일어나는 전극

→ Counter electrode (= auxiliary electrode)
: WE 와 짝반응이 일어나는 전극

WE    (CE)
      RE
→ Reference electrode : "기준"

→ Right electrode : $Fe^{3+} + e \rightarrow Fe^{2+}$ , $E^0 = 0.771\,V$

Left electrode : $AgCl + e^- \rightarrow Ag + Cl^-$ , $E^0 = 0.222\,V$
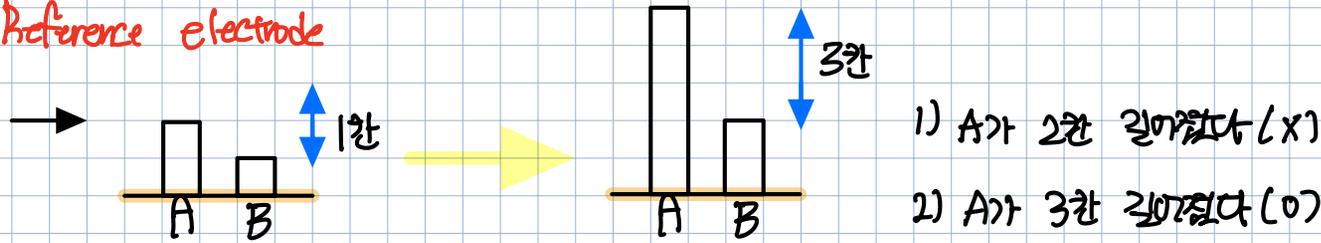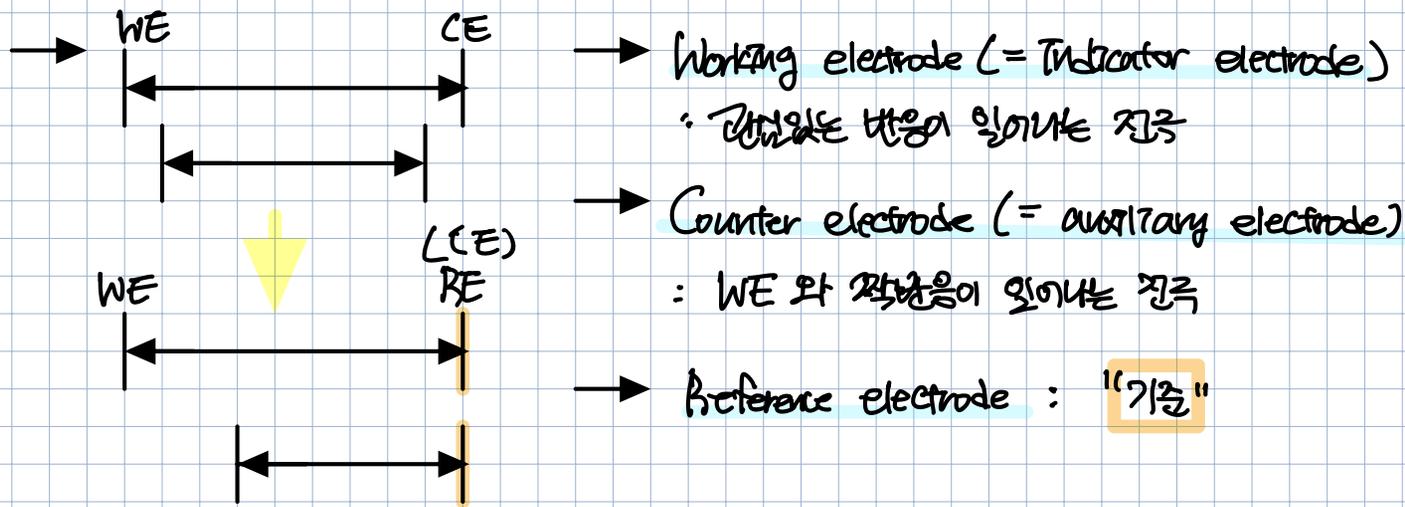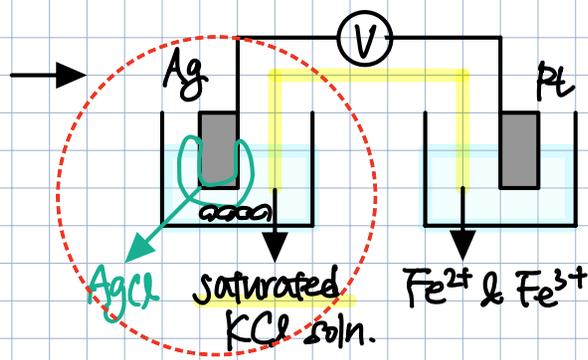
→ $E_1 = 0.771 - 0.059 \log \dfrac{[Fe^{2+}]}{[Fe^{3+}]}$

$E_2 = 0.222 - 0.059 \log [Cl^-]$

→ const. ←

→ $E = 0.771 - 0.059 \log \{[Fe^{2+}]/[Fe^{3+}]\} - \{0.222 - 0.059 \log [Cl^-]\}$

→ Standard hydrogen electrode (= Normal hydrogen electrode) : $0\,V$ (vs. SHE)

Saturated Calomel electrode (SCE) : $\begin{cases} 0.241\,V \ (vs.\ SHE) \\ E = E^0 + \dfrac{RT}{2F} \ln\left(\dfrac{1}{(a_{Cl^-})^2}\right) \quad (\because Hg_2Cl_2 + 2e^- \rightarrow 2Hg + 2Cl^-) \end{cases}$

Ag|AgCl : $\begin{cases} 0.197\,V \ (vs.\ SHE) \\ E = E^0 + \dfrac{RT}{F} \ln\left(\dfrac{1}{a_{Cl^-}}\right) \quad (\because AgCl + e^- \rightarrow Ag + Cl^-) \end{cases}$