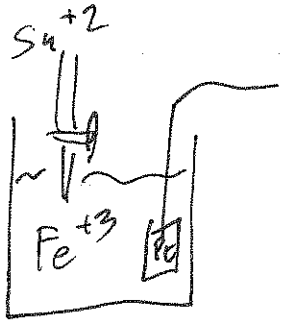
$$2\,Fe^{+3} + Sn^{+2} \rightarrow 2\,Fe^{+2} + Sn^{+4}$$

E of titration electrode $= E_{Fe^{+2}/Fe^{+3}}$ or $E_{Sn^{+2}/Sn^{+4}}$



Must be equal
Use either couple to compute $E_{titration}$

$$E_{titration} = E_{Fe^{+2}/Fe^{+3}} = E^{\circ}_{Fe^{+2}/Fe^{+3}} - \frac{0.059}{1}\log\frac{Fe^{+2}}{Fe^{+3}}$$

$$\text{or} \quad = E_{Sn^{+2}/Sn^{+4}} = E^{\circ}_{Sn^{+2}/Sn^{+4}} - \frac{0.059}{2}\log\frac{Sn^{+2}}{Sn^{+4}}$$

Multiply Sn $\times 2$, Add equations

~~$3E_{+} \equiv$~~

$$3\,E_{titr} = E_{Fe} + 2E_{Sn} = E^{\circ}_{Fe} + 2E^{\circ}_{Sn} - 0.059\log\frac{[Fe^{+2}][Sn^{+2}]}{[Fe^{+3}][Sn^{+4}]}$$

At eq pt, product conc are related $2[Sn^{+4}] = [Fe^{+2}]$

reactant conc " " $2[Sn^{+2}] = [Fe^{+3}]$ back reaction!

$$Q = \frac{[Fe^{+2}][Sn^{+2}]}{[Fe^{+3}][Sn^{+4}]} = \frac{2[Sn^{+4}][Sn^{+2}]}{2[Sn^{+2}][Sn^{+4}]} = 1\,!$$

$\log Q = 0\,!$

$$3\,E_{titr} = E^{\circ}_{Fe} + 2E^{\circ}_{Sn}$$

$$E_{titr} = \frac{E^{\circ}_{Fe} + 2E^{\circ}_{Sn}}{3}$$ Weighted average