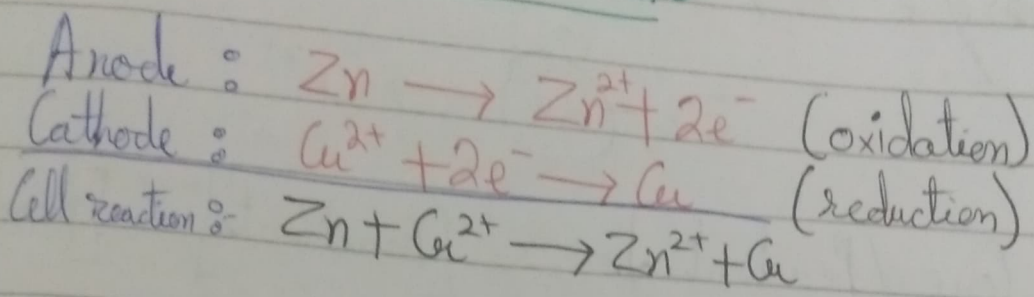
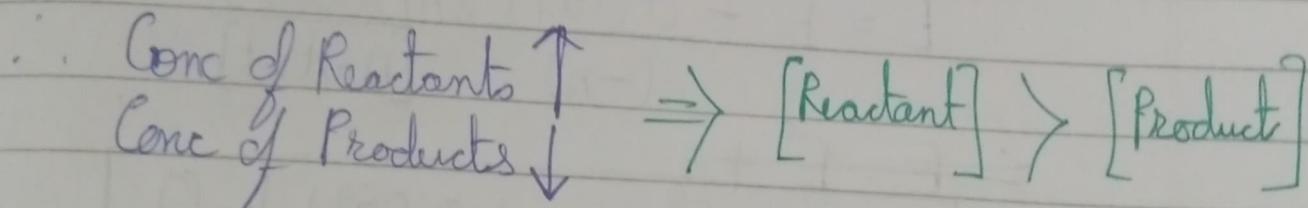
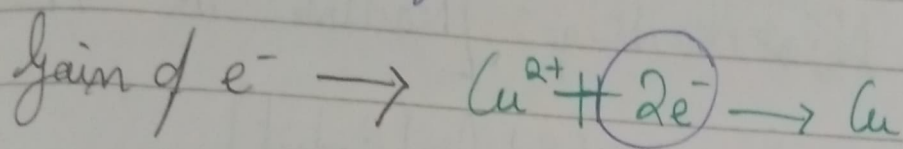


Reduction v/s Oxidation Reactions

Let us consider a cell reaction:-



→ For reduction half (Cathode) :-



$\therefore +n$ in Nernst eqⁿ :- $[\text{Reactant} + ne^- \rightarrow \text{Product}]$

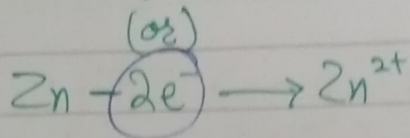
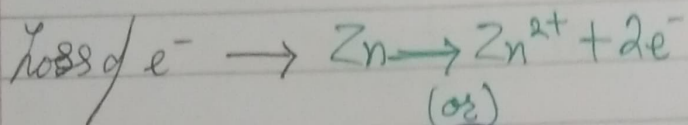
$$E = E^\circ - \frac{0.0591}{(+n)} \ln \frac{[\text{Product}]}{[\text{Reactant}]}$$
$$\therefore \boxed{E_{\text{reduction}} = E^\circ_{\text{reduction}} - \frac{0.0591}{n} \log Q}$$

$Q \rightarrow [\text{Product}] : [\text{Reactant}]$ ratio

$\therefore [\text{Reactant}] > [\text{Product}] \therefore Q \uparrow \rightarrow \ln Q \uparrow$

$\therefore E \downarrow$ as a result (reduction half)

2) For oxidation half (Anode):



\therefore Conc of Reactants \downarrow
Conc of Products $\uparrow \Rightarrow [\text{Reactants}] < [\text{Product}]$

$\therefore -n$ in ~~Nernst~~ Nernst eq: $[\text{Reactants} - ne^- \rightarrow \text{Products}]$

$$E = E^\circ - \frac{0.0591}{(-n)} \ln \frac{[\text{Product}]}{[\text{Reactant}]}$$

~~$E = E^\circ +$~~

$$\therefore E_{\text{Oxidation}} = E^\circ_{\text{Oxidation}} + \frac{0.0591}{n} \log Q$$

$Q \rightarrow [\text{Product}] : [\text{Reactant}]$ ratio

$\therefore [\text{Reactant}] < [\text{Product}] \therefore Q \downarrow \rightarrow \ln Q \downarrow$

$\therefore E \uparrow$ as a result (oxidation half)

Summary:

1) For reduction: The eqⁿ uses -ve sign because of increase in concentration of products that leads to decrease in electrode potential of reduction half reaction

2) For oxidation: The eqⁿ uses +ve sign because of increase in concentration of reactants that leads to increase in electrode potential of oxidation half reaction