red happens @ ↓ oxid happens @ ↓

$$E^\circ_{cell} = E^\circ_{red}(cathode) - E^\circ_{red}(anode)$$

$E^\circ_{cathode}\ [Cu^{2+} \rightarrow Cu(s)] = 0.342\ V$
$E^\circ_{anode}\ [Zn^{2+} \rightarrow Zn(s)] = -0.762\ V$

Fri Apr 19

Try it!

$e^-$ flow from anode → cathode where reduction occurs and from ↑ potential → ↓ potential

cathode (reduction) $Cu^{2+} + 2e^- \rightarrow Cu(s)$ $E^\circ = 0.342\ V$
anode (oxidation) $Zn^{2+} + 2e^- \rightarrow Zn(s)$ $E^\circ = -0.762\ V$

$E^\circ_{cathode} - E^\circ_{anode}$
$0.342V - (-0.762V) = 1.104\ V$

## Zinc-Air battery

$2Zn(s) + O_2(g) \rightarrow 2ZnO(s)$

Reduction: $O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$ $E^\circ_{cathode} = 0.401V$
Oxidation (reverse): $ZnO + H_2O + 2e^- \rightarrow Zn$ $E^\circ_{anode} = -1.25V$
$E^\circ_{cell} = (0.401V) - (-1.25V) = 1.65V$

larger $E^\circ$ undergoes reduction

$E^\circ_{red} = 0.771\ V$ $Fe^{3+} + e^- \rightarrow Fe^{2+}$
$E^\circ_{red} = 0.535\ V$ $I_2 + 2e^- \rightarrow 2I^-$

Calc $E_{cell}$ for $2Fe^{3+} + 2I^- \rightarrow 2Fe^{2+} + I_2$

$E_{cell} = 0.771V - (0.535V)$
$= 0.263V$

Lg + $E^\circ_{red}$ → easily reduced ⇒ strong oxidizing agents
Lg - $E^\circ_{red}$ → difficult to reduce, easy to oxidize ⇒ strong reducing agents

## Redox, free energy, and K

- all these tell us about spontaneity

$$\Delta G^\circ = -nFE^\circ = -RT\ln K$$

F = 96,485 C/mol Faraday constant