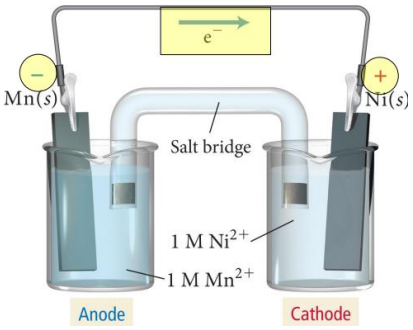
N44 - Cells



Galvanic

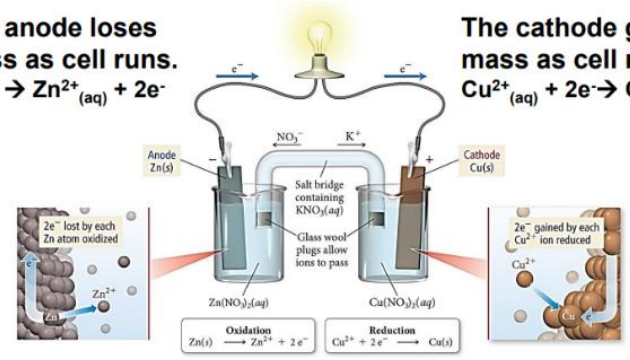
- Converts chemical energy into electrical energy.
- Positive cell potential, $E°_{cell}$ = +
- Spontaneous, negative free energy difference, ΔG = -
- Anode = - and Cathode = +
- Electrons supplied by the chemical being oxidized.
- Electrons flow from anode to cathode.

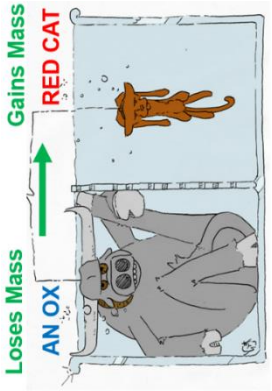
Electrolytic

- Converts electrical energy into chemical energy
- Negative cell potential, $E°_{cell}$ = -
- NOT spontaneous, positive free energy difference, ΔG = +
- Anode = + and Cathode = -
- Electrons supplied by an external source
- Electrons enter from the cathode and come out at the anode.

The anode loses mass as cell runs.
$Zn_{(s)} \rightarrow Zn^{2+}_{(aq)} + 2e^-$

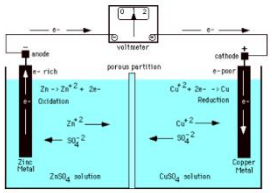
The cathode gains mass as cell runs.
$Cu^{2+}_{(aq)} + 2e^- \rightarrow Cu_{(s)}$





a RED CAT gains, what AN OX loses

Line Notation



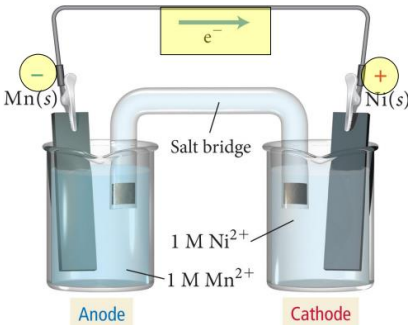
$Zn(s) \mid Zn^{2+}(aq) \parallel Cu^{2+}(aq) \mid Cu(s)$

Anode material | Anode solution || Cathode solution | Cathode material

Requirements for Drawing/Labeling a Cell

- ❑ Determine what is reduced vs. oxidized ($E°_{cell}$ values, OR told which rxn to do)
- ❑ Beaker/container for anode and cathode AND liquid line drawn for each beaker
- ❑ Anode/cathode metal strips drawn submerged in liquid
- ❑ Label which solution/ions are in each beaker
- ❑ Label which beaker is anode and cathode
- ❑ Label anode/cathode strips with which solid metal each is
- ❑ Label anode and cathode with correct -/+ depending on if it is a galvanic cell (A-/C+) or electrolytic cell (A+/C-).
- ❑ Write the half reactions for each beaker
- ❑ Wire connecting anode/cathode strips together
- ❑ Label direction of e- flow along wire at top of drawing (anode → cathode always)
- ❑ Salt bridge submerged in liquid on both sides
- ❑ Label direction of ion flow inside salt bridge (anions flowing to anode, cations flowing to cathode)

N44 - Cells



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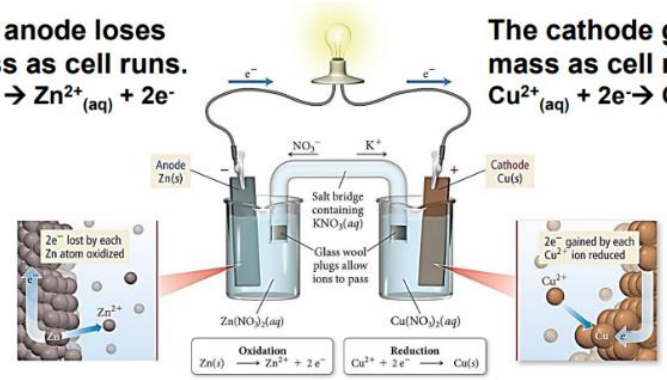

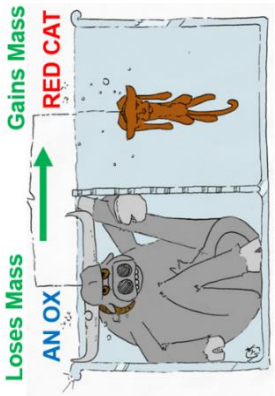

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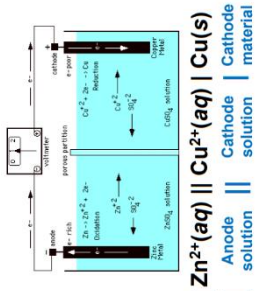

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