


# ELECTROLYSIS

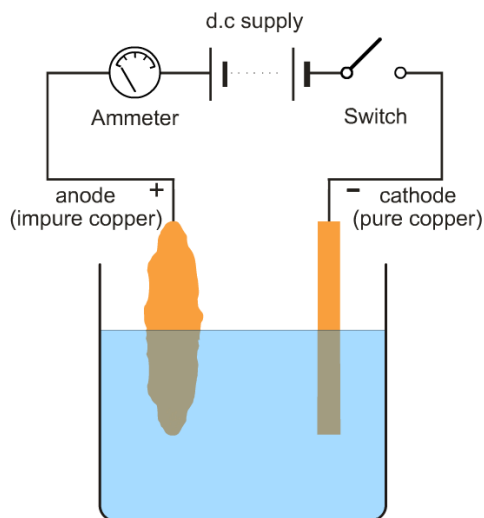


POSITIVE CATIONS are attracted to the  cathode where they are reduced by the GAIN of electrons.



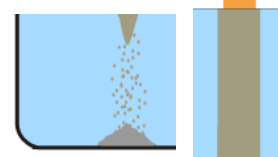
NEGATIVE ANIONS are attracted to the  anode where they are oxidized by the LOSS of electrons.

The electrolyte can be aqueous or molten (melted) – either way the IONS are free to move!

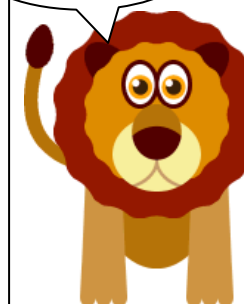


## PURIFICATION OF COPPER BY ELECTROLYSIS

At anode:  $\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$   
 At cathode:  $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$   
 In effect you move Cu from one electrode to the other! But as you do the impurities from the anode fall to the bottom of the cell as "anode sludge". The cathode grows larger as it is coated in PURE Cu.



Ger!!!!!!



Loss of electrons = oxidation  
 Gain of electrons = reduction

Balancing half equations.

- Balance atoms that aren't H or O
- Balance O's by adding water, balance H's by adding H<sup>+</sup>
- Balance charge by adding e<sup>-</sup> to either side

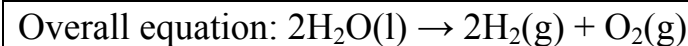
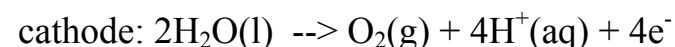
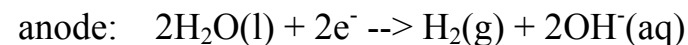
Combining half equations.

- Multiply one or both by a number so the e<sup>-</sup> will be the same and will cancel out. Combine the 2 equations. \*Cancel out any species that now occur on both sides of the arrow (often H<sub>2</sub>O or H<sup>+</sup>).

# REDOX REVISION

**Oxidation numbers** Increase in oxidation number = oxidation, Decrease in oxidation number = reduction *Useful for working out what's been oxidised etc.*  
**Assigning Oxidation numbers:** oxidation no. of element = 0. Sum of oxidation numbers in molecule = 0. Sum of oxidation numbers in ion = charge on that ion. H in compounds is always +1 (unless in a metal hydride). O in compounds is always -2 (unless in a peroxide). Oxidation of simple monatomic ions = their charge. Watch out for N, S, and Cl in particular which can vary a lot.

**Electrolysis of water** – splits water into H<sub>2</sub> & O<sub>2</sub> gas



The decomposition of water produces twice as much hydrogen gas as oxygen gas.