

Problem...



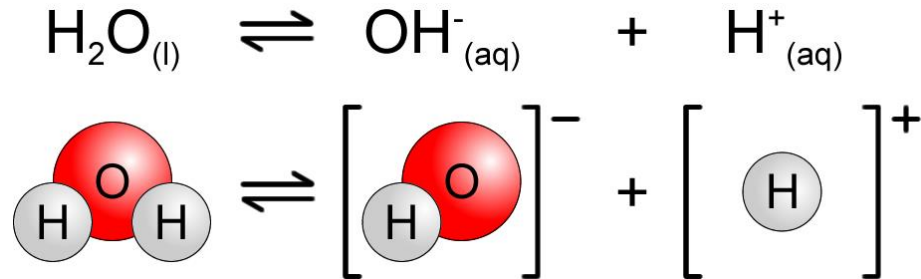
...with the Electrolysis
of Aqueous Salts?



Electrolysis Rage

Spontaneous Ionization of Water

Water molecules,
what r u doing?

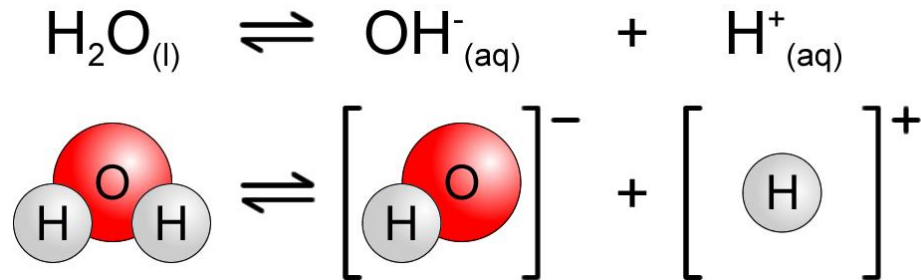


Electrolysis Rage

Spontaneous Ionization of Water



Water molecules spontaneously ionizes to form OH^- and H^+ !



- The aqueous solution of a salt will contain *four ions*:
 - 1) H^+ from water.
 - 2) cation from salt.
 - 3) OH^- from water.
 - 4) anion from salt.

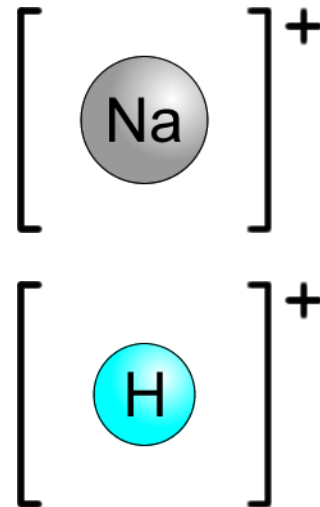


Electrolysis Rage

Electrolysis of Dilute Aqueous Sodium Chloride



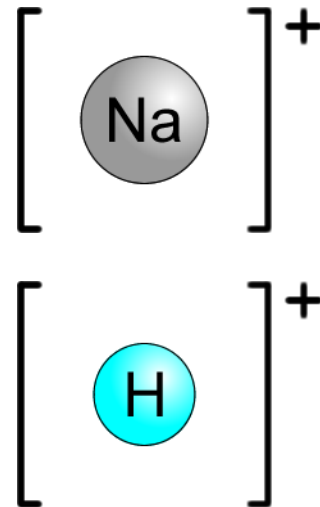
*Sodium ions, y u
no discharge?*



Electrolysis Rage

Electrolysis of Dilute Aqueous Sodium Chloride

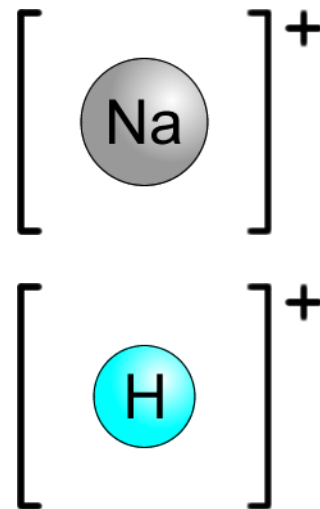
Sodium is *above*
hydrogen in the
electrochemical series!



Electrolysis Rage

Electrolysis of Dilute Aqueous Sodium Chloride

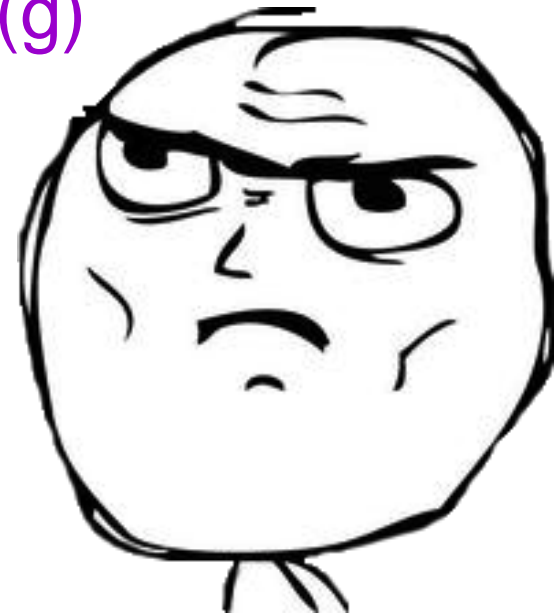
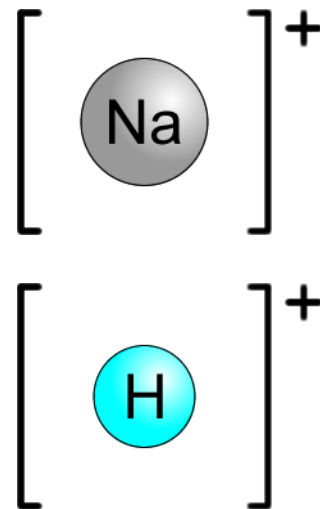
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Electrolysis Rage

Electrolysis of Dilute Aqueous Sodium Chloride

Ions of the less reactive element (hydrogen) are preferentially reduced at the cathode:



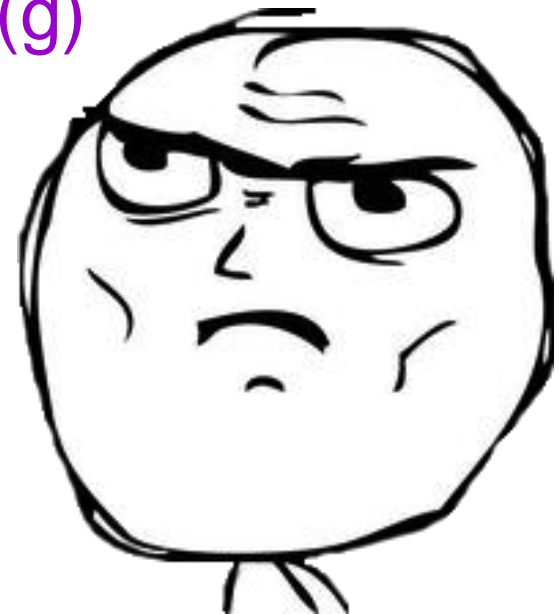
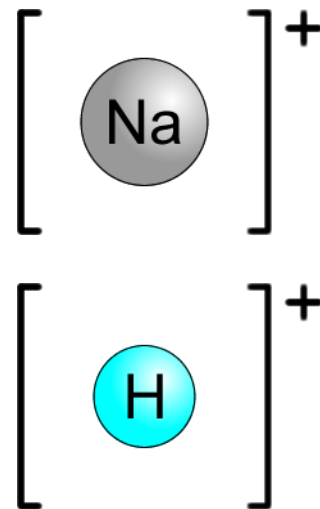
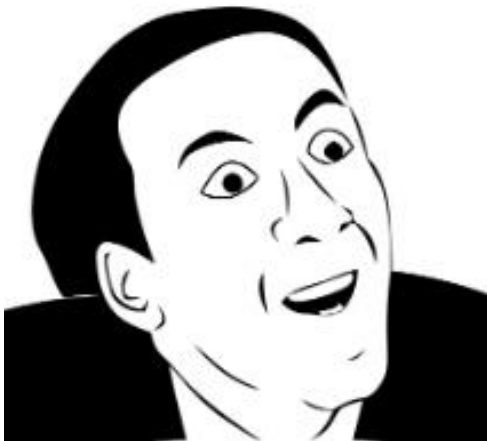
Electrolysis Rage

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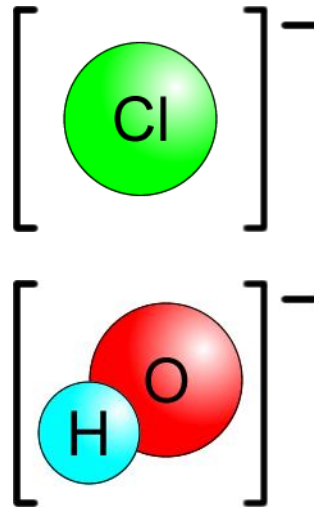
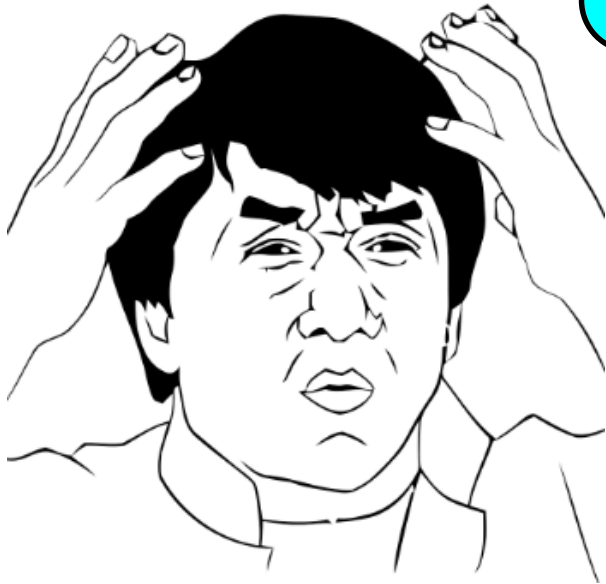
You don't say!



Electrolysis Rage

Electrolysis of Dilute Aqueous Sodium Chloride

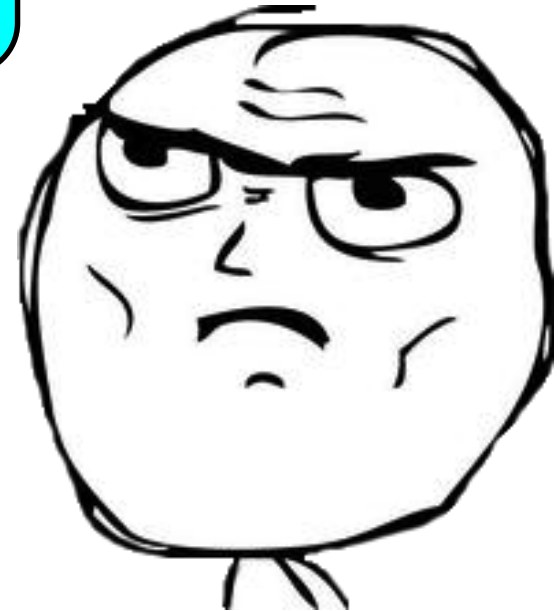
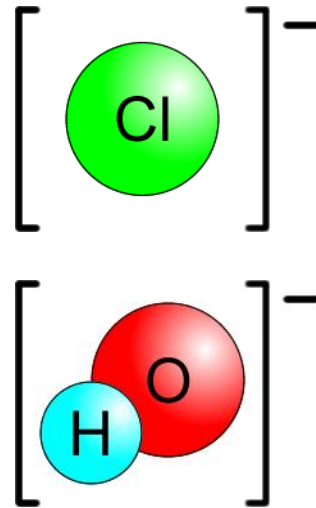
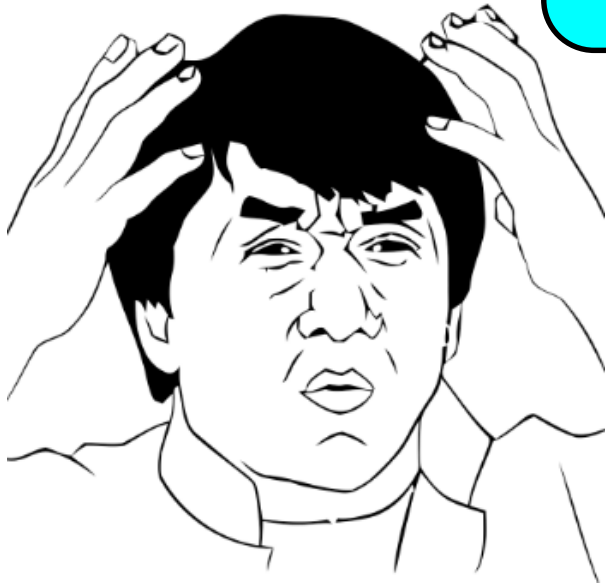
*Chloride ions, y u
no discharge?*



Electrolysis Rage

Electrolysis of Dilute Aqueous Sodium Chloride

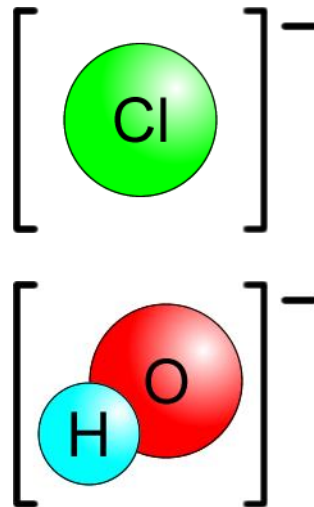
The aqueous solution is *dilute*!



Electrolysis Rage

Electrolysis of Dilute Aqueous Sodium Chloride

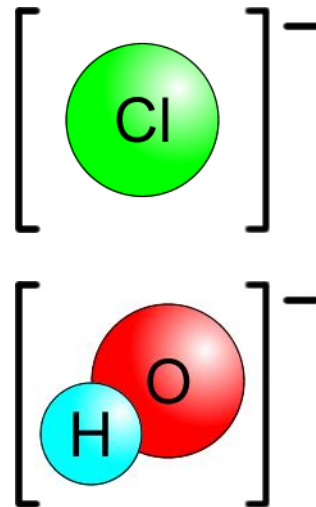
The aqueous solution is *dilute*!



Electrolysis Rage

Electrolysis of Dilute Aqueous Sodium Chloride

Hydroxide ions are preferentially oxidised at the anode during the electrolysis of a dilute aqueous solution:



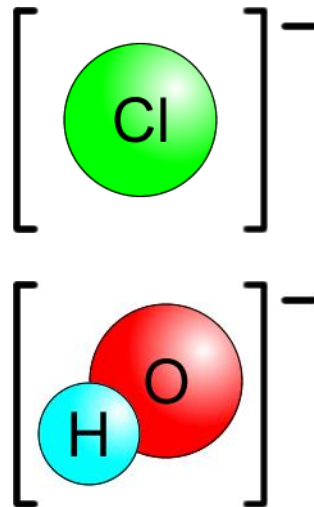
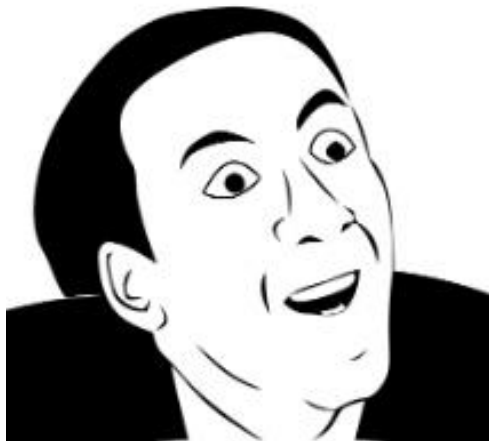
Electrolysis Rage

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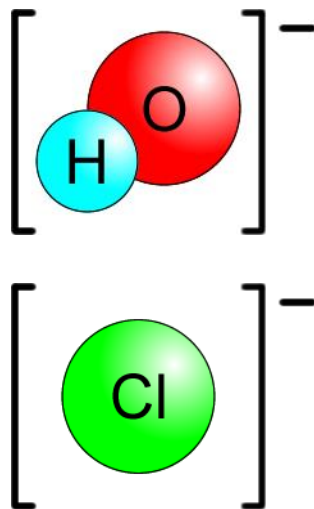
You don't say!



Electrolysis Rage

Electrolysis of Concentrated Aqueous Sodium Chloride

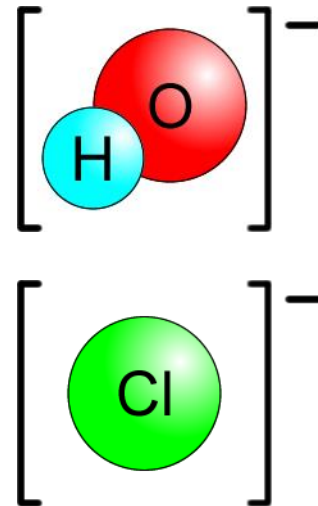
Hydroxide ions,
y u no
discharge?



Electrolysis Rage

Electrolysis of Concentrated Aqueous Sodium Chloride

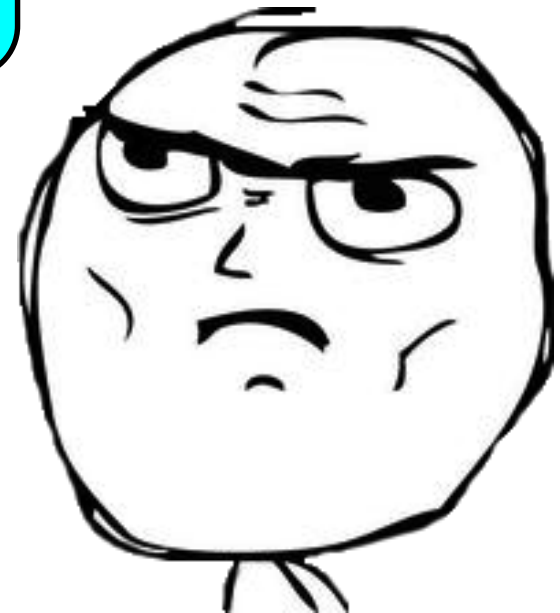
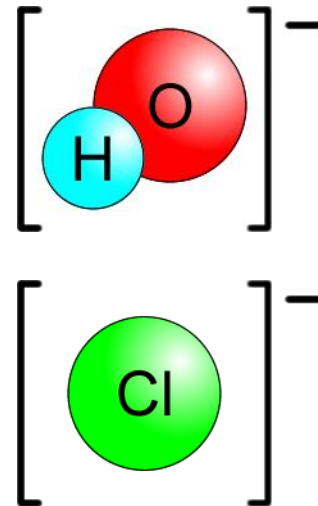
The aqueous solution is *concentrated!*



Electrolysis Rage

Electrolysis of Concentrated Aqueous Sodium Chloride

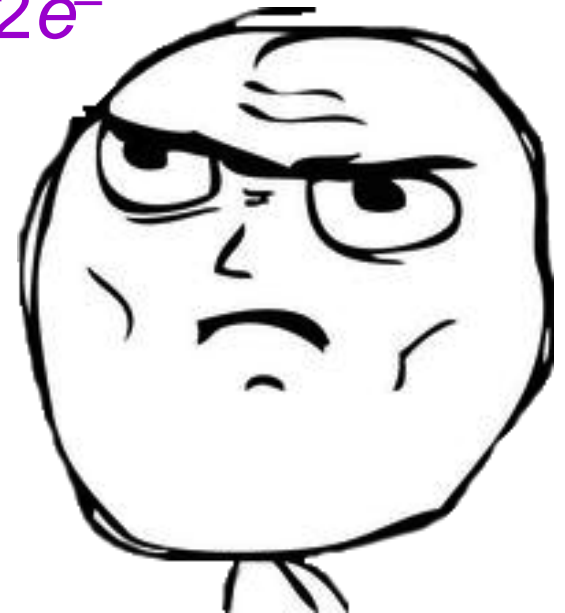
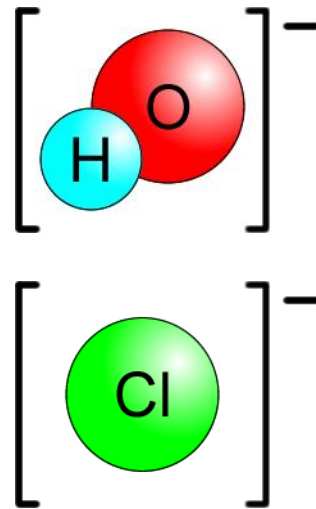
The aqueous solution is *concentrated!*



Electrolysis Rage

Electrolysis of Concentrated Aqueous Sodium Chloride

Chloride ions are preferentially oxidised at the anode to produce molecular chlorine:



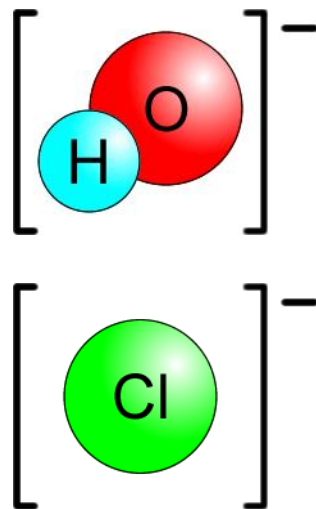
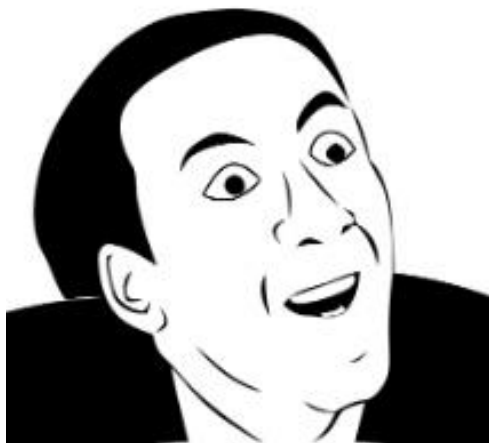
Electrolysis Rage

Electrolysis of Concentrated Aqueous Sodium Chloride

Chloride ions are preferentially oxidised at the anode to produce molecular chlorine:



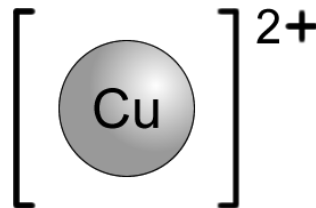
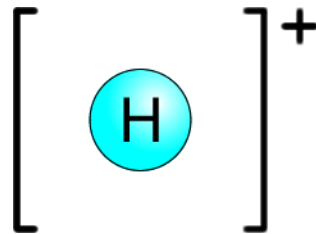
You don't say!



Electrolysis Rage

Electrolysis of Aqueous Copper(II) Sulfate

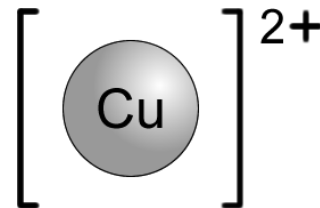
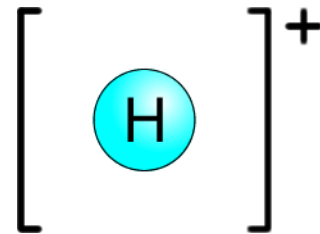
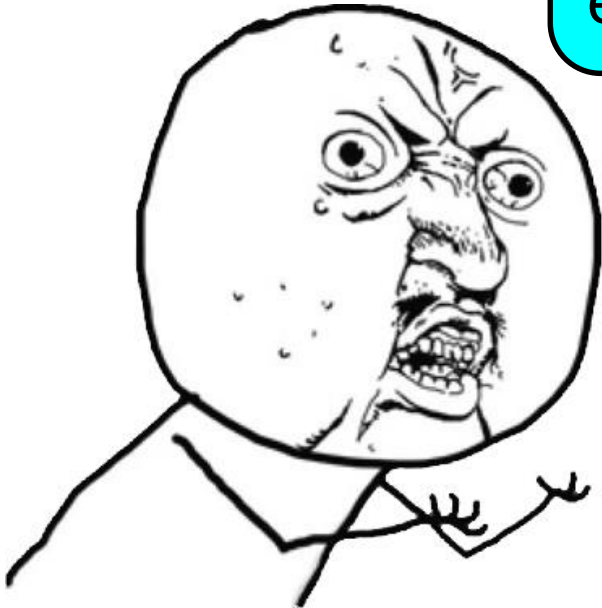
*Hydrogen ions,
y u no
discharge?*



Electrolysis Rage

Electrolysis of Aqueous Copper(II) Sulfate

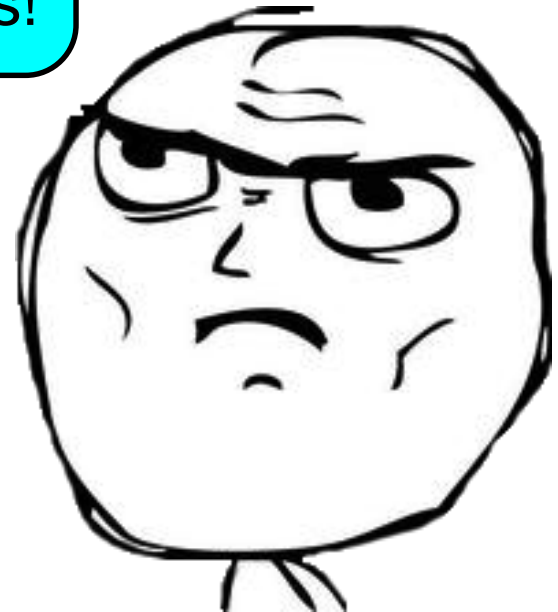
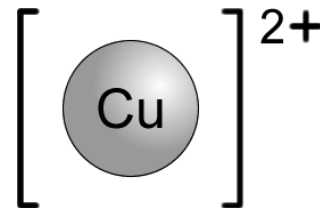
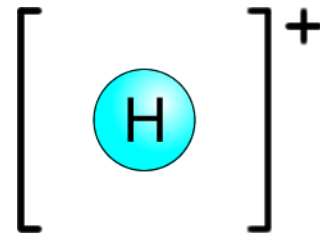
Copper is *below* hydrogen in the electrochemical series!



Electrolysis Rage

Electrolysis of Aqueous Copper(II) Sulfate

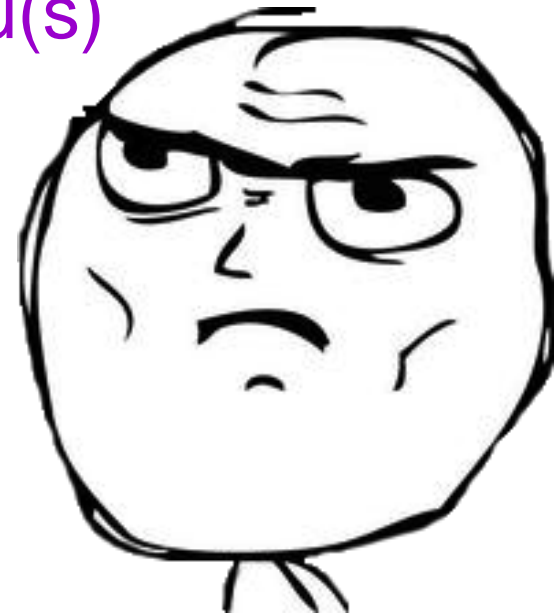
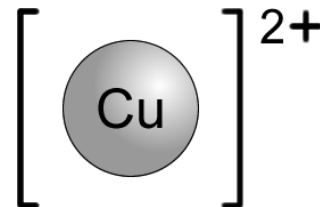
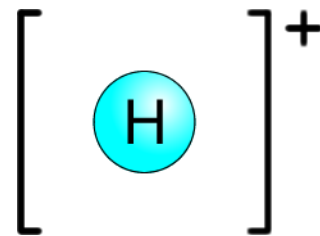
Copper is *below* *hydrogen* in the electrochemical series!



Electrolysis Rage

Electrolysis of Aqueous Copper(II) Sulfate

Ions of the less reactive element (copper) are preferentially reduced at the cathode:



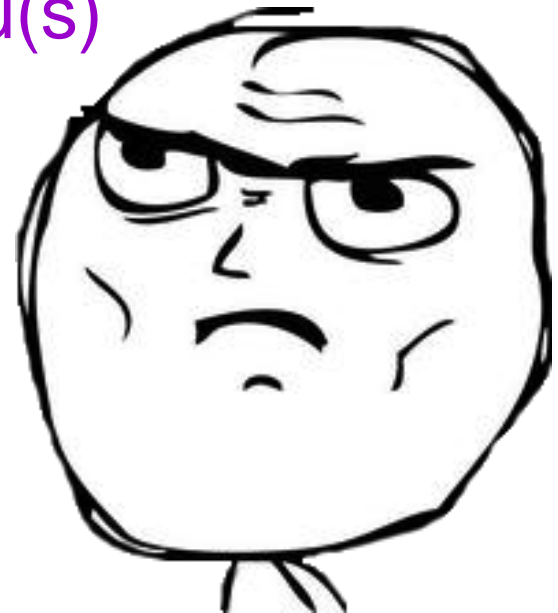
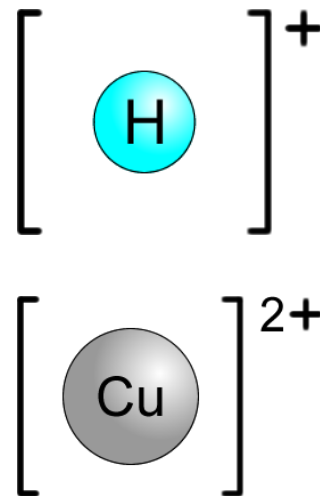
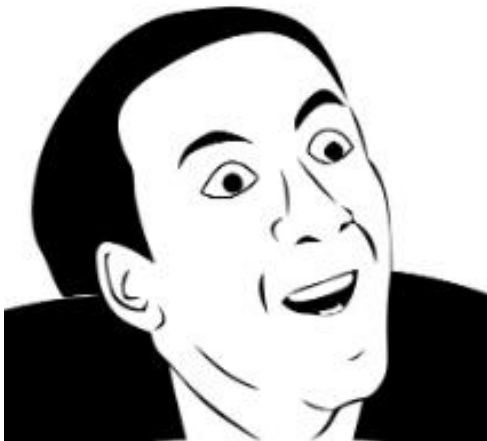
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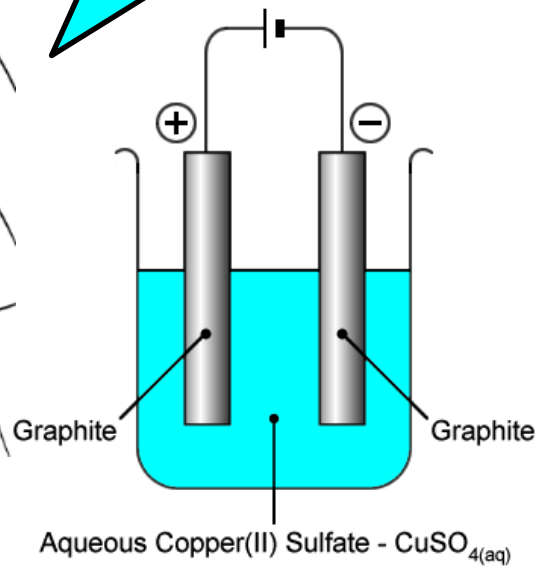
You don't say!



Electrolysis Rage

Electrolysis with Inert Graphite Electrodes

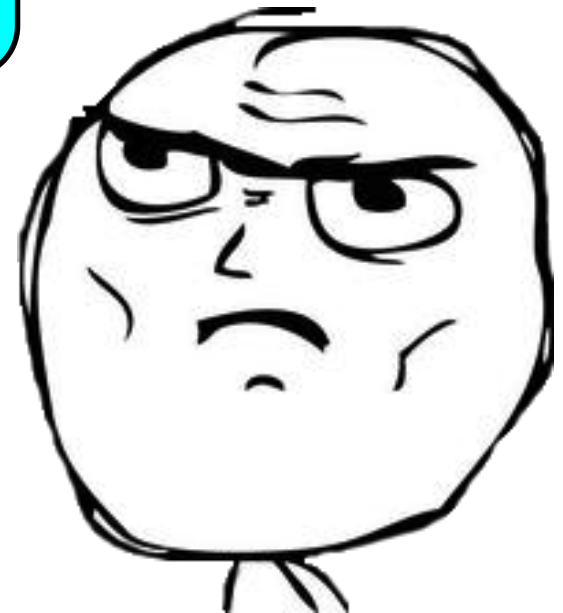
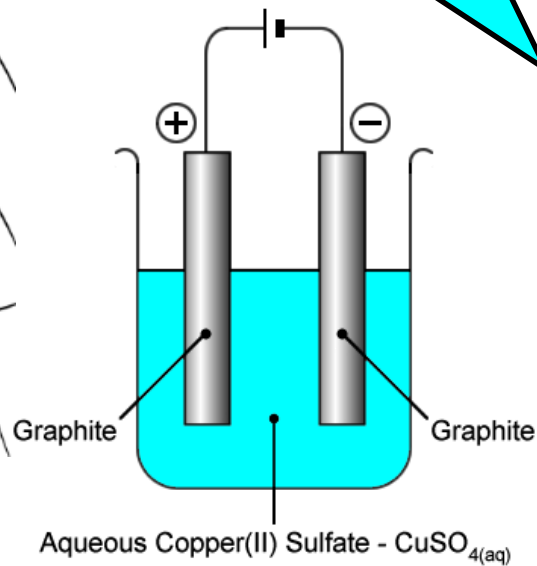
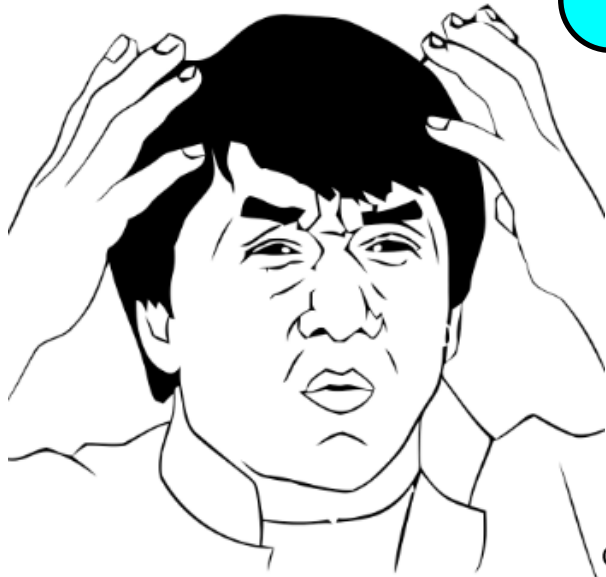
*Graphite anode,
y u no dissolve?*



Electrolysis Rage

Electrolysis with Inert Graphite Electrodes

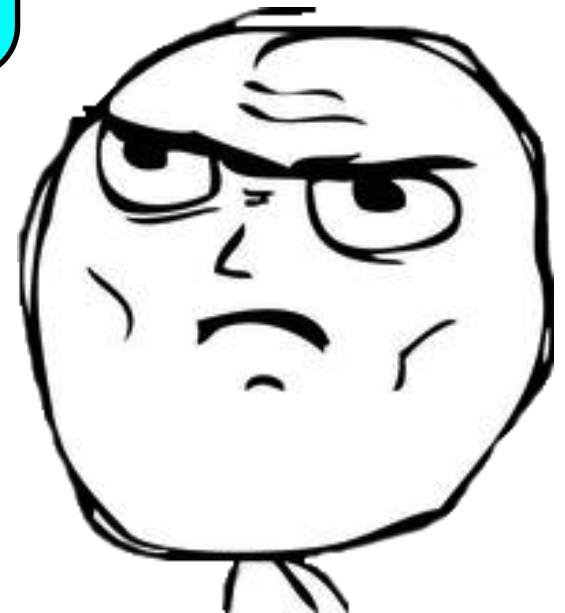
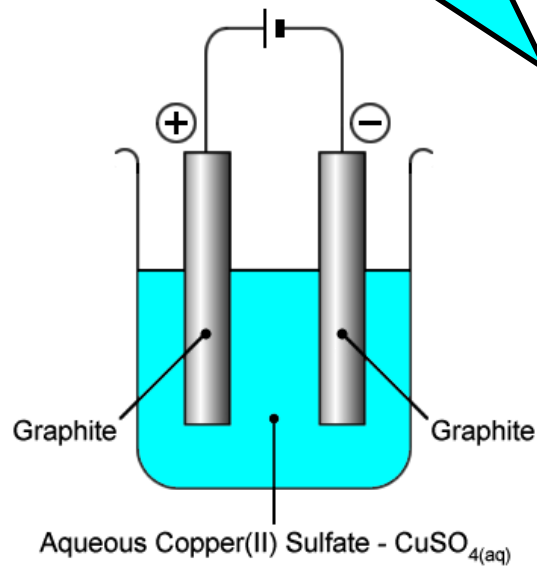
Graphite is *inert* and will *not react* during the electrolysis!



Electrolysis Rage

Electrolysis with Inert Graphite Electrodes

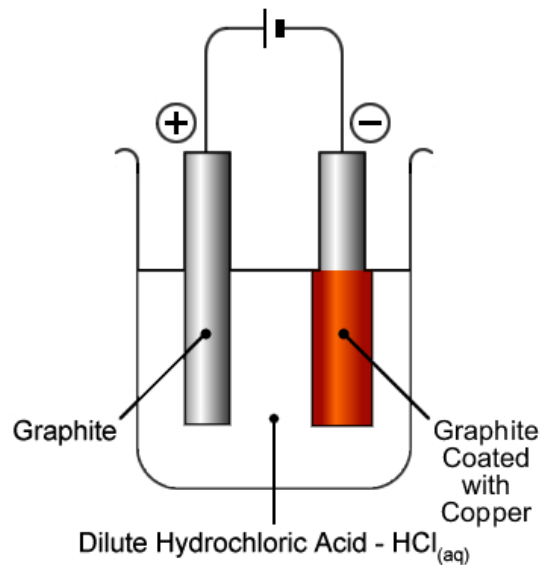
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Electrolysis Rage

Electrolysis with Inert Graphite Electrodes

Graphite and platinum can both be used as inert electrodes.

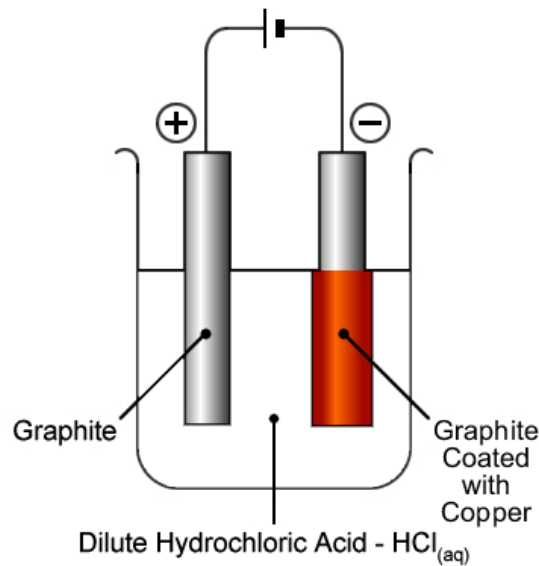
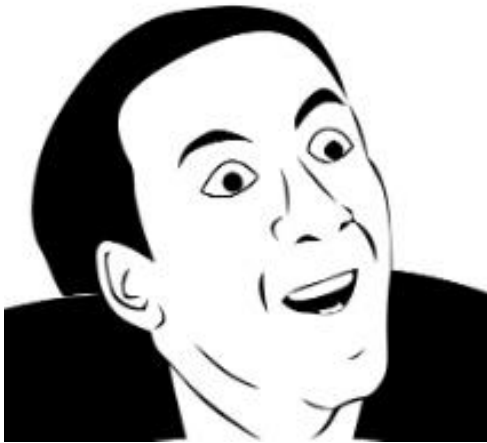


Electrolysis Rage

Electrolysis with Inert Graphite Electrodes

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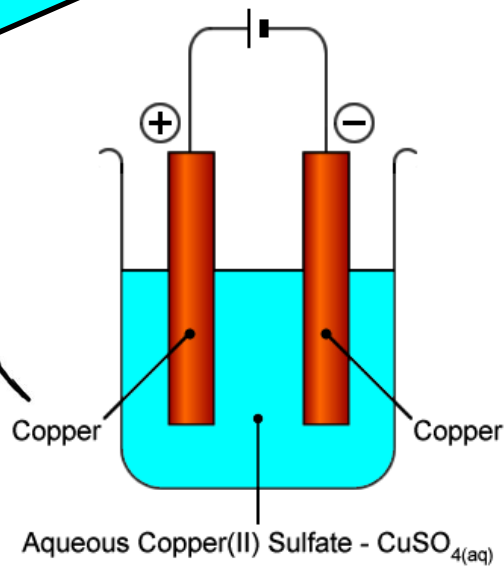
You don't say!



Electrolysis Rage

Electrolysis with Active Copper Electrodes

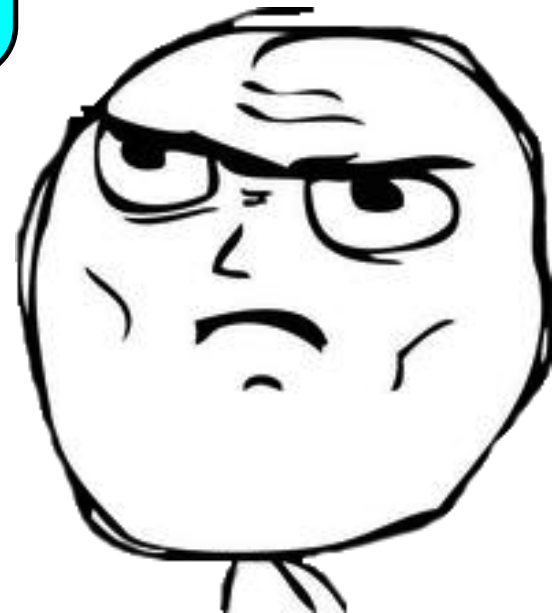
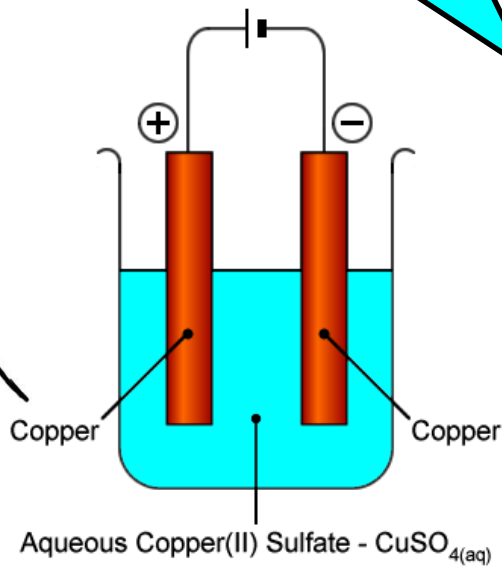
*Copper anode,
y u dissolve?*



Electrolysis Rage

Electrolysis with Active Copper Electrodes

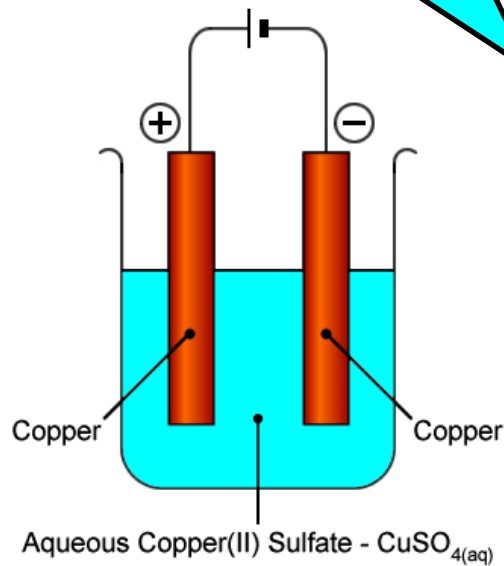
If the *anode* is made of *copper*, then it will be *oxidised* during electrolysis!



Electrolysis Rage

Electrolysis with Active Copper Electrodes

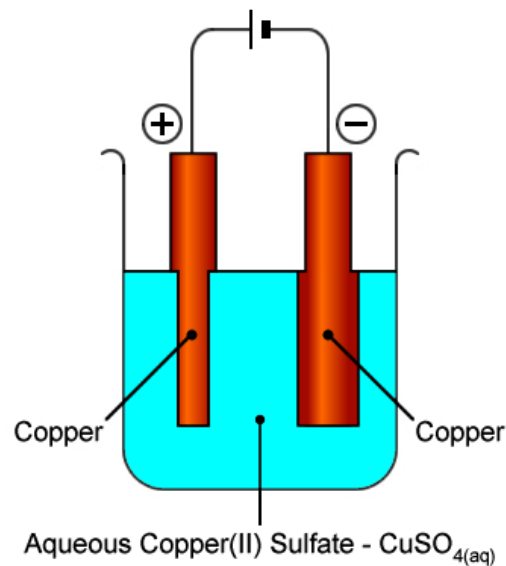
If the *anode* is made of *copper*, then it will be *oxidised* during electrolysis!



Electrolysis Rage

Electrolysis with Active Copper Electrodes

If the anode is made of metal, then atoms of the metal can be oxidised to metal cations which dissolve into the solution:



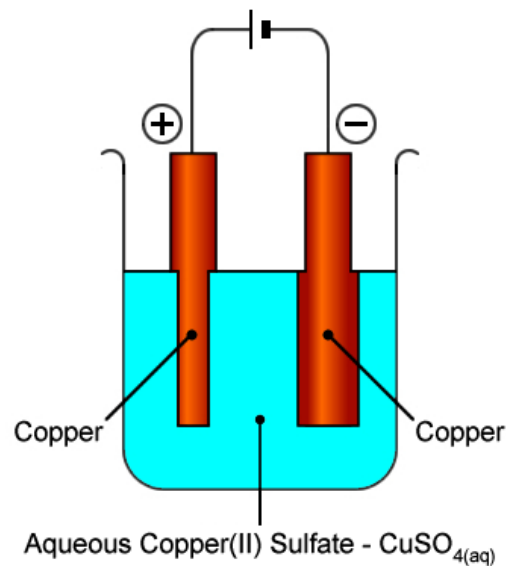
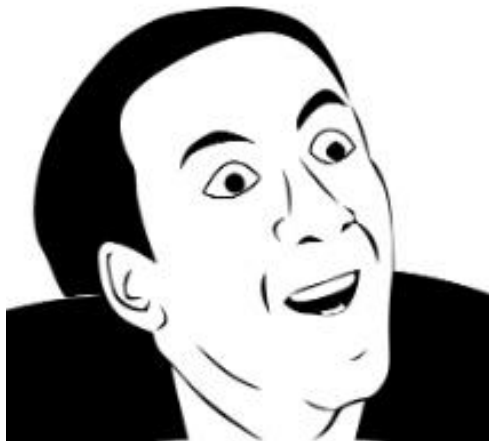
Electrolysis Rage

Electrolysis with Active Copper Electrodes

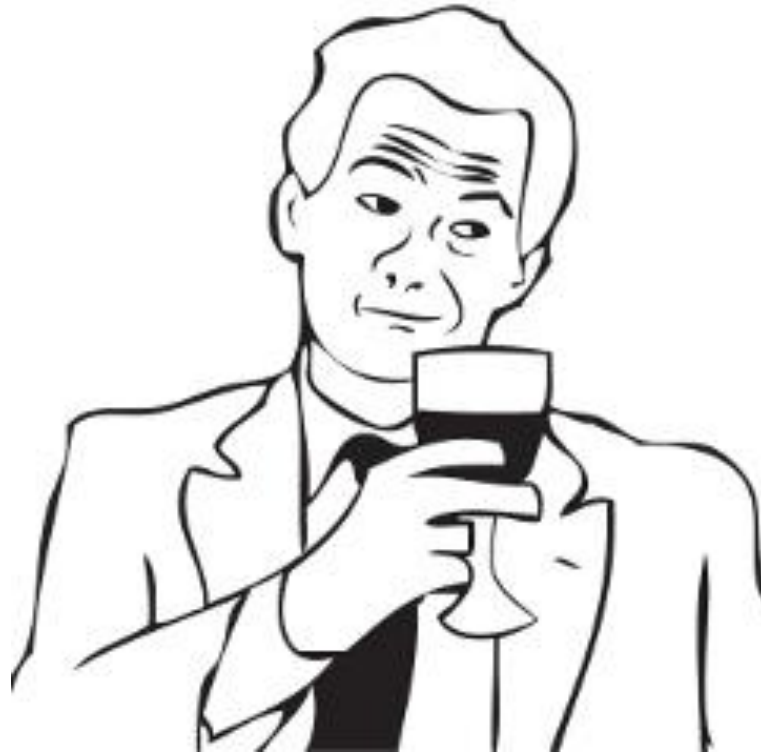
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You don't say!



Electrolysis Rage



True Story

Told by Dr. Chris Slatter
Nanyang Girls' High School
8th February 2016

