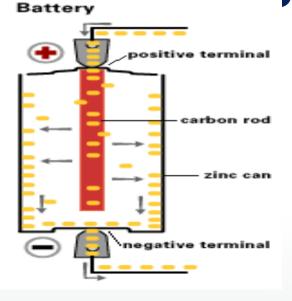
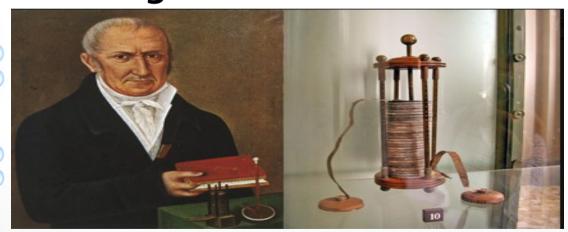
World Of Rattorios



History Of Batteries

The history of electrochemical energy storage began with scientific



Alessandro Volta (1745-1827)



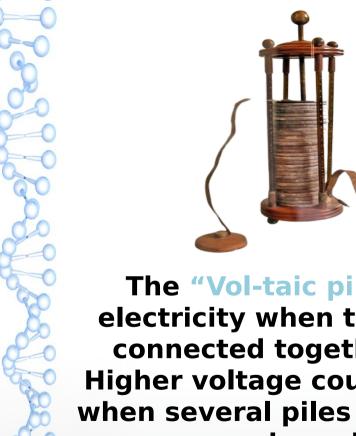
Luigi Galvani (1737-1798)

- Names such as Luigi Galvani
- and Alessandro Volta are associated with this work and live on today in terms such as "galvanic cell" and "volt". In 1789, while conducting an experiment, Galvani noticed that the legs of a frog began to twitch when they came into contact with two different types of metal.

He concluded there was a connection between electricity and muscle activity.

Ten years later, Volta constructed the first simple battery

He put together alternating discs of copper and zinc in a column, with a sheet of paper soaked in a salt solution inserted between each of the .layers



The "Vol-taic pile" produced electricity when the plates were connected together with wire. Higher voltage could be extracted when several piles were connected in series.



Figure 2: A typical body-worn vacuum tube hearing aid of the 1940s. The two batteries together are larger than

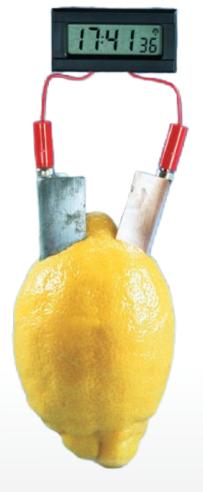




Figure 3: The type of battery that was used in the early 1920s to provide power for lighting, engine ignition, radios and, yes, even hearing aids.

Believe it or Not

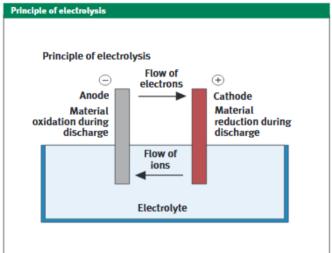
If you pierce a lemon with a copper plate and a zinc plate, without the plates touching, a voltage of about 1 V can be measured between the plates. The voltage is sufficient to run an electric clock. The metal strips are referred to as electrodes. The chemical reactions take place at the electrodes. Instead of energy being released as heat or light, it is emitted in the form of electrical energy

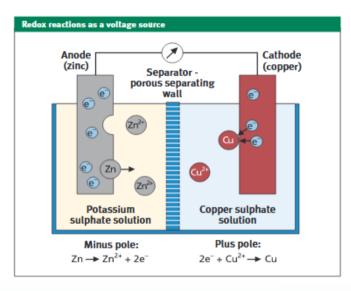


Differences between Prilliary and Secondary(accumulators) The discharg**&y&dang**e process___ can be repeated up to a thousand times. Primary batteries can only be discharged once Rechargeable batteries allow_ spent chemical energy to be restored by recharging. A recharger device pumps electrons from the .plus pole back to the minus pole This recharges and reactivates the electrode mass. The discharge/recharge process can be

Some kind of Batteries











Summary of characteristics and examples of the use of standard battery systems

Туре	Zinc Carbon	Alkaline Manganese	Silver Oxide	Lithium	Nickel Metal Hydride	Nickel Cadmium Accumulators	Lithium Ion
Voltage	1,5 V	1,5 V	1,55 V	3 V	1,2 V	1,2 V	3,6 V
Minus Pole Anode	zinc	zinc	zinc	lithium	water storing metal alloy	cadmium	lithium cobalt compound
Plus pole Cathode	manganese dioxide	manganese dioxide	silver oxide	manganese dioxide	nickel hydroxide	nickel hydroxide	graphite
Electrolyte	ammonium chloride or zinc chloride	potassium hydroxide	potassium hydroxide	lithium compound in org. solution	potassium hydroxide	potassium hydroxide	lithium compound in org. solution
Characteristics	voltage sinks significantly when discharging, cheap	leak proof, high performance, long-life	voltage constant for long time, very long life	very long storage, voltage stays constant for long time	high resilience, rechargeable	rechargeable, cheap	high resilience, high energy density, rechargeable
Use	pocket torche	radios, cameras, toys	watches, calculators, cameras	remote controls, calculator, back-up systems	cordless telephones, digital cameras	video cameras, tools	mobile phones, laptops, digital cameras





- The overall reaction :in the cell is
 - Zn + 2MnO₂ → ZnO
 - + Mn₂O₃
 - Anode: Zn → Zn²⁺ +
 - -2e
 - Cathode: 2NH₄+ +
 - 2MnO₂ + 2e- →
- $Mn_2O_3 + H_2O + 2NH_3$



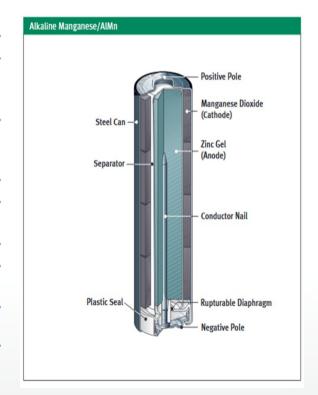


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:At the anode
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$$Zn + 2OH- → Zn(OH)_2 + 2e-$$

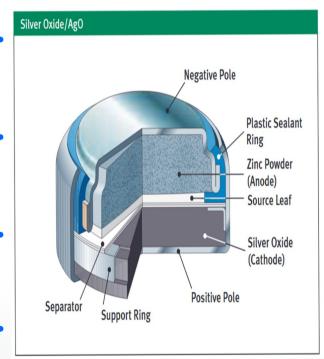
 $Zn(OH)_2 + 2OH- →$
 $-[Zn(OH)_4]^2$

- At the cathode: 2MnO₂ + -H₂O + 2e⁻ → Mn₂O₃ + 2OH
 - :For full discharge
 - $MnO_2 + 2H_2O + 2e \rightarrow -Mn(OH)_2 + 2OH$
 - :Overall
- Zn + 2MnO₂ → ZnO + Mn₂O₃ · For full discharge
 - $Zn + MnO_2 + 2H_2O \rightarrow Mn(OH)_2 + Zn(OH)_2$



Silver Oxide/Ago (3)

At the anode: Zn + 2OH- → $-Zn(OH)_2 + 2e$ At the cathode: $Ag_2O + H_2O + 2e$ -→ 2Ag + 2OH Overall: $Ag_2O + H_2O + Zn$ \rightarrow 2Ag + Zn(OH)₂

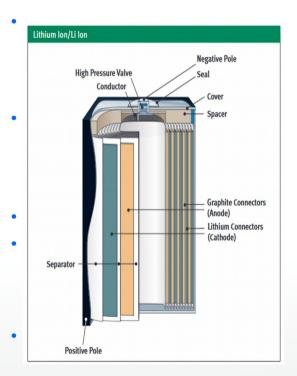


Lithuim Ion/Li Ion(4)

Negative Electrode (anode) oxidation reaction : LiC₆ → xLi⁺ + -xC6 + e Positive electrode

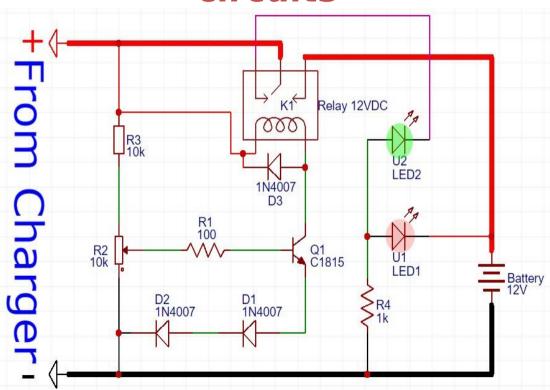
Positive electrode (cathode) reduction reaction : Li₁-xCoO₂ + xLi₊ + xe- → LiCoO2

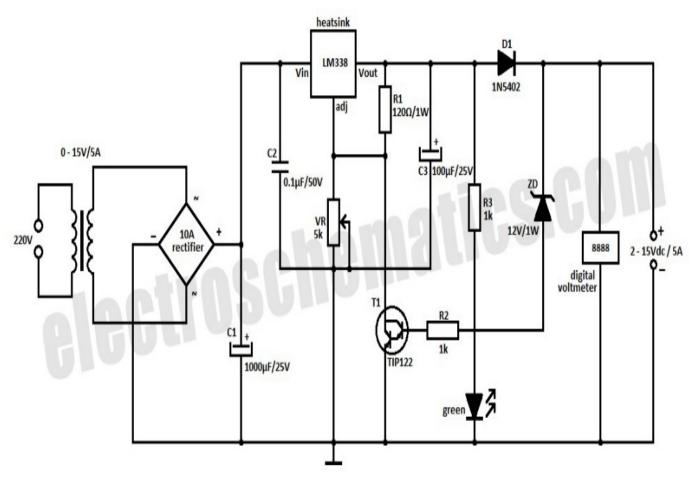
Overall reversible, Redox, : cell reaction LiC₆ + CoO₂ <____> C6 + LiCoO₂



How to charge your Battery?

These are some electric circuits





These are some battery charger





For more information

https://youtu.be/_GGgKh6Sb00 https://youtu.be/HIGITf-rhCE https://youtu.be/Qd0FpGFyAbs

: References

1- DIY Lithium Batteries: How to Build Your Own Battery Packs
2- Batteries in a portable world: a handbook on rechargeable batteries for non-engineers by <u>Buchmann</u> & <u>Isidor</u>

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hank You