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With the rise in portable devices such as laptops, cell phones, MP3 players and cordless power tools, the need for rechargeable batteries has grown substantially in recent years. Rechargeable batteries have been around since 1859, when French physicist Gaston Plante invented the lead acid cell. With a lead anode, a lead dioxide cathode and a sulfuric acid electrolyte, the Plante battery was a precursor to the modern-day car battery.

With NiCd and NiMH batteries, charging can be tricky. You must be careful not to overcharge them, as this could lead to decreased capacity. To prevent this from happening, some chargers switch to a trickle charge or simply shut off when charging is complete. NiCd and NiMH batteries also must be reconditioned, meaning you should completely discharge and recharge them again every once in a while to minimize any loss in capacity. LiOn batteries, on the other hand, have sophisticated chargers that prevent overcharging and never need to be reconditioned.

Rechargeable batteries are more beneficial to both the environment and your wallet than standard batteries. But how do they work? If you"ve ever been curious about how rechargeable batteries work or why you should switch from standard, we"ve got you covered.

There are a few key differences between a rechargeable battery and its standard cousin, but the core process required for a battery to power a device is the same. Those few differences, however, make rechargeable batteries way more efficient, energy-conscious, and cheaper in the long run.

To understand how rechargeable batteries work, you first have to know how a standard (one-time use) battery works. If you already know how regular batteries work, you can skip ahead a little bit; if not, check out this short explanation.

Going back to very basic science, a battery, like everything else in life, is made up of atoms. Then, an atom is made up of particles called protons, neutrons, and electrons. Although it seems like protons, electrons, and neutrons were defined multiple times throughout grade school, here"s a refresher. Protons are positive particles, electrons are negative particles, and neutrons are neutral particles with no charge.

If you grab a AA battery and take a close look at it, you"ll see a positive symbol (+) on one end and a negative symbol (-) on the other. These positive and negative indicators represent a positive electrode and a negative electrode inside the battery, separated by an electrolyte solution that controls the electric current between both ends of the battery.

The positive electrode, called the cathode, has a positive charge because it has way more protons than electrons. Then, the negative electrode, called the anode, has a surplus of electrons that don"t match its number of protons.

Both the cathode and the anode want to get to a state of equilibrium where they have equal numbers of protons and electrons. To do this, electrons travel from the anode (the negative end) to the cathode (the positive end) using the electrolyte solution, which only lets electrons through when a battery is connected to a device.

When all the excess electrons from the anode have made their way to the cathode, the battery is dead and can no longer power any of your electronics. On the other hand, rechargeable batteries can use a charger to reverse electron flow so that the anode once again has a ton of electrons to give off and allow an electric current.

This electron reversal process allows rechargeable batteries to be used again and again. Now, that"s not to say that you can buy a pack of rechargeable batteries and have it last you for life. Just like your smartphone battery life gets worse over time, rechargeable AA or AAA batteries will lose their ability to hold a full charge. If you"re maintaining and using your rechargeable batteries properly, they can last you up to five to seven years.

Rechargeable batteries have to be made of certain elements, like lithium, to allow for a safe recharging process. Non-rechargeable batteries are typically called alkaline batteries, with zinc and manganese dioxide as electrodes and either potassium or sodium hydroxide as the electrolyte solution dividing the two. Alkaline batteries can"t be recharged and, in fact, can even be dangerous and sometimes explosive.