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Welcome to the wonderful world of rechargeable lithium batteries. They're energy-dense, compact, and have completely transformed our world. Without them, laptops wouldn't be portable, smartphones wouldn't fit in your pocket, and electric vehicles would be far less advanced.

But how do rechargeable lithium batteries actually work? Here at Battle Born Batteries, we specialize in rechargeable lithium batteries, so keep reading to learn all about them including their average life cycle and how to use them to their fullest potential. Let's begin.

No, all lithium batteries are not rechargeable. To help understand this concept better, let's talk about the difference between lithium batteries and lithium-ion batteries. Lithium batteries refer to what we call primary cell batteries that you can't recharge.

These batteries are very energy-dense and can store and emit power for long periods. They're great for watches, smoke detectors, and pacemakers—all of which need constant and continuous power. Nevertheless, once they're done, they're done, and must be disposed of.

Lithium-ion batteries, on the other hand, are rechargeable. We call this type of cell a secondary cell. This means that the lithium ions can move in two directions: from the anode to the cathode while discharging and from the cathode to the anode when recharging. Lithium-ion batteries are used for everything from earbuds to home backup power systems.

To understand how a rechargeable lithium battery works, we must first understand the components inside the battery. Each lithium-ion cell has an anode, a cathode, an electrolyte, and a separator. In most lithium-ion cells, manufacturers make the anode out of graphite. Popular cathode materials include lithium iron phosphate, lithium cobalt oxide, and lithium manganese oxide.

Between the anode and cathode is the liquid electrolyte, usually made of lithium salt. As the battery discharges (powering your devices), lithium-ions flow from the anode to the cathode and pass through a separator, which forces the electrons to power your electronics.

This unit constantly monitors the temperature of the battery, but it also ensures that the battery is working correctly. The BMS does this by making sure all the cells of the battery are discharging and recharging at the same rate. This helps get the most potential power out of your battery and extend its life.

We've talked about how a lithium battery works, but what happens when it recharges? Essentially, the flow of lithium-ions between the anode and cathode reverses. Instead of moving from the anode to the cathode, the lithium ions flow from the cathode to the anode.

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A battery charger increases the voltage of the system above the battery's voltage to inject the charge. Having a programmable charger that can be set to the battery's specific needs is important to get this process to work correctly. In a lithium battery, the BMS mentioned in the above paragraph is in place to prevent the charger from doing anything that will damage the battery.

You shouldn't try to charge your batteries with just any charger. For example, chargers for lead-acid batteries are specially designed to protect the battery life by pulsing high voltages into the battery occasionally. Because lithium batteries run at a narrower range of voltage, these lead-acid chargers could potentially overcharge your lithium-ion battery. This is why it's so important to use a charger specially designed for your batteries' specific chemistry.

The amount of times you can recharge a lithium battery completely depends on the type of battery and on how you use it. Not all lithium-ion batteries are created equal and cell design plays a large role in lifespan. For example, prismatic cell batteries have significantly lower lifespans than cylindrical cells. Because of this, we choose to use long-lasting high-quality cylindrical cells in Battle Born Batteries.

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Web: <https://sumthingtasty.co.za/contact-us/>

Email: energystorage2000@gmail.com

WhatsApp: 8613816583346

