



How does a lithium ion battery work

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Lithium-ion batteries are incredibly popular these days. You can find them in laptops, PDAs, cell phones and iPods. They're so common because, pound for pound, they're some of the most energetic rechargeable batteries available.

- Lithium-ion batteries have also been in the news lately. That's because these batteries have the ability to burst into flames occasionally. It's not very common -- just two or three battery packs per million have a problem -- but when it happens, it's extreme. In some situations, the failure rate can rise, and when that happens you end up with a worldwide battery recall that can cost manufacturers millions of dollars.

Lithium-ion batteries are popular because they have a number of important advantages over competing technologies:

That is not to say that lithium-ion batteries are flawless. They have a few disadvantages as well:

Many of these characteristics can be understood by looking at the chemistry inside a lithium-ion cell. We'll look at this next. -

Lithium-ion battery packs come in all shapes and sizes, but they all look about the same on the inside. If you were to take apart a laptop battery pack (something that we DO NOT recommend because of the possibility of shorting out a battery and starting a fire) you would find the following:

If the battery pack gets too hot during charging or use, the computer will shut down the flow of power to try to cool things down. If you leave your laptop in an extremely hot car and try to use the laptop, this computer may prevent you from powering up until things cool off. If the cells ever become completely discharged, the battery pack will shut down because the cells are ruined. It may also keep track of the number of charge/discharge cycles and send out information so the laptop's battery meter can tell you how much charge is left in the battery.

It's a pretty sophisticated little computer, and it draws power from the batteries. This power draw is one reason why lithium-ion batteries lose 5 percent of their power every month when sitting idle.

As with most batteries you have an outer case made of metal. The use of metal is particularly important here because the battery is pressurized. This metal case has some kind of pressure-sensitive vent hole. If the battery ever gets so hot that it risks exploding from over-pressure, this vent will release the extra pressure. The battery will probably be useless afterwards, so this is something to avoid. The vent is strictly there as a safety measure. So is the Positive Temperature Coefficient (PTC) switch, a device that is supposed to keep the battery from overheating.

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This metal case holds a long spiral comprising three thin sheets pressed together:

Inside the case these sheets are submerged in an organic solvent that acts as the electrolyte. Ether is one common solvent.

The separator is a very thin sheet of microperforated plastic. As the name implies, it separates the positive and negative electrodes while allowing ions to pass through.

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