Lithium ion battery optimal temperature

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Over three decades since their initial development, the capabilities of lithium batteries continue to expand. Today"s batteries offer increased run times, faster charging, and higher consistency of power.

But there remains a difference between what the battery is capable of doing, and its ideal conditions for peak performance. For example, when we look at temperature there are two clear categories: the temperature range in which the battery can operate, and the ideal operating temperature range for lithium batteries.

Ask 10 different experts or consult ten different resources, and you"ll get ten different answers as to the battery"s potential and ideal temperature ranges. But we can divide the best answers into three categories:

The takeaway? Lithium batteries can operate in all temperatures and environments. Even the hottest summer day in the Arizona desert doesn"t reach 130? F, while it would take an abnormally Arctic night to push temperatures low enough to cease discharge.

When the temperature goes below freezing, just about any lithium battery will automatically cease charging. But the batteries themselves don"t freeze and will continue discharge at such temperatures. The battery should be warmed to a more moderate temperature before charging.

"You can go below freezing with lead acid because of its sluggish behavior," explained Cromer. "Lead acid has the reputation of usage in more extreme temperatures than lithium, but that"s because it doesn"t have the same use cases as lithium.

"Starting your car isn"t the same as running your house. Plus, lead acid is a cheaper battery with a shorter life - it doesn"t always need or deserve the same protections of a longer-lasting, more expensive lithium battery system."

It"s not just lithium batteries either. Any battery running at an elevated temperature will exhibit loss of capacity faster than at room temperature. That"s why, as with extremely cold temperatures, chargers for lithium batteries cut off in the range of 115? F.

Again, answers vary from different resources - but our answer is a range from 50? F to a high end of 110? F allows the battery to operate at peak performance while preserving its longevity and ability to function at highest capacity for 6,000 cycles.

As such, if you"re able to store your batteries in an indoor, heated environment so they do not chill to below 50? F or install a heating system to warm batteries once reaching the 50? F threshold, you"re increasing, or at the very least preserving your battery"s life. While heating the battery does take energy, the alternative is

faster degradation or worst case, an inability to access the energy you do have once temperatures reach the freezing point.

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