Lithium battery storage life

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Battery expiration. Expiration as applied to energy storage devices does not mean the same as its application to food items. An expired battery denotes the inability of its manufacturer to guarantee its full charge upon a certain date. As a rule of thumb, when your battery"s total self-discharge is over 20 percent, you can consider the battery expired. You can find your battery"s expected date of expiration on the packaging or the battery. Most recognized manufacturers set it off from surrounding text with distinguishing features such as boxing, color, or separation.

Battery self-discharge rate. As soon as a battery is manufactured, it immediately begins to lose its charge--it discharges its energy. Discharge occurs at variable rates based on chemistry, brand, storage environment, temperature. Self-discharge denotes the rate at which the battery self-depletes in idle storage. All batteries self-discharge over time even when idle.

Battery shelf life. This term is closely connected with self-discharge. Where self-discharge focusses on rate of speed, shelf life is concerned with duration. Shelf life is the length of time your disposable battery will retain its charge unused, or in the case of rechargeable batteries, how long before it will require a charge or is considered spent.

Apart from capacity during storage, the ideal, ambient storage temperatures is the same for battery chemistries across the board with some nuances at the extreme ranges. Another factor that is widely shared is battery contact with other materials.

Contact with other items. Whether being transported or stored, batteries should never come into contact with metallic items or other batteries. Tossing your batteries into a bin containing paper clips or other metallic items for later reuse, or into a purse or pocket containing keys or coins is strongly discouraged. Contact with other batteries or metallic items that can substantially increase the risk of short circuiting. Batteries are best stored in their original packaging. Where this is not possible, batteries should be individually wrapped in plastic.

The flow of excess current in a short-circuited battery causes its temperature to rise, making it significantly more susceptible to leakage. Reusing older batteries with newer one, or installing batteries of mixed capacities into a device, also makes them more prone to leakage. Battery leaks--in most cases, potassium hydroxide battery acid--is corrosive to both electronic components and organic tissue. For this reason, batteries should be removed from devices and equipment before storage.

Nickel-based Ni-MH batteries and Ni-CDs should be stored at about 40 percent state of charge (SoC) to curtail age-related capacity loss while keeping the battery operational and allowing some self-discharge. Although it is not recommended, they can be stored in a fully discharged state with no apparent adverse effects to their

integrity. Maintaining some charge, however, will allow for faster priming when taken out of storage.

Because of its flat discharge curve, the temperature effects on voltage, and the agitation caused by charge and discharge cycles, ascertaining a nickel battery"s state of charge is not simple; however, it is also not crucial. If it is depleted, simply charge it, and store it cool and dry.

An Ni-MH battery can withstand 3-5 years of storage, even at zero voltage. It is widely held that priming is necessary when voltage drops below 1V/cell and can serve to reverse some of its reduced capacity. Nickel-cadmium batteries have a good performance reputation even after extended storage.

Charge a lead acid battery before storing. Lead acid batteries can be stored for up to 2 years. It is generally advisable to periodically monitor the battery voltage and charge it when it falls below 70 percent state-of-charge (SoC); however, lead batteries typically have brand specific readings. For example, some manufacturers may recommend allowing the SoC to drop to 60 percent before recharging the battery. It is, therefore, good practice to always consult the manufacturer"s manual for your specific lead acid battery.

When charging a sealed lead-acid (SLA) battery with an elevated voltage, protect it from damage by setting the current limit to the lowest practical setting and observing the battery voltage and temperature during charge. Never allow the battery to rupture. Accidental skin contact with electrolyte, lead, or cadmium can result in burning and tissue damage. Wash any area of contact promptly. In case of eye contact, thoroughly flush with water and consult a doctor immediately.

The following table illustrates how the two main factors--heat and state of charge--affect capacity of different battery chemistries over a twelve-month period (except as otherwise specified). It also comparatively demonstrates why you should never store lithium batteries fully charged.