

Self-discharge

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Self-discharge is a phenomenon in batteries in which internal chemical reactions reduce the stored charge of the battery without any connection between the electrodes. Self-discharge decreases the shelf life of batteries and causes them to initially have less than a full charge when actually put to use.

How fast self-discharge in a battery occurs is dependent on the type of battery, state of charge, charging current, ambient temperature and other factors.

Typically, among rechargeable batteries, lithium-ion batteries absorb the least amount of self-discharge (around 2% to 3% discharge per month) than lead-acid batteries at 4% to 6%, while nickel-based batteries are more seriously affected by the phenomenon (nickel cadmium, 15% to 20%; nickel metal hydride, 30%,) with the exception of Low self-discharge NiMH batteries (2 to 3%.) Primary batteries, which aren't designed for recharging between manufacturing and use, have much lower self-discharge rates, with shelf lives of 2 to 3 years for zinc–carbon batteries, 5 years for alkaline batteries, and 10 years for lithium batteries.^[1]

Self-discharge is a chemical reaction, just as closed-circuit discharge is, and tends to occur more quickly at higher temperatures. Storing batteries at lower temperatures thus reduces the rate of self-discharge and preserves the initial energy stored in the battery. Self-discharge is also thought to be reduced as a passivation layer develops on the electrodes over time.

References

1. Battery performance characteristics (<http://www.mpoweruk.com/performance.htm>), MPower UK, 23 February 2007. Information on self-discharge characteristics of battery types

Further reading

- Wu and White, "Self-Discharge Model of a Nickel-Hydrogen Cell." Journal of the Electrochemical Society, 147 (3) 901-909 (2000)

External links

- Battery dischargers (<http://www.amperis.com/en/products/misc/battery-dischargers/>) Description and treatment of sulphated batteries

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Categories: Battery (electricity) | Battery charging | Rechargeable batteries

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