

Information Sheet - NiMH Batteries

Basics

The charging efficiency of nickel metal hydride batteries is typically 66%, meaning that you must put 1.5 amp hours into the battery for every 1 amp hours you get out. The faster you charge the worse this gets.

Normal (Overnight) Charging

The easiest way to charge a nickel metal hydride battery is to charge at C/10 or below (10% of the rated capacity per hour). So a 1000 mAH battery would be charged at 100 mA for 15 hours. This method does not require an end-of-charge sensor and ensures a full charge. Even though continued charging at C/10 does not cause venting, it does warm the battery slightly. To preserve battery life the best practice is to use a timer to prevent charging to continue past 15 - 20 hours.

Fast Charging

Using a timer it is possible to charge at C/3.33 for 5 hours. This is a little risky, since the battery should be fully discharged before charging. If the battery still has 90% of its capacity when the timer starts you would have a good chance of venting the battery. One way to ensure this doesn't happen is to have the charger automatically discharge the battery to 1 volt per cell, then turn the charger on for 5 hours.

Quick Charging

To charge at faster rates the safest option is to use a Microprocessor controlled Delta-peak Charger such as the IMAX B6AC. This is an intelligent multifunction charger which can charge and discharge all common battery types safely at higher charge currents.

Trickle Charging

In a standby mode you might want to keep a nickel metal hydride battery topped up without damaging the battery. This can be done safely at a current of between 0.03 C and .05 C.

Over-Discharging

A complete discharge of a cell until it goes into polarity reversal can cause permanent damage to the cell. This situation can occur in the common arrangement of four AA cells in series, where one will be completely discharged before the others due to small differences in capacity among the cells. When this happens, the good cells will start to drive the discharged cell in reverse, which can cause permanent damage to that cell. It is therefore not recommended to completely discharge batteries below 1 volt per cell during normal use (a 4 cell pack should not be discharged below 4 volts).

Self-Discharge

After charging, a NiMH battery will typically self-discharge at a rate of 5 - 10% on the first day stabilising to around 0.5 - 1% per day at room temperature. This is not a problem in the short term but makes them unsuitable for many light-duty uses, such as clocks or safety devices, where the battery would normally be expected to last many months or years.

Low Self-Discharge Cells

This new type of nickel-metal hydride cell has reduced self-discharge and therefore longer shelf life. The cells retain 70% to 85% of their capacity after one year when stored at 20 °C. These cells are marketed as "hybrid", "ready-to-use" or "pre-charged". Besides the longer shelf life, they are otherwise similar to normal NiMH batteries of equivalent capacity and can be charged in typical NiMH chargers.