

# Nickel Metal Hydride Technology

## Chapter Objectives

Nickel Metal Hydride battery technology moved into the electric, hybrid, and fuel cell forefront with its introduction in the mid-1990's. Since that time this technology has blossomed as the primary energy storage source for all advanced technologies using battery pack systems. This chapter is of enormous importance to any technician that has interest in gaining a deep understanding of this technology for the purposes of applying this knowledge to analyzing and repairing an advanced technology battery pack system.

By the conclusion of this chapter you will learn:

- ✓ Nickel Metal Hydride charge and discharge operation and characteristics
- ✓ Nickel Metal Hydride self discharge characteristics
- ✓ The electrolyte mixture contained in Nickel Metal Hydride cells
- ✓ Lead Acid versus Nickel Metal Hydride Specific Energy and Specific Power ratings
- ✓ Proper method to store a Nickel Metal Hydride battery module

## Key Terms

**Potassium Hydroxide (KOH)** Electrolyte solution that is a mixture of potassium hydroxide and water solution.

**Lithium Ion (Li Ion)** An advanced battery technology that has almost double the specific energy of NiMH technology while providing about the same level of specific power.

**Capacity (Battery)** A term that is synonymous with amp-hours or state-of-charge.

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Although PbA technology has been used in both traditional ICE vehicles and EV designs for decades, it is NiMH and **Li Ion** technologies that have emerged as the preferred technology for contemporary EV and HEV because of the broad specific energy and specific power capabilities, when compared to PbA. The NiMH battery is termed an alkaline storage battery because of its use of **potassium hydroxide (KOH)** electrolyte. The aqueous electrolyte solution is a concentration of the KOH and water. Structurally and electrically, NiMH batteries are very similar to nickel cadmium (NiCd) batteries (see Figure 14-1).

Rechargeable alkaline storage batteries are a dominant factor in the market for several technical reasons:

- High electrolyte conductivity permits for high power applications
- The battery system can be sealed minimizing maintenance and leakage issues
- Operation is possible over a wide temperature range
- Long life characteristics offset higher initial cost than other technologies
- Higher energy density and lower cost per watt or watt-hour (depending on design)