

## Battery Comparison Chart

	<b>Alkaline</b>	<b>Lead Acid</b>	<b>NiCD</b>	<b>NiMH</b>	<b>LiMnO<sub>2</sub></b>	<b>Lithium Ion</b>
<b>Type</b>	Primary	Secondary	Secondary	Secondary	Primary	Secondary
<b>Chargeable</b>	No	Yes	Yes	Yes	No	Yes
<b>Chemistry</b>	Manganese dioxide and powdered zinc with an aqueous solution	Lead (Pb) anode, lead oxide (PbO <sub>2</sub> ) cathode, sulfuric acid (H <sub>2</sub> SO <sub>4</sub> ) electrolyte	Cadmium (Cd) anode, nickel oxyhydroxide (NiO <sub>2</sub> H cathode, potassium hydroxide (KOH) electrolyte	Metal hydride (MH) anode, nickel oxyhydroxide (NiO <sub>2</sub> H) cathode, potassium hydroxide (KOH )	Lithium anode, manganese dioxide cathode, and the electrolyte is some organic solvent or salt	Lithium metal oxide cathode, lithiated carbon for anode, and an electrolyte of some organic solvent. Lithium polymer batteries use a gelled electrolyte
<b>Nominal Voltage</b>	1.5 volts	2.1 cell voltage 6 cells = 12.6 volts	1.2 volts	1.2 volts	3 volts	4 volts
<b>End Point</b>	0.8 volts	1.75 volts per cell	1.0 volts	1.0 volts	2 volts	3 volts
<b>Capacity</b>	30 mAh to 45 Ah	1 to 10,000 Ah	0.5 to 10 Ah	4 to 100 Ah	25 mAh – 2.9 Ah	Up to 100 Ah
<b>Density</b>	125 – 225 Wh/kg	10 – 40 Wh/kg	20 – 40 Wh/kg	75 wh/kg	30 – 260 Wh/kg	150 Wh/kg
<b>Packaging</b>	AAA, AA, C, D, button cells, 9 volt (6 cell), and lantern battery	Size depends on Ah rating; smaller sizes for non-automotive use	AAA, AA, C, D, special packaging	AAA, AA, C, D, special packaging	N type miniature tubular; some button or rectangular	Sizes depend on Ah rating. Lithium polymer shapes and sizes for application
<b>Applications</b>	Flashlights; most consumer electronic products and toys except cell phones and laptop computers	Cars, trucks, golf carts, scooters, boats, planes; non-automotive versions for UPS and solar power systems	Cordless phones, power tools, appliances, and cameras	Cell phones, laptop computers, hybrid-electric cars	Cameras, watches, security equipment, some medical applications	Cell phones, laptop computers
<b>Comments</b>	Most widely used battery type outside the automotive industry; successor to original carbon-zinc cells	2 <sup>nd</sup> most common type of battery	Memory effect reduces energy capacity when not discharged completely	High density cell that gives more power per given size	Highly dangerous in handling and disposal; best shelf life of any primary battery	Highly dangerous in handling and disposal; highest density and best shelf life of any secondary battery