BATTERY TERMS & WHAT THEY MEAN

Here's a listing of most of the technical terms commonly used in connection with batteries of both the primary and secondary type, with each term briefly explained.

Accumulator
A fairly old term for a lead-acid battery, with a number of cells in series to 'accumulate' a higher voltage.

Alkaline-Manganese Dioxide Cell
A type of primary cell which uses an anode of powdered zinc, a cathode of manganese dioxide and a potassium hydroxide electrolyte. Offers up to 8 times the capacity of carbon-zinc cells. Commonly called the 'alkaline' battery.

Ampere-hour (Ah)
The unit used in specifying the storage capacity of a battery. A battery with 1Ah capacity can supply a current of one ampere for one hour or 0.5A for two hours, etc. 1Ah is the equivalent of 3600 coulombs of electrical charge.

Battery
An electrochemical energy storage system packaged as a physical component. Strictly speaking the term means an array of multiple interconnected cells (generally in series), by analogy to a gun battery (or a battery of hens), but nowadays it is often used to designate a single cell.

C Rate
The charging or discharging rate of a cell or battery, expressed in terms of its total storage capacity in Ah or mAh. So a rate of 1C means transfer of all of the stored energy in one hour; 0.1C means 10% transfer in one hour, or full transfer in 10 hours; 5C means full transfer in 12 minutes, and so on.

Capacity
The electrical charge effectively stored in a primary or secondary battery and available for transfer during discharge. Usually expressed in ampere-hours (Ah) or milliampere-hours (mAh).

Carbon-Zinc Battery
The earliest type of primary cell and battery, first developed by Georges Leclanché in 1868 and still very widely used. It uses carbon and manganese dioxide as the positive electrode and zinc as the negative electrode, with an aqueous solution of ammonium chloride and zinc chloride as the electrolyte.

Cell
A single electrochemical system, consisting of positive and negative electrodes and an electrolyte to transport ions between them — all housed in a protective enclosure. A battery consists of an array of such cells.

Cell Reversal
In NiCad batteries with a number of cells in series, excessive discharge can cause the cells with least capacity to be partly recharged in the reverse direction. Tends to result in cell damage.

Charge Rate
The rate at which a secondary cell or battery is recharged, expressed in terms of the battery capacity. In other words the C rate, but as applied to recharging.

Charge Retention
The degree to which a charged cell or battery maintains its capacity when not supplying load current.

Charging
With secondary batteries, the process of supplying charge to the battery in order to restore its stored energy.

CC Charging
Restoring charge to a secondary battery in a mode where the charging *current* level is kept substantially constant.

CV Charging
Restoring charge to a secondary battery in a mode where the battery's terminal *voltage* is kept substantially constant, or kept below a certain level.

Cutoff Voltage
A voltage level or threshold where either the charging or discharging of a battery is ended, or should be ended for optimum battery life.

Cycle
For secondary cells or batteries, a single discharge-and-recharge sequence.

Cycle Depth
The degree to which the charge of a secondary battery is drawn from it during discharge, expressed as a percentage of the total battery capacity.

Cycle Life
How many cycles a secondary battery can typically perform before its capacity falls significantly. Varies with the type of battery and the type of cycling it is made to perform.

Deep Cycling
Repeated subjection of a secondary battery to deep discharging and recharging; i.e., frequent withdrawal of most of the battery's total storage capacity.

Discharge Rate
The rate at which charge is withdrawn from a cell or battery during discharge; i.e., the discharge current, expressed in terms of the battery's capacity. In other words the C rate, as applied to discharging.

Discharging
Withdrawing the stored energy from a cell or battery.

Dry Cell/Battery
The most common type of cell or battery nowadays, where the electrolyte is either in non-liquid form (i.e., a paste or gel) or absorbed in a porous separator material. This allows the cell or battery to be sealed.

Electrode
One of the two conducting elements in an electrochemical cell where part of the chemical reaction occurs, and electrons are either released to or withdrawn from the external electrical circuit.

Electrolyte
The element in an electrochemical cell which provides the medium through which ions are transported between the two electrodes, to allow internal current flow. Generally either a liquid, paste or gel.

Energy loss
All batteries waste energy due to internal resistance and

other losses. This term describes the proportion of a secondary battery's nominal capacity which is lost during charging, and not returned using discharge. A typical figure is 40% of capacity.

EOC Voltage
The terminal voltage of a secondary cell or battery at the end of charging.

EOD Voltage
The terminal voltage of a cell or battery which is specified as representing the end of discharge.

Energy density
A measure of the energy storage efficiency of a battery, usually expressed in watt-hours per kilogram (Wh/kg).

Fast Charging
A term used to describe charging a secondary battery at a rate of 0.5C or higher — i.e., in less than 2 hours.

Float Charging
A term used to describe charging a secondary battery at a rate only sufficient to neutralise its self-discharge — i.e., maintain it at full capacity.

Flooded cell
A type of wet cell where the active electrodes are submerged in liquid electrolyte. The common car or truck battery uses this type of cell.

Galvanic or Voltaic cell
An electrochemical cell which employs a chemical reaction to generate electrical energy. The first such cell is attributed to Luigi Galvani in 1792 — although Alessandro Volta was the first to explain how it worked, in 1800.

Internal Resistance
All cells and batteries inevitably exhibit internal resistance, which limits discharging and charging current levels and produces heat within the battery.

Lead-Acid Battery
A type of secondary battery which uses a positive electrode of lead oxide, a negative electrode of metallic lead and an electrolyte of sulphuric acid (in either liquid or gel form). First developed in 1859 by French physician Gaston Planté.

Li-ion Battery
The lithium-ion battery is a secondary battery, which uses a negative electrode of lithium-cobalt dioxide and a positive electrode of carbon (coke or graphite), with an electrolyte of a lithium salt dissolved in an organic solvent.

Lithium-Manganese Battery
A type of primary cell or battery which uses manganese dioxide and carbon as the positive electrode, lithium metal foil as the negative electrode and lithium perchlorate dissolved in propylene carbonate as the electrolyte. Often called simply 'lithium cells', they offer very high energy storage density.

Memory Effect
If NiCad cells or batteries are subjected to repeated shallow cycling, their internal structure changes and they lose storage capacity — known as the memory effect.

Mercuric Oxide Cell
Commonly called the 'mercury cell', a type of alkaline primary cell with a positive electrode of mercuric oxide (often with manganese dioxide), a negative electrode of metallic zinc and either potassium or sodium hydroxide as electrolyte.

Milliamp-hours (mAh)
The unit generally used to specify the storage capacity of smaller batteries. A battery with a capacity of 100mAh can supply 100mA for one hour, or 10mA for 10 hours etc. One mAh is the equivalent of 3.6 coulombs of charge.

Negative Electrode
The electrode of a cell or battery which develops an excess of electrons as a result of the internal chemical reaction.

NiCad Battery
The most common type of secondary cell/battery, which uses nickel hydroxide as the positive electrode, cadmium/cadmium hydroxide as the negative electrode and potassium hydroxide as the electrolyte.

Nominal Voltage
The average terminal voltage of a cell or battery during its discharge.

OC Voltage
The terminal voltage of a cell or battery when *open circuited* — i.e., not supplying any significant load current.

Overcharging
Attempting to store more charge into a secondary cell or battery than its electrochemical system can safely absorb — i.e., beyond its capacity. Can cause overheating and irreversible structural damage, including explosion.

Overdischarging
Withdrawing too much energy from a cell or battery, which can shorten its working life or in extreme cases cause irreparable damage.

Plates
Another term meaning much the same as 'electrodes'.

Positive Electrode
The electrode of a cell or battery which normally has a shortage of electrons due to the internal chemical reaction.

Primary Battery
An electrochemical cell or battery which contains a fixed amount of stored energy when manufactured, and cannot be recharged after that energy is withdrawn.

Recharging
With secondary cells or batteries, the process of re-storing electrical energy after the battery is discharged — by driving a current back into it from an external source.

Rechargeable Alkaline
A variety of manganese-zinc alkaline cell designed to absorb the hydrogen gas released during recharging, and allow re-use as a secondary battery. Low in cost, but with very limited cycle lifetime.

Rechargeable Battery
Any electrochemical cell or battery which can be recharged — i.e., a secondary cell or battery.

Sealed Dry Battery
A cell or battery where the case can be effectively sealed to allow operation in any position without leakage of the chemical electrolyte.

Secondary Battery
An electrochemical cell or battery which can be recharged.

Self-Discharge Rate
All batteries tend to discharge themselves even when not supplying energy, as a result of internal losses. The self-discharge rate describes this effect in terms of a percentage

of the battery capacity, over a specified period.

Shallow cycling
Repeatedly discharging a secondary battery by only a small proportion of its capacity before recharging again. Some types of battery prefer it, some don't.

Shelf Life
The period during which a battery will retain a certain proportion of its rated capacity, when not in use.

Silver Oxide Cell
The silver oxide-zinc cell is an alkaline primary type. It uses silver oxide as the positive electrode and zinc as the negative electrode, with an electrolyte of either sodium or potassium hydroxide. They are mainly used in low-drain applications.

SLA Battery
The sealed lead-acid battery is a type of secondary battery derived from the original flooded lead-acid type. It has a positive electrode of lead oxide, a negative electrode of porous metallic lead and sulphuric acid as the electrolyte.

Slow or Trickle Charging
Recharging a secondary battery at a rate of between 0.05C and 0.2C — i.e., over a period between 7 and 28 hours (charging 140% of nominal capacity).

Wet Cell/Battery
An electrochemical cell or battery in which the electrolyte is in the liquid form.

Zinc-Air Cell
A recently developed type of primary cell which has a very high energy density, but a relatively short working life. It uses a negative electrode of powdered zinc mixed with potassium hydroxide and a negative electrode of moist air.

Zinc Chloride Battery
An enhanced version of the standard zinc-carbon primary battery, with about 50% higher capacity. The main difference is the use of zinc chloride as the electrolyte.