

# How a Battery is Made

Batteries are made of five basic components:

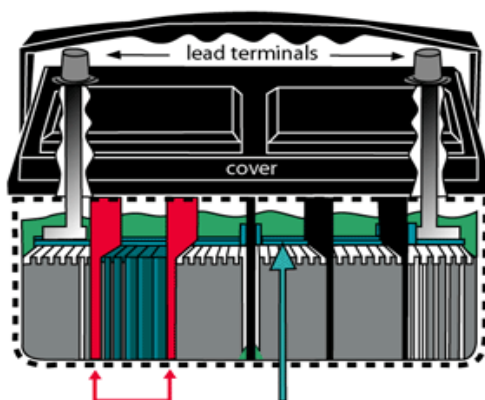
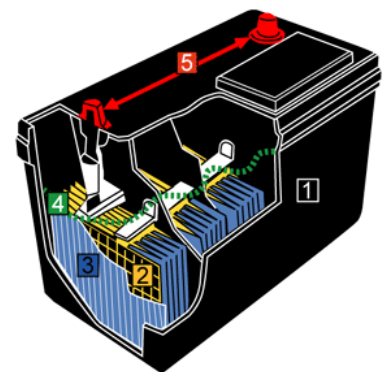
1. A container made of plastic.
2. Positive and negative internal plates made of lead.
3. Separators made of porous synthetic material.
4. Electrolyte, a dilute solution of sulphuric acid and water better known as battery fluid.
5. Lead terminals, the connection point between the battery and whatever it powers.

The manufacturing process begins with the production of a plastic container and cover. Most **automotive** battery containers and their covers are made of polypropylene. For a typical 12-volt car battery, the case is divided into six sections, or cells, shaped somewhat like one row in an ice-cube tray. The cover will be sealed to the top of the container when the battery is finished.

The process continues with the making of grids or plates from lead or an alloy of lead and other metals. A battery must have positive and negative plates to conduct a charge.

Next, a mud-like paste mixture of lead oxide powder, sulphuric acid and water (plus a small amount of additives depending on whether the paste is for positive or negative plates) is applied to the grids.

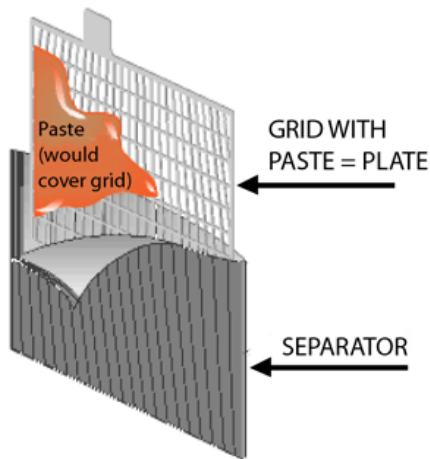
Inside the battery, the pasted positive and negative plates must be separated to prevent short circuits. Separators are thin sheets of porous, insulating material used as spacers between the positive and negative plates. Fine pores in the separators allow electrical current to flow between the plates while preventing short circuits.



A cell:  
positive and  
negative plates  
with separators

Cells are connected  
with metal that  
conducts electricity  
from one cell to the  
next.

In the next step, a positive plate is paired with a negative plate and a separator. This unit is called an element, and there is one element per battery cell, or compartment in the container. Elements are dropped into the cells in the battery case. The cells are connected with a metal (usually lead) that conducts electricity. The terminals, or posts, (usually made of lead) are welded on.

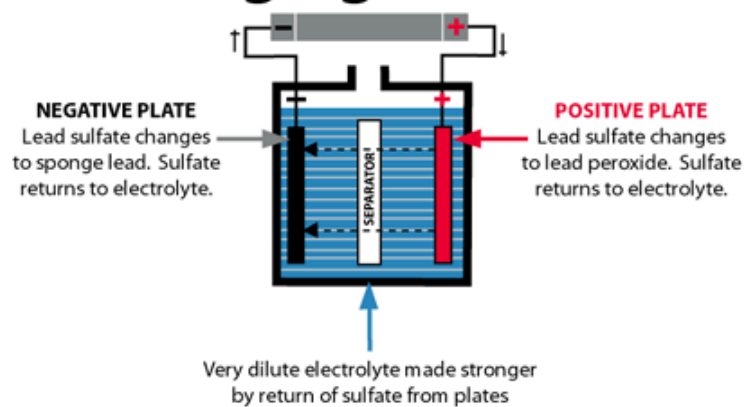


The battery is then filled with electrolyte - or battery fluid - a mixture of sulphuric acid and water, and the cover is attached.

The final step is charging, or finishing. During this step, the battery terminals are connected to a source of electricity and the battery is charged for many hours. During this process the paste in the positive plate is converted to a different form of lead oxide and the paste in the negative plate is converted to spongy lead. When the battery is fully charged,

the battery is cleaned, the labels are attached and it is packaged ready for transport.

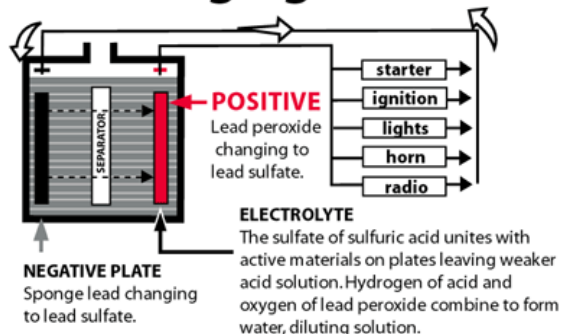
## Charging Process:



## How a Battery Works

A battery stores electricity for future use. It develops voltage from the chemical reaction produced when two unlike metals, such as the positive and negative plate materials, are immersed in the electrolyte, a solution of sulphuric acid and water. In a typical lead-acid battery, the voltage is approximately 2 volts per cell, for a total of 12 volts. Electricity flows from the battery as soon as there is a circuit between the positive and negative terminals. This happens when any load that needs electricity, such as the radio, is connected to the battery.

### Discharging Process:

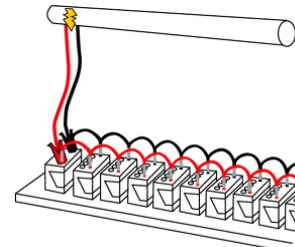


Electricity flows from the battery as soon as there is a circuit between the positive and negative terminals. This happens when any load that needs electricity, such as the radio, is connected to the battery.

Most people don't realize that a lead-acid battery operates in a constant process of charge and discharge. When a battery is connected to a load that needs electricity, such as the starter in your car, current flows from the battery. The battery begins to be discharged.

In the reverse process, a battery becomes charged when current flows back into it. This happens when you're driving without any accessories and the alternator puts current back into the battery.

As a battery discharges, the lead plates become more chemically alike, the acid becomes weaker, and the voltage drops. Eventually the battery is so discharged that it can no longer deliver electricity at a useful voltage.



After a battery is made, it is charged with electricity.

You can recharge a discharged battery by feeding electrical current back into the battery. A full charge restores the chemical difference between the plates and leaves the battery ready to deliver its full power.

If the battery won't start your car, you usually refer to it as "dead," even though that's not technically correct. A battery that's merely discharged - from leaving your headlights on or from a faulty alternator -- can usually be recharged to its full capacity. But a battery that's at the end of its service life can't be recharged enough to restore it to a useful power level. Then it truly is dead, and must be replaced.



If the battery is discharged, not dead, you can jump-start it from another fully charged battery. About 30 minutes of driving should allow the alternator to return charge the battery (in such cases it is recommended that the battery be given a top up charge at an auto servicing outlet so as to restore

full charge). But if the alternator or another part of the electrical system in your car is damaged, they won't be able to recharge your battery. So if your battery keeps discharging, before you replace it, have your electrical system checked. What looks like a bad battery could be an electrical system problem. If you have a bad component in the electrical system, it will keep draining a new battery, and you'll be stranded again and again.