

What are lithium rechargeable batteries made of ?

- **Cobalt (used for the cathode) :** Cobalt is mined in Congo, China and Canada. It's a raw material, one of the main components of rechargeable batteries as lithium cobalt oxide for its high volumetric capacity, low self-discharge, high discharge voltage and good cycling performance. It could be replaced with manganese oxide or iron phosphate, rarely with graphite.
- **Graphite (used for anode) :** Graphite is used for its low voltage and excellent performance.
- **Lithium ions (produced by electrolysis reactions) :** Lithium is mined in China and Australia, but it was discovered in Sweden. It's the most important component of this type of batteries that are called, as a matter of fact, lithium ions batteries.



How about their stories ?

The lithium rechargeable batteries were invented and marketed in 1970 by small American and Japanese companies. The first type was the button cells, used for watches, cameras, calculators, remote controls, and for surgical implants, like pace-makers, and others objects of that type.



What are they used for ?

This type of batteries are used for their excellent capacity for smartphones, computers and cameras. They have some drawbacks like short duration and limited specific power. They are also used by Mercedes Benz Company for the air conditioning system and for electric cars prototypes.



How they can be recycled ?

Lithium batteries of vehicles aren't recycled in Italy but they are sent abroad, (France, Germany, USA, Belgium) where they can take two different ways of processing. The first is regeneration : when they came to end (5-10 years), if they contain some residual energy, they are recharged and put back on the market. The second one is recycling, that can take place in specifics ovens that recover metals of batteries. The recycling is also done by hydrometallurgical system, that is a method of separation through an aqueous solutions. But the problem is that all these processes are really expensive and they leads companies to consider recycling a disadvantageous process. Recycling these batteries is important because they are made up of graphite and cobalt, that are REE (Rare Earth Elements). Since they are rare in nature, they are subsequently sold at very high prices by countries like China, that has a lots of deposits of them.

