

# ***THE LITHIUM BATTERY IN MOBILE PHONES (English version)***

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## MOBILE PHONES

Mobile phones are already part of our daily life; the society and manufacturers are constantly pushing us to buy new, latest models of mobile phones. The ones which are thrown away become toxic trash, which are often not recycled.

In 2014, the sales of smartphones increased by 23%, but only 27 % of them are recycled every year.

# Where are RAW materials in our mobile phones?

COMPONENTI	ELEMENTI
Screen	Indium, Yttrium, Lattanium, Terbium, Proseodimio, Europium, Dispradium, Gadolinium
Battery	Litium, Cobalt
Elettronics	Nichel, Dispradium, proseodimium, Neodimium, Gadolinium, Gallium, Lead, Coppe, Gold, Steel, Silver
Case	Magnesium

# Known quantity and life after recycling

## Electronics:

- Copper**: re-used for cable and vacuum cleaners, hairdryers, cars parts
- Gold**: 0.24g; reused in jewellery or transformed in lingots;
- Steel**: 11g; Steel industry;
- Silver**: 0,30 g jewellery, medical ointments, steel industry;

## Battery:

- Cobalt**(3.5g) with **Lithium**(0.6g) used for new batteries;

# Lithium battery

The lithium battery is a component of lots of technological products; from electric cars to mobile phones.

Thanks to the fact it can be easily recycled, lithium is often reused.

Recycling lithium is one of the most important aspects in our battle against pollution because its extraction is linked to a massive deforestation;

The lithium is important because it has more efficiency with less volume;

# Recycling method

## Hydrometallurgical process

This process has the purpose of recovering lithium. Lithium is unstable and can release toxic materials, making its recycling process hard. During the recycling process, batteries are completely discharged and frozen to cryogenic temperatures to reduce the reactivity of some of its materials. That helps to prevent explosions during recycling.

The reaction of lithium and other components produces some salts, which are reused by battery manufacturers.

However, in the process many parameters need to be controlled, as the pH, and the amount of Na (sodium). The product formed in the process is a solution of salts with about 70% of salt content. Some ions, created in the process, pass through a membrane, and in the basic side is shaped LiOH (lithium hydroxide) which is later placed in contact with CO<sub>2</sub> (carbon dioxide) to produce LiCO<sub>3</sub> (lithium carbonate).

In conclusion, at the end of the process lithium carbonate is obtained thanks to the mixing of carbon dioxide and lithium hydroxide.

# Conclusion

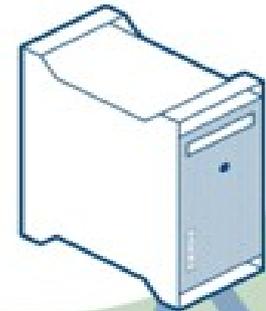
- Lithium is a valuable resource that should be protected and reused , since with the increase and diffusion of technologies it will become one of the most important elements in electronics . A current example is the use of lithium in the batteries of electric cars: they represent the future of the cars and they will replace fuel cars, increasing the presence and demand of lithium. Recycling this element is an important aspect of a green economy .

The EU has issued several regulations for the consumption and recycling of lithium , but unfortunately being very recent they are not always respected

# COMPUTERS & ELECTRONICS



## MANUAL DISASSEMBLY



## RECYCLABLE COMPONENTS



METAL



PRECIOUS METALS



GLASS



PLASTIC



CIRCUIT BOARDS

BASE METALS

PLASTIC PELLETS

PROCESSED GLASS

## SHREDDING & GRANULATING

## MAGNETIC & EDDY CURRENT SEPARATION



<http://rmschools.isof.cnr.it/>

## SOURCES

- <http://www.fondazionetelios.it/documents/riciclobatterie.pdf>
- Google images
- Wikipedia
- CNR presentations