COBALT: WHAT FUTURE?

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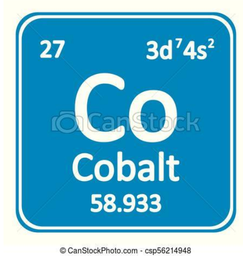
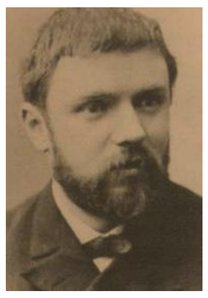
CHARACTERISTICS



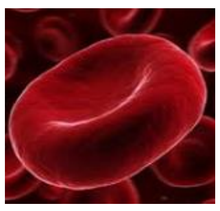
Cobalt is the chemical element with Z = 27 and mass equal to 58.93 u. It is a ferromagnetic metal of the d-block. Present in the Earth's core but not very abundant in the crust, in nature it is widespread in various minerals mainly such as arsenide, sulphide and sulfur arsenide and it is obtained as a by-product of the extraction of Cu and Ni. In its compounds it has oxidation number +2 and +3.

HISTORY

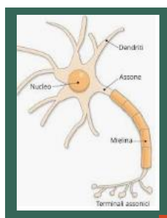


Cobalt was discovered around 1735 by the Swedish chemist **Georg Brandt** but its minerals had been used since 2000 B.C. by Egyptians and Persians, to give a blue color to glass and ceramics. The word “cobalt” could derive from the German term "*Kobold*" which means "evil spirit" as cobalt ores, often confused with those containing precious metals, emitted toxic vapors of As_2O_3 (g) during smelting.

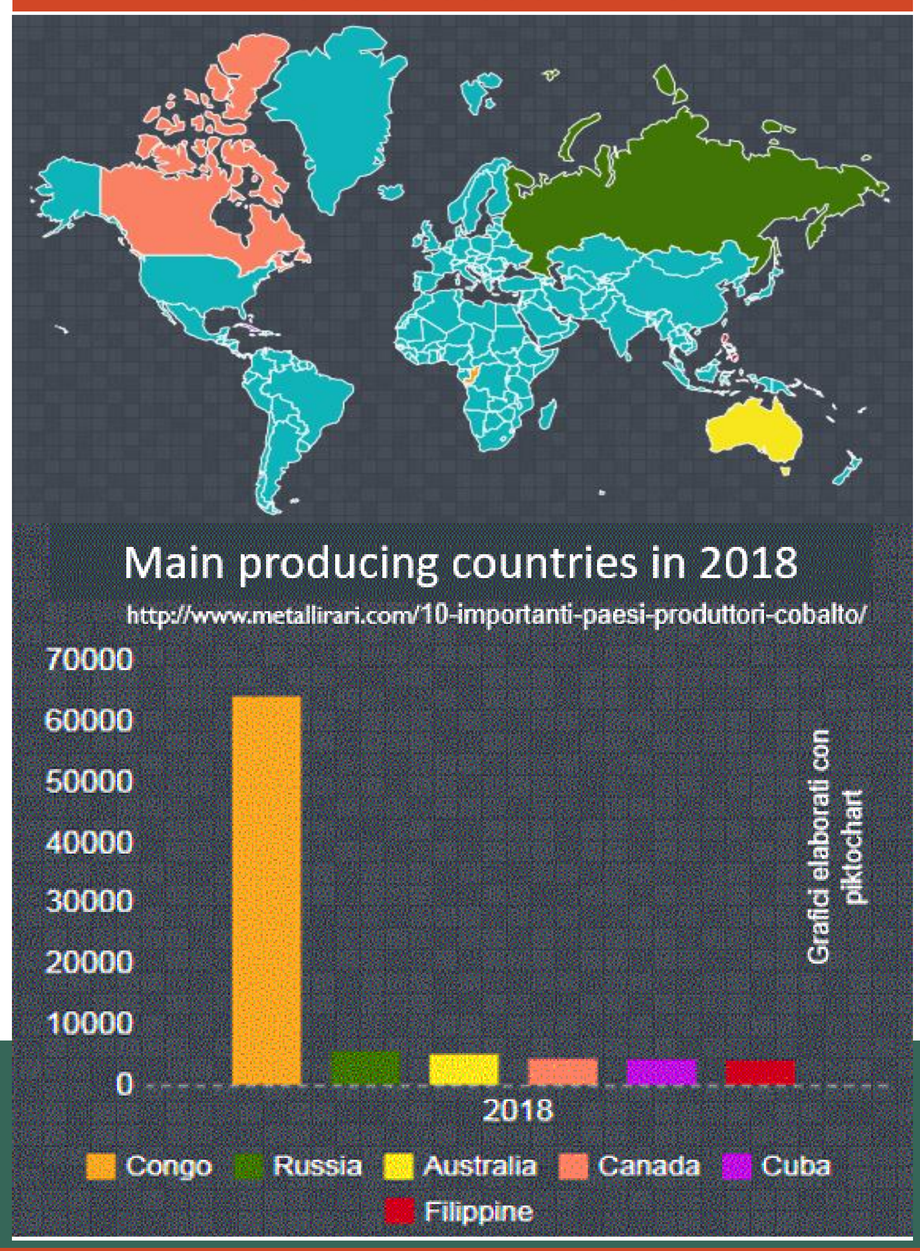
EFFECTS ON THE HUMAN ORGANISM



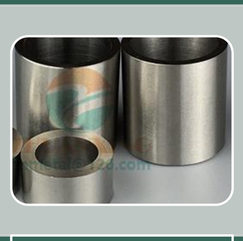
It is a component of vitamin B12, necessary both for the synthesis of red blood cells and for the synthesis of myelin sheaths that surround the nerves. In small quantities, the metal is therefore indispensable for man who obtains it mainly from animal sources. However, high doses of Co are harmful. Inhalation of Co dust causes a disease similar to asthma. AIRC classifies the metal as a possible human carcinogen and ACGIH as a carcinogen, in high doses, for laboratory animals.



PRODUCING COUNTRIES



MAIN APPLICATIONS



Special metal alloys resistant to heat, corrosion, wear

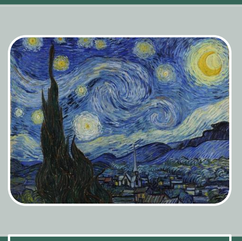
Steel for aircraft turbines or high-speed tools

Permanent magnets: common are those Samarium-Cobalt or Alnico formed by Al, Ni, Co and Fe

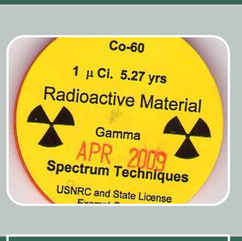
Catalysts for the chemical and petrochemical industry

Electrochemical: coating of other metals by electrochemical deposition. Ni-Co or Zn-Co plating is common

Bluing in the ceramics and glass industries



Pigment industry. Cobalt blue or Co aluminate was used a lot by the Impressionists (it is stable and dries easily)

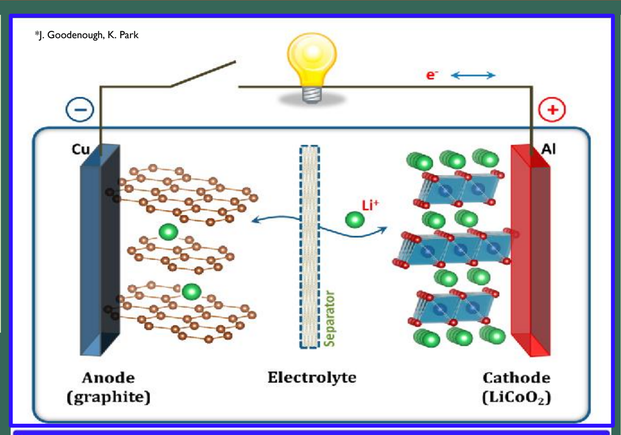


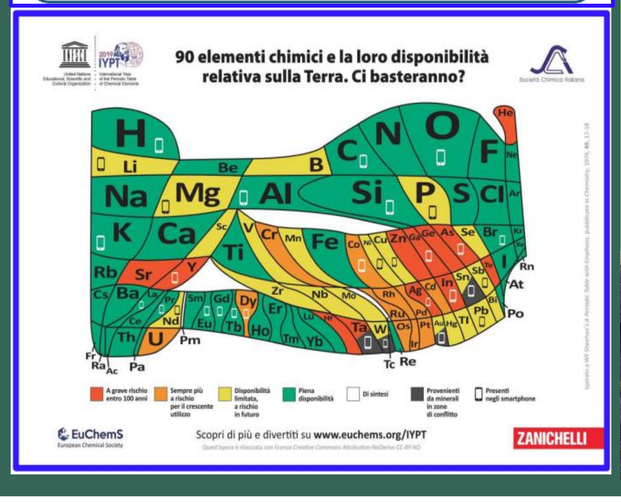
^{60}Co, radioactive isotope, used as a gamma source in radiotherapy, food sterilization, industrial radiography

RAPIDLY INCREASING USES, ENVIRONMENTAL SUSTAINABILITY AND THE FUTURE OF COBALT

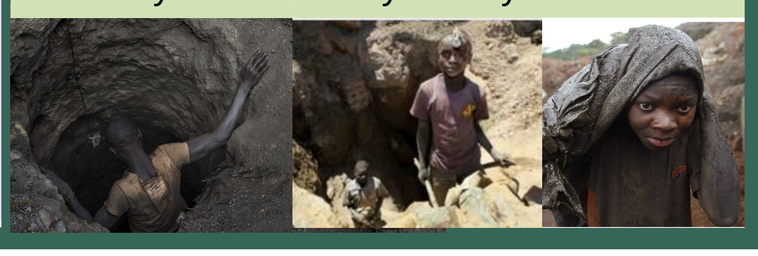
Cobalt is a key component in the cathode of lithium-ion batteries, used to power smartphones, laptops, bikes and electric cars. The strong concern about climate change is likely to lead to a boom in the spread of electric cars in the near future.

The demand for Co will therefore increase dramatically and outstrip the supply; its availability will become at risk, as highlighted in the EuChemS Periodic Table.





Co production is subject to various critical issues. It is a hitch-hiker metal, obtained as a by-product of the extraction of Ni and Cu, therefore at the risk of price volatility. Furthermore, its production is concentrated in Congo, a politically unstable country, where there are abusive mining activities with violations of the human rights of workers and the employment of children *. Its refining is also almost exclusively controlled by China. For these economic, ethical and geopolitical reasons, Europe is committed to the research and development of new Li-S and Li-air batteries, with greater efficiency and total recyclability.



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