

BUT WHAT IS PLASTIC?

"Nothing is created, nothing is destroyed, everything is transformed"

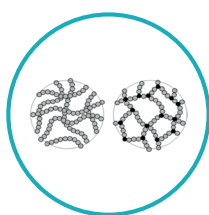
Antoine-Laurent de Lavoisier (1743-1794)

French chemist, biologist, philosopher and economist

THE CHEMISTRY OF PLASTICS

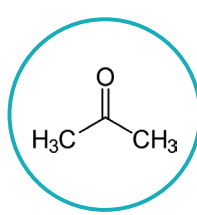
The International Union of Pure and Applied Chemistry (IUPAC) defines plastics as *"polymeric materials that may contain substances aimed at improving their properties or reducing their costs"*. This, in fact, represents a commercial definition, but from a chemical point of view, plastic can be defined as a non-natural organic material, characterized by remarkable plasticity as well as versatility of performance and ease of processing. Unlike many organic substances, plastic is not found in nature: **it is artificially synthesized from natural resources such as gas, oil and its derivatives.**

THE PLASTIC IS A:



POLYMER

That is a molecule of great size (relatively speaking) which appears as a long chain to which they can be tied several branches. The structure is formed by many unit-base: an example in macroworld could be a pearl necklace.



ORGANIC

A compound in which one or more carbon atoms are united by covalent atom bonding of others elements (mainly hydrogen, oxygen, nitrogen). Be careful though: some molecules, for example carbon dioxide (CO₂) make exception, while being composed of the carbon are inorganic!



SYNTHETIC

Created by the human being.

DID YOU KNOW THAT?



POLYMERS THAT YOU WOULDN'T EXPECT!!

A typical natural polymer is cellulose, consisting of many units of sugar. A cotton fiber (almost pure cellulose), for example, consists of 3,500 monomers of sugar, while polyvinyl chloride (PVC) has a chain of 25,000 monomers. Other polymers are rubbers and plastics, wool, starch.

This chain-like linear macromolecule, formed by monomers (the single links of the chain), is produced starting from the processing of fossil fuels and their polymers: propylene, ethylene, butadiene and styrene.

Oil and gas are **hydrocarbons**, organic substances composed exclusively of carbon and hydrogen. To get to the plastic you need to **break it down into its own elements**, this is possible thanks to a process called **cracking**, during which the long hydrocarbon chains are broken.

BIOPLASTICS BIOLOGICAL PLASTICS? LET S CLARIFY

The term "bioplastic" brings together several meanings and its use often generates confusion. In fact, in the transition from the technical-scientific context to that of the market, the real meaning of "bio" has not been clarified from time to time, so under this wide hat are now aggregates materials of a very different type. The term "bioplastic" is used in different contexts with at least three different meanings that, at an industrial level, can also be possessed by the same material.

1 "Bio" as origin of raw materials used

In this case we mean the origin of raw materials: bioplastics or biopolymer are obtained wholly or partly from raw materials of renewable origin, rather than fossil and therefore non-renewable. They can be "synthetic" if produced by the polymerization of monomers obtained from renewable sources; or they can be natural biopolymers, or synthesized directly by living organisms, such as plants, animals, algae, micro-organisms.



2 Presence of a "bio" functionality: biodegradability

Here the prefix "bio" indicates the ability to biodegrade: an example is that of bio-plastics used for the production of compostable objects. In this case the term bioplastic (or biopolymer) refers to an important feature when this becomes a waste (for example, fruit and vegetable bags).

3 Presence of a "bio" functionality: biocompatibility

A polymer that has a "bio" function linked to biocompatibility, has important applications in the medical and surgical field: it can in fact come into contact with the fluids and tissues of the human body without causing damage or rejection. This type of polymers can also be bio-degradable: in the human body (bio-degradable polymers).

SOURCES AND INSIGHTS



[The plastic \(English video\)](#)

Plastics 101 | National Geographic - YouTube

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