

EDITORIAL

Chemicals: how good or bad are they?

Productos químicos: ¿qué tan buenos o malos son?

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The simplest definition of chemicals establishes that there are elements, or a combination of elements, with a specific composition and structure. This means that all matter is made of chemicals! However, in today's world, this term is often misunderstood and misrepresented. Chemicals are considered offensive, feared, are also treated as the source of cancer and many other illnesses according to some anti-science movements. Because of this, they are given a bad reputation. I think everyone, even those of us who are irked by this popular misuse of the term "chemical", must be reminded that absolutely everything is a chemical: we are chemicals, the air we breathe are chemicals, the food we consume are chemicals, which are digested by chemicals, and that turn them into more chemicals.

Chemistry is everywhere, so why does it scare us so much then? Chemophobia is an irrational fear of chemicals. It includes the fear of sugar or additive in food, formaldehyde in shampoo or aluminium in vaccines. Fitness bloggers, quack doctors and even small cosmetic companies take advantage of these quirks to sell fake-natural products at elevated prices. Almost always, the same people who spread a fear of chemicals also have "chemical-free" products for sale. The simple word "chemical" is often synonymous of toxins or poison. People use phrases like "it's full of chemicals" to say that something is artificial and, therefore, bad. Besides, meaningless labels, such as "without chemicals," are seen in products sold in "health" food stores, referring to the fact that the mentioned foods are "free of synthetic chemicals". Perpetrators of chemo phobia create unnecessary guilt, stress and anxiety as consumers worry about making the right choices for their family. Consumers are the victims in this battle as pro-natural and anti-natural businesses spread fear about each other's products. In my view as chemist, I do not understand the distinction. Why are synthetic chemicals worse than natural ones? Why is the synthetic E300 additive considered bad while the vitamin C found in orange juice is good? (Even though they are the same thing).

Nowadays, society seems to demonize any type of chemical substance, especially as a consequence of the advertising and promotion strategies of the industry related to these chemical-free products. What is really "natural"? What do we mean by "artificial"? For example, food additives are substances that are intentionally added to food products to carry out certain functions, the most common being to provide color, contribute to the flavor or help in its conservation. There seems to be a generalized idea that additives are only used by manufacturers to make the product more attractive or cheaper, but in reality its use goes further. They are elements with a technological function, which is fundamental in the food production chain, since they help to stabilize it during its preparation, packaging and storage, thus ensuring the best conditions for the health of the consumer. One of the problems that derive from the regulations is the way in which they are labeled. To achieve uniformity in all countries, additives are collected under specific names that can sometimes confuse the consu-

mer. The problem is that these denominations are presented to the consumer in a too "scientific" and cold way, giving the impression that an ingredient that is recognized by a series of numbers is "artificial"¹. However, if we were to find out which additive each E number refers to, we could take more than one surprise. For example, E-330 corresponds to citric acid, naturally present in fruit, and so it is with many other elements.

Another illustrative example relating to chemophobia, the misinformation and general ignorance of people are the campaigns appeared in newspapers and social networks some time ago, showing how dangerous could be the dihydrogen monoxide (DHMO). Authors describe the DHMO as a colorless substance, with hardly any odor and difficult to detect because of its mild flavor, but also as responsible for the death of thousands of people every year. Most of these deaths are attributed to this chemical by accidental inhalation, but the describe danger of this substance does not end here for these false scientists. They also state that prolonged exposure to the solid form of this substance can cause serious damage to human tissues and that the symptoms of ingestion of DHMO include excessive sweating and a large amount of urine and occasionally nausea, vomiting and electrolyte imbalances. For those patients who stop taking it, it means without exception, death². All these affirmations are mainly true, but of course it's about water, dihydrogen monoxide, or more briefly: H₂O³.

A few years ago the Royal Society of Chemistry promised to give a million pounds to anyone who found a substance that was 100% free of chemicals. It was a satirical way of showing to the population that "chemistry" does not have to mean "poison", as it seems they want us to believe from the food industry and its advertising. The truth is that everything that surrounds us is made up of chemical substances (Royal Society of Chemistry, 2010-2012)⁴.

Concluding, due to research and scientific advances we now have access to a wider range of foods, cosmetics, drugs, among others useful things, which are also safer for consumption. By having to pass many controls and have certain additives, we are guaranteed much more security. Advertising makes us believe that everything related to chemicals is bad, and what is supposed to be natural is good, which is not true. Always remember that chemistry is fascinating precisely because it can be used to synthesize new things. It's like a molecular Lego. The fact that everything is made of just over 100 basic components is extraordinary. Only by putting chemicals in a pot in the correct way can the world around us be built. Let's not be gullible and get closer to science.

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