$27

million per gram Californium is the most expensive element. The price tag is explained by the high cost of production. Created in nuclear reactors and particle accelerators, it is a powerful neutron emitter that is used to detect oil or precious metals in inaccessible places.

6 **C**

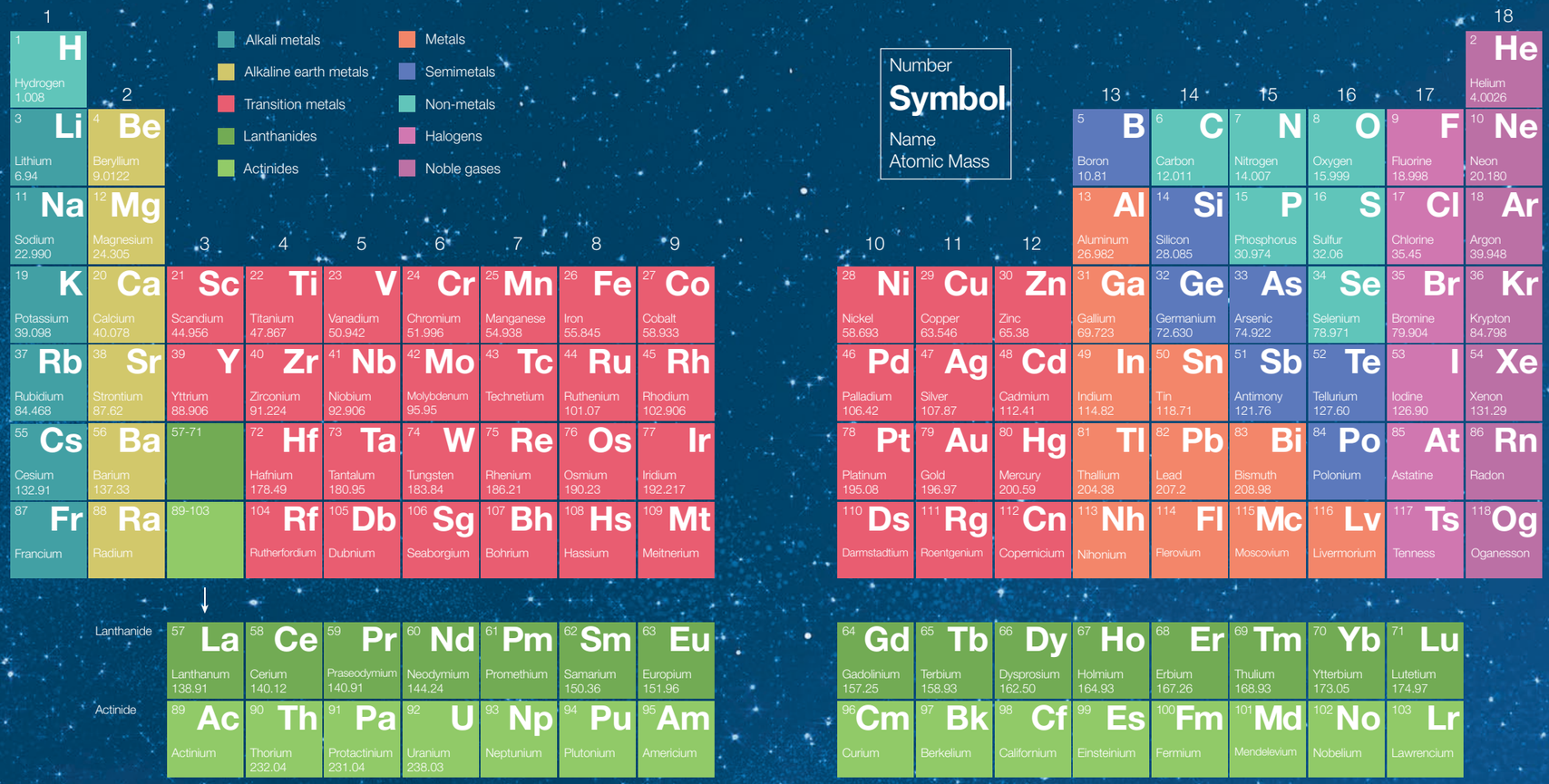
Carbon is the building block of life – every plant and animal contains it. But diamonds, charcoal, oil and graphite are also made of it. For BASF, carbon is an important element in the production of numerous products. The vast majority of carbon comes from fossil feedstock. In addition, renewable resources are also used as carbon sources in the existing Production Verbund, for example as part of the biomass balance approach.

Discovering elements

When the German alchemist Hennig Brand discovered phosphorus in 1669, he became the first person to isolate an element. His method involved evaporating urine and then heating the residue. Today, the hunt for element 119 requires smashing charged particles together at about 30,000 kilometers per second in the hope that their two nuclei fuse. To do this you need a linear particle accelerator and a small fortune.

Is that really it?

How do we know there are no more natural elements? Uranium, with 92 protons in its nucleus, is the last naturally occurring element in the table. The trouble with all the elements after uranium is that they have too many protons to be stable for any useful length of time. Their half-lives are just seconds or milliseconds. Heavier, unstable elements may exist elsewhere in the universe in more extreme environments, but here on earth they have to be produced by smashing atoms together.



3 **Li**

Lithium is a metal so light it can float on water. Lithium-ion batteries have a lot of power for little weight, which is useful for powering devices such as electric vehicles and laptops. But lithium can also be used as a psychiatric medication.

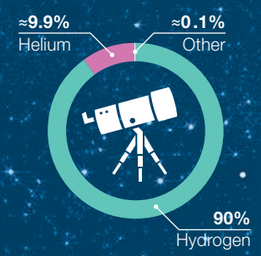
2 **He**

Helium, unlike all the other elements, was found on the sun before it was found on earth, which is why it was named after the Greek god of the sun. It is one of the noble gases, yet today you are most likely to come across it in a party balloon.

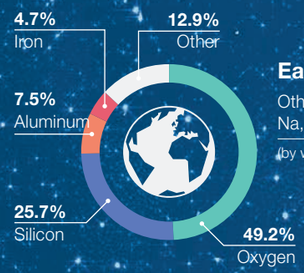
22.59

High density Osmium is the densest of the elements at 22.59 grams per cubic centimeter. Twice as dense as lead, it is used for fountain pen nibs and phonograph needles.

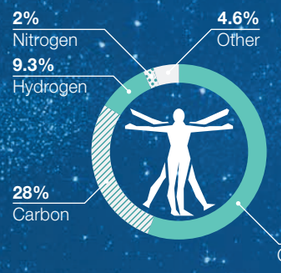
Occurrence of elements



Universe
Other: The remaining 116 elements are just a rounding factor in cosmic terms.



Earth's crust
Other: Mainly Ca, Na, K, Mg, H, Ti
(by weight)



Humans
Other: Mainly Ca, Cl, P, K, S
(by weight)

2019
150
years
of the periodic table

Around 490–430 BC
Empedocles of Acragas: Everything is composed of the four elements of fire, water, air and earth.

600 BC

700 BC

Around 624–545 BC
Thales of Miletus: Water is the original substance of which material is composed.

500 BC

400 BC ....

1700 It is thought that only the following 15 elements were known up to the 18th century: the metals iron, copper, lead, bismuth, arsenic, zinc, tin, antimony, platinum, silver, mercury and gold; and the non-metals carbon, sulfur and phosphorus.

1869
Mendeleev presents the periodic table.

1939 Francium is the last element to be discovered in nature.

2016 IUPAC approves the last new elements to date – those with the numbers 113, 115, 117 and 118. The new elements are super-heavy and extremely short-lived.

.... **1700**

1800

1900

2000

2050

1808 John Dalton publishes his atomic theory in "A New System of Chemical Philosophy." According to this, material is composed of atoms.

1850 About 45 percent of the elements known today were only discovered in the 19th century.

1937 Technetium, the first artificial element, is discovered.

1944 Curium and Americium are discovered. Both are highly radioactive.