KRONDORF

ANNO 1876

Health Benefits

"I wish Krondorf mineral water success on the market and I hope we will encounter it again in research studies into the beneficial physiological effects of silicon, as we have seen with similar mineral waters abroad."

Doc. Ing. Jiří Brát, CSc.

—THE IMPORTANCE OF SILICON IN FOOD—

SILICON – THE SECOND MOST ABUNDANT ELEMENT ON EARTH

After oxygen, silicon is the second most abundant element on Earth. It is present especially in rocks and soil in the form of silica or silicic acid. Quartz is commonly recognised by most people and the Czech Republic is rich in quartz gemstones.

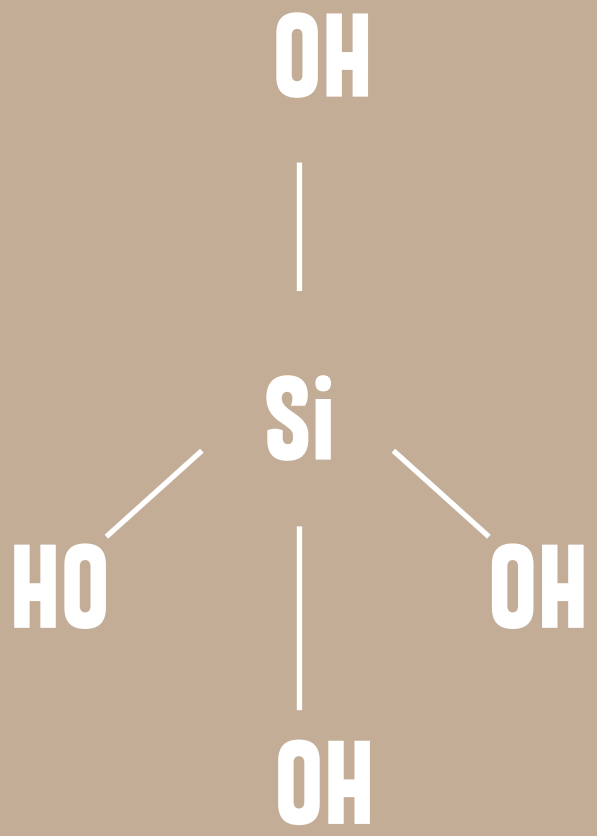
Silicon is part of the same group of elements as carbon. It may form similar compounds, including long strands with oxygen bonds. Life on Earth is based on carbon and the immense diversity of organic forms. Based on some theories, often featured in science fiction, silicon-based life could potentially exist somewhere in the Universe. However, there are profound differences between silicon and carbon, which put these theories in doubt. Carbon dioxide, which we exhale, is a gaseous substance, while silicon dioxide is a solid substance. A number of complex compounds based on carbon have no alternative silicon-based forms. Nevertheless, silicon remains an important element for the life on Earth and for the nutrition of fauna and flora.

SILICON IN FOOD

Silicon in the form of silicic acid is mostly present in plant foods. The main sources of silicon include cereals, legumes, vegetables and herbs, such as horsetail and nettle. The silicic acid is also present in some mineral waters, where the contents may vary depending on the geological environment in the individual source areas. The most precious waters are characteristic by the high concentrations of this substance. Krondorf mineral water is among these sources, as it contains orthosilicic acid in the concentration of 145 $mg.l^{-1}$, which corresponds to 42milligrams of silicon per litre. These concentrations of active silicon make Krondorf mineral water an important source of this element.

ROLE OF SILICON IN THE HUMAN BODY

After iron and zinc, silicon is the third most abundant trace element in the human body. On average, the human body contains roughly two grams of silicon.



Unlike other trace elements, it is not bound in protein strands in the blood, but exists in the form of silicic acid. Not all forms of silicon can be utilised by the body. As numerous studies have shown, orthosilicic acid is one of those substances that can be absorbed.

The role of silicon can be inferred from the parts of the body where it is present in highest concentrations. Silicon is present the most in connective tissues, the aorta, trachea, bones and skin. Somewhat lower concentration were found in the liver, muscles and lings. Silicon adds flexibility to the connective tissues. In bones, it acts as a mineralisation agent and plays a role in their growth. Silicon is also important for the growth of cartilage, joints, teeth, hair and nails and supports strength and flexibility of tendons, skin and blood vessels. Silicon helps keep the hair flexible and resistant against hear breaking and the skin well perfused. The formation of wrinkles and dry skin in advanced age is often linked to silicon deficiency. Reduced intake of biologically usable forms of silicon with increasing age also causes reduction of blood vessels flexibility. Significantly reduced silicon levels were found in persons with atherosclerosis, which may be linked to an overall silicon deficiency in the body. Silicon deficiency may also play a role in the development of degenerative conditions such as atherosclerosis.

The regions of France where mineral waters with higher silicon content are often consumed show a lesser incidence of Alzheimer's disease. A three-month therapy using mineral water with an increased silicon content helped excretion of aluminium in the urine, without any negative side effects.

Silicon is also sometimes linked to immunity. Silicon helps maintain normal function of macrophages and white blood cells. Macrophages are natural immunity cells that play a critical role in the body's immune response. They are capable of absorbing foreign substances, including germs.

Silicic acid creates a protective layer in the stomach. In some cases, it can help with problems involving gastric mucosa inflammation. Silicic acid's magnesium salts are used in some antacids – substances reducing stomach acidity.

RECOMMENDED SILICON CONTENT IN FOODS

The recommended daily silicon consumption is around 20 to 40 milligrams. In healthy population and with sufficiently varied foods, the intake is sufficient to ensure its basic functions in the body. The intake may be lower if hormone problems are present. With increasing age, the silicon content in the body decreases, which is often linked to lower hormonal activity. Mineral waters with high silicon content can thus serve as a suitable source of silicon, without the risk of excessive intake.

Karlovy Vary, 29 January 2016

Doc. Ing. Jiří Brát, CSc.
food and nutrition specialist

"The Czech Republic is a country with rich sources of mineral waters of various compositions. I am glad that Krondorf mineral water, which counts among the most silicon-rich sources in the worlds, is among them."

— Doc. Ing. Jiří Brát, CSc. —

After graduating in 1982, Jiří Brát worked as research fellow and assistant professor at the Institute of Chemical Technology in Prague. Since 1992, he has worked as a technical and quality manager in Unilever Czech Republic. Since 2014, he has been a consultant in the areas of food technology, quality systems and nutrition. He is also the vice-chairman of the expert groups for fats, detergents and cosmetic chemistry at the Czech Chemical Society, member of the Food Technology board at the Institute of Chemical Technology in Prague and the Slovak University of Technology in Bratislava, a member of the administrative board of the Vím, co jím a piju, o.p.s. (I know what I eat and drink, beneficial society) and a scientific secretary of the national science committee attached to the aforesaid organisation, and chairman of the Committee for Health and Social Policy at the Czech Food Chamber and the Czech Technological Platform for Food. He has authored and co-authored a number of scientific publications in the Czech Republic and abroad. Doc. Ing. Jiří Brát, CSc. frequently give lectures at various specialist conferences (chemistry, technology, food characteristics and nutrition).

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