

# SILICIUM IN THE SKIN



## Introduction – General background

Silicium is the second most abundant element in the Earth's crust after oxygen (Ehrlich H.L., 1981). Depending on the source, it is believed to make up between 25% and 27.7% of the Earth's crust by weight, and although it is 146 times more abundant than carbon, silicium is rarely found as a component of biological matter.

## 1. THE CHEMISTRY OF SILICIUM

Chemically, silicium is a tetravalent metalloid found in group 14 of the Mendeleev Periodic Table (see Figure 1), close to carbon but with weaker reactivity (review in Götz W et al., 2019).

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Cu	Ni	Zn	Ga	Ge	As	Se	Br	Kr	
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Uue	Uuq	Uub	Uuc	Uud	Uue	Uuq	Uub	

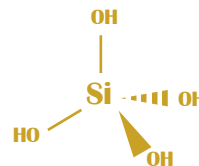
Si

Figure 1: Position of the silicium atom in the Mendeleev Periodic Table.

*Crystalline*  
Insoluble in water



*Amorphous*  
Insoluble in water



*Orthosilicic acid*  
Soluble in water  
Primary source of bioavailable Si

Figure 2: The different natural forms of silicium.

Silicium is all around us. It is found in the majority of minerals, rocks, sands and clays, and it exists in a myriad of mineral forms, including quartz, emerald, feldspar, talc, clay, asbestos, opal, glass, etc.

Due to its strong affinity for oxygen and aluminium, silicium forms various oxides and aluminosilicates.

In its natural state, it exists **in amorphous form** (clay, opal, diatomaceous earth, etc.) which is insoluble in water, **in crystalline form** (silica (SiO<sub>2</sub>) and various silicates (SiO<sub>4</sub><sup>4-</sup> complexed with cations (Ca<sup>2+</sup>, Mg<sup>2+</sup>, Na<sup>+</sup>, K<sup>+</sup>, etc.)), also insoluble in water and finally, **as orthosilicic acid**, Si(OH)<sub>4</sub>, the form that is soluble in water (see Figure 2).