

Silicic acid

en.wikipedia.org/wiki/Silicic_acid

Silicic acid



Names

[IUPAC name](#)

Silicic acid

[Other names](#)

Monosilicic acid
Orthosilicic acid

Identifiers

[CAS Number](#) [10193-36-9](#)^Y

[ChEBI](#) [CHEBI:26675](#)^Y

[ChemSpider](#) [14236](#)^Y

[EC Number](#) [233-477-0](#)

[Gmelin Reference](#) [2009](#)

[Jmol interactive 3D](#) [Image](#)

[PubChem](#) [14942](#)

InChI

- InChI=1S/H4O4Si/c1-5(2,3)4/h1-4H ✓Y
Key: RMAQACBXLXPBSY-UHFFFAOYSA-N ✓Y
- InChI=1S/H4O4Si/c1-5(2,3)4/h1-4H
Key: RMAQACBXLXPBSY-UHFFFAOYSA-N
- InChI=1/H4O4Si/c1-5(2,3)4/h1-4H
Key: RMAQACBXLXPBSY-UHFFFAOYAS

SMILES

- O[Si](O)(O)O

Properties

Chemical formula	H ₄ O ₄ Si
Molar mass	96.11 g·mol ⁻¹
Acidity (pK _a)	9.84, 13.2

Related compounds

Related compounds

[Orthocarbonic acid](#)

Except where otherwise noted, data are given for materials in their [standard state](#) (at 25 °C [77 °F], 100 kPa).

Y [verify](#) ([what is](#) ^{YN} ?)

[Infobox references](#)

Silicic acid is a [chemical compound](#). It is a [silanol](#). Silicic acid is the general name for a family of chemical compounds containing the element [silicon](#) attached to oxide and [hydroxyl](#) groups. This family of compounds have the general formula $[\text{SiO}_x(\text{OH})_{4-2x}]_n$.^{[1][2]} Some simple silicic acids have been identified, but only in very dilute aqueous solution, such as *metasilicic acid* (H₂SiO₃), *orthosilicic acid* (H₄SiO₄, pK_{a1}=9.84, pK_{a2}=13.2 at 25 °C), *disilicic acid* (H₂Si₂O₅), and *pyrosilicic acid* (H₆Si₂O₇); however in the solid state these probably condense to form polymeric silicic acids of complex structure.

orthosilicic acid

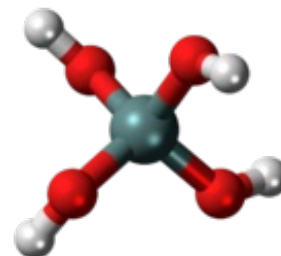
disilicic acid

metasilicic acid

pyrosilicic acid

Chemical reactions

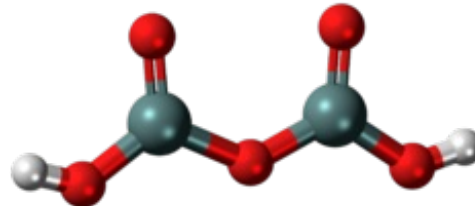
In general, silicic acid reactions are difficult to control. Partial dehydration to metasilicic acid, for example,



is challenging because the reaction typically progresses all the way to [silicon dioxide](#) and [water](#).

Acid-base reactions

Like other silanols, silicic acid is a weak acid. It can be deprotonated in solution, the [conjugate base silicate](#) is known.

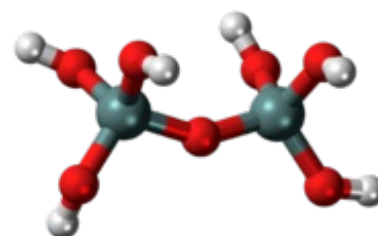
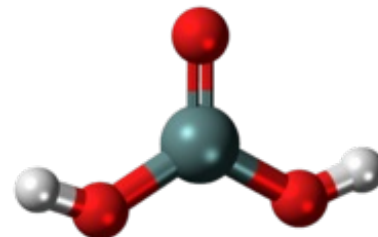
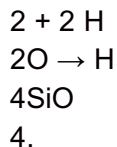


Production

Silicic acid was discovered by [Jöns Jacob Berzelius](#) between 1810 and 1836 when studying silicon generated by his experiments. However, he failed to recognise it as distinct from [silicon dioxide](#).

Hydration

Naturally occurring silicic acid is produced by a non-biological process called [hydration](#) involving water, and [quartz](#), which is known to be common on Earth. The reaction producing silicic acid from quartz can be written as: *Quartz + Water* → *Silicic acid*, or (in balanced form):



Laboratory synthesis

Oceanic silicic acid

Silicic acid is created near the ocean's surface, by the process of [hydration](#). It is carried into the [abyssopelagic zone](#) by falling water in the [poles](#). Uncontrolled build-up of silicic acid in the ocean is naturally checked – although human influence can upset this natural regulation. It is primarily removed by conversion to silicon dioxide and water. In the [oceans](#), silicon exists primarily as orthosilicic acid (H₄SiO₄), and its [biogeochemical cycle](#) is regulated by the group of [algae](#) known as the [diatoms](#).^{[4][5]} These algae [polymerise](#) the silicic acid to so-called [biogenic silica](#), used to construct their [cell walls](#) (called [frustules](#)).

Silicic acid in health

Continuing research of the correlation of [aluminium](#) and [Alzheimer's disease](#) has in the last few years included the use of silicic acid in beverages,^{[6][7][8]} due to its abilities to both reduce aluminium uptake in the digestive system as well as cause renal excretion of aluminium.

Study has shown that physiological concentration of orthosilicic acid stimulates [collagen](#) type 1 synthesis and osteoblastic differentiation in human osteoblast-like cells in vitro.^[9]

[Choline](#)-stabilized orthosilicic acid is a bioavailable [nutritional supplement](#). It has been shown to prevent the loss of hair tensile strength,^[10] have positive effect on skin surface and skin mechanical properties, and on brittleness of hair and nails,^[11] abate brittle nail syndrome,^[12] partially prevent femoral bone loss in the aged [ovariectomized rat](#) model,^[13] increase collagen concentration in calves,^[14] and have potential beneficial effect on bone collagen formation in osteopenic females.^[15]

References

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15. ^

External links

- [Bioinorganic Chemistry of Aluminium and Silicon research group website](#)