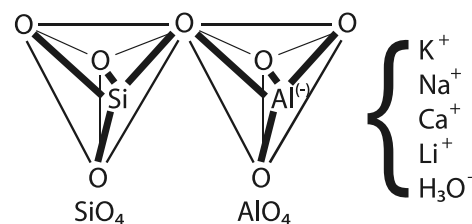


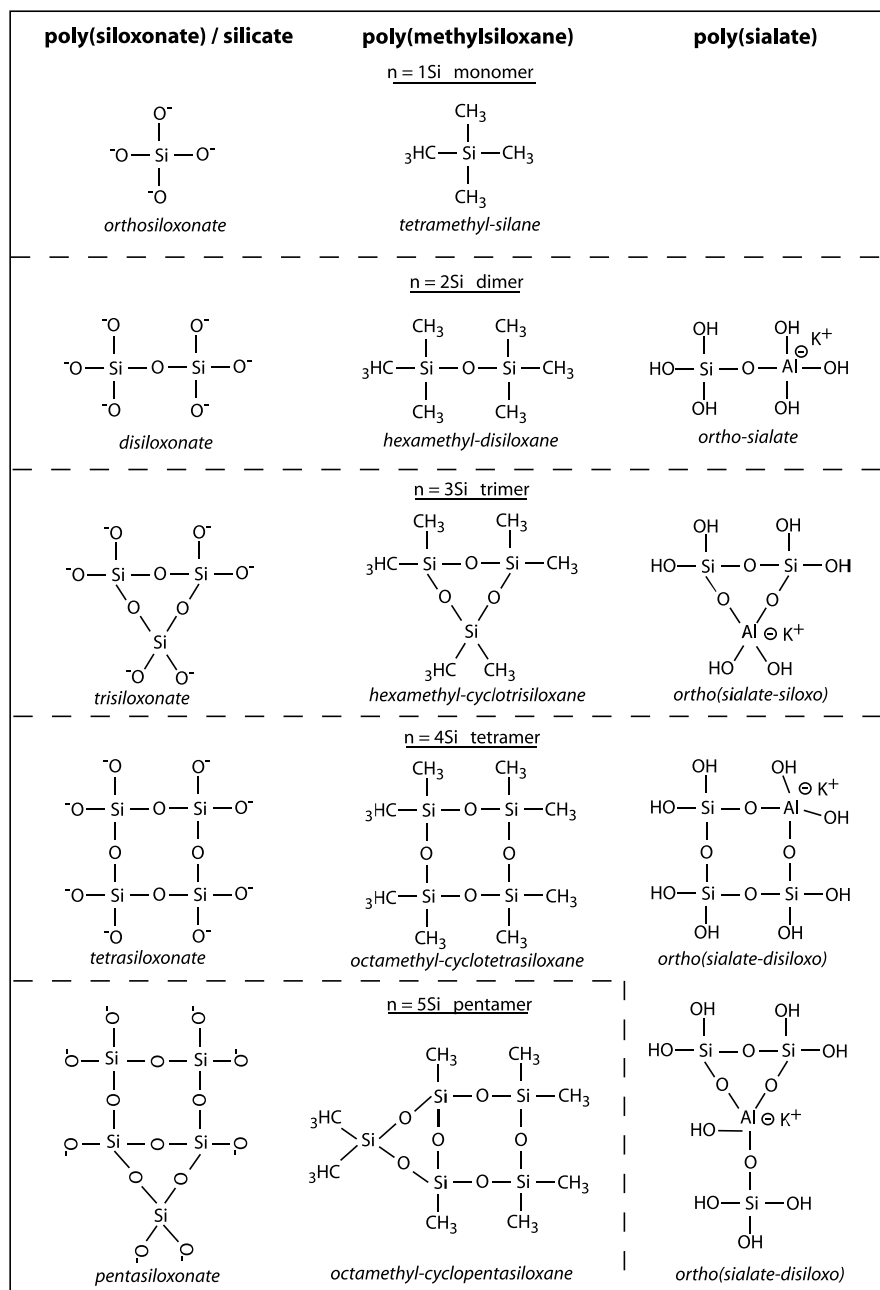
The Mineral Polymer Concept: Silicones and Geopolymers with Covalent Bonding

Joseph Davidovits, Geopolymer Institute, 02100 Saint-Quentin, France, www.geopolymer.org

In 1937 W. L. Bragg published a method for classifying all kinds of silicates and their crystal structures based on the concept of the *ionic* theory by L. Pauling. The fundamental unit is a tetrahedral complex consisting of a small cation such as Si⁴⁺, or Al³⁺ in tetrahedral coordination with four oxygens (Pauling's first rule).



This *ionic* coordination representation is no longer adapted to the requirements of geopolymer chemistry that is governed by *covalent* bonding mechanisms.



The similarity of the siloxane (Si-O-Si) structure in organo-silicones to the chains, rings, and networks of silicon and oxygen found in silica and the silicate minerals has been pointed out many times.

The Figure displays the **covalent molecular structures** for poly(siloxonate) (*waterglass*), poly(methylsiloxane) (*silicone*), poly(sialate) (*geopolymer*) respectively. It shows the identity for siloxonate, methyl-siloxane and sialate molecules, in relation with the number of Si atoms; in the case of the sialate group one Al atom is considered as one Si.

Details
in the book
*Geopolymer
Chemistry & Applications*

