

## GEOSIL – READY TO USE ALKALINE ACTIVATOR SOLUTIONS FOR GEOPOLYMERS

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Soluble silicates, also known as waterglass represent one of the oldest anthropogenic chemicals in the world. Waterglass not only has one single stoichiometric structure. It more or less stands as collective name for glassy frozen melts of alkali silicates with varying compositions as well as their solutions.

In Geopolymer applications a large number of activator solutions were tried out, such as alkali hydroxides, sulfates, aluminates and other oxides but none of them is comparable to waterglass with its unique properties. Unfortunately the majority of research laboratories don't focus on waterglass which has been produced under industrial conditions and is industrial available in future. But especially for future industrial applications and for bringing Geopolymer products broader into the market these requirements are essential. Furthermore qualified production processes ensure a constant product quality over the time for materials available in bulk.

With this awareness of the needs of the customers and the market, Woellner started to develop its new ready-to-use liquid alkaline activator solution production line for Geopolymers called "Geosil®".

Woellner is one of the biggest waterglass producers in Europe and is connected with Geopolymer projects for more than 30 years. Within the last 10 years, the number of inquiries, projects and customers has increased significantly.

Waterglass in AAM (alkali activated materials)

Basically there are two common types of waterglass which can be used as activator solutions. Sodium silicate, potassium silicate as well as mixtures of both. Lithium waterglass usually shows minor reactive properties and consequently only seldom is used for research. Depending on the application, a thorough selection of the corresponding type of Geosil® product has to be performed.

For building materials applications, especially at visible parts and surfaces, Geosil® products based on potassium silicate are commonly used. Sodium silicate based Geosil® products show their main advantages for example in the application of waste material immobilization. Geopolymer-based mineral foams are mainly produced by Geosil® products based on blended waterglass.

Geosil® products are adopted to your specific needs and ensure excellent working properties. The different products can be used in high solid systems as well as in binder dominant formulations and lead to end products with optimized mechanical and chemical properties.

Commercial available soluble silicates usually show the following molar ratios ( $\text{SiO}_2/\text{Me}_2\text{O}$ ,  $\text{M}=\text{Na}, \text{K}, \text{Li}$ ):

Sodium silicate: molar ratio: 1,7 – 4,0

Potassium silicate: molar ratio: 1,0 – 4,0

Lithium silicate: molar ratio: 2,5 – 5,0

For Geopolymers the most effective molar ratio lies between 1,5-1,7.

From practical point of view a molar ratio above 1,6 should be favoured as this leads to products without dangerous goods transport classification.

Geosil® products represent user-friendly, storage stable, ready-to-use formulations based on soluble silicates. They are produced via a quality controlled production process. Woellner ensures the high purity of raw materials via defined chemical parameter and makes the products available in many countries worldwide in different packaging sizes.