

Dynasylan® A

Tetraethylorthosilicate

Technical data

Properties and test methods	Value	Unit	Method
Flash point	approx. 45	°C	DIN 51755
Density (20 °C)	0.93 - 0.94	g/cm ³	DIN 51757
Viscosity (20 °C)	0.75	mPa·s	DIN 53015
SiO ₂ content	28.3 - 29.1	% by weight	AN-SAA 0851
Initial boiling point	> 168	°C	DIN 51751

Registrations

Dynasylan® A

EINECS/ELINCS (EU):	Yes
AICS (Australia):	Yes
DSL/NDSL (Canada):	Yes
PICCS (Philippines):	Yes
TSCA (USA):	Yes
IECS (P.R. China):	Yes
ENCS (Japan):	Yes
ECL (South Korea):	Yes

Dynasylan® A is the ethyl ester of orthosilicic acid.

In the literature it is frequently also referred to under the name TEOS (tetraethoxysilane). **Dynasylan® A** is a colourless, low-viscosity liquid with SiO₂ content of 28.5%. Use requires acid- or alkali-catalysed hydrolysis. Since all 4 ethoxy groups are able to participate in this reaction, **Dynasylan® A** is regarded as tetrafunctional. Hydrolysis leads to silanol groups which, in a subsequent condensation reaction, form very stable siloxane bonds (-Si-O-Si-). Condensation starts before hydrolysis is complete. During storage of these hydrolysates condensation, continues until a gel is formed. The rate of gelation depends on the concentration of water.

Safety and handling

Before considering the use of Dynasylan® and Protectosil® products please read its Material Safety Data sheet (MSDS) thoroughly for safety and toxicological data as well as for information on proper transportation, storage and use. The Material Safety Data Sheet is available after registration on our website www.dynasylan.com or upon request from your local representative, customer service or from Evonik Industries AG, Product Safety Department, E-MAIL sds-im@evonik.com.

Packaging and storage

Dynasylan® A must be stored with exclusion of moisture. In a sealed container, the product has a shelf-life of 12 months with no loss of quality. **Dynasylan® A** is supplied in 25 kg or 190 kg drums or in 850 kg containers.

Properties and application

Dynasylan® A is a ready source of silicic acid for many applications. Silicic acid is usually obtained by hydrolysis, or thermally by condensation at elevated temperature. The resulting silicic acid bonds well to many inorganic substrates and can be deposited in situ in a controlled manner. The surfaces of glass, metals, pigments, fillers and synthetic fibres can be coated with a very thin SiO_2 layer in order to improve chemical and thermal stability and mechanical properties.

Other applications are:

- crosslinkers in silicone rubber systems
- drying agents in sealing compositions

Dynasylan® A is an important starting material for sol-gel processes, where the additional use of alkylalkoxysilanes (e. g. **Dynasylan® MTES**) can give the siloxane network a somewhat organic character as a result of the incorporation of alkyl groups.

It is also possible to construct an inorganic/organic network by adding silanes containing organofunctional groups (e.g. aminopropyl groups) and polymerizing with organic precursors. This principle makes it possible to obtain highly scratch- and abrasion-resistant coatings.

Dynasylan® A is immiscible with water, so hydrolysis requires the use of a cosolvent such as ethanol. Suitable catalysts are mineral acids or ammonia, or even acetic acid and amines.

Partial hydrolysis gives hydrolysates of **Dynasylan® A** whose shelf life depends on the amount of water and solvent used. The amount of water determines the activity of the hydrolysate. Activity and shelf life are inversely proportional. The correct choice of the amount of water can give hydrolysates which have a shelf life of up to a year.

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