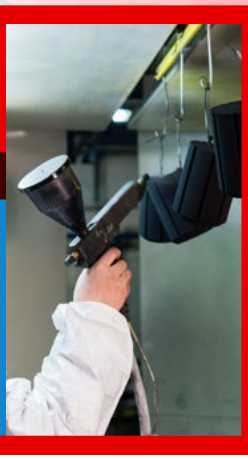


Organosilanes

AB SPECIALTY SILICONES • RAW MATERIAL SOLUTIONS

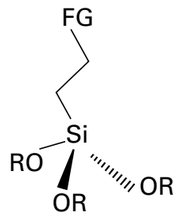
WAUKEGAN, IL • WWW.ANDISIL.COM

ABOUT SILANES

OVERVIEW

Organofunctional Silanes have an organic functional end group and an alkoxy functional end group which allow the silane to act as a bridge between organic materials and inorganic substrates. The organic functional group is matched to the resin system while the alkoxy group provides the reactive site for crosslinking. These materials are useful as adhesion promoters, crosslinking agents, surface modifiers and hydrophobizing agents.

SILANE STRUCTURE



FG = Alkyl, Amino, Epoxy, Methacryloxy, Vinyl
OR = Alkoxy, Acetoxy, Oxime

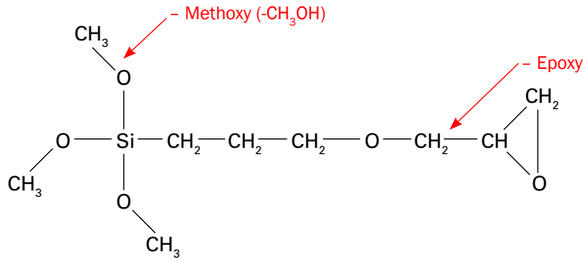


Figure 1: Andisil® 187 Silane

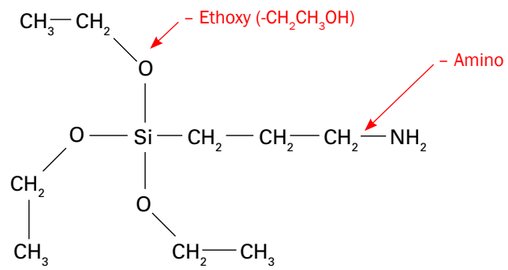


Figure 2: Andisil® 1100 Silane

HOW DO SILANES WORK?

Silanes function through a two-step mechanism: hydrolysis followed by condensation. Each alkoxy group is hydrolyzed to form a silanol and an alcohol. The rate of hydrolysis varies depending on the type of alkoxy functionality, for example, methoxy groups hydrolyze faster than ethoxy groups. When multiple alkoxy groups are present, the rate of hydrolysis increases for each subsequent hydrolysis step. See Figure 3. Once all alkoxy groups have been hydrolyzed, condensation will proceed. The cure mechanism is predominately governed by condensation. Both hydrolysis and condensation are greatly affected by pH. Figure 4 shows where the minima in each process occurs according to the pH of the system.

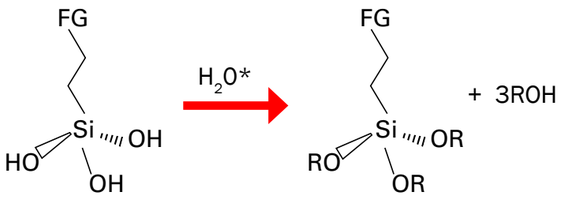


Figure 3: First Step Reaction-Hydrolysis

* H_2O can come from the

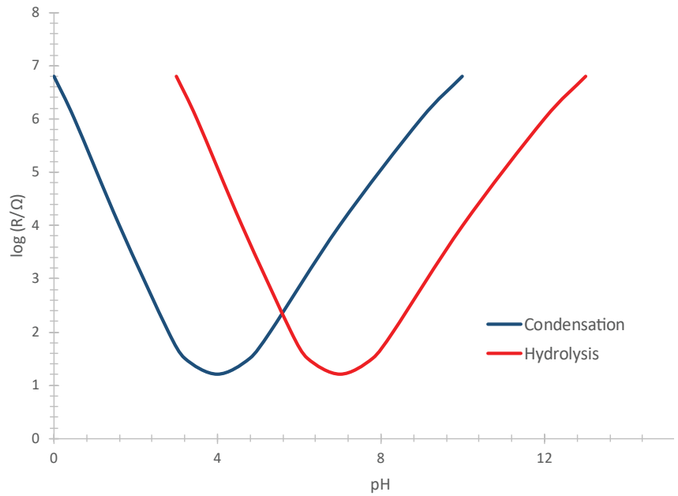


Figure 4: Hydrolysis and Condensation - Effect of pH

MARKETS & APPLICATIONS

- Adhesives & Sealants
- Chemical Manufacturing
- Coatings
- Mineral & Fiber Treatment
- Mold Making
- Roof Coatings
- Rubber Manufacturing

KEY FUNCTIONS

Adhesion Promotion

- Low use levels, typically <1%
- Substrates – reaction with alkoxy functional group
  - Glass
  - Siliceous Substrates
  - Metals/ metal oxides
- Substrates – reaction with organic functional group
  - Acrylics
  - Polyamides
  - Polyesters

Coupling Agent

- Dispersed in adhesive/ sealant material
- Improves
  - Mechanical Properties
  - Chemical Resistance
  - Hydrolytic Stability
- Substrates
  - Mineral fillers
  - Polymeric coatings

Crosslinking

- Create structure in polymer network
- Improve physical properties
  - Heat resistance
  - Hardness
  - Chemical Resistance

Dispersing Agent

- Improves filler wetting
- Decreases viscosity which allows for high loading of silica

Acetoxy Silanes

NAME	CHEMICAL NAME	CAS #
Andisil® MTAS Silane	Methyltriacetoxysilane	4253-34-3
Andisil® ETAS Silane	Ethyltriacetoxysilane	17689-77-9
Andisil® MTAS/ETAS Silane	Methyltriacetoxysilane /Ethyltriacetoxysilane blend	--
Andisil® MTAS/ETAS 30/70	30% Methyltriacetoxysilane, 70% Ethyltriacetoxysilane	--
Andisil® 4153 Silane	Di-t-butoxydiacetoxysilane	13170-23-5

Alkoxy Silanes

NAME	CHEMICAL NAME	CAS #
Andisil® 137 Silane	Octyltriethoxysilane	2943-75-1
Andisil® 155 Silane	Vinyltriisopropoxysilane	18023-33-1
Andisil® 162 Silane	Methyltriethoxysilane	2031-67-6
Andisil® 163 Silane	Methyltrimethoxysilane	1185-55-3
Andisil® 1150 Silane	Bis-(triethoxysilyl)ethane	16068-37-4
Andisil® 6665 Silane	Octyltrimethoxysilane	3069-40-7
Andisil® TEOS Silane	Tetraethoxysilane	78-10-4
Andisil® TEOS-40 Silane	Tetraethoxysilane, Si-40	78-10-4

Amino Silanes

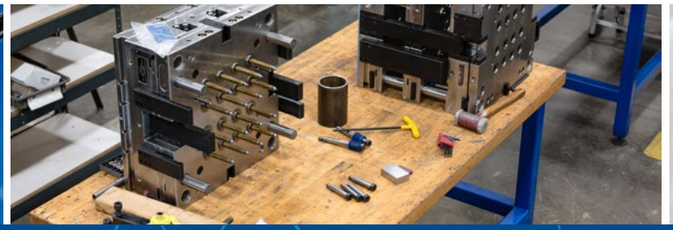
NAME	CHEMICAL NAME	CAS #
Andisil® 1100 Silane	Aminopropyltriethoxysilane	919-30-2
Andisil® 1110 Silane	Aminopropyltrimethoxysilane	13822-56-5
Andisil® 1120 Silane	Aminoethylaminopropyltrimethoxysilane (technical grade)	1760-24-3
Andisil® 1122 Silane	Aminoethylaminopropyltrimethoxysilane	1760-24-3
Andisil® 1130 Silane	Triamino-functional propyltrimethoxysilane	35141-30-1
Andisil® 1170 Silane	Bis(trimethoxysilylpropyl)amine	82985-35-1
Andisil® 2100 Silane	Aminopropylmethyldiethoxysilane	3179-76-8
Andisil® 2120 Silane	N-(2-Aminoethyl)-3-aminopropylmethyldimethoxysilane	3069-29-2
Andisil® 6021 Silane	Aminoethylaminopropyltriethoxysilane	5089-72-5

Chloro Silanes

NAME	CHEMICAL NAME	CAS #
Andisil® 6376 Silane	Chloropropyltriethoxysilane	5089-70-3
Andisil® 143 Silane	Chloropropyltrimethoxysilane	2530-87-2

Epoxy Silanes

NAME	CHEMICAL NAME	CAS #
Andisil® 186 Silane	Epoxycyclohexylethyltrimethoxysilane	3388-04-3
Andisil® 187 Silane	Glycidoxypropyltrimethoxysilane	2530-83-8
Andisil® 6041 Silane	Glycidoxypropyltriethoxysilane	2602-34-8
Andisil® 78 Silane	Glycidoxypropylmethyldiethoxysilane	2897-60-1
Andisil® 1770 Silane	Epoxycyclohexylethyltriethoxysilane	10217-34-2

Methacryloxy Silanes

NAME	CHEMICAL NAME	CAS #
Andisil® 174 Silane	Methacryloxypropyltrimethoxysilane	2530-85-0
Andisil® 502 Silane	Methacryloxypropylmethyldimethoxysilane	14513-34-9

Oxime Crosslinkers

Oxime crosslinkers are liquid raw materials for neutral condensation curing silicone sealants.

NAME	DESCRIPTION	CAS #
Andisil® MOS	Methyl tris(MEKO)silane	22984-54-9
Andisil® POS	Phenyl tris(MEKO)silane	34036-80-1
Andisil® VOS	Vinyl tris(MEKO)silane	2224-33-1
Andisil® TT 5050	Tetrakis(MEKO)silane in Toluene	--
Andisil® MT 9010	90% MOS/10% TOS	--
Andisil® VT 6535	65% VOS/35% TOS	--

Phenyl Silanes

NAME	CHEMICAL NAME	CAS #
Andisil® 6123 Silane	Phenyltriethoxysilane	780-69-8
Andisil® 6124 Silane	Phenyltrimethoxysilane	2996-92-1

Sulfur Silanes

NAME	CHEMICAL NAME	CAS #
Andisil® 189 Silane	Mercaptopropyltrimethoxysilane	4420-74-0
Andisil® 1891 Silane	Mercaptopropyltriethoxysilane	14814-09-6
Andisil® 264 Silane	Thiocyanatopropyltriethoxysilane	34708-08-2
Andisil® 1289 Silane	Bis[3-(triethoxysilyl)propyl]tetrasulfide	40372-72-3
Andisil® 6920 Silane	Bis-(triethoxysilylpropyl)disulfide	56706-10-6

Ureido Silanes

NAME	CHEMICAL NAME	CAS #
Andisil® 1524 Silane	Ureidopropyltrimethoxysilane	23843-64-3
Andisil® 1160 Silane	Ureidopropyltriethoxysilane	23779-32-0

Vinyl Silanes

NAME	CHEMICAL NAME	CAS #
Andisil® 151 Silane	Vinyltriethoxysilane	78-08-0
Andisil® 158 Silane	Vinyltris(isopropenoxy)silane	15332-99-7
Andisil® 171 Silane	Vinyltrimethoxysilane	2768-02-7
Andisil® 172 Silane	Vinyltris(2-methoxyethoxy)silane	1067-53-4




SELECTION GUIDE

■ Recommended
♦ Highly Recommended

	ACETOXY	Andisil® MTAS Silane	Andisil® ETAS Silane	Andisil® MTAS/ETAS Silane	Andisil® MTAS/ETAS 30/70	Andisil® 4153 Silane	ALKOXY	Andisil® 137 Silane	Andisil® 155 Silane	Andisil® 162 Silane	Andisil® 163 Silane	Andisil® 1150 Silane	Andisil® 6665 Silane	Andisil® TEOS Silane	Andisil® TEOS-40 Silane	AMINO	Andisil® 142 Silane	Andisil® 1100 Silane	Andisil® 1110 Silane	Andisil® 1120 Silane	Andisil® 1122 Silane	Andisil® 1130 Silane	Andisil® 1170 Silane	Andisil® 2100 Silane	Andisil® 2120 Silane	Andisil® 6021 Silane	CHLORO	Andisil® 6376 Silane	Andisil® 143 Silane	EPOXY	Andisil® 186 Silane	Andisil® 187 Silane	Andisil® 6041 Silane	Andisil® 78 Silane	Andisil® 1770 Silane	ETHYL LACTATO	Andisil® EL-30 Silane	Andisil® EL-90 Silane	METACYRLOXY	Andisil® 174 Silane	Andisil® 502 Silane	OXIME	Andisil® MOS	Andisil® POS	Andisil® VOS	Andisil® TT 5050	Andisil® MT 9010	Andisil® VT 6535	Andisil® VT 8218	PHENYL	Andisil® 6123 Silane	Andisil® 6124 Silane
FUNCTION																																																			
Adhesion Promoter																	♦	♦	♦	♦	♦	♦	♦	♦	■	♦		♦	♦		♦	♦	♦		♦					♦	♦										♦	♦
Coupling Agent		♦	♦	♦	♦	♦		♦									♦	♦	♦	♦	♦	♦	♦	♦	■	♦		♦	♦		♦	♦	♦		♦					♦	♦										♦	♦
Crosslinker									♦	♦	♦	♦	♦	♦	♦																					♦	♦					♦	♦	♦	♦	♦	♦	♦			
Dispersion Aid								♦	♦	♦	♦	♦	♦																																							
Moisture Scavenger		♦	♦	♦	♦	♦			■	■	♦	♦		♦	♦																					♦	♦					♦	♦	♦	♦	♦	♦	♦			
Resin Additive																																		■						♦	♦											
Surface Modifier								♦	♦	♦	♦		♦				♦	♦	♦	♦	♦	♦	♦	♦	■	♦		♦	♦		♦	♦	♦	♦	♦					♦	♦										♦	♦
APPLICATION																																																			
Acrylic																	■	♦	♦	♦	♦	♦	♦	♦	♦	♦					♦								■	■											
Butyl																															■								♦	♦											
Cement / Mortar								♦					♦																																							
Epoxy																	■	♦	♦	♦	♦	♦	♦	♦	♦	♦					♦	♦	♦	♦	♦																
Isoprene																		♦	♦	♦	♦	♦	♦	♦	♦	♦																										
Melamine																		♦	♦	♦	♦	♦	♦	♦	♦	♦																										
Neoprene																		■	■	■	■	■	■	■	■	■																										
Nitrile																		■	■	■	■	■	■	■	■	■					♦	♦	♦	♦	♦																
Nitrocellulose																		♦	♦	♦	♦	♦	♦	♦	♦	♦																										
Phenolic																		■	■	■	■	■	■	■	■	■					■	■	■	■	■																
Polyamide																		♦	♦	♦	♦	♦	♦	♦	♦	♦					■	■	■	■	■																
Polycarbonate																		♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦		■	■	■	■	■																
Polyester																		■	■	■	■	■	■	■	■	■		♦	♦		■	■	■	■	■					♦	♦											
Polyether/SPUR/STP																		♦	♦	♦	♦	♦	♦	♦	♦	♦						■								♦	♦											
Polyolefin									♦		♦							■	■	■	■	■	■	■	■	■						■								♦	♦											
Polystyrene									♦		♦							♦	♦	♦	♦	♦	♦	♦	♦	♦																										
Polysulfone																		♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦																						
Polyurethane/Polyurea																		■	■	■	■	■	■	■	■	■						♦																		
Polyvinyl butyral																		♦	♦	♦	♦	♦	♦	♦	♦	♦																										
Polyvinyl chloride																		■	■	■	■	■	■	■	■	■		■	■																						
Silicones		♦	♦	♦	♦	♦			♦	♦	♦	♦		♦	♦			♦	♦	♦	♦	♦	♦	♦	♦	♦					■	■			■		♦	♦		♦	♦		♦	♦	♦	♦	♦	♦	♦		♦	♦
Styrene-Butadiene									♦			♦						♦	♦	♦	♦	♦	♦	♦	♦	♦																										
Urea (Formaldehyde)																		♦	♦	♦	♦	♦	♦	♦	♦	♦						♦																		

■ Recommended
♦ Highly Recommended

	SULFUR	Andisil® 189 Silane	Andisil® 1891 Silane	Andisil® 264 Silane	Andisil® 1289 Silane	Andisil® 6920 Silane	UREIDO	Andisil® 1524 Silane	Andisil® 1160 Silane	VINYL	Andisil® 151 Silane	Andisil® 158 Silane	Andisil® 171 Silane	Andisil® 172 Silane
FUNCTION														
Adhesion Promoter		♦	♦	♦	♦	♦		♦	♦					
Coupling Agent		♦	♦		♦	♦		♦	♦		♦	♦	♦	♦
Crosslinker											♦	♦	♦	♦
Dispersion Aid											■	■	■	■
Moisture Scavenger											♦	♦	♦	♦
Resin Additive											♦		■	
Surface Modifier		♦	♦	♦	♦	♦		♦	♦		♦	♦	♦	♦
APPLICATION														
Acrylic		■	■		■	■								
Butyl		■	■											
Cement / Mortar														
Epoxy		♦	♦		♦	♦								
Isoprene		♦	♦		♦	♦								
Melamine														
Neoprene		♦	■		■	■					♦		♦	♦
Nitrile		♦	■		■	■								
Nitrocellulose														
Phenolic		♦												
Polyamide								♦	♦					
Polycarbonate														
Polyester														
Polyether/SPUR/STP								♦	■		♦		♦	
Polyolefin											♦		♦	♦
Polystyrene											♦		♦	♦
Polysulfone														
Polyurethane/Polyurea		♦						♦	■					
Polyvinyl butyral														
Polyvinyl chloride														
Silicones											♦	♦	♦	♦
Styrene-Butadiene		♦	♦		♦	♦		♦			♦		♦	♦
Urea (Formaldehyde)								♦	■					

AB SPECIALTY SILICONES is a US Manufacturer and Worldwide Distributor of specialty silicone chemicals. With customer focus at the forefront, our goal is to be the one source for all of your silicone raw material needs – providing the highest quality materials, service and technical expertise available.

Our core brand is Andisil®, representing high quality materials and encompassing a broad product catalog serving many industries: Personal Care, Roof Coatings, Chemical Manufacturing, Dental & Medical, Mold Making, Electronic Encapsulation, Adhesives & Sealants, Coatings, Gypsum, Mineral & Fiber Treatment, Pulp Manufacturing, Pressroom et al.

At the heart of our company is our vision - Enthusiasm & Innovation Create Success. Our team works hard to let our customers know how important they are. Present us with your needs, and we will figure out the possibilities.

» Product Quality.
» Customer Service.
» Technical Expertise.

US Manufacturer

Headquartered in Waukegan, Illinois

IL-Based Warehousing

- Over 200,000 Sq Ft of warehouse space
- Results in minimal lead times

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Enthusiasm & Innovation Create Success.

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