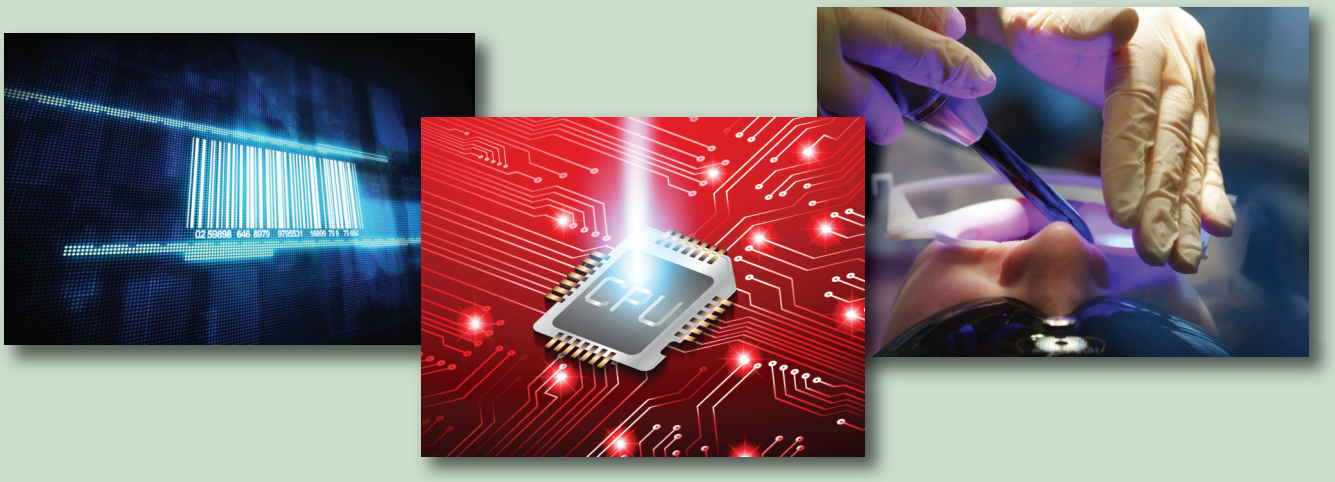
Gelest

Enabling Your Technology

SIVATE™ A200

Activated Acrylate Functional Silane



The benefits of activated silanes are:

- High speed reactivity
- Improvements in adhesion
- Higher mechanical bond strength
  (flexural, tensile and impact)
- Moisture activation not required prior to deposition

Applications Include:

- Primers for fiberoptic cladding
- Coupling agent for light-cure acrylic nanocomposites
- Adhesion promoter for high-speed UV cure systems, particularly acrylated urethanes

SIVATE™ A200 can be used in adhesion promotion applications between inorganic materials, particularly vitreous substrates with radical-cure resins when applied on a 100% actives basis as a primer or incorporated at a 0.5-2.0% level with low water content UV curable resins. Photoinitiators should be "hydroxyl-free." The silane or blended silane-resin combination must be stored in sealed containers under dry conditions until use. Within seconds of application initial bonding is formed with surface in an "A-stage." After exposure to moisture, the bond strengthens over several hours, depending on conditions, to achieve ultimate "B-stage" bond strength (moisture cure stage).

Product Code: SIA0200.A1

Density: 1.03
pH value: (1:1 in water): ~ 10
Viscosity: 2-3 cSt.
Flashpoint: >65°C (>150°F)

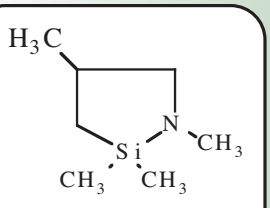
Availability:
2 kg bottles, 16 kg pails, 180 kg drums

Compared to conventional silanes, SIVATE™ Silanes:

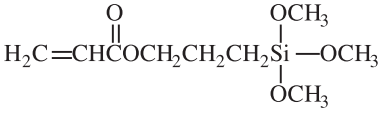
- Radcure: UV, EB, Visible Light
- React at high speed (seconds compared to hours)
- Do not require moisture or hydrolysis to initiate surface reactivity
- React with a greater variety of substrates
- Inhibit moisture initiated crack propagation on vitreous surfaces

Activation of silanes is effected by combining a cyclic azasilane with an acrylate functional silane. The cyclic azasilane reacts with a wider variety of hydroxyl groups with reaction speeds more than 100 times faster than the base silane, providing instant adhesion. Once reacted with the substrate, the cyclic azasilane forms a secondary amine that catalyzes the moisture-initiated condensation reactions of the balance of the silane components, establishing maximum bond strength.

Adhesion and bonding proceeds with a wider variety of substrates. In contrast to conventional silanes, SIVATE™ activated silanes react with newly formed glass surfaces, reducing crack propagation associated with moisture adsorption.



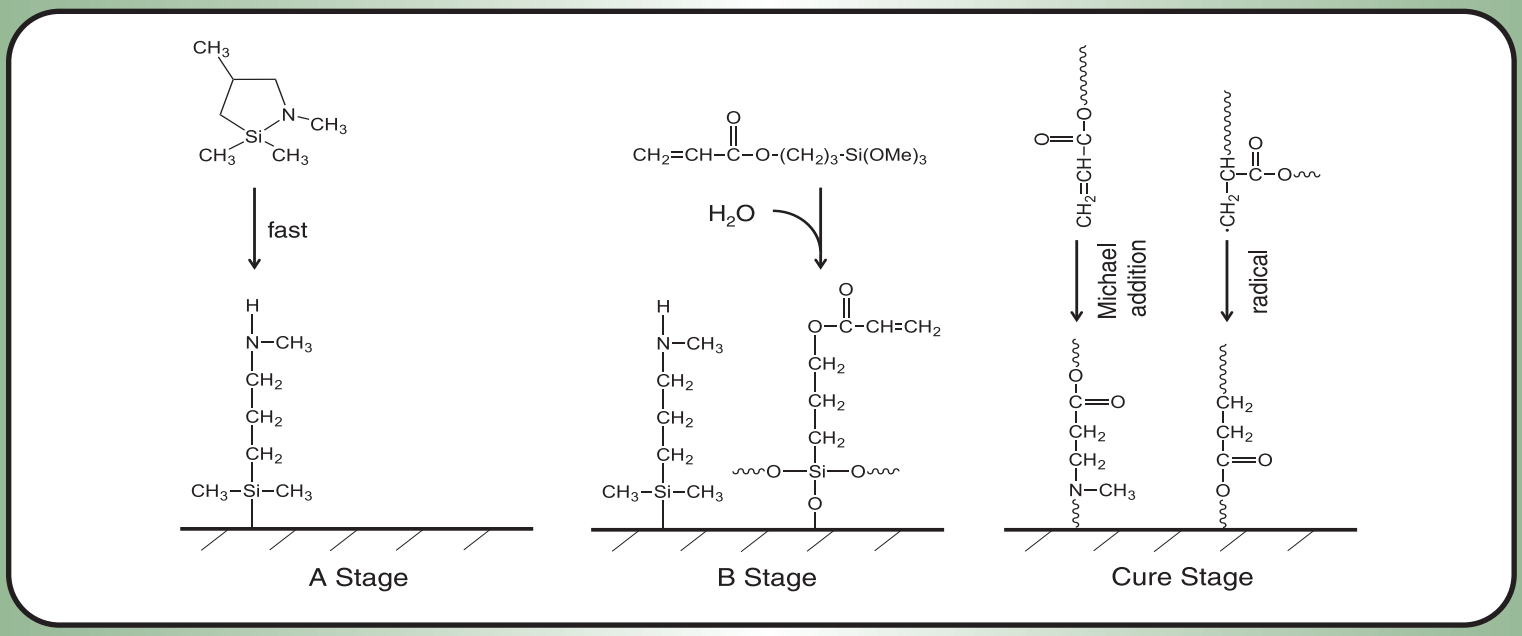
activating silane



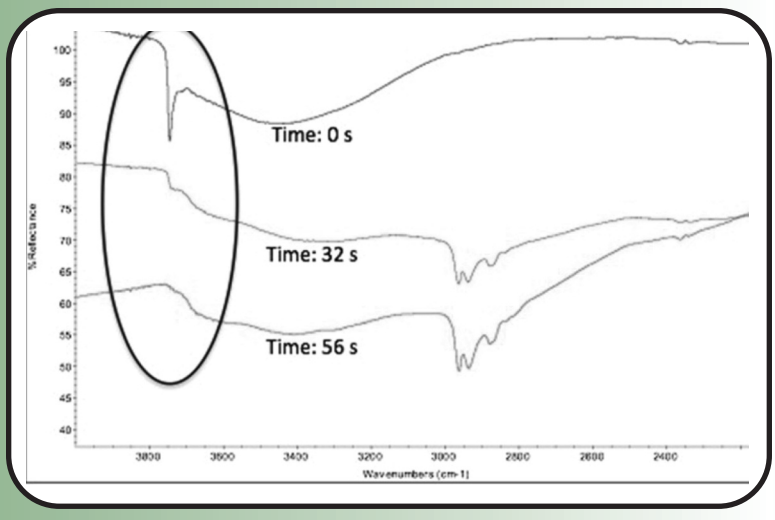
base silane

How do activated silanes work? (Mechanism and Chemistry)

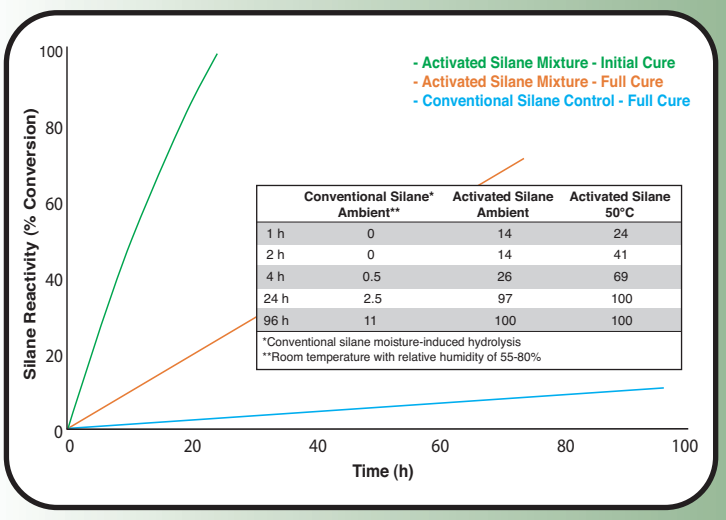
The reaction of activated silanes is driven by the thermodynamically favored formation of a silicon-oxygen bond, and is >85% complete in less than 15 seconds, reacting with more than three times as many hydroxyl groups as the conventional ethoxysilane achieves in 1 hour. Once the ring is opened, the secondary amine promotes the condensation of silanols formed from the base silane component with the substrate, more than doubling the kinetics of reactivity for hydrolytic deposition.



Reaction of activating silane with surface during deposition



DRIFT Spectra monitoring the disappearance of the terminal hydroxyl peak over exposure time as the terminal hydroxyls react with a cyclic azasilane



	Conventional Silane* Ambient**	Activated Silane Ambient	Activated Silane 50°C
1 h	0	14	24
2 h	0	14	41
4 h	0.5	26	69
24 h	2.5	97	100
96 h	11	100	100

*Conventional silane moisture-induced hydrolysis
**Room temperature with relative humidity of 55-80%

Reaction Kinetics of the activated silane with an acrylate polymer

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headquartered in Morrisville, PA, is recognized worldwide as an innovator, manufacturer and supplier of commercial and research quantities of organosilicon, metal-organic compounds and silicones. Gelest serves advanced technology markets through a materials science-driven approach. The company provides focused technical development and application support for: semiconductors, medical materials, pharmaceutical synthesis, diagnostics and separation science, and specialty polymeric materials.

For additional information on Gelest's SIVATE™ Technology or to inquire on how we may assist in *Enabling Your Technology,* please contact:

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