

Silquest™ A-178

Silquest* A-178

Description

Momentive Performance Materials Silquest A-178 silane is a coupling agent for glass fiber and particulate filler reinforced composites. It is a 100% active methacrylamido functional silane that may be used to promote adhesion between a wide range of resins and substrates and reinforcements. It is also useful as a monomer in the synthesis of organic polymers. It functions as a moisture- activated crosslinking agent.

Key Features and Benefits

The chemical structure of Silquest A-178 silane offers a number of important benefits:

Features	Typical Benefits
100% Active Ingredient	<ul style="list-style-type: none"> • Contains no flammable or combustible solvent. • Offers low VOC emissions
Methacrylamido Group	<ul style="list-style-type: none"> • Reactive with a large number of resin systems, such unsaturated polyester, vinyl ester, acrylic, polybutylene and polyolefins • Compatible with many typical glass fiber size and coating ingredients, such as film formers, anti-static agents, surfactants, lubricants and other coupling agents • Improves hygrothermal aging properties of glass fiber and particulate filler-reinforced composites • Provides glass fiber protection • Improves strand integrity for better fiber processing and composite fabrication

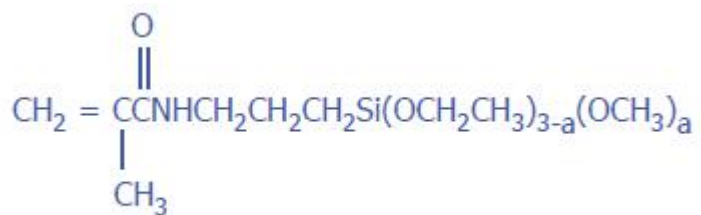
Typical Physical Properties

Physical Form	Liquid
Color	Clear and colorless
Active Ingredients, %	100
Specific Gravity, 25/25°C	1.0186
Boiling Point at 760 mmHg, °C	379
Flash Point, Pensky-Marten Closed Cup ASTM D 93, °C (°F)	101.7 (215)

Solubility

Silquest A-178 silane is soluble in methanol, ethanol, acetone, toluene, methyl Cellosolve® solvent (Dow Chemical Company) and water. It reacts with water and alcoholic solvents. In water, a concentration of one weight percent is stable for greater than 72 hours.

Chemical Structure



Silquest A-178 silane is a mixture of ethoxy and methoxy esters. The average value of a is 1.

Potential Applications

Silquest A-178 silane is recommended for evaluation in instances where inorganic surfaces such as glass fibers, particulate fillers or metals are combined with organic polymers, for example, unsaturated polyester, vinyl ester, acrylic, polybutylene and polyolefins. This silane is often applied to the inorganic surface from an aqueous solution. The treating solution can be quite simple, consisting of only silane, water and a small amount of acid to adjust the pH. These solutions are used commonly in finishing of heat-cleaned woven glass fabrics or treating particulate fillers. More complex solutions often are used when treating glass fibers used for reinforcing organic resins. These treating solutions may contain (in addition to Silquest A-178 silane) water-soluble organic polymers or emulsions of organic polymers as film formers, lubricants, anti-static agents, wetting agents, water, acids or buffers and other silane coupling agents. A reference that contains lists of commercial products used in

preparing glass fiber sizes is The Manufacturing Technology of Continuous Glass Fibres: Glass Science and Technology 6, second edition, K. L. Loewenstein, Elsevier, New York (1983).

The performance of Silquest A-178 silane in glass fiber-reinforced composites is illustrated in Table 1. The single-end, water sized glass fibers were finished with a 0.5 weight percent solution of Silquest A-178 silane in water. The pH of the solution was adjusted to 3.5 with glacial acetic acid. The sized single-end roving was then dried. Glass fibers were also treated with Silquest A-174* silane, 3-methacryloxypropyltrimethoxysilane, as a control. Pultruded glass rods were fabricated using these glass fibers and an unsaturated polyester resin (Aropol® 7241, Ashland Chemical Inc.).

Table 1: Performance of Silquest A-178 Silane and Silquest A-174 Silane in Glass Fiber Application

Property	Silquest A-174 Silane	Silquest A-178 Silane
Glass Flexural Strength 2.54 cm Span, grams	28	42
360° Twist Abrasion Test, minutes	1.3	1.2
As Molded Composite Flexural Strength, MPa	814	786
Composite Flexural Strength After 24 hr. Water Boil, MPa	717	717

Silquest A-178 silane may also be used as a monomer in the synthesis of organic polymers, such as acrylics, styrenics and vinylacrylics. The silane is incorporated into the polymer backbone and functions as a crosslinking agent and adhesion promoter. Amide functionality provides different solubility and physical properties than ester functionality. The polymers may be useful in coatings, sealants and adhesives.

Patent Status

Standard copy to come

Product Safety, Handling and Storage

Standard copy to come

Limitations

Standard copy to come

Contact Information

Email

commercial.services@momentive.com

Telephone

Americas	Latin America	EMEAI- Europe, Middle East, Africa & India	ASIA PACIFIC
+1 800 295 2392 Toll free* +704 805 6946 Direct Number	Brazil +55 11 4534 9650 Direct Number	Europe +390510924300 Direct number	China 800 820 0202 Toll free +86 21 3860 4892 Direct number
All American countries	Mexico +52 55 2169 7670 Direct Number	India, Middle East & Africa + 91 44 71212207 Direct number *All Middle Eastern countries, Africa, India,	Japan +81 3 5544 3111 Direct number Korea +82 2 6201 4600

For literature and technical assistance, visit our website at: www.momentive.com

DISCLAIMER:

THE MATERIALS, PRODUCTS AND SERVICES OF MOMENTIVE PERFORMANCE MATERIALS INC. AND ITS SUBSIDIARIES AND AFFILIATES (COLLECTIVELY "SUPPLIER"), ARE SOLD SUBJECT TO SUPPLIER'S STANDARD CONDITIONS OF SALE, WHICH ARE INCLUDED IN THE APPLICABLE DISTRIBUTOR OR OTHER SALES AGREEMENT, PRINTED ON THE BACK OF ORDER ACKNOWLEDGMENTS AND INVOICES, AND AVAILABLE UPON REQUEST. ALTHOUGH ANY INFORMATION, RECOMMENDATIONS, OR ADVICE CONTAINED HEREIN IS GIVEN IN GOOD FAITH, SUPPLIER MAKES NO WARRANTY OR

GUARANTEE, EXPRESS OR IMPLIED, (i) THAT THE RESULTS DESCRIBED HEREIN WILL BE OBTAINED UNDER END-USE CONDITIONS, OR (ii) AS TO THE EFFECTIVENESS OR SAFETY OF ANY DESIGN INCORPORATING ITS PRODUCTS, MATERIALS, SERVICES, RECOMMENDATIONS OR ADVICE. EXCEPT AS PROVIDED IN SUPPLIER'S STANDARD CONDITIONS OF SALE, SUPPLIER AND ITS REPRESENTATIVES SHALL IN NO EVENT BE RESPONSIBLE FOR ANY LOSS RESULTING FROM ANY USE OF ITS MATERIALS, PRODUCTS OR SERVICES DESCRIBED HEREIN. Each user bears full responsibility for making its own determination as to the suitability of Supplier's materials, services, recommendations, or advice for its own particular use. Each user must identify and perform all tests and analyses necessary to assure that its finished parts incorporating Supplier's products, materials, or services will be safe and suitable for use under end-use conditions. Nothing in this or any other document, nor any oral recommendation or advice, shall be deemed to alter, vary, supersede, or waive any provision of Supplier's standard Conditions of Sale or this Disclaimer, unless any such modification is specifically agreed to in a writing signed by Supplier. No statement contained herein concerning a possible or suggested use of any material, product, service or design is intended, or should be construed, to grant any license under any patent or other intellectual property right of Supplier covering such use or design, or as a recommendation for the use of such material, product, service or design in the infringement of any patent or other intellectual property right.

*Silquest™ is a trademark of Momentive Performance Materials Inc.

The use of the "™" symbol designates registered or unregistered trademarks of Momentive Performance Materials Inc. or its affiliated companies. Momentive and the Momentive logo are trademarks of Momentive Performance Materials Inc.