

CoatOSil* 2287

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Description

CoatOSil 2287 silane may provide shelf stable non-yellowing crosslinking performance to enhance the physical properties of waterborne dispersion polymers such as polyurethane and acrylic latexes. When CoatOSil 2287 silane is incorporated as a crosslinker or adhesion promoter, it may provide improved water resistance and wet adhesion, with good shelf stability.

Key Features and Benefits

- Enhanced water and organic solvent resistance of coatings
- Improved wet and dry adhesion, without yellowing
- Performance consistency with aging

Typical Physical Properties

| Property | CoatOSil 2287 |
|--|---------------|
| Specific Gravity at 25°C | 0.979 |
| Viscosity at 25°C, cSt | 3 |
| Flash Point, Pensky-Martens closed cup ASTM D93, °C (°F) | 104 (220) |

Chemical Structure



Chemical Name
 3-Glycidoxypropylmethyldiethoxysilane

CAS # 2897-60-1

Potential Applications

CoatOSil 2287 silane is an excellent candidate to consider for formulations employing carboxylated latexes

(acrylic, SBR, polyurethane, etc.) exhibiting a pH between 6 and 8.5.

CoatOSil 2287 silane may be employed as an adhesion promoter or crosslinker. It may be suitable for use as a water stable single component crosslinker in applications such as:

- Wood furniture and flooring finishes
- Metal coatings

In such applications, CoatOSil 2287 silane may provide a means of replacing a 2 part waterborne coating with a single component system. The potential benefits of a silane crosslinked water stable single component system include reduced scrap, improved process efficiency and reduced crosslinker toxicity.

Table 1: Acrylic Latex Wood Coating Test Formulation

| Material | Control Phr | Silane modified Phr |
|---|-------------|-----------------------------------|
| First step | | |
| Latex (45% solids, acid number = 48, MFFT <5°C) | 69.5 | 69.5 |
| Water | 9.5 | 8.3 |
| CoatOSil 2287 Epoxysilane | 0.0 | 1.2 (induction time of 2 days) |
| Second step | | |
| Matting agent | 0.9 | 0.9 |
| Water | 4 | 4 |
| CoatOSil 1211 Surfactant | 0.2 | |
| Coalescing agent | 9 | 9 |
| Wax dispersion | 4.3 | 4.3 |
| Wax dispersion | 2.5 | 2.5 |
| Ammonium Hydroxide (25%) | 0.1 | 0.1 |
| Total | 100 | 100 |

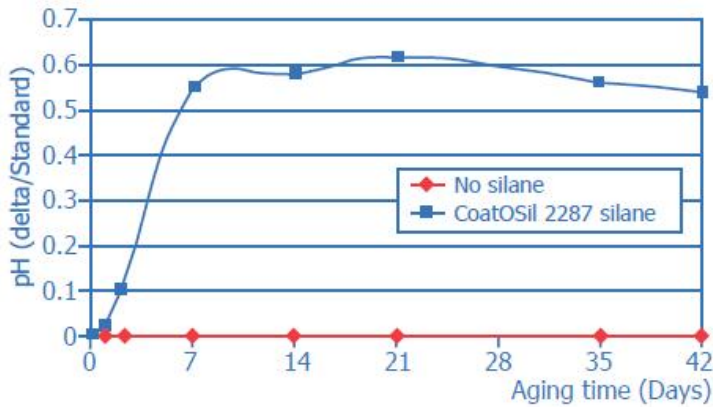
Note: Ratio of epoxysilane to acid functionality of resin = 0.08% silane per mg KOH acid number (3.8 phr)
Test data. Actual values may vary.

Reactivity Characteristics

CoatOSil 2287 silane reacts with carboxyl groups in anionic polymers to produce a silylated polymer. An acid number of 15 or greater is necessary to have enough sites for effective silylation and crosslinking during coalescence and cure of the coating.

It is recommended that the silane be added to the latex and then allowed to stand for one to three days before the mixture is applied to a substrate. This induction time is polymer dependant and must be checked prior to final tests or application. As the modified latex typically stays shelf stable, it is usually not a problem to keep material for induction prior to industrial applications. Figure 1 illustrates the pH change (relative to the latex control) that occurs as the -COOH group is reacted with the glycidoxy group.

Figure 1: Impact of Epoxysilane on pH of Acrylic Latex

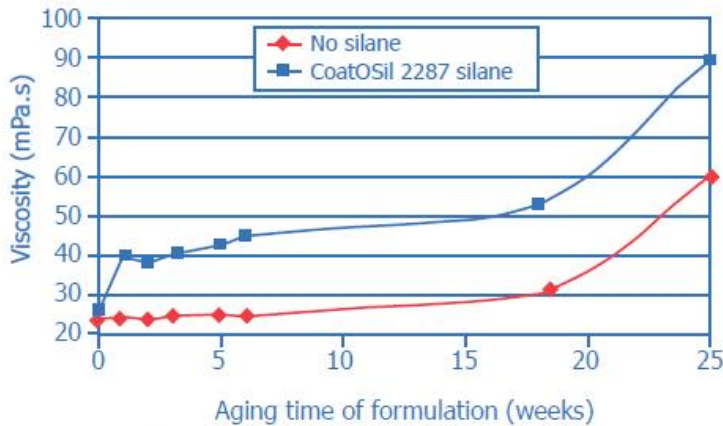


Note: Test data. Actual results may vary.

Shelf Stability Performance

CoatOSil 2287 silane may help deliver enhanced crosslinking and adhesion performance without the rapid loss of shelf stability observed with methoxysilanes. Figure 2 illustrates the effect of aging on viscosity of the acrylic latex formulation described in Table 1.

Figure 2: Waterborne Acrylic Latex Shelf Stability - Change in Viscosity at Ambient Conditions



Note: Test data. Actual results may vary.

Crosslinking Performance

CoatOSil 2287 silane delivers high gel content by crosslinking polymer chains. Figure 3 illustrates the measured gel content of the acrylic latex formulation described in Table 1. Figure 4 shows the potential improvement in solvent resistance for the same formulation with and without CoatOSil 2287 and Figure 5 illustrates the potential improvement in water resistance. The different figures illustrate the effects of freshly modified latexes after one week or of aged latexes after 6 months storage.

Figure 3: Gel Content of Acrylic Latex Coating Cured with CoatOSil 2287 Silane



Note: Test data. Actual results may vary.

Figure 4: Solvent Resistance of Acrylic Latex Coating Cured with CoatOSil 2287 Silane

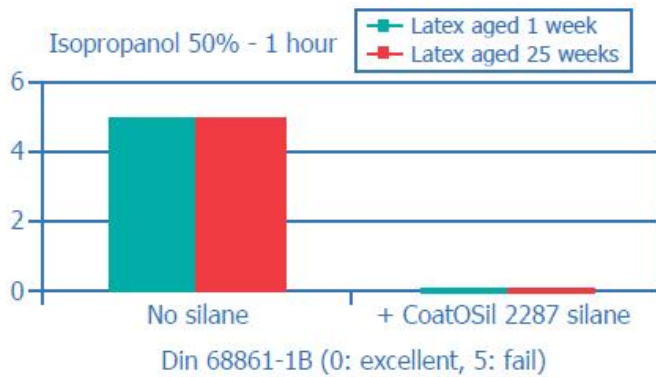
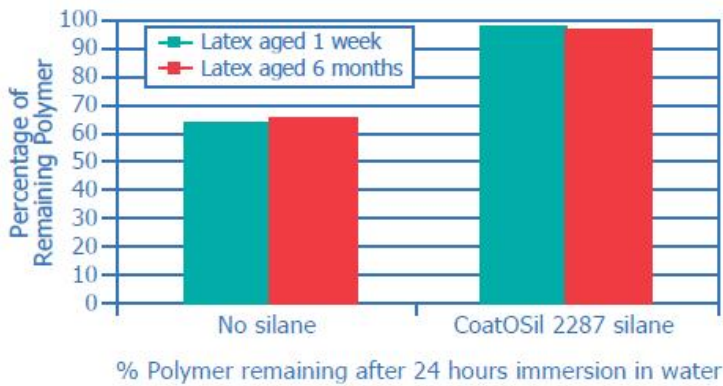


Figure 5: Water Resistance of Acrylic Latex Coating Cured with CoatOSil 2287 Silane



Note: Test data. Actual results may vary.

Recommended Loading Levels

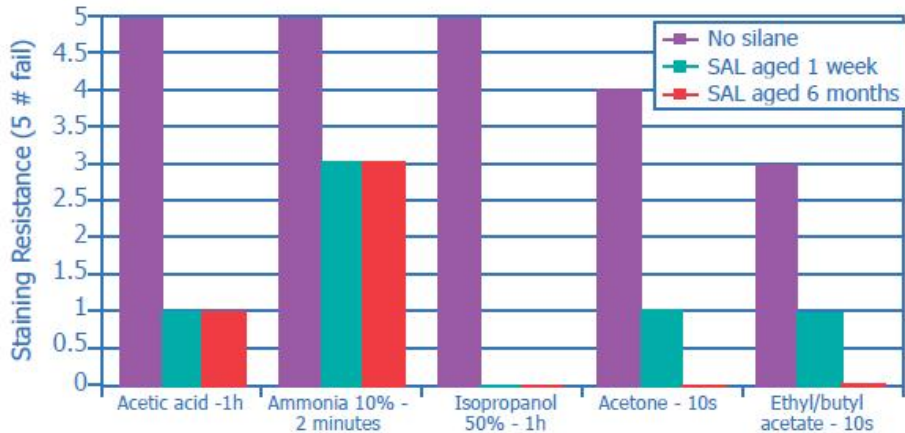
Initial loading levels of 2.0 phr on resin solids are recommended for the development of improved performance through crosslinking. The formulation demonstrated in this bulletin had 0.08 weight % silane added for each unit of acid number. Higher levels may impact shelf life.

Staining Resistance of Wood Coating

Figure 6 shows the staining resistance of formulation given in Table 1 as applied on oak ply wood panels. Application procedure involves deposit of 130g/sqm of wet coating using a spray gun.

Staining tests are made according to DIN 68861-1B. Figure 6 reports tests for latex without silane and for Silylated Acrylic Latex (SAL) using CoatOSil 2287 silane aged 1 week or six months.

Figure 6



Note: Test data. Actual results may vary.

Patent Status

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