

## Niax\* catalyst A-1

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#### Description

Niax catalyst A-1 contains 70 percent bis(2-dimethylaminoethyl) ether, one of the most active urethane foam amine catalysts known. As a matter of convenience, the pure amine ether has been diluted with 30 weight percent dipropylene glycol to facilitate metering and to permit the use of conventional quantities in foam formulations.

#### Typical Physical Properties

Specific Gravity at 20/20°C (68/68°F)	0.9022
Viscosity at 20°C (68°F), cP	4.1
Freezing Point	Sets to glass below -80°C (-112°F)
Vapor Pressure, mm Hg	0.01
Solubility in Water at 20°C (68°F)	Complete
Solubility in Benzene at 20° (68°F)	Complete
Refractive Index, n <sub>D</sub> 25°C	1.4346
Flash Point, °C (°F)	74 (165)
Pensky-Martens Closed Cup <sup>(1)</sup>	

(1) ASTM Method D 93

#### Catalytic Activity

The basic chemical reactions important in the polyether foaming process are the polyol/isocyanate reaction and the water/isocyanate reaction. Table 1 shows how Niax catalyst A-1 compares to various amine catalysts in promoting these two basic reactions. In the polyol/isocyanate (alcohol/isocyanate) reaction, Niax catalyst A-1 gives a specific rate constant that is about 10 percent higher than a similar blend of triethylene diamine, the next most active amine. In the water/isocyanate reaction, however, Niax catalyst A-1 has a specific rate constant that is 50 percent greater than triethylenediamine, the next most active amine.

The strong catalytic effect of Niax catalyst A-1 toward the water/isocyanate reaction facilitates the balancing of the catalysis of the polyol/isocyanate reaction by small variations in the stannous octoate level. This control is important in the production of commercial open-celled, split-free, flexible urethane foam. The level of Niax catalyst A-1 can be adjusted over a wide range to permit control of foam rise time without a sacrifice in tin operating range.

**Table 1: Reaction Rate Constants of Niax Catalyst A-1 Compared to Conventional Amine Catalysts**

Alcohol/Isocyanate Reactions <sup>(1)</sup>	Specific Rate Constant <sup>(2)</sup> , Alcohol/Isocyanate Reactions(1) Ka/Ca (min <sup>-1</sup> )
Niax Catalyst A-1	56
Triethylenediamine	49
N,N-Dimethylethanolamine	10
N-Methyl Morpholine	7.5
N-Ethyl Morpholine	5.0
Water/Isocyanate Reactions <sup>(3)</sup>	
Niax Catalyst A-1	158
Triethylenediamine	98
N,N-Dimethylethanolamine	68
N-Methyl Morpholine	14
N-Ethyl Morpholine	10

(1) Equal parts stannous octoate used with each amine

(2) Kinetic data obtained with a model reaction system consisting of butanol and phenyl isocyanate at 25°C in a solvent blend of 90 percent toluene and 10 percent dimethylformamide

(3) Kinetic data obtained with a model reaction system consisting of water and phenyl isocyanate at 25°C in a solvent blend of 90 percent toluene and 10 percent dimethylformamide

### Processing Recommendations

#### Performance in Urethane Foam

Niax catalyst A-1, when used alone or as part of the amine catalyst system, helps improve the processing characteristics and physical properties of the following types of flexible foams:

- High-density unfilled foam
- Filled foam
- High-load-bearing flexible foam
- Low-density foam
- High Resilience molded foam

#### Patent Status

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