Product Information

Dynamar™
Curative/Bonding Agent HX-752

Description

This material is a difunctional aziridine amide derived from isophthalic acid and propylene imine.

Applications

Dynamar HX-752 belongs to the chemical class of acyl aziridines which react with carboxylic acids to form ring-opened ester-amide linkages and with alcohols in the presence of acidic catalysts to form ring-opened ether-esters. These reactions take place at relatively low temperatures and without the evolution of byproducts, so HX-752 can be used as a chain extender or crosslinker to cure carboxyl-functional polymers or to harden hydroxyl-functional polymers in the presence of acidic species.

HX-752 has found use in solid rocket propellant formulations where it acts as a bonding agent for ammonium perchlorate in polybutadiene matrices.

Typical Properties

Not for specification purposes

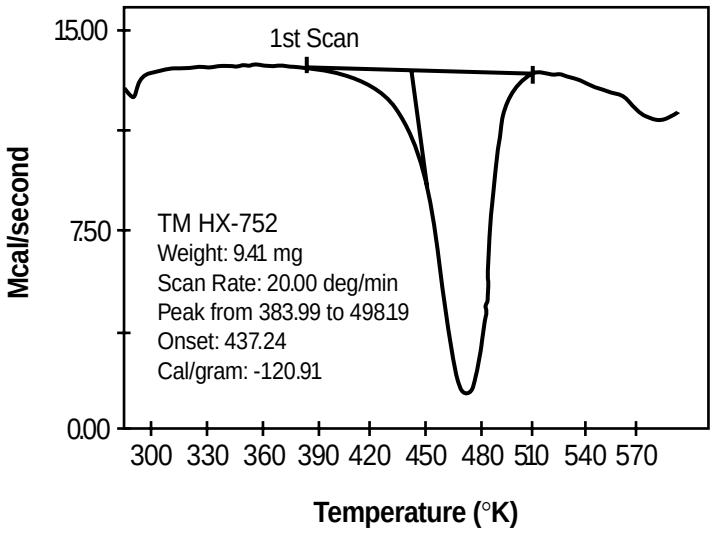
All measurements at 25°C, 1 atm unless noted

Appearance	Colorless to yellowish viscous liquid or whitish solid melting around 35°C
Viscosity, cps	5000 (supercooled liquid)
Density, g/cc	1.12 (supercooled liquid)
Equivalent weight (KCNS Titration)	133
Moisture, %	0.05
Flash point (Penske-Martens Closed Cup)	>110°C (230°F)

Caution

Hazardous polymerization may occur if a mass of this product is heated above 55°C (130°F). A differential scanning calorimeter was used to examine the exothermic behavior of HX-752. When a small sample was heated at a rate of 20°C per minute, it showed an exothermic reaction peaking near 190°C (374°F) amounting to a heat release of 121 calories per gram. The trace is reproduced below. If exothermic polymerization occurs because of overheating, do not breathe the smoke or fumes that may be generated.

Differential Scanning Calorimetry Results for HX-752 Showing Exothermic Behavior



Handling

Dynamar™ HX-752 has a marked tendency to supercool, and may remain in a glassy state for years at -18°C. More typically, the material slowly crystallizes during storage, with nucleation occurring at several points in the container. The growing crystallites eventually merge and the entire mass becomes solid. The process does not affect the quality or activity of the product. If liquid HX-752 is allowed to stand at room temperature, it often crystallizes in a few days.

HX-752 may be warmed to 45°C (about 110°F) to melt the crystallites and lower the viscosity for easier handling. The safest way to avoid polymerization is to immerse the container in a water bath at 45°C. If the container is kept closed until it is warm, moisture condensation in the product will be avoided.

A small sample of each lot of HX-752 is tested at 3M by holding it for 16 hours at 45°C and then retesting the equivalent weight by KCNS titration. The result must remain essentially unchanged if the lot is to be released. This equivalent weight determination is the most sensitive measure of the quality of the product and should be retested if there is any concern about changes in the product due to long storage, freezer malfunction or suspected mishandling.

If HX-752 is being used in quantities of less than a full container, it is recommended that the original container be warmed to no higher than 45°C and all the material repackaged into containers in which each hold the amount required for a single batch. This ensures that the material in the original container will not be repeatedly warmed each time a small amount is needed.

Safety and Toxicology	Material Safety Data Sheets are available from 3M Performance Materials Division.
Storage	The recommended storage temperature for HX-752 is -18°C (0°F), and at this temperature the shelf life is at least one year. At higher temperatures HX-752 is generally found to slowly homopolymerize or rearrange to the oxazoline form.
Shelf Life	One year under recommended storage conditions.
Packaging	One-pound, eight-pound and 44-pound units.
Shipping	To ensure stability during transit, all shipments of this product are made in insulated cartons packed with dry ice.
Disposal	Testing of a solution of 40% GAP in ethyl acetate indicates that such solutions may be classified as a “flammable liquid.” It should be possible to destroy such solutions in an approved incinerator.

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