

## KDT Ceraset Polysilazane 20

*Heat Curable Ceramic Precursor (Product Code: C-2001)*



KDT Ceraset Polysilazane 20 is a liquid polymer that is readily thermoset to a solid by heating. The polymer is designed to be a matrix resin for the fabrication of ceramic matrix composites via polymer infiltration pyrolysis (PIP) techniques. KDT Polysilazane 20 can be pyrolyzed to either silicon carbide or silicon nitride-containing ceramics by heating to 1,000 °C, thus allowing flexibility in composite engineering.

### Major Applications:

Ceramic Matrix Composites (CMCs), Metal Matrix Composites (MMCs), Ceramic MEMS, Ceramic Joining, SiC/Si<sub>3</sub>N<sub>4</sub> coatings for C/C composites and SiC/Si<sub>3</sub>N<sub>4</sub> ceramic nanocomposites.

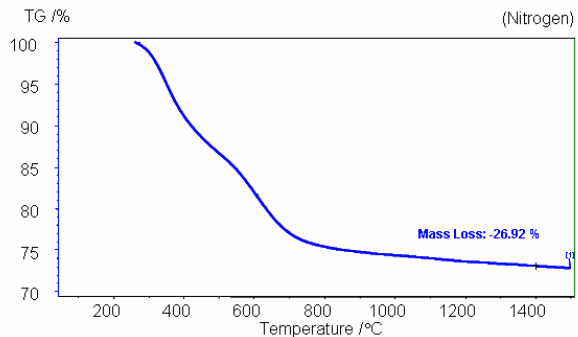
### Cure Conditions:

Cure from liquid to solid can be accomplished in times ranging from 1 to 90 minutes over a temperature range of 90°C to 190°C. The peroxides are typically dissolved in solvent free polymer at the 0.5 to 1.0wt% level based on the weight of polymer employed. Cure without the use of a peroxide can be effected by heating to 180-200°C. Curing may also be accomplished by addition of a photo initiator followed by exposure to UV radiation (Molar Extinction Coefficient: 0.15 M<sup>-1</sup> cm<sup>-1</sup>).

### Physical Properties of Resin

Color	Clear to pale yellow liquid
Refractive Index	1.490 @ 23 °C [73 °F]
% Resin	100 % solids as a liquid
Flash Point	29 °C [84 °F]
Density of Liquid	1.020 g/cm <sup>3</sup>
Density of Cured Material	1.120 g/cm <sup>3</sup>
Density of Ceramic	2.400 g/cm <sup>3</sup>
Viscosity	184-200 cps @ 19 °C [67 °F]

### TGA of KDT Ceraset Polysilazane 20



### Pyrolysis and Ceramic Conversion:

Pyrolysis of cured KDT Ceraset Polysilazane 20 results in progressive conversion of the polymer to an amorphous and ultimately crystalline ceramic phase. Pyrolysis up to 1400°C results in amorphous ceramic; crystallization begins above 1400°C. The final phase is dependent upon the pyrolysis atmosphere and the presence of any fillers which may seed particular ceramic phases. Inert gas pyrolysis results in a silicon carbide ceramic, while pyrolysis in an ammonia-containing atmosphere results in a silicon nitride ceramic.

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**Properties of SiC Fiber Reinforced Composites by PIP using KDT Ceraset Polysilazane 20:**

Fiber	Fiber Weave	Pyrolysis Temp. (°C)	Matrix	Flex Strength (MPa)
Nicalon®	8HSW	1,000	SiC	404
Hi-Nicalon®	Plain	1,300	SiC	580
Nicalon®	8HSW	1,000	Si <sub>3</sub> N <sub>4</sub>	300

**Properties of Hi-Nicalon Fiber - Reinforced Composites fabricated by resin infusion of C/SiC Hi – Nicalon:**

Pyrolysis Temp. (°C)	Density (g/cm <sup>3</sup> )	Flexural Strength (MPa)		Fracture Toughness (MPa·m <sup>0.5</sup> )	
		Average	Maximum	Average	Maximum
1300	2.57	447	580	30	32
1600	2.87	263	310	24	25

**Clean Up:**

Clean tools immediately after use with acetone or mineral spirits. Solvent cleaning can be followed by a wash with soapy water. Cured material cannot be removed with solvent. Proper clean-up of equipment is essential.

**Handling:**

**Storage Life:** Minimum of 2 years for unopened containers.

**Pot Life:** Usable life will be determined by the precautions taken to keep containers tightly sealed and protected from moisture.

**Solvents:**

KDT Ceraset Polysilazane 20 is miscible with dry aprotic solvents such as alkanes, aromatic hydrocarbons, ethers, ketones, and esters. KiON Ceraset Polysilazane 20 is hydrolytically sensitive and will slowly generate ammonia upon contact with moisture. The polymer will also react with other protic substances such as acids, bases, and alcohols.

**Safety:**

Use safety glasses and adequate ventilation. Protect skin from exposure using gloves and appropriate clothing. Seek medical attention if ingestion or overexposure is suspected. Keep uncured product from flame, all ignition sources, and moisture. This product is intended for professional use by persons familiar with this product data sheet, the Material Safety Data Sheet (MSDS) that accompanies product shipments, and applicable health, safety, and environmental practices and regulations. Contact KDT for advice concerning this product's suitability for specific applications.

**Disclaimer:**

Information on this product sheet is subject to change without notice as a result of experience and ongoing product development. It is the user's responsibility to verify that this sheet is current prior to use. The user accepts all risk associated with any use of this product for any purpose other than as recommended herein.

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