AGOSTYX LLC

General Properties of a VinylMethyl Polysilazane

20% ViMeSi-NH / 80% HMeSi-NH

Liquid Resin

Color: Clear to Pale Yellow Liquid
Viscosity: 50 - 200 cps @ 25 °C [77 °F]
VOC Content: N/A
Refractive Index of Liquid Polymer: 1.4896 @ 23 [1]C [73 [1]F]
Molar Extinction Coefficient: 0.15 M^{-1} cm^{-1}
Flash Point: 29 °C [84 °F]
Specific Gravity: 1.020
Density: 8.50 lb/gal [1.02 kg/L]
Amine Equivalent Weight: 64
DC Electrical Conductivity of Liquid Resin: 1.0 X 10^{-12} mhos
Solubility: soluble in most aprotic solvents both polar and non-polar

Cured Resin

Density of Cured Solid: 1.120
Hardness of Cured Solid: 120 MPa Vickers
Rockwell M Hardness: 45 to 60
Pencil Hardness of Cured Film (Coating): 9H
Volume Shrinkage upon Curing: 6.2 %
Moisture Absorption of Cured Resin at Room Temp: 0.1 % (boiling water for 24 hr)
Linear Expansion Coefficient: CTE (25 – 475 [1]C) = 152.4 ppm/K
CTE (475 – 975 [1]C) = -334 ppm/K
Thermal Expansion Coefficient: 8 X 10^{-5} / [1]K
UV Absorption Edge of Cured Resin: 300 nm
Dielectric Constant of Cured Resin (8.4-12.1 GHz): 2.74 (± 0.005)
Voltage Breakdown of Cured Resin: 1,000 V
AC Loss Tangent of Cured Resin: 0.0093
Solubility: insoluble in most solvents, water, dilute acids and bases

Ceramic

Linear Shrinkage upon Pyrolysis: 15 – 20 %
Weight Loss upon Pyrolysis: 15 – 20 %
Ceramic Mass Yields (900 – 1600 °C):
Pyrolyzed in **Argon 75-86 %**; in **Nitrogen 75-85 %**; in **Air 95 %**

Compositions at 1600 °C:

Pyrolyzed in **Argon; SiC**; in **Nitrogen; SiC/Si_3N_4**; in **Ammonia; Si_3N_4**; in **Air; $Si_xO_yN_z$**

Crystalline Phases at 1600°C:Pyrolyzed in **Argon; beta SiC**; in **Nitrogen; beta SiC, alpha Si_3N_4 , beta Si_3N_4;** in **Ammonia; alpha Si_3N_4, beta Si_3N_4**

(Note: Crystal seeding influences exact crystalline phase formed.)

Bulk Density of amorphous Ceramic from Pyrolysis (@1000 °C): 2.4 g/cm^3
Bulk Density of crystalline Ceramic from Pyrolysis (@ 1600 °C): 3.2 g/cm^3
Flexural Strength of SiCN Ceramic Generated from Pyrolysis: 600 – 1,000 Mpa
Young's Modulus of SiCN Ceramic Generated from Pyrolysis: 155 Gpa
Fracture Toughness of SiCN Ceramic Generated from Pyrolysis: 3.5 Mpa.m$^{0.5}$
Hardness of SiCN Ceramic Generated from Pyrolysis: 15 Gpa
Thermal Expansion Coefficient of Ceramic from Pyrolysis: 0.5 X 10^{-5} / [1]K
Poisson's Ratio: 0.18