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TECHNICAL DATA SHEET

Silmer SH[®] Q20
MQT Type Thiol Resin

DESCRIPTION

Silmer[®] SH Q20 is a silicon thiol resin with very high cross-link density. **Silmer SH Q20** contains no dimethyl silicone groups to maximize the hardness of the materials cured from it.

TYPICAL PROPERTIES

Appearance	Clear to slightly hazy liquid
Viscosity, cPs	15,000
Active Content, %	100
SH content, %	14.2
Odor	Distinctive but mild

USES AND APPLICATION

Silmer[®] SH Q20 is designed to be the thiol component in a UV cured thiol-ene reaction-based resin system. It can be reacted with vinyl containing crosslinked silicon Q resins, such as Silmer VQ92, and linear extenders such as Silmer VIN 65k as example systems.

Thiol-ene cured silicones are effective at providing very high elongation properties which are typical of condensation cured silicones but not of UV cured acrylate functional silicones. We have obtained elongation up to 200% with this family of products.

The formulation shown below was cured on the benchtop and also 3D printed. Due to the viscosity being too high for an SLA type printer, instead we used an UltiMaker 2+ FMD from Sturctra3D. This is a thermal cured printer so we attached a UV lamp to the print head or held the light by hand to effect UV curing.

Silmer SH Q20 can also be reacted in conditions in which any primary thiol would react. It is significantly sterically hindered but reacts quickly in our formulations

FORMULATION

One of many formulations evaluated, the following formula gave good toughness and flexibility. The SH/Vinyl ratio should be 3.6 to 5.0; up to 17% of the **Silmer SH Q20** is beneficial and up to 5% excess of Silmer VIN 65k can be used to improve tear strength.

Component	Charge	Properties after Cure	
Silmer SH Q20	21.5%	Appearance	tough flexible, white opaque
Silmer 65K	42.3%	Tensile Strength (kPa)	3,496
Silmer VQT 83-30*	35.6%	Elongation (%)	99
SH/Vinyl	3.63	Total Energy (J/m)	263
TPO-L	0.6%	Tear Strength (N/mm)	6.8
*delivered 1:1 in Silmer VIN 65k		Shore A Hardness	55
		G' (Pa)	6.4E+05
		G'' (Pa)	1.1E+05
		Cure rate (Pa/s)	0.18

A second formulation with higher SH/vinyl ratio and a different Silmer VQ resin gives a very strong and flexible formulation.

Component	Charge	Properties after Cure	
Silmer SH Q20	15.6	Appearance	tough flexible, white opaque
Silmer 65K	51.7	Tensile Strength (kPa)	4027
Silmer VQ 92*	32	Elongation (%)	203
SH/Vinyl	4.9	Total Energy (J/m)	763
TPO-L	0.7%	Tear Strength (N/mm)	8.2
*delivered 1:1 in Silmer VIN 65k		Shore A Hardness	46
		G' (Pa)	4.7E+05
		G'' (Pa)	5.3E+04
		Cure rate (Pa/s)	7.62E+04



Pictured above right are some bracelets 3D printed in the manner described above. Above left is a bat insignia being printed. The cured resins are opaque white, flexible and reasonably tough.

SAFETY

Before handling, read the Material Safety Data Sheet and container label for safe use, physical and health hazard information.

THIS MATERIAL IS NOT FOR MEDICAL OR DRUG USE.

STORAGE AND SHELF LIFE

When stored in the original, unopened containers between 10 and 40°C, **Silmer SH Q20** has a shelf life of 12 months from date of manufacture.

PACKAGING

Silmer SH Q20 is available in 20kg and 200kg containers.

LEGAL DISCLAIMER

Siltech Corporation believes that the information in this technical data sheet is an accurate description of the typical uses of the product. Siltech Corporation, however, disclaims any liability for incidental or consequential damages, which may result from the use of the product that are beyond its control. Therefore, it is the user's responsibility to thoroughly test the product in their particular application to determine its performance, efficacy and safety. Nothing contained herein is to be considered as permission or a recommendation to infringe any patent or any other intellectual property right.

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