

Silquat® 4016

Silicone Quat for Shampoos and Conditioners



INNOVATIVE SILICONE SPECIALTIES

DESCRIPTION

Silquat® 4016 is a solution of a synergistic blend of a high molecular weight water-soluble silicone quaternary ammonium compound and cetyltrimethylammonium chloride. It offers excellent conditioning to hair, yet very low eye irritation. The INCI name is *Water, Dimethicone-PG Diethylammonium Chloride, Cetrimonium Chloride, and 1,3-propanediol*.

TYPICAL PROPERTIES

PROPERTY	Silquat® 4016
Appearance	Clear Light Yellow Liquid
Colour, Gardner	1
Viscosity, cps	150
Solid Content %	40%
Solvent	1,3-propanediol and Water
Solubility (1%/10%)	
Water	Soluble/Soluble
IPA	Soluble/Soluble
Mineral Oil	Insoluble/Insoluble

USES AND APPLICATIONS

Silquat 4016 is an excellent hair conditioner for both clear and opaque 2 in 1 shampoos. Due to its positive charge, **Silquat 4016** is highly substantive to hair. **Silquat 4016** gives gloss, good softening and both wet and dry combability. It also reduces flyaway and gives better manageability.

Key Features And Benefits:

- Superior Conditioning and Softening
- Very Cost Effective
- Non-Irritating. The 1 HETCAM score allows use in sensitive applications such as baby shampoo.
- Has a minimal effect on the viscosity of shampoos
- Substantive to Hair
- Non Greasy or Sticky Feel
- Improved Shine and Gloss
- Good Foaming

Typical use levels are 0.5 – 5%.

APPLICATIONS DATA

In order to evaluate **Silquat® 4016** as a conditioning agent, three formulations were made using the base shampoo shown in **Table 1**. One was prepared with 2% **Silquat 4016** and the second one with 2% of a competitive silicone. Finally, we used the base formula as a control.

Various types of hair tresses were treated with the three shampoo formulations and evaluated for combability, softness, gloss, stability (at both RT and 45°C), and typical physical properties.

The products were also similarly compared at 2% use level in a model hair gel formulation and in a model hair conditioning formulation.

TABLE 1: SHAMPOO FORMULATION

INGREDIENT	%
D.I. Water	47.5
Guar Hydroxypropyl Trimonium Chloride	0.5
Na ₂ EDTA	0.1
Sodium Laureth-2 Sulfate	28.0
Cocamidopropyl Betaine	10.0
Decyl Glucoside	3.0
Disodium Cocoamphodiacetate	3.0
SLES-2 and PEG-3 DiStearate	5.5
Silquat 4016 or competitive product	2.0
Citric Acid (40% aq)	q.s.
Nipaguard DMDMH	0.4
Sodium Chloride	q.s.
Crothix (PEG-150 Pentaerythrityl Tetrastearate)	q.s.

The dramatic impact of the competitive product on viscosity as well as significantly reduced foam height is clearly shown in **Table 2** (highlighted cells). In addition, the wet and dry comb performances are best with the formula containing **Silquat 4016**. Finally, the formula containing the **Silquat 4016** provides the best shine.

Shown to the right is a visual comparison of hair tresses which have been shampooed with either the **Silquat 4016** or the competitive silicone containing shampoo formulation. On the left is Brazilian Curly Hair and on the right is European Brown Hair. Both hair types are visually better and feel softer with the **Silquat 4016**, but in particular there is less fly-away in the Brazilian hair and a much more conditioned tress in the European hair.



INNOVATIVE SILICONE SPECIALTIES

TABLE 2 - SHAMPOO PROPERTIES

	Properties	Shampoo Base	Shampoo with Silquat 4016	Shampoo with Competitive Conditioner
Physical Properties	Viscosity (cps)	7,000	6,900	4,000
	pH	6.45	6.50	6.45
	Appearance		White Cream	
	Stability @ RT/45 °C		Good/Good	
	Compatibility		Good	
	Feel (1-10, 10 best)	9.00	9.40	9.30
Foam Height (After a 20 sec sparge)	Initial Foam Height, mL	720	700	680
	2 min Foam Height, mL	720	700	670
	5 min Foam Height, mL	720	700	670
Wet Comb	Wet Combability, 1-10	9.0	9.4	9.3
	Rinse Off, 1-10	9.0	9.4	9.3
	Clean Feel, 1-10	9.0	9.4	9.3
	Shine, 1-10	9.0	9.4	9.3
	Softness, 1-10	9.0	9.4	9.3
	Residual Feel, 1-10	9.1	9.4	9.3
	Fullness, 1-10	8.9	9.4	9.4
Dry Comb	Dry Combability, 1-10	9.0	9.4	9.3
	Feel, 1-10	9.0	9.4	9.3
	Clean Feel, 1-10	9.0	9.3	9.3
	Shine, 1-10	9.0	9.3	9.3
	Fullness, 1-10	9.0	9.4	9.3
	Flyaway, 1-10	9.0	9.5	9.4
	Residual Feel, 1-10	9.0	9.3	9.4
	Static, 1-10	9.0	9.4	9.4

Table 3 shows the results from the model hair gel formulations comparison. Silquat® 4016 increases gloss over the control but not as much as the competitive offering. Overall Silquat 4016 provides good gloss, comparable or better combability and hold at a very good price.

TABLE 3 - HAIR GEL PROPERTIES

PROPERTY	CONTROL	Silquat 4016	Competitive
Viscosity (cps)	115,000	115,000	110,000
pH	6.5	6.5	6.5
Stability at RT/45 °C		Stable/Stable	
Compatibility		Good	
Average Fell (1-10, 10 best)	9.1	9.3	9.3
Gloss, °	66	69	76

FIGURE 1:TRESSES TREATED WITH GEL

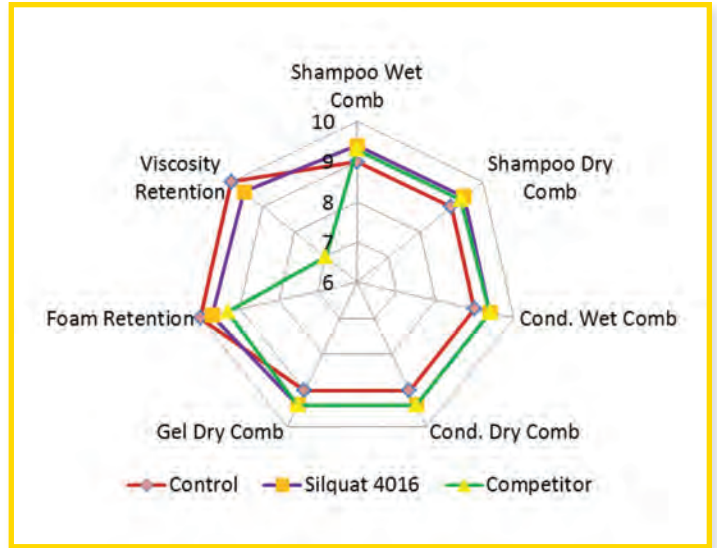


APPLICATIONS DATA CONTINUED

The photo (Fig 1) of tresses treated with the hair gel formulations shows that the tress treated with the **Silquat® 4016** formulation holds its shape much better and feels much softer than the control and is as good or better than the competitive product.

The products were also compared in a model conditioner formulation in which **Silquat 4016** and the competitive product behaved very similarly. A summary of the combing data for all three formulations is shown at right.

Detailed experimental data is available on request or the relevant technical papers can be downloaded from our website www.siltech.com.



SAFETY

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

STORAGE AND SHELF LIFE

When stored in the original, unopened containers between 10 and 40°C, **Silquat 4016** has a shelf life of 36 months from date of manufacture.

PACKAGING

Silquat 4016 is available in 20 Kg and 200 Kg containers.

LEGAL DISCLAIMER

Siltech believes that the information in this technical data sheet is an accurate description of the typical uses of the product. Siltech, 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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