ELEMENTIS
SPECIALTIES

BENTONE GEL® 1002 V

Questions & Answers

Contents

Q: What is BENTONE GEL® 1002 V?

A: BENTONE GEL® 1002 V is an alternative to BENTONE GEL® VS-5PC V It is a dispersion of fully activated BENTONE® 38 V, a non-animal origin hectorite organoclay, in ultra pure cyclopentasiloxane.

It delivers a combination of benefits in a single, easy to use product. While providing a silky skin feel and high pigment wetting, this product further rheologically modifies the oil phase and emulsions, which leads to enhanced product stability, as well as increased viscosity, superior suspending capabilities, a rich texture and smooth skin feel, better spreading properties and thixotropic flow characteristics. The INCI name of BENTONE GEL® 1002 V is Cyclopentasiloxane, Disteardimonium Hectorite and Propylene Carbonate.

BENTONE GEL® 1002 V BENTONE GEL® VS-5PC V

Figure 1. BENTONE GEL® 1002 V compared to BENTONE GEL® VS-5PC V

Typical Properties

Property	BENTONE GEL® 1002 V Specification	BENTONE GEL® VS-5PC V Specification
Appearance	Light Buff Paste	Light Buff Paste
Viscosity (MM cps)	1.4 - 4.0	1.4 - 4.0 (US)
Ash Content (%)	10.8 - 11.8	10.8 - 11.8
Total Plate Count	0 - 100	0 - 100

Table 1. Typical Properties of BENTONE GEL® 1002 V and BENTONE GEL® VS-5PC V

Q: What is Ultra Pure Cyclopentasiloxane?

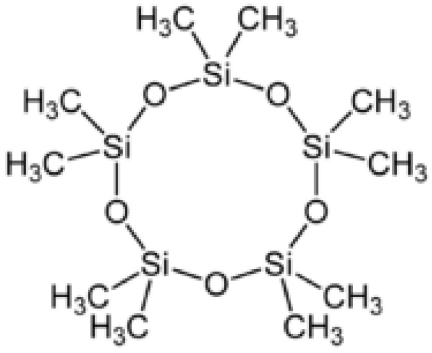


Figure 2. Chemical structure of cyclopentasiloxane

Cyclopentasiloxane is a volatile silicone fluid, which provides excellent spreading and lubrication properties, while also having unique volatility characteristics. Cyclopentasiloxane imparts a pleasant residual silkiness to the skin, leaving no oily residue. It can also help to mask the greasy or tacky feel of other products in the formulation

Ultra pure cyclopentasiloxane is at least 99% D5 cyclopentasiloxane, containing less than 0.1% cyclotetrasiloxane (D4), whereas normal cyclopentasiloxane can contain up to 1% cyclotetrasiloxane (D4).

The ultra pure cyclopentasiloxane was tested for volatility against standard cyclopentasiloxane, see Figure 3. Both gave very similiar volatity results. The materials were also tested for coefficient of friction, to mimic the perception of drag, see Figure 4. These results were also similar.

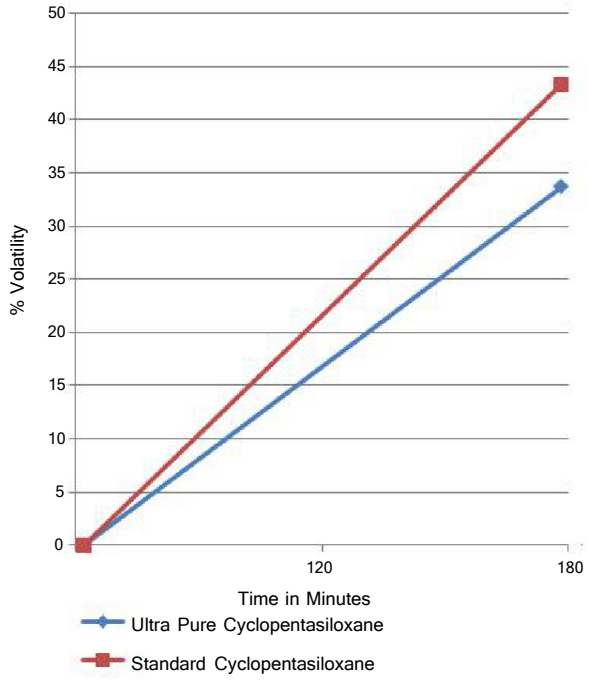


Figure 3. Flowcurve comparing Ultra Pure Cyclopentasiloxane and Standard Cyclopentasiloxane

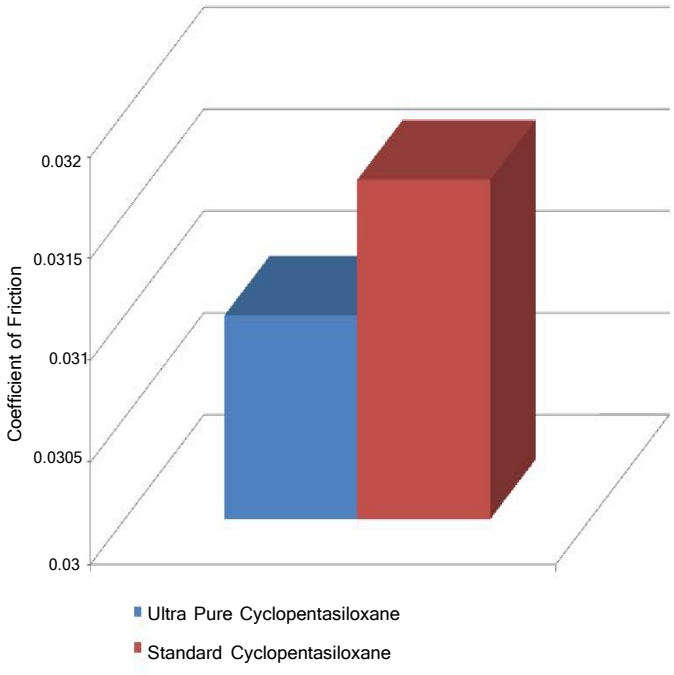


Figure 4. Coefficient of Friction of Ultra Pure Cyclopentasiloxane and Standard Cyclopentasiloxane

Q: What are the major application benefits?

A: The application benefits include:

- Improved formulation stability, including elevated temperature stability
- Thickening and suspending
- Thixotropic rheological flow
- Enhanced pigment wetting and dispersion
- Rich texture and improved formulation aesthetics
- Smooth skin feel and reduces greasiness
- Ease of spreading and even coverage
- Cushioning emollience
- Enhanced UV protection
- Improved shine/gloss for hair

Q: Where can BENTONE GEL® 1002 V be used?

A: BENTONE GEL® 1002 V is suitable for various personal care applications. Some formulation examples are listed in this application guide. This product is very easy to incorporate into the oil phase of emulsions, or all oil systems. Applications may include:

- Antiperspirants
- Lip products
- Eye Make-up
- Face Make-up
- Emulsions
- Creams/lotions
- Sun Care Products

Q: What are the typical use levels?

A: Product use levels depend on the amount of thickening, stabilisation and cushioning emollience desired in the final formulation. Suspension will be provided by concentrations of 2.5-10.0%. In emulsions, thickening will occur only in the oil phase. Emulsion viscosities will be influenced by concentrations of 3-5%. Higher levels of BENTONE GEL® will have a greater effect on the viscosity. Thermostable viscosity in single phase systems may be achieved by adding 10-25% to the formulation.

Q: How do I incorporate the product into my formulations?

A: BENTONE GEL® PTIS V may be added to the oil phase of a formulation at any convenient stage during the manufacturing cycle. This is a very high viscosity, shear-thinning product. To ensure good homogeneous mixing is achieved, care should be taken to overcome the large viscosity differential existing between the BENTONE GEL® and the other lower viscosity components. The use of medium to high shear mixing equipment is recommended.

Thorough mixing of the BENTONE GEL® in the oil phase should be ensured before continuing to the next processing step, such as emulsification.

Batch Processing

Single Phase Systems

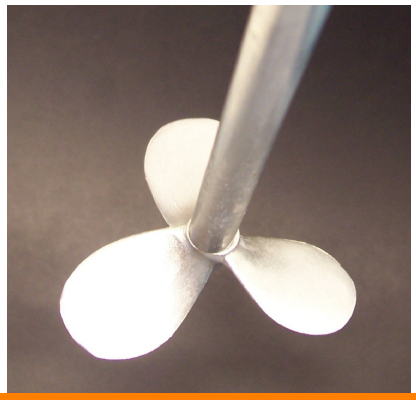
Always add the BENTONE GEL®, under shear, to a portion of the organic component or solvent with which it is most compatible. Mix until homogeneous before adding the other ingredients.

Multi-Phase Systems (e.g. emulsions)

Treat as with the single phase but always ensure the BENTONE GEL® additive is thoroughly mixed in before continuing to the emulsification stage.

Continuous Processing

The BENTONE GEL® should be added to the oil phase at any convenient point, which meets the above guidelines for batch processing. In multi-manifold systems, a flowable pre-mix of the BENTONE GEL® with a compatible oil or solvent should be made in a side vessel.



Where only lower shear mixing equipment is available, stir the BENTONE GEL® and slowly add the most compatible component gradually, always ensuring the mixture remains homogeneous at each stage.

Q: How do the properties of BENTONE GEL® 1002 V differ from that of BENTONE GEL® VS-5PC V?

A: The flow curves and oscillation curve (frequency sweep) of BENTONE GEL® 1002 V and BENTONE GEL® VS-5PC V are compared below. Both gels appear to be very similarly.

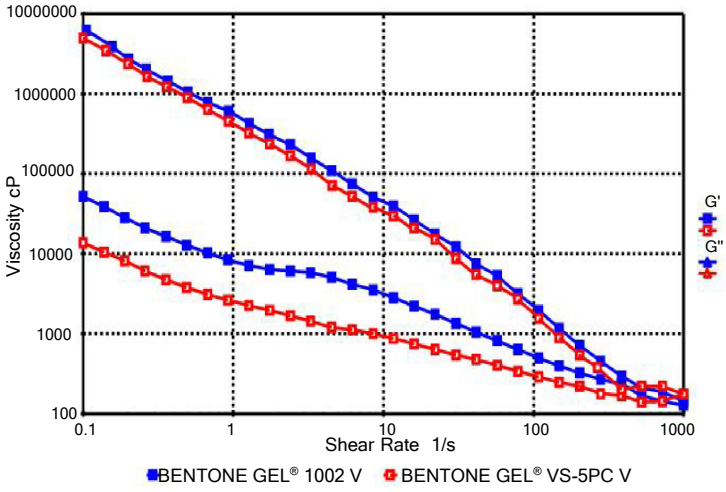


Figure 5. Flowcurve comparing BENTONE GEL® 1002 V to BENTONE GEL® VS-5PC V

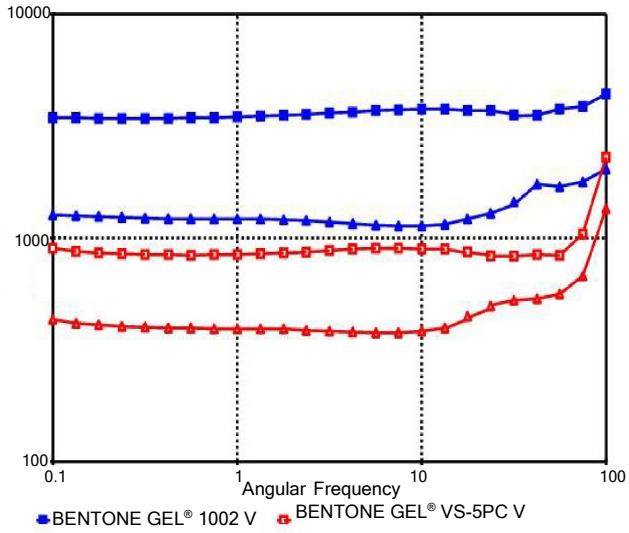


Figure 6. Frequency Sweep comparing BENTONE GEL® 1002 V to BENTONE GEL® VS-5PC V

The BENTONE GEL® products were tested for volatility and coefficient of friction to indicate the feel on the skin, see Figure 7 and 8 respectively. Both products were similar.

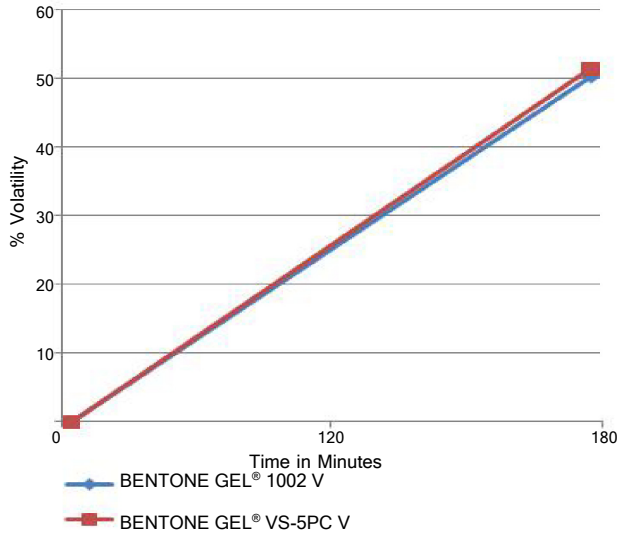


Figure 7. Volatility comparison of BENTONE GEL® 1002 V to BENTONE GEL® VS-5PC V

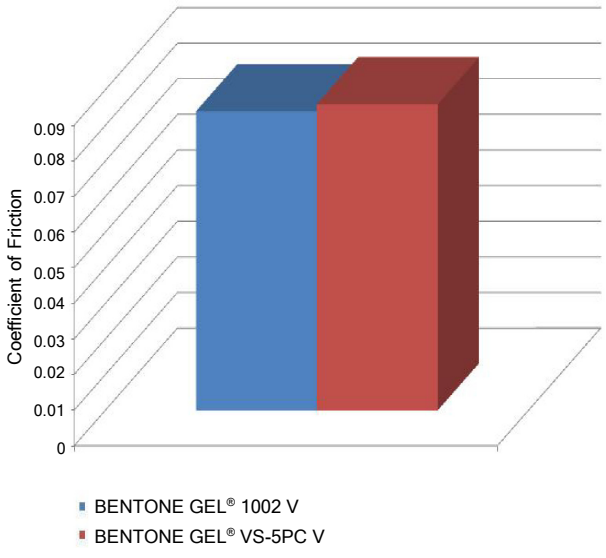


Figure 8. Coefficient of Friction of BENTONE GEL® 1002 V and BENTONE GEL® VS-5PC V

Q: Can you demonstrate the applications with some formulation examples?

A: Some representative formulations with BENTONE GEL® 1002 V are listed here to demonstrate the various potential applications.

Formula 1: Hand and Nail Cream

Ingredient	Supplier	% w/w
PHASE A		
Deionised Water		68.8
Glycerin	KIC Group	5.0
Sodium Chloride		2.0
Hydrolysed Silk	A&E Connock	1.0
Dissolvine NA2 (EDTA Disodium)	Ciba	0.1
PHASE B		
BENTONE GEL® 1002 V (Cyclopentasiloxane and Disteardimonium Hectorite and Propylene Carbonate)	**ELEMENTIS Specialties**	**4.0**
Dow Corning 345 Fluid (Cyclomethicone)	Dow Corning	7.0
Estasan GT8-60 3575 (Caprylic/Capric Triglycerides)	Croda	6.0
Dow Corning 5200 Formulation Aid (Laurylmethicone Copolyol)	Dow Corning	2.0
Lexol IPP-NF (Isopropyl Palmitate)	Inolex	2.0
Prunus Amygdalus Dulcis Oil	A&E Connock	2.0
PHASE C		
Paratexin FPX (Phenoxyethanol, Methylparaben, Ethylparaben, Propylparaben, Butylparaben and Isobutylparaben)	Azelis	0.1
	Total	100.0

Procedure

1. Premix Phase A together using a propellar stirrer.
2. Premix Phase B using a Silverson Homogeniser.
3. Using a Silverson Homogeniser slowly add approximately 1% of Phase A to Phase B and continue mixing for several minutes before further addition. Very slowly add the remainder of Phase A. Continue to homogenise for several minutes.
4. Add Phase C and mix using a propellar stirrer.

Physical Properties

Appearance	Off White Cream
pH	N/A
Viscosity - Brookfield DV-II+, Spindle 7, 5rpm (cps)	24800

Formula 2: Hair Defining Complex

Ingredient	Supplier	% w/w
PHASE A		
BENTONE GEL® 1002 V (Cyclopentasiloxane and Disteardimonium Hectorite and Propylene Carbonate)	**ELEMENTIS Specialties**	**1.0**
Incroquat Behenyl TMS (Cetearyl Alcohol and Behentrimonium Methosulphate)	Croda	4.0
PHASE B		
Deionised Water		78.4
Glycerin	KIC Group	4.0
Luviskol VA64 Powder (VP/VA Copolymer)	BASF	2.0
PHASE C		
Dow Corning 345 Fluid (Cyclomethicone)	Dow Corning	10.0
PHASE D		
Propylene Glycol		0.4
Paratexin FPX (Phenoxyethanol, Methylparaben, Ethylparaben, Propylparaben, Butylparaben and Isobutylparaben)	Azelis	0.1
PHASE E		
Sodium Hydroxide		to pH 5.5
	Total	100.0

Procedure

1. Combine Phase A and heat to 75-80°C.
2. Combine Phase B and heat to 75-80°C.
3. Add Phase A to Phase B with the silverson homogeniser and mix for 20 minutes.
4. With the propeller stirrer add Phase C.
5. Cool to 35°C and add Phase D with stirring.
6. Measure the pH and if needed adjust with Phase E to pH 5.5.

Physical Properties

Appearance	White Serum
pH	5.5
Viscosity - Brookfield DV-II+, Spindle 7, 5rpm (cps)	11200

Formula 3: Waterproof W/Si Mascara

Ingredient	Supplier	% w/w
PHASE A		
BENTONE GEL® 1002 V (Cyclopentasiloxane and Disteardimonium Hectorite and Propylene Carbonate)	**ELEMENTIS Specialties**	**20.0**
DHL Black (C.I. 77499 and Dimethicone)	US Cosmetic Group	25.0
Dow Corning 345 Fluid (Cyclomethicone)	Dow Corning	20.0
Dow Corning 5225C Formulation Aid (Cyclopentasiloxane and PEG/PPG-18/18 Dimethicone)	Dow Corning	10.0
Protachem 100 (Polyglyceryl-4 Oleate)	Protameen	3.0
PHASE B		
Deionised Water		15.3
Paratexin FPX (Phenoxyethanol, Methylparaben, Ethylparaben, Propylparaben, Butylparaben and Isobutylparaben)	Azelis	1.0
Sodium Chloride		0.7
PHASE C		
Dow Corning 749 Fluid (Cyclomethicone and Trimethylsiloxysilicate)	Dow Corning	5.0
	Total	100.0

Procedure

1. Combine Phase A and mix.
2. Premix Phase B and add to Phase A with a Silverson homogeniser.
3. Add Phase C and mix.

Physical Properties

Appearance	Black Paste
pH	N/A
Viscosity - Brookfield DV-II+, Spindle 7, 5rpm (cps)	13600

Q: Is testing data available to help show the performance provided by BENTONE GEL® 1002 V is the same as for BENTONE GEL® VS-5PC V?

A: Experimental data has been obtained by testing the different formulations, with either BENTONE GEL® 1002 V or with BENTONE GEL® VS-5PC V.

BENTONE GEL® 1002 V in a Hand and Nail Cream (Formula 1)

The hand and nail creams with BENTONE GEL® 1002 V and BENTONE GEL® VS-5PC V look identical, as can be seen in Figure 9.

In Figure 10 we can see the flowcurves of the hand and nail cream with BENTONE GEL® 1002 V and the hand and nail cream with BENTONE GEL® VS-5PC V. Both are very similar, showing similar performance.

The frequency sweep in Figure 11 also shows that both hand and nail creams have similar structures and we would predict that they both give good stability.

Overall the addition of BENTONE GEL® 1002 V in this hand and nail cream instead of BENTONE GEL® VS-5PC V made no difference to the performance or appearance of the product.

with BENTONE GEL® 1002 V | *with BENTONE GEL® VS-5PC V*

Figure 9. Hand & Nail Cream with BENTONE GEL® 1002 V and with BENTONE GEL® VS-5PC V

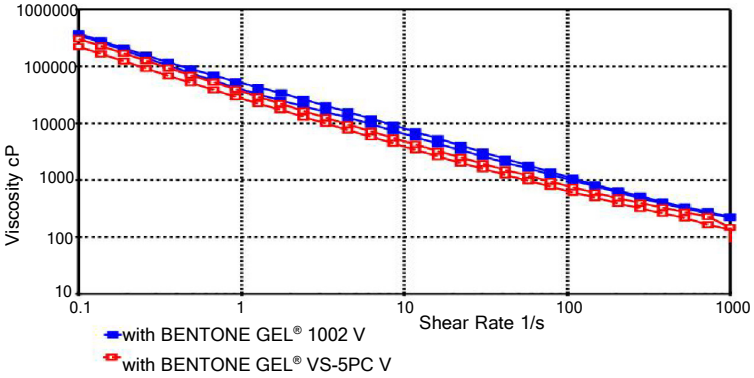


Figure 10. Flowcurve comparison of hand & nail cream with BENTONE GEL® 1002 V or BENTONE GEL® 1002 V

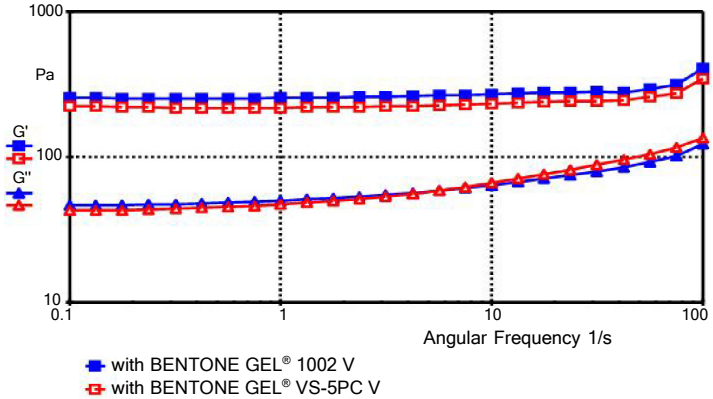


Figure 11. Frequency sweep comparison of hand & nail cream with BENTONE GEL® 1002 V or BENTONE GEL®

BENTONE GEL® 1002 V in a Hair Defining Complex (Formula 2)

The hair defining complexes made with either BENTONE GEL® 1002 V or BENTONE GEL® VS-5PC V are shown in Figure 12. Both products looked identical.

In Figure 13 the flowcurves show how similar the hair defining complexes with BENTONE GEL® 1002 V and BENTONE GEL® VS-5PC V are.

The hair defining complexes with BENTONE GEL® 1002 V and BENTONE GEL® VS-5PC V shown in the frequency sweep in Figure 14 again indicate the similarites of both products.

Overall the addition of BENTONE GEL® 1002 V in the hair defining complex instead of BENTONE GEL® VS-5PC V made no difference to the performance or appearance of the product.

with BENTONE GEL® 1002 V

with BENTONE GEL® VS-5PC V

Figure 12. Hair defining complex with BENTONE GEL® 1002 V and with BENTONE GEL® VS-5PC V

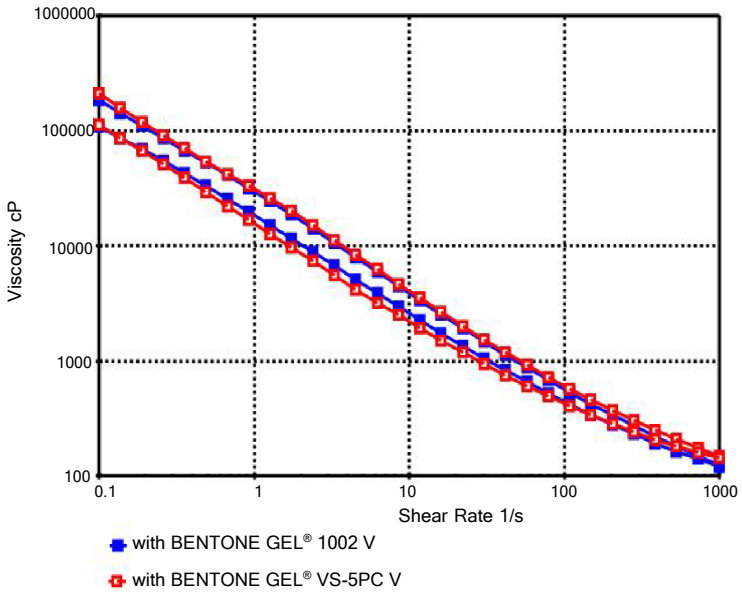


Figure 13. Flowcurve comparison of hair defining complex with BENTONE GEL® 1002 V or BENTONE GEL® 1002 V

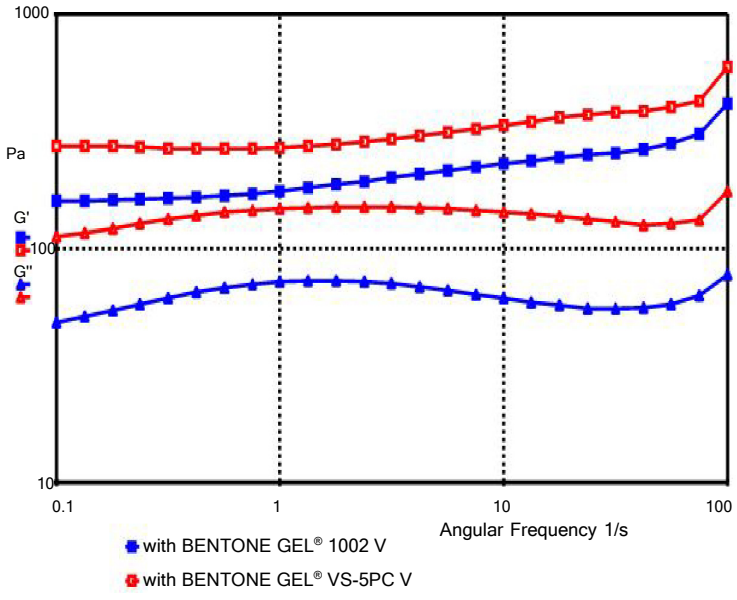


Figure 14. Flowcurve comparison of hair defining complex with BENTONE GEL® 1002 V or BENTONE GEL® 1002 V

BENTONE GEL® 1002 V in a Waterproof W/Si Mascara (Formula 3)

with BENTONE GEL® 1002 V *with BENTONE GEL® VS-5PC V*

Figure 15. Waterproof W/Si mascara with BENTONE GEL® 1002 V and with BENTONE GEL® VS-5PC V

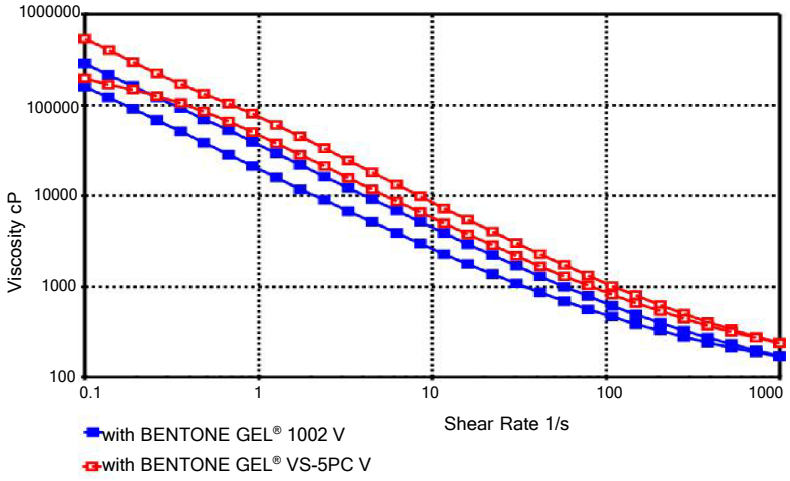


Figure 16. Flowcurve comparison of waterproof mascara with BENTONE GEL® 1002 V or BENTONE GEL® 1002 V

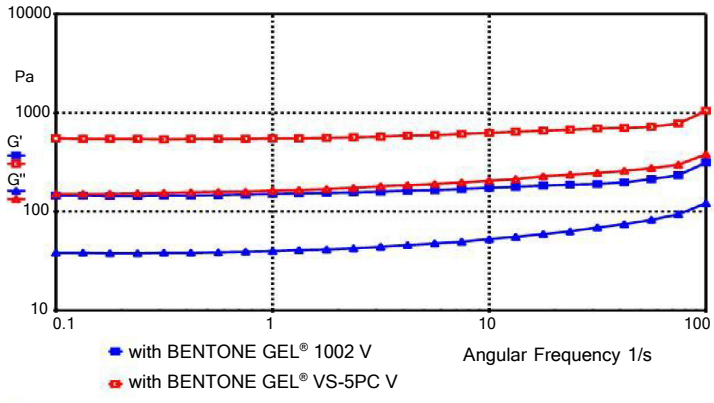


Figure 17. Flowcurve comparison of waterproof mascaras with BENTONE GEL® 1002 V or BENTONE GEL® 1002 V

As we can see in Figure 15, the waterproof W/Si mascara products made with either BENTONE GEL® 1002 V or BENTONE GEL® VS-5PC V look the same.

In Figure 16 the flowcurves of the waterproof W/Si mascara with BENTONE GEL® 1002 V and the waterproof W/Si mascara with BENTONE GEL® VS-5PC V are both very similar, showing similar performance.

The frequency sweeps in Figure 17 show that both waterproof W/Si mascaras have similar structures and should both give good stability.

Overall the addition of BENTONE GEL® 1002 V in this waterproof W/Si mascara instead of BENTONE GEL® VS-5PC V made no difference to the performance or appearance of the product.

Before using any of our products please consult our Safety Data Sheets.

The information in this publication is, to the best of our knowledge, true and accurate, but since the conditions of use are beyond our control, no warranty is given or to be implied in respect of such information. In every case, caution must be exercised to avoid violation or infringement of statutory obligations and any rights belonging to a third party. We are, at all time, willing to study customers' specific outlets involving our products in order to enable their most effective use.

For more details please contact:

AMERICAS **Elementis Specialties**
P.O. Box 700
Hightstown
New Jersey 08520
USA
Tel: +1.609.443 2500
Fax: +1.609.443 2446

EUROPE **Elementis GmbH**
Stolberger Strasse 370
50933 Cologne
Germany
Tel: +49.221.2923.2000
Fax: +49.221.2923.2000

ELEMENTIS
SPECIALTIES