



A BETTER WAY TO FORMULATE

VERSAGEL[®]

INTELLIGENT GEL TECHNOLOGY

The Penreco[®] Versagel technology is used in thousands of cosmetic, pharmaceutical and personal care products around the world. Our innovative patented system for thickening and gelling hydrocarbon materials offers an infinite number of customized rheological properties.

- Clear, colorless (does not discolor with age), hydrophobic, thermally reversible and without syneresis.
- Creates a film barrier for added moisturization, delivers superior stabilization and suspension properties.
- Available in multiple viscosity ranges and compatible with many common ingredients.
- Easier and safer than gels made using metal stearates or fumed silica.
- Provides enhanced fragrance retention and waterproofing properties.

For more than 100 years, Penreco has specialized in niche product blending to meet customer specific requirements. If you are interested in finding out more about the many attributes of our gelled technology, we can provide supporting clinical studies. Please contact your Penreco sales representative and our technical experts will be happy to find a solution that's right for you.

Let us show you a better way to formulate.

penreco[®]

138 Petrolia St., Karns City, PA 16041
800.437.3188 ■ 724.756.1050 ■ penreco@clmt.com

To request a sample, visit penreco.com.

VERSAGEL® M & MX

MOISTURIZING GELS

The Versagel M & MX products are based on gelling USP grade white mineral oil in such a way as it promotes superior moisture retention by creating a continuous film enabling oil to be easily spread with no pooling of the product. It also provides a low-moisture system for protection of water-sensitive additive packages/ingredients. In liquid systems fine particles don't easily remain in suspension; they tend to settle at the bottom and agglomerate. As shown below in the suspension stability testing, Versagel provides excellent suspension properties because the polymers provide sufficient yield stress to prevent aggregation and settling.

APPLICATIONS

- Color Cosmetics ■ Fragrances ■ Hair Products ■ Soap and Bath Products ■ Skin Care ■ Sun Care
- Pharmaceuticals/Nutraceuticals ■ Healthcare

TYPICAL PROPERTIES

	VISCOSITY @ 25 °C D2983 (cPs)	SPECIFIC GRAVITY @ 25/25 °C D4052	SAYBOLT COLOR D156	FLASH POINT °C ASTM D92	POLARITY LOG P
VERSAGEL M (70 VIS White Mineral Oil)					
M 200	13,330 - 27,700	0.8421	+30	>175	10.0
M 500	47,000 - 57,000	0.8445	+30	>175	10.0
M 750	67,000 - 83,000	0.8434	+30	>175	10.0
M 1600	132,000 - 198,000	0.8425	+30	>175	10.0

VERSAGEL MX (600 VIS White Mineral Oil)					
MX 500 T	58,400	0.8735	+30	>250	10.0
MX 750 T	75,500	0.8687	+30	>250	10.0
MX 1600 T	132,000 - 198,000	0.8688	+30	>250	10.0

Versagel MX meets the EU Colipa Lip Care Requirements.

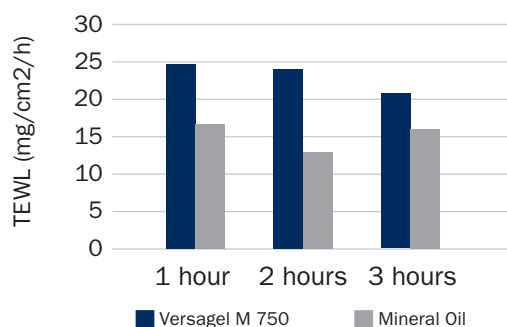
International Nomenclature of Cosmetic Ingredients (INCI):

Mineral Oil (and) Ethylene/Propylene/Styrene Copolymer (and) Butylene/Ethylene/Styrene Copolymer.

All products are also available with Tinogard®, Pentaerythrityl Tetra-di-t-butyl Hydroxyhydrocinnamate and will be indicated by a T in the name.

Tinogard® is a registered trademark of Ciba Specialty Chemical Corporation.

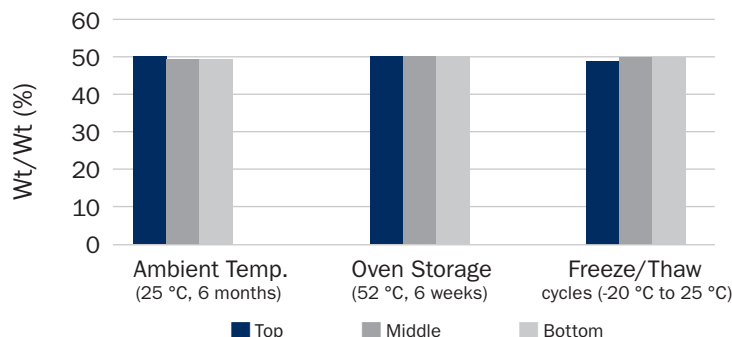
Moisturization



The TEWL test shows gelled mineral oil improves moisturization by 53% more than mineral oil alone. Using a gelled product in your formulation can significantly improve its moisturization benefits.

Suspension Stability

Versagel M200 with 50 wt% Zinc Oxide



No change in suspension capabilities under test conditions. Gelled mineral oil maintains suspension of active ingredients at a very high load.

VERSAGEL® MC

LIGHT NON-STICKY GEL

The Versagel MC products are isohexadecane (C16 isoparaffin) as the base. The gelled isohexadecane is known to have great silicone compatibility, slip and shine. As an emollient it can help create a creamy, thick formula, with rich texture and a light non-sticky feel on the skin. In formulations it provides good cleansing properties which is ideal in buffing oils, face primers and gel cleansers.

APPLICATIONS

- Color Cosmetics: mascara, primer
- Skin Care: lotions, moisturizers, massage oils, cleansers
- Sun care: suntan oils, sunblock/sunscreen

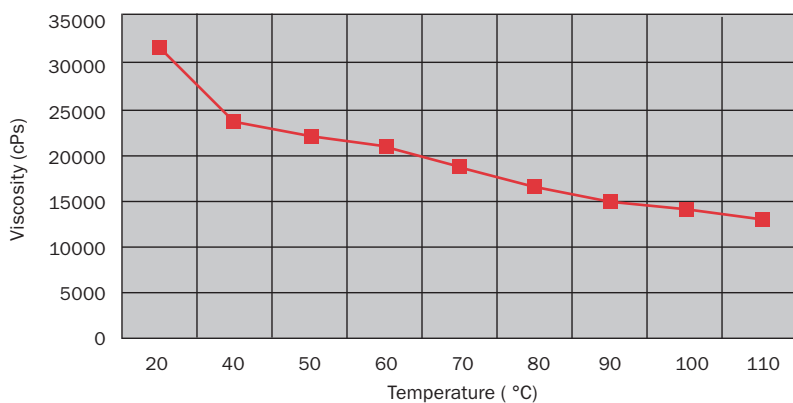
TYPICAL PROPERTIES

	VISCOSITY @ 25 °C D2983 (cPs)	SPECIFIC GRAVITY @ 25/25 °C D4052	SAYBOLT COLOR D156	FLASH POINT °C ASTM D92	POLARITY LOG P
VERSAGEL MC (Isohexadecane)					
MC 750	35,000 - 53,000	0.7856	+30	>95	8.2
MC 1600	50,000 - 70,000	0.7983	+29	>95	8.2

International Nomenclature of Cosmetic Ingredients (INCI):

Isohexadecane (and) Ethylene/Propylene/Styrene Copolymer (and) Butylene/Ethylene/Styrene Copolymer

Versagel MC Viscosity - Temperature Profile



Like the other Versagel products, Versagel MC is shear thinning. However, the Versagel MC products are unique in that they exhibit minimal “stringiness” due to the short hydrocarbon chain structure of the base oil. This characteristic is desirable in certain applications where elasticity needs to be minimized. The graph shows how viscosity decreases as the temperature increases for Versagel MC 750.

VERSAGEL® MD

FAST-DRYING AND TRANSFER-RESISTANT GEL

Gelled Isododecane (C12 isoparaffin) provides a highly volatile emollient with light, non-greasy and low residue skin feel. It is an ideal vehicle for delivering pigments and other solid materials in quick-set/fast-dry anhydrous applications. With a low viscosity and density, Versagel MD products have high spreadability and are used as a film former for applications that require transfer-resistance. The gels have excellent clarity which allows unique items such as glitter, wax beads and other materials to be suspended. It is thermally stable and UV stable as well as compatible with most chemical ingredients including, cyclomethicone and phenyl trimethicone; however, the viscosity of the gel may be decreased significantly.

APPLICATIONS

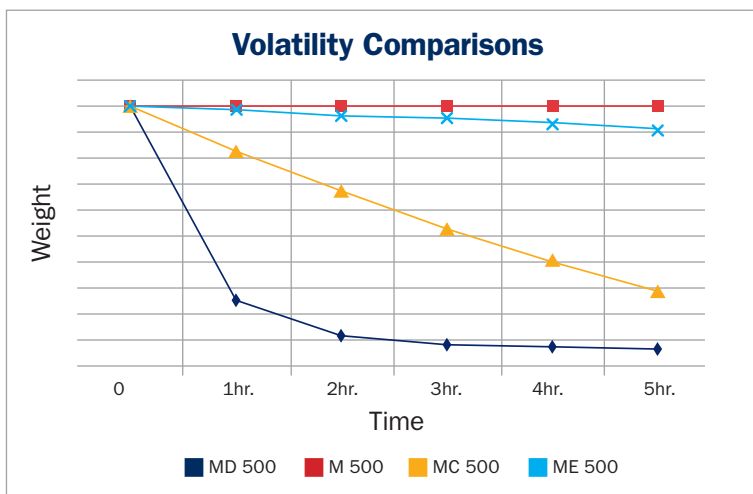
- Color Cosmetics: mascara, eyeliner, lipstick, eyeshadow, face/body paint, blush, bronzer, foundation, setting lotions and primers, body glitter
- Skin Care: serums, gels, oils, lotions, creams, scrubs, balms, makeup remover, hand cleaners
- Hair Care: serums, oils, styling products, conditioners, creams

TYPICAL PROPERTIES

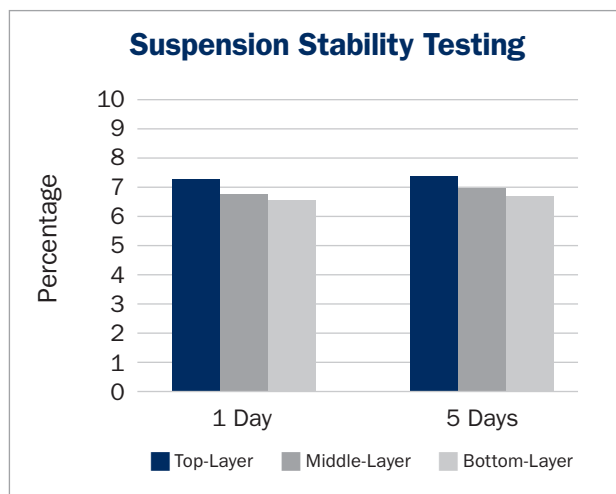
	VISCOSITY @ 25 °C D2983 (cPs)	SPECIFIC GRAVITY @ 25/25 °C D4052	SAYBOLT COLOR D156	FLASH POINT °C ASTM D93	POLARITY LOG P
VERSAGEL MD (Isododecane)					
MD 500	20,000 - 35,000	0.7486	+23	>45	6.2
MD 1600	40,000 - 55,000	0.7496	+23	>45	6.2

International Nomenclature of Cosmetic Ingredients (INCI):

Isododecane (and) Ethylene/Propylene/Styrene Copolymer (and) Butylene/Ethylene/Styrene Copolymer



Among the Versagel product lines, Versagel MD has the greatest volatility. The graph illustrates the volatility differences among Versagel MD, MC, ME and M products. Versagel MD 500 loses 75% of its weight in the first hour, versus 18% for MC 500 and 1.6% for ME 500 at elevated temperatures (90 °C).



The stability results shows Versagel MD 1600 and iron oxide suspension stored at elevated temperature (60 °C). The distribution of iron oxide remains homogeneous throughout the aging process.

VERSAGEL® ME

MINERAL OIL-FREE GEL

The Versagel ME products are patented gelled emollients which exhibit extraordinarily good clarity, excellent thermal and UV stability, and versatile chemical compatibility. It is highly non-polar and thus, has a better affinity for low polarity materials such as fatty esters, low HLB nonionic surfactants, cyclomethicone, and other synthetic and natural emollients. Moisturization properties will be affected only minimally even though the viscosity of the gel may decrease significantly when other ingredients are added.

TYPICAL PROPERTIES

	VISCOSITY @ 25 °C D2983 (cPs)	SPECIFIC GRAVITY @ 25/25 °C D4052	SAYBOLT COLOR D156	FLASH POINT °C ASTM D92	POLARITY LOG P
VERSAGEL ME (Hydrogenated Polyisobutene)					
ME 500	50,000 - 75,000	0.8264	+30	>149	9.7
ME 750	85,000 - 110,000	0.8265	+30	>149	9.7
ME 1600	140,000 - 180,000	0.8280	+30	>149	9.7
ME 2000	245,000 - 325,000	0.8269	+30	>149	9.7

International Nomenclature of Cosmetic Ingredients (INCI):

Hydrogenated Polyisobutene (and) Ethylene/Propylene/Styrene Copolymer (and) Butylene/Ethylene/Styrene Copolymer

APPLICATIONS

- Color Cosmetics: lip gloss, lipstick, mascara, eyeliner, eyebrow gel, eyeshadow, face/body paint, blush, bronzer, foundation, concealer, illuminators, primer
- Skin Care: moisturizers, gels, oils, lotions, butters, creams, scrubs, balms, exfoliators, masks/peels, massage oils, serums
- Sun care: suntan oils, sunblock/sunscreen
- Hair Care: treatments, serums, oils, conditioners, styling products
- Health Care: topicals, ointments, wound healing products

VERSAGEL ME 750 MOISTURIZATION AND LIP CONDITIONING BENEFITS STUDY

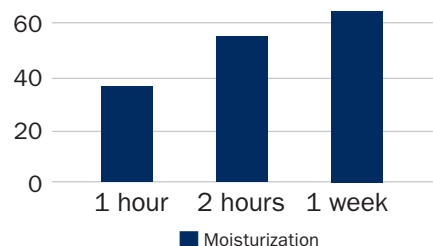
In the clinical study, moisture content of the lips was measured with a NOVA Dermal Phase Meter (NOVA DPM) which measures the moisture in the skin by measuring an electrical parameter (impedance). Measurements were taken on the right and left side of the lower lip to quantify the moisture content of the stratum corneum. Overall, there was a 61% improvement in lip moisture content in 1 week.

Additionally, lip condition was graded by skilled clinician comparing all improvements to baseline. The clinical grading of lip condition correlated with the instrumentally measured improvement in skin moisturization at 1h, 2h, and 1 week:

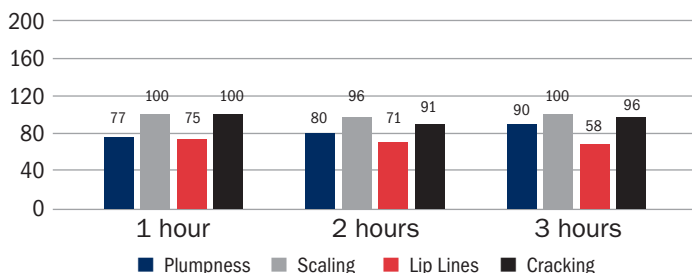
- Plumpness: Increased 45%
- Scaling: Decreased 27%
- Lip Lines: Decreased 62%
- Cracking: Decreased 22%

The high sensitivity of lip skin is well known and partly due to its much lower number of skin layers compared to regular skin. This makes lips highly susceptible to dryness. The excellent performance of Versagel ME in lip care applications is due to its exceptional mildness, moisturization and lip conditioning benefits — which also makes it an excellent ingredient for leave-on skincare products such as creams and lotions.

% Improvement in Moisture Content



% Improvement from Baseline - Grading



Study #C01-C138

VERSAGEL® MG

CONDITIONING AND CLEANSING GEL

Versagel MG products are based on hydrogenated C6 – C14 alkenes combined with our patented gelling technology. Versagel MG offers an alternative to silicones for formulating products when a silky, elegant after-feel is desired. Versagel MG gels are compatible with most ingredients, with most non-ionic surfactants, and other synthetic and natural emollients. A unique property of the Versagel product lines is their suspension capability for fine particles. Versagel MG can be utilized as suspension vehicles for fine particles or encapsulated liquids such as Zinc Oxide, Titanium Dioxide, Iron Oxide, Talc, Decorative Glitters and Vitamins E and C.

APPLICATIONS

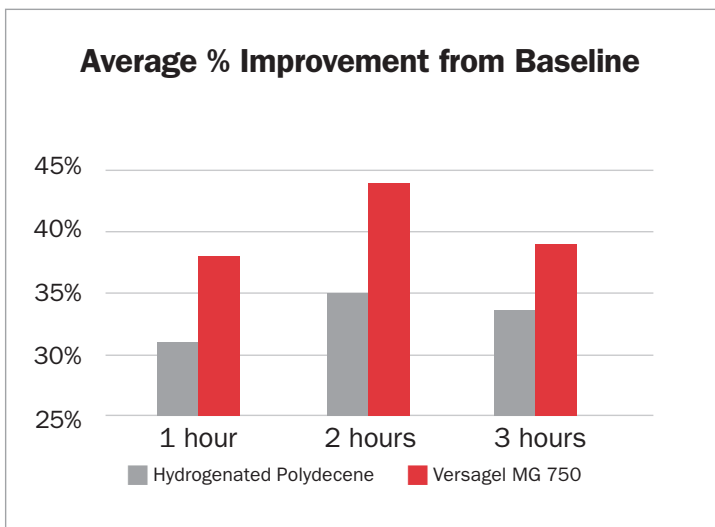
- Color Cosmetics: lipstick, lip gloss, lip balm, lip oil, mascara, eyeshadow, powder/blush/bronzer, foundation, concealer
- Skin Care: gels, oils, creams/lotions, cleansers, masks/peels

TYPICAL PROPERTIES

	VISCOSITY @ 25 °C D2983 (cPs)	SPECIFIC GRAVITY @ 25/25 °C D4052	SAYBOLT COLOR D156	FLASH POINT °C ASTM D92	POLARITY LOG P
VERSAGEL MG (Hydrogenated Poly (C6-14 Olefin))					
MG 500 T	50,000 - 75,000	0.8204	+30	>175	6.2
MG 750 T	85,000 - 110,000	0.8169	+30	>175	6.2
MG 1600 T	140,000 - 180,000	0.8292	+29	>175	6.2

International Nomenclature of Cosmetic Ingredients (INCI):

Hydrogenated Poly (C6-14 Olefin) (and) Ethylene/Propylene/Styrene Copolymer (and) Butylene/Ethylene/Styrene Copolymer and Pentaerythrityl Tetra-di-t-butyl Hydroxyhydrocinnamate.



A moisturization clinical study measuring transepidermal water loss (TEWL) showed that the gelled hydrogenated poly (C6-14 olefin) (Versagel MG 750) outperformed the neat hydrogenated poly (C6-14 olefin) throughout the test period. The test demonstrates that Versagel MG 750 exhibits better occlusivity and barrier function improvement on skin than the same substrate ungelled.

Study #C05-055

VERSAGEL® ML

FAST ABSORBING DRY-FEEL GEL

The Versagel ML products are based on C12-15 Alkyl Benzoate, which provides a light, dry and non-greasy skin feel. It provides superior solubility, broad ingredient compatibility, and water proofing properties. It also brings additional benefits such as suspension and stability of APIs such as organic sunscreen agents and topical pain relievers. It's known as an emulsifier and solubilizer for sunscreen agents and antiperspirant actives. The suggested use level of these gels ranges from 5% to 70%, depending on the specific application. Versagel ML products can be easily combined with other oil-phase ingredients in the formula when they are mixed at elevated temperature. To ensure uniformity during mixing, it is highly recommended that nonpolar or less polar ingredients be added to the gel first. Cyclomethicone and nonpolar esters can also be added to formulations containing Versagel ML materials to modify the aesthetics of finished products.

APPLICATIONS

- Color Cosmetics: mascara, lipstick, lip liner, lip gloss, rouge, multi-use illuminator, eyeshadow, foundation
- Skin Care: serums, gels, oils, lotions, creams, balms, butters
- Sun Care: self-tanning, sunblock/sunscreen, bronzing gel, after sun, suntan oil
- Hair Care: treatments, conditioners, serums, oils, pomade, colorants

TYPICAL PROPERTIES

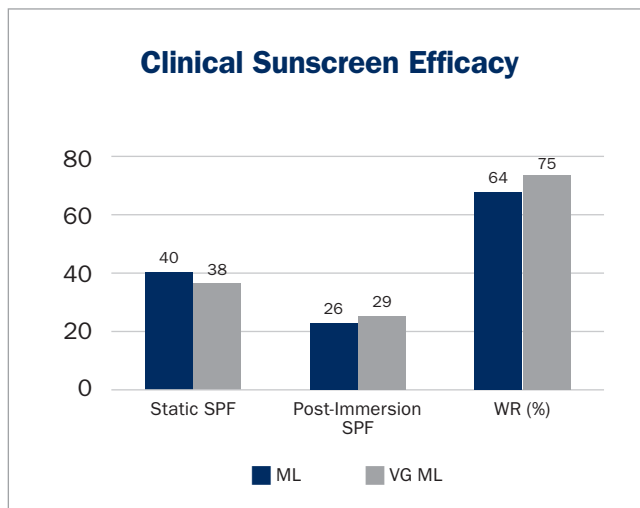
	VISCOSITY @ 25 °C D2983 (cPs)	SPECIFIC GRAVITY @ 25/25 °C D4052	SAYBOLT COLOR D156	FLASHPOINT °C ASTM D92	POLARITY LOG P
VERSAGEL ML (C12-15 Alkyl Benzoate)					
ML 750	99,000	0.9262	+30	>199	8.2
ML 1600	250,000	0.9272	+29	>199	8.2

International Nomenclature of Cosmetic Ingredients (INCI):

C12-15 Alkyl Benzoate (and) Ethylene/Propylene/Styrene Copolymer (and) Butylene/Ethylene/Styrene Copolymer

CLINICAL EFFECT OF VERSAGEL ON SUN PROTECTION FACTOR (SPF)

This study showed that both sunscreen lotion containing ML and VG ML performed similarly for static sunscreen protection with average SPF of 40 and 38 respectively. Similar comparative performance was seen after 40 minutes of immersion with SPF of 26 vs. 29 for ML and VG ML respectively. Both products can be classified as good water resistance with WR of 64% vs. 75% for ML and VG ML respectively. The 15% improvement in water resistance achieved by VG ML placed its performance on the threshold of very good water resistance. This result shows that VG ML can be used to improve the water resistance of sunscreen products.



Study #1701I20SWR3 & #1701I20SWR4

VERSAGEL® MN

SILKY CONDITIONING GEL

The Versagel MN products are anhydrous clear gels that provide versatility and a distinctive, elegant feel. The polymer system provides lubricity and conditioning, while the ester base, isononyl isononanoate, offers non-greasy emolliency. Due to the polymer matrix in the gel, these materials enable fine particles, such as color pigments, to be readily suspended or dispersed with minimal settling and agglomeration. The Versagel MN products also exhibit good thermal and UV stability and silicone solubilization.

Depending on the application, the suggested use level may range from 5% to 60%. Versagel MN gels should be blended with the rest of the ingredients in the oil phase of the formulation, while the nonpolar or less polar ingredients are added to the gel first. The gels are compatible with most nonionic surfactants, cyclomethicone, phenyl trimethicone, and other synthetic and natural emollients.

APPLICATIONS

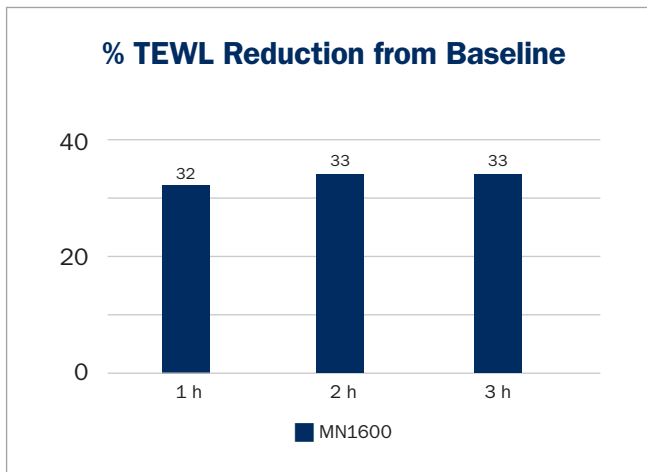
- Color Cosmetics: lipstick, lip polish, lip stain, lip gloss, lip balm, eye shadow, brow shadow, bronzer, foundation
- Skin Care: depilatory cream, scrubs/exfoliators, serums, moisturizers, creams, lotions
- Sun Care: sunblock/sunscreen

TYPICAL PROPERTIES

	VISCOSITY @ 25 °C D2983 (cPs)	SPECIFIC GRAVITY @ 25/25 °C D4052	SAYBOLT COLOR D156	FLASHPOINT °C ASTM D92	POLARITY LOG P
VERSAGEL MN (Isononyl Isononanoate)					
MN 750	155,000	0.8540	+28	>149	5.9
MN 1600	265,000 - 339,000	0.8549	+29	>149	5.9

International Nomenclature of Cosmetic Ingredients (INCI):

Isononyl Isononanoate (and) Ethylene/Propylene/Styrene Copolymer (and) Butylene/Ethylene/Styrene Copolymer



Study #C05-C055

The rapid and sustained moisturization improvement of Versagel MN results showed a >30% reduction in Transepidermal Water Loss (TEWL), an improvement from baseline statistically significant at $p \leq 0.05$

VERSAGEL® MP

ENHANCING GEL

Versagel MP products are a gelled fatty ester made from isopropyl palmitate. Isopropyl palmitate is an emollient ester derived from isopropyl alcohol and palmitic acid, generally conforming to the following structure: $\text{CH}_3(\text{CH}_2)_{14}\text{CO}_2\text{CH}(\text{CH}_3)_2$. Similar to hydrocarbon gels with similar chain length, the Versagel MP materials are equipped with a long hydrophobic hydrocarbon chain to provide skin occlusivity. Additionally, they have a carboxylic functionality near the end of the molecule to give a drier and lighter skin feel.

Versagel MP acts as a fast spreading emollient providing moisturization and efficient absorption. It provides a soft and supple texture as well as good spreading characteristics. Isopropyl palmitate is an established penetration enhancer for transdermal systems and the innovative gelled option can provide better functionality and aesthetics.

APPLICATIONS

- Color Cosmetics: lipstick, lip gloss, lip gel
- Skin Care: creams, lotions, face mask/peels, oils
- Hair Care: treatments, serums, oils

TYPICAL PROPERTIES

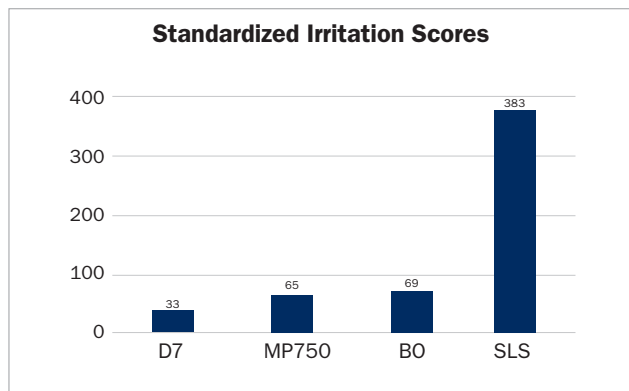
	VISCOSITY @ 25 °C D2983 (cPs)	SPECIFIC GRAVITY @ 25/25 °C D4052	SAYBOLT COLOR D156	FLASH POINT °C ASTM D92	POLARITY LOG P
VERSAGEL MP (Isopropyl Palmitate)					
MP 750	82,000 - 108,000	0.8520	+30	>160	8.1
MP 1600	160,000 - 200,000	0.8520	+28	>160	8.1

International Nomenclature of Cosmetic Ingredients (INCI):

Isopropyl Palmitate (and) Ethylene/Propylene/Styrene Copolymer (and) Butylene/Ethylene/Styrene Copolymer

MINERAL OIL AND VERSAGEL MP STUDY TO DETERMINE COMPARATIVE MILDNESS OF INGREDIENTS

A clinical study was conducted using 100 micro liters occlusive patches of product applied to backs of subjects for 14 days. Using the Berger & Bowman Grading Score the skin patches were evaluated and given standardized cumulative irritation scores. The study showed that Drakeol® 7 (D7) was more than 50% less irritating than a commercial baby oil (BO) while Versagel MP 750 had a similarly low irritation score to BO. The study also showed the anionic surfactant sodium lauryl sulfate (SLS) which is a known skin irritant as a positive control. The BO and SLS provided benchmarks that further showed how both Drakeol 7 White Mineral Oil and Versagel MP are very mild ingredients in applications such as moisturizers and offer hydration without irritating sensitive skin.



Study #C00-C023

VERSAGEL® P

HYDRATING AND PROTECTING GEL

The Versagel P products combine highly purified, USP-grade, white petrolatum with block copolymers to enhance the occlusivity that naturally accompanies all petrolatum products. Even though petrolatum is considered the best occlusive agent available, our studies indicate that gelled petrolatum outperforms ungelled petrolatum in reducing transepidermal water loss (TEWL). These Versagel P products also exhibit excellent thermal and UV stability, as well as a versatile chemical compatibility.

APPLICATIONS

- Color Cosmetics: lipstick, lip balm, lip gloss, illuminator, foundation, blush
- Skin Care: lotions, creams, balms, butters, moisturizers, scrubs/exfoliators, rash guard, body wash
- Hair Care: moisturizers, pomade, styling products, treatments
- Health Care: scar treatment, topicals, ointments, wound-healing products, pain relief
- Other: diapers and paper products

TYPICAL PROPERTIES

	VISCOSITY @ 110 °C (cPs)	SPECIFIC GRAVITY @ 25/25 °C D4052	SAYBOLT COLOR D156	FLASH POINT °C ASTM D92	POLARITY LOG P
VERSAGEL P (Petrolatum)					
P 200	4,619	0.8650	+Opaque (Lovi Bond <2.0y)	>249	10.5

International Nomenclature of Cosmetic Ingredients (INCI):

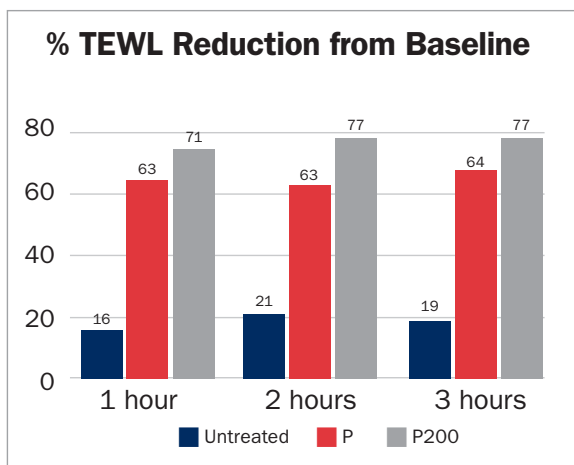
Petrolatum (and) Ethylene/Propylene/Styrene Copolymer (and) Butylene/Ethylene/Styrene Copolymer

Also available, Versagel P "EU" version which is Colipa compliant. Colipa compliance parameters:

Viscosity ≥ 11 cSt at 100 °C, Average molecular weight ≥ 500 and, Carbon number at the 5% boiling point ≥ 25

PETROLATUM AND VERSAGEL P200 SKIN BARRIER REPAIR STUDY

A clinical study was conducted using petrolatum and Versagel P on the volar forearms of test subjects with self-perceived dry skin. TEWL measurements (DermaLab) were taken at baseline 1 hour, 2 hours and 3 hours with re-application after each test. The study showed that petrolatum had over 60% decrease in Transepidermal Water Loss (TEWL) and Versagel P200 (gelled Petrolatum) had even higher TEWL at over 70% and both were much more efficacious than the untreated site. Thus, proving that petrolatum and Versagel P200 are highly-effective moisturizing ingredients for use in hand creams and lotions.



Study #C05-C055

Unlike conventional petrolatums that become very fluid in the temperature range of 50 – 60 °C, Versagel P products maintain some degree of consistency above 60 °C. These gelled petrolatum materials have a much broader melting temperature "slope." Versagel P gels are stiffer and have more adhesive properties than conventional petrolatums. These gels also provide film-forming benefits which can enhance the characteristics of several types of finished products.

Even though Versagel P products are made from white petrolatum, USP, the gels are not classified as USP products. All components are listed on US TSCA, Canadian DSL. One or more components are listed on EU EINECS, Japanese ENCS.

VERSAGEL® SF

VERSATILE SMOOTH-FEEL GEL

The Versagel SF product offers a silicone-free alternative for haircare with flexibility to suit a formulator's unique needs. In addition to haircare, it also provides a smooth feel as well as versatility across multiple cosmetic and personal care applications. The gelled structure is based on Isoparaffin combined with patented block copolymer technology. The gellant system for the SF product is comprised of proprietary synthetic polymers which allow the gels to be clear, stable, thermally reversible and is BHT free. The Versagel SF gels are compatible with silicones, most non-ionic surfactants and other synthetic and natural emollients.

TYPICAL PROPERTIES

	VISCOSITY @ 25 °C D2983 (cPs)	SPECIFIC GRAVITY @ 25/25 °C D4052	SAYBOLT COLOR D156	FLASH POINT °C ASTM D92	Polarity Log P
VERSAGEL SF (C13-14 Isoparaffin)					
SF	12,000	0.7824	+30	>96	6.8

International Nomenclature of Cosmetic Ingredients (INCI):

C13-14 Isoparaffin, Butylene/Ethylene/Styrene Copolymer, Ethylene/Propylene/Styrene Copolymer, Pentaerythrityl Tetra-Di-t-Butyl Hydroxyhydrocinnamate

UNIQUE PROPERTIES

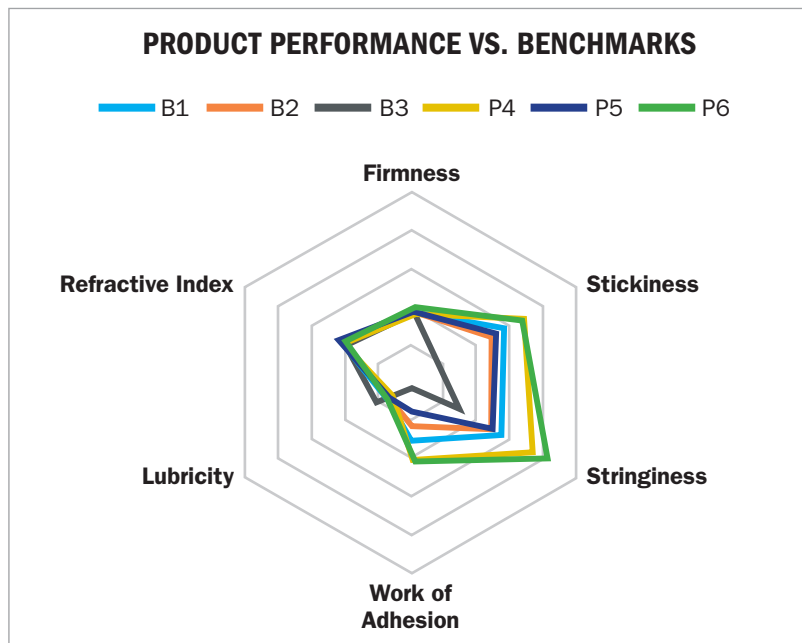
Studies on the Versagel SF technology have shown that our gelled products improve key properties such as slip, shine and smoothness compared to commercial benchmarks.

VERSATILITY

Test results indicate that the prototype formulation using Versagel SF allows for formulation versatility in various attributes such as shine, rheology and lubricity. Based on formulator's performance goals for a haircare product, formulation can be adjusted to optimize key attributes.

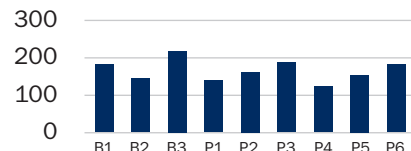
APPLICATIONS

- Hair Care: colorants, treatments, styling products, serums, oils, creams, moisturizers
- Color Cosmetics: lip gloss, lip oil, lip polish, foundations/fluid illuminators
- Skin Care: creams, lotions, balms, moisturizers, butters
- Sun Care: sunblock/sunscreen



Slip/Lubricity (Friction Reduction)

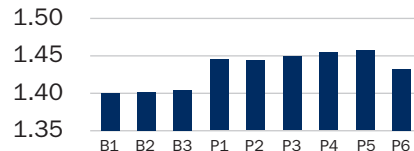
Mean Friction (g)



Versagel SF formulation outperformed even the most lubricious benchmark (B2).

Shine/Gloss

Refractive Index



All Versagel SF blends have higher RI than all commercial hair oil product benchmarks.

KEY

- Benchmark Oil 1 (B1)
- Benchmark Oil 2 (B2)
- Benchmark Oil 3 (B3)
- Versagel SF/Sunflower Oil (90/10) (P1)
- Versagel SF/Sunflower Oil (80/20) (P2)
- Versagel SF/Sunflower Oil (70/30) (P3)
- Versagel SF/Sunflower Oil (60/40) (P4)
- Versagel SF/Sunflower Oil (50/50) (P5)
- Versagel SF/Dodecanol (50/50) (P6)

VERSAGEL® SQ

ANTI-AGING “NATURAL” GEL

Versagel SQ products are a great additive or substitute in both oil-based formulas and emulsions. Versagel SQ is a gelled form of squalane. Squalane is naturally present in the skin lipid barrier and is an ingredient known for its exceptional skin membrane fluidizing and moisturizing properties, and its ability to penetrate the skin to deliver benefits. Like jojoba, it closely mimics the body's natural moisturizers and is absorbed quickly and effectively, without leaving greasy residue on the skin. Squalane is a non-GMO, plant-derived ingredient and Versagel SQ is a high-quality replacement for shark and olive squalene. It is derived from plant sugar, is ECOCERT approved, and is readily biodegradable as well.

Versagel SQ is a versatile ingredient which works well in skin care, sun care and baby care. In skin care, it helps to facilitate an even distribution of sunscreen active ingredients. In baby care, it softens the skin and is easily absorbed. In makeup, it facilitates the even application of products such as lipsticks, foundations and hot-poured products such as lip balms, glosses and gels. It also is a useful ingredient in hair care products, as it lends a soft after-feel.

FORMULATION BENEFITS

- Non-polar, colorless and odorless
- Stable to oxidation, heat, cold and UV
- Easily incorporated into emulsions
- Compatible with most cosmetic ingredients
- Spreads easily and is rapidly absorbed into the epidermis
- Highly moisturizing, softens and soothes
- Creates very elegant textures

**Data provided pertains to pure Neossance® Squalane, not in gelled form*

APPLICATIONS

- Color Cosmetics: foundation, lipstick, lip balm, lip gloss, primer, rouge/cheek balm, highlighter/contour
- Skin Care: serums, gels, oils, lotions, creams, moisturizers, masks, butters, complexion correction
- Sun Care: self-tanning, sunblock/sunscreen
- Hair Care: shampoos, conditioners and styling products

TYPICAL PROPERTIES

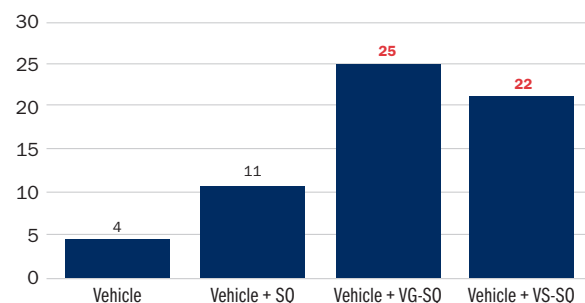
	VISCOSITY @ 25 °C D2983 (cPs)	SPECIFIC GRAVITY @ 25/25 °C D4052	SAYBOLT COLOR D156	FLASH POINT °C ASTM D92	POLARITY LOG P
VERSAGEL SQ (Squalane)					
SQ 500 T	52,000	0.8076	+28	>218	9.6
SQ 1600 T	138,000	0.8077	+29	>218	9.6

International Nomenclature of Cosmetic Ingredients (INCI):

Squalane (and) Ethylene/Propylene/Styrene Copolymer (and) Butylene/Ethylene/Styrene Copolymer and Pentaerythrityl Tetra-di-t-butyl Hydroxyhydrocinamate.

ANTI-AGING CLINICAL STUDY TO COMPARE THE EFFECT OF VERSAGEL SQUALANE TO SQUALANE AND A PLACEBO

% Wrinkle Reduction from Baseline After 4 Weeks

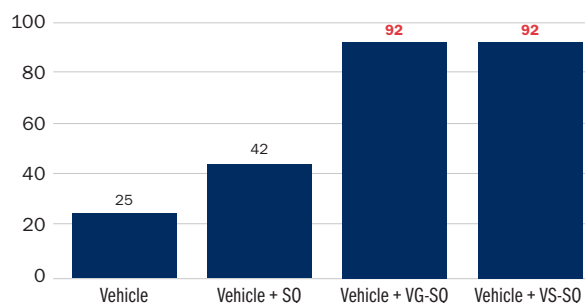


Study #C19-D069

Reduction of Periorcular Wrinkles

Subjects showed an average of 25% reduction in total area of periorcular wrinkles after 4 weeks. Test results showed VG-SQ is 127% more effective than SQ.

% People Improved from Baseline After 4 Weeks



Study #C19-D069

Improvement of Overall Appearance

92% of subjects showed an improvement of visual smoothness and texture after 4 weeks. Test results showed VG-SQ is 119% more effective than SQ.

VERSAGEL® HSQ

INNOVATIVE NATURAL GEL

The Versagel HSQ product offers a silicone-free alternative to oil-based and emulsion formulas. The gelled structure is based on Hemisqualane (C13-15 Alkane) combined with patented block copolymer technology. Hemisqualane is a non-volatile emollient derived from plant sugar and is inherently biodegradable, ECOCERT-approved, NPA Natural Seal Certified, and a USDA Certified bio-based product. It provides a light, non-greasy and silky feel, and serves as an effective alternative to petroleum and silicone-based ingredients. The gelled version provides additional benefits of a rheology modifier and a suspension agent for a wide range of cosmetic and personal care applications.

APPLICATIONS

- Hair Care: colorants, treatments, styling products, serums, oils, creams, moisturizers
- Color Cosmetics: lip gloss, foundations/fluid illuminators
- Skin Care: creams, cleansers, make-up removers, lotions, balms, moisturizers, butters
- Sun Care: sunblock/sunscreen

TYPICAL PROPERTIES

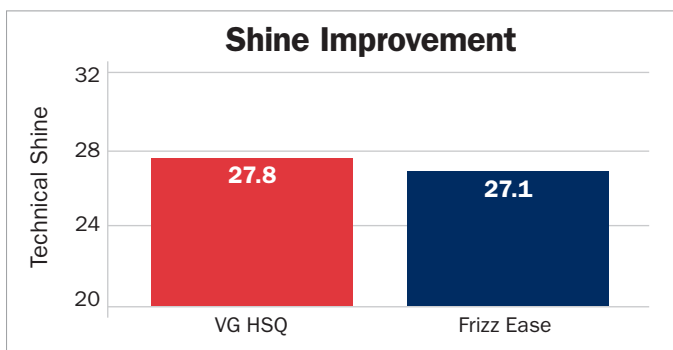
	VISCOSITY @ 25 °C D2983 (cPs)	SPECIFIC GRAVITY @ 25/25 °C D4052	SAYBOLT COLOR D156	FLASH POINT °C ASTM D92	POLARITY Log P
VERSAGEL HSQ (C13-15 Alkane)					
HSQ 200T	13,500	0.8080	+25	>200	6.2

Finished formulations using each Versagel product can vary depending on the other ingredients incorporated. To help formulators understand how each Versagel may perform we have provided the calculated polarity. The polarity calculation was performed on Mol inspiration yielding a value of Log P. A higher Log P means more non-polar.

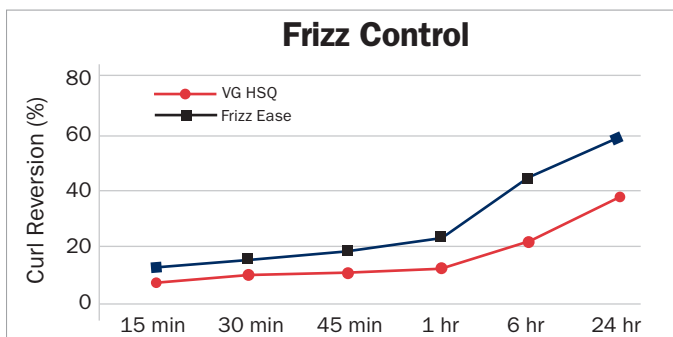
International Nomenclature of Cosmetic Ingredients (INCI): C13-15 Alkane (and) Ethylene/Propylene/Styrene Copolymer (and) Butylene/Ethylene/Styrene Copolymer and Pentaerythrityl Tetra-di-t-butyl Hydroxyhydrocinnamate

UNIQUE PROPERTIES

Efficacy testing of a Versagel Hemisqualane hair serum formulation (VG HSQ) demonstrated that VG HSQ improves key properties such as shine and frizz compared to a commercial benchmark (Frizz Ease) which had a high silicone content. Shine Improvement was measured using a Samba instrument while Frizz Reduction was measured via curl reversion after humidity chamber exposure.



For the Shine Improvement test, clinically prepared hair swatches of virgin frizzy black hair were cut into small sections approximately five grams each and ½" wide. Swatches were treated with equal amounts of assigned hair serum. The results demonstrate that VG HSQ hair serum formulation gives similar amount of shine as the Frizz Ease benchmark.



For the Frizz Control test, six curly hair swatches were treated with the assigned test serum and swatches were then treated with a flat iron and brush. Initial straight hair length measures were taken and the swatches were placed in a high T and % RH Chamber. Curl reversion was measured at various time intervals. The prototype hair serum significantly outperformed Frizz Ease at 30 min and beyond (95% confidence). This shows that Versagel HSQ significantly improves anti-frizz performance.

APPLICATIONS

- Color Cosmetics ■ Fragrances ■ Hair Products ■ Soap and Bath Products ■ Skin Care ■ Sun Care
- Pharmaceuticals/Nutraceuticals ■ Healthcare

VERSAGEL[®] TYPICAL PROPERTIES

	VISCOSITY @ 25 °C D2983 (cPs)	VISCOSITY @ 110 °C (cPs)	SPECIFIC GRAVITY @ 25/25 °C D4052	SAYBOLT COLOR D156	FLASH POINT °C ASTM D92 (D93*)	POLARITY LOG P
VERSAGEL M (70 VIS White Mineral Oil)						
M 200	13,330 - 27,700	-	0.8421	+30	>175	10.0
M 500	47,000 - 57,000	-	0.8445	+30	>175	10.0
M 750	67,000 - 83,000	-	0.8434	+30	>175	10.0
M 1600	132,000 - 198,000	-	0.8425	+30	>175	10.0
VERSAGEL MC (Isohexadecane)						
MC 750	35,000 - 53,000	-	0.7856	+30	>95	8.2
MC 1600	50,000 - 70,000	-	0.7983	+29	>95	8.2
VERSAGEL MD (Isododecane)						
MD 500	20,000 - 35,000	-	0.7486	+23	>45*	6.2
MD 1600	40,000 - 55,000	-	0.7496	+23	>45*	6.2
VERSAGEL ME (Hydrogenated Polyisobutene)						
ME 500	50,000 - 75,000	-	0.8264	+30	>149	9.7
ME 750	85,000 - 110,000	-	0.8265	+30	>149	9.7
ME 1600	140,000 - 180,000	-	0.8280	+30	>149	9.7
ME 2000	245,000 - 325,000	-	0.8269	+30	>149	9.7
VERSAGEL MG (Hydrogenated Poly (C6-14 Olefin))						
MG 500 T	50,000 - 75,000	-	0.8204	+30	>175	6.2
MG 750 T	85,000 - 110,000	-	0.8169	+30	>175	6.2
MG 1600 T	140,000 - 180,000	-	0.8292	+29	>175	6.2
VERSAGEL MX (600 VIS White Mineral Oil)						
MX 500 T	58,400	-	0.8735	+30	>250	10.0
MX 750 T	75,500	-	0.8687	+30	>250	10.0
MX 1600 T	132,000 - 198,000	-	0.8688	+30	>250	10.0
VERSAGEL P (Petrolatum)						
P 200	-	4,619	0.8650	+Opaque (Lovibond <2.0y)	>249	10.5
VERSAGEL SF (C13-14 Isoparaffin)						
SF	12,000	-	0.7824	+30	>96	6.8
VERSAGEL ML (C12-15 Alkyl Benzoate)						
ML 750	99,000	-	0.9262	+30	>199	8.2
ML 1600	250,000	-	0.9272	+29	>199	8.2
VERSAGEL MN (Isononyl Isononanoate)						
MN 750	155,000	-	0.8540	+28	>149	5.9
MN 1600	265,000 - 339,000	-	0.8549	+29	>149	5.9
VERSAGEL MP (Isopropyl Palmitate)						
MP 750	82,000 - 108,000	-	0.8520	+30	>160	8.1
MP 1600	160,000 - 200,000	-	0.8520	+28	>160	8.1
VERSAGEL HSQ (C13-15 Alkane)						
HSQ 200 T	13,500	-	0.8080	+25	>200	6.2
VERSAGEL SQ (Squalane)						
SQ 500 T	52,000	-	0.8076	+28	>218	9.6
SQ 1600 T	138,000	-	0.8077	+29	>218	9.6

Hydrocarbons, Esters and Natural Hydrocarbons

Versagel products are used in a wide variety of formulations. Product properties such as texture and phase stability depend on several factors like the Versagel used, it's viscosity, other formulation ingredients, relative amounts of all ingredients, order of addition, and other formulation variables. The calculated Log P (Mol Inspiration) can be used to compare the relative polarity of each Versagel. We hope that formulators find these Log P values helpful when deciding which Versagel to incorporate into their formulations. In general, the non-polar Versagel products have higher Log P values and should mix well with non-polar formulation bases. Surfactants and emulsifiers enable mixing of polar and non-polar substances so they can have a significant impact on formula stability when utilized.

International Nomenclature of Cosmetic Ingredients (INCI)

Each product line includes the gelled (substrate) and Ethylene/Propylene/Styrene Copolymer, Butylene/Ethylene/Styrene Copolymer. All products are also available with Tinogard[®], Pentaerythrityl Tetra-di-t-butyl Hydroxyhydrocinnamate, and will be indicated by a T in the name. Tinogard[®] is a registered trademark of BASF SE.



All trademarks are owned by Calumet Refining, LLC ("Calumet"), a wholly-owned subsidiary of Calumet Specialty Products Partners, L.P., unless otherwise specified.

