SENSORY ENHANCED EMOLLIENTS

Silicone Alternatives in Anticipation of Evolving Regulations and Trends

sonneborn™

AN HF SINCLAIR BRAND

sonneborn™

WHERE SENSORY PERFORMANCE MEETS EVOLVING REGULATIONS AND TRENDS

Sonneborn sensory-enhanced emollients and silicone alternatives

At Sonneborn, an HF Sinclair brand, a global leader in high-purity ingredients for the personal care industry, we are dedicated to advancing cosmetic innovation. With over 120 years of expertise, we support our customers by delivering silicone-replacing emollients that not only moisturize and protect but also elevate the sensory experience, ensuring your formulations both perform and delight.

Navigating Evolving Regulations

As regulatory pressures increase with the global move away from silicone compounds, particularly D4 (octamethylcyclotetrasiloxane), D5 (decamethylcyclopentasiloxane), and D6 (dodecamethylcyclohexasiloxane), our silicone alternatives provide a compliant and reliable solution. Designed to adhere to emerging standards, our high-purity emollients empower you to create products that satisfy modern safety and environmental requirements without compromising on quality or sensory appeal.

The Power of Sensory Attributes

We understand that a superior sensory experience is key to consumer satisfaction and loyalty. Sonneborn's sensory-enhanced emollients are crafted to deliver a luxurious, smooth feel while ensuring non-comedogenic, biodegradable, and skin-friendly benefits. Our innovative formulations, including products like Sonnecone DM1 and CM, Lilac™, and Iris™, are designed to enrich the tactile appeal of your skincare, hair care, and cosmetic products.

Trusted Solutions for Leading Brands

Our silicone alternatives are the choice of leading cosmetic brands worldwide. Whether you are developing formulations for moisturizers, sunscreens, shampoos or other personal care products, Sonneborn is your partner in creating innovative, sustainable, and regulatory-compliant solutions that resonate with today's dynamic beauty movement.

Our Expertise and Global Reach

Manufactured and/or supplied from our state of the art facilities in Pennsylvania, USA and Amsterdam, The Netherlands, our products reflect the highest standards of purity and performance. At Sonneborn, we pride ourselves on our commitment to quality, technical support, and genuine partnership - ensuring that our silicone alternatives continue to inspire and innovate across the personal care industry.

Learn More

Discover how Sonneborn's sensory-enhanced emollients can transform your formulations. Visit www.sonneborn.com or contact our knowledgeable sales team to discuss how our silicone-free solutions can meet your unique needs.

Lilac™ and Iris™

Sensory Enhanced Alkanes

Lilac (INCI C14-22 Alkane) and Iris (INCI C12-17 Alkane) are both highly refined alkanes ideal for use as lightweight, colorless alternatives for D4, D5 and D6 silicones.

- **Colorless and odorless**
- **Hydrophobic**
- **Biologically stable**
- **Non-comedogenic**
- **Silky spreadability**
- **Powdery, soft after-feel**

Lilac is colorless, hydrophobic, odorless, biologically stable, non-comedogenic, and does not support bacterial growth. It offers silky spreadability, short playtime, and a powdery, soft after-feel, making it suitable for applications such as shampoos, conditioners, skin creams, and lotions. It provides smooth application, quick absorption, and a silky, non-tacky after-feel.

Lilac offers a preferred after feel compared to other alternatives on the market. The combination of emollient with silicone-like properties makes this a very versatile ingredient in cosmetic applications where an emollient and moisturizer are required.

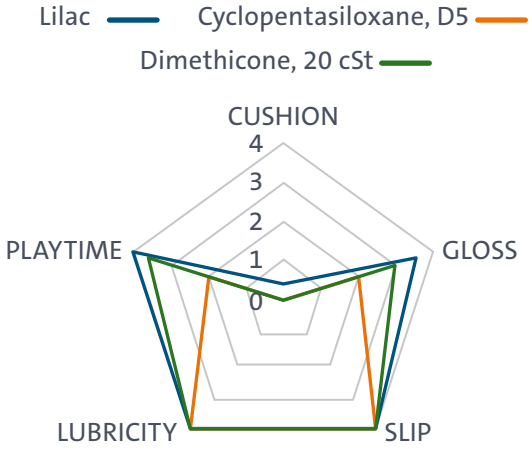
An advantage to using Lilac in formulations is its ability for blending at much higher temperatures, higher safety threshold and preferred after feel over other alternatives in the market.

Lilac can be produced out of both North America and Europe.

Lilac G (INCI name Alkane and C12-23 Alkane) is also available from both North America and Europe.

Iris is a highly refined mixture of alkanes offering enhanced skin-feel for a wide range of personal care applications. Iris is a colorless, odorless liquid with the sensory characteristics of cyclopentasiloxane and was developed as an alternative to D5 silicones in cosmetic formulations.

Lilac vs D5 and Dimethicone



Product	Cushion	Gloss	Slip	Lubricity	Playtime
Lilac	0.5	3.5	4	4	4
Cyclopentasiloxane, D5	0	2	4	4	2
Dimethicone, 20 cSt	0	3	4	4	3.5

Lilac™ and Iris™ Applications

Alkanes Applications
PERSONAL CARE
AP/DEO
Body Wash
Hair Shampoo & Conditioner
Hair Styling and Finishing
Hand Cleaners
Moisturizing Lotions
Permanent Waves
Scalp Protector
Skin Creams and Lotions
Sun care products
Pharmaceutical
Dental Adhesive Formulations
Medicated Ointments
Suppositories

Product Information	**Lilac**	**Iris**
INCI Name	C14 – 22 Alkane	C12 – 17 Alkane
CAS Number	8042-47-5	8042-47-5
CAS Registry Name (s)	White Mineral Oil, Paraffin Oil	White Mineral Oil, Paraffin Oil

Typical Features	**Lilac** 	**Lilac** 	**Iris***
Density at 20˚C, kg/m³	810-830	810-830	791-806
Density at 20˚C - Test method	ASTM D4052	ASTM D4052	ASTM D4052
Kin. Viscosity at 40˚C, mm²/s	3.9-5.0	3.9-5.0	2.25-2.95
Kin. Viscosity at 40˚C - Test method	ASTM D445	ASTM D7279	ASTM D445
Pour Point (°C) - Test method D97	3 Max	3 Max	-12 Max

*Iris does not meet the REACH regulation for European Sales
Lilac G INCI Name C13-14 Alkane and C15-23 Alkane is also available out of US and EU with same specifications.

Sensory profile. To help in choosing the right ingredient for your particular formulation with similar properties as silicones, please refer to the sensory selection guide below where both products are compared to Cyclopentasiloxane.

Product	Cushion	Lubricity	Gloss	Slip	Playtime
Lilac	+	+++	+++	++++	++
Iris	+	+++	++	++++	++
Cyclopentasiloxane	+	++	++	++++	++

+ = very low | ++ = low-medium | +++ = medium | ++++ = high | +++++ = very high

Sonnecone

Sensory Enhanced Petrolatums

DISTINCTLY UNIQUE. By applying developmental expertise, Sonneborn has created two different Sonnecone products that are not easily recognizable as petrolatum.

Sonnecone CM and DM1 have a sensory profile that compliments many personal care formulations with their silky skin-feel, excellent spreadability, easy handling, and smooth application as they melt at skin temperature. Both are 100% USP Petrolatums that also meet the FDA requirements for food grade petrolatum in 21 CFR 172.880.

Sonnecone CM is a soft, translucent, high-gloss petrolatum that offers a powdery soft afterfeel. It is an excellent emollient for skin lotions designed to be lightweight, yet deliver optimal moisturizing benefits.

Sonnecone DM1 is soft and translucent with medium gloss and higher cushion. Both Sonnecone products are excellent options for enhancing products where skin protection and TEWL are critical, but a more luxurious skin-feel is desired.

APPLICATIONS AND PROPERTIES. Combining the traditional benefits of a petrolatum with enhanced sensory characteristics, Sonnecone products can be used as some of your most versatile formulating ingredients. Sonnecone offers a unique “non-greasy” texture, a smoother, drier, low tack after feel with a more satiny appearance after rub-in.

Sonnecone Most Used Applications

Alkanes Applications
PERSONAL CARE
Anti-Ash Skin Products
Color Cosmetics
Dry Body Oil
Hair Smoothing
Hair Styling
Hand Cleaners
Hand and Body Lotions
Massage Cream
Moisturizing Lotions
Moisturizing Body Wash
Scalp Protector
Skin Creams and Lotions
Sun Care Products
Pharmaceutical
Dental Adhesive Formulations
Medicated Ointments

Comparison of Afterfeel Atributes (Neat Form)

Attributes	Sonneborn Products	Competitor's Silicones		
	Sonnecone Petrolatums	Cyclohexasiloxane (D6)	Dimethicone 50 cs	Dimethicone 100 cs
Light	✓	✓	✓	✓
Fast Absorption	✓	✓	✓	
Soft	✓		✓	

RHEOLOGY AND SKIN-FEEL. Petrolatum has long been a benchmark for moisturization and skin protection, but at high levels it often imparts a heavy feel on the skin surface. For this reason, rheology plays an important role in how face and bodycare products are applied, spread, and absorbed into the skin's surface. Sonnecone products have been developed to enhance skin-feel without compromising the many functional benefits of classic petrolatum.

There are two properties described on the following pages which illustrate the rheological enhancement of Sonnecone products over that of standard petrolatums; these are known as Flow Onset and Complex Viscosity. Flow Onset relates to spreadability properties, whereas Complex Viscosity, which provides similar information, is more related to rub-in and absorption.

FLOW ONSET. The rheology of petrolatum can be defined by the decrease in viscosity with increasing temperature. We define flow onset as the temperature at which the dynamic viscosity reaches 25 Pa*s (pascal-second). By looking at the difference between the flow onset temperature of a "standard" petrolatum used in typical personal care products, versus that of the Sonnecone products, one can predict the relative rheology and therefore its spreadabilty, drag and overall skin-feel properties upon application.

The typical flow onset temperature of a "standard" USP Petrolatum (for example, Sonneborn's White Protopet 1S) is between 45°C and 55°C, whereas the flow onset temperature of the Sonnecone product line occurs between 30°C and 40°C. At body temperature, Sonnecone becomes fluid, therefore exhibiting easier spreadability, less drag and an overall lighter skin-feel upon application.

Most petrolatums are resistant to spreading, and have a heavier/greasier skin-feel. Conversely, the spreadabilty of the Sonnecone products resembles that of some silicones.

The table below shows the flow onset temperatures of the Sonnecone products versus White Protopet 1S Petrolatum:

Product	*Flow Onset °C
Sonnecone CM	31.7
Sonnecone DM1	39.7
White Protopet™ 1S	53.0

This particular Sonnecone property adds a more appealing sensory dimension to petrolatum, while still delivering the same attributes of moisturization, occlusivity and skin protection.

COMPLEX VISCOSITY. Complex viscosity is another characteristic that helps to predict certain sensory qualities of petrolatum. Between the temperature range of 35°C to 45°C, the complex viscosity for the Sonnecones approaches 0.1 Pa*s. The temperature for the complex viscosity to reach 0.1 Pa*s for typical USP Petrolatum is above 47°C. The table below describes the temperature at which G' is equal to 0.1 Pa*s, or the pressure at which there is no "drag" or resistance when rubbing a product into the skin; i.e. the point at which a product feels light and absorbed into the skin.

Product	*0.1 Pa*s
Sonnecone CM	35.9°C
Sonnecone DM1	36.3°C
White Protopet 1S	>65°C

*Instrument used in study is TA AR2000ex Rheometer

The temperature range at which the Sonnecone viscosity approaches 0.1 Pa*s, is close to that of skin temperature. When Sonnecone is applied to the skin, it spreads smoothly and without the drag or tackiness that is characteristic of standard petrolatum. This characteristic further enhances the elegant application and skin-feel of the Sonnecone product line. Lower drag and lower flow onset temperature are desirable characteristics in personal care formulations including creams and ointments.

Sensory profile. Sonnecone CM and DM1 are both 100% USP petrolatum products, offering the advantages of a petrolatum with CM having less cushion and higher gloss than DM1.

To help find the right product for your particular formulation, please refer to the sensory selection guide below where each is compared to White Protopet 1S as the standard.

Typical Properties of Sonnecone

Product	Kin Viscocity @ 100°C, cSt	Drop Point (°C)	Cone Penetration	Lovibond color Y	Compliance	
Test method : USP	Test method is ASTM D445	USP	ASTM D937	IP17	Ph. Eur.	FDA*
Sonnecone DM1	3.95	35-70	240-300	3" cell: 1 max	Full	✓
Sonnecone CM	3.62	35-70	240-300	3" cell: 1 max	Full	✓

* 21 CFR 172.880

Product	Cushion	Lubricity	Gloss	Slip	Playtime
Sonnecone CM	++	++++	++++	++++	++++
Sonnecone DM	+++	++++	+++	++++	++++
White Protopet 1S	++++	+++	++	++	+++

+ = very low | ++ = low-medium | +++ = medium | ++++ = high | +++++ = very high

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AN HF SINCLAIR BRAND

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LUB34489 (03.2025)

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