High Performing Sustainable Solutions for Responsible Brands

NEOSSANCE® HEMISQUALANE – YOUR SUSTAINABLE ALTERNATIVE FOR ISOHEXADECANE & FLUID SILICONES

APRINNOVA

A Joint Venture of
Amyris & NIKKOL GROUP

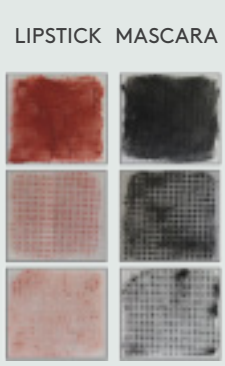
Sustainability

Today, cosmetic formulators are increasingly challenged to address social responsibility needs as well as traditional requirements such as performance and cost. Incremental improvements in a raw material's sustainability profile meet consumers' desires to buy responsibly and enable marketers to meet their CSR targets. Neossance Hemisqualane is made via fermentation of sugar cane. This crop, which is grown sustainably in Brazil without irrigation, represents the highest level of biomass per hectare of all sugar sources. Waste streams are converted to electricity to power the plant and the local community. Life cycle analyses demonstrate that our sugar cane based fermentation processes generate significantly less greenhouse gas formation compared to similar products produced from petroleum sources. But sustainability is only one part of the Hemisqualane story. When compared to petroleum-based materials such as isohexadecane or fluid silicones, comparative testing in a wide variety of applications demonstrates performance equivalence (see our test results below). In addition, Hemisqualane is priced comparably with these materials so consumers do not have to pay more to make a responsible choice.

CSR Characteristics	NEOSSANCE® Hemisqualane
GHG reduction	>60%[1] reduction in GHG formation compared to petroleum based ingredients
Sustainable innovation in Formulas	SEPAWA NEOSSANCE Hemisqualane was a 2015 winner of the SEPAWA Innovation Award Cosmetics
Water	No irrigation used in agriculture. Minimal water use in production
Waste	Bagasse used for electricity co-generation
Implementation	Now – an enabling technology for our customers' 2020 goals

[1]TOTAL/Amyris computation based on EPA, CARB, and EC LCA methods at targeted fermentation yield rate.

Makeup remover abilities comparable with isohexadecane



Evaluation conducted by Nikkol Group on Transpore Tape, 3M Healthcare

Protocol: Standard amount of lipstick and mascara was uniformly applied on the surface of a 2x2cm tape fixed on a slide glass, then dried at room temperature for 12 hours. A standard amount of oil was applied on the tape surface and rubbed with finger 20 times. The excess of oil was then removed using a tissue paper.

Results: Hemisqualane and isohexadecane showed comparable makeup remover properties.

Demonstrated performance equivalence with fluid silicones in haircare

Benefit	Dimethicone	Amodimethicone
Wet Combing		✔
Dry Combing		✔
Anti-Frizz	✔	
Color Protection	✔	

Evaluations on tresses and in salon have demonstrated similar performances with several fluid silicones. Hemisqualane is ideal for conditioners, treatments and styling products – opening up new possibilities for haircare performance.

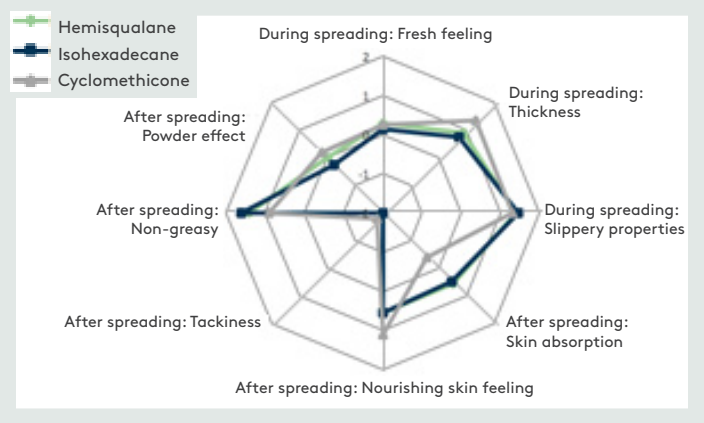
Certification

Approved by ECOCERT RAW MATERIAL COSMETICS

USDA CERTIFIED BIOBASED PRODUCT PRODUCT 100%

High-spreadability & a great sensorial profile, ingredient of choice for dry feel suncare applications

A SENSORIAL PROFILE SIMILAR TO ISOHEXADECANE & CYCLOMETHICONE

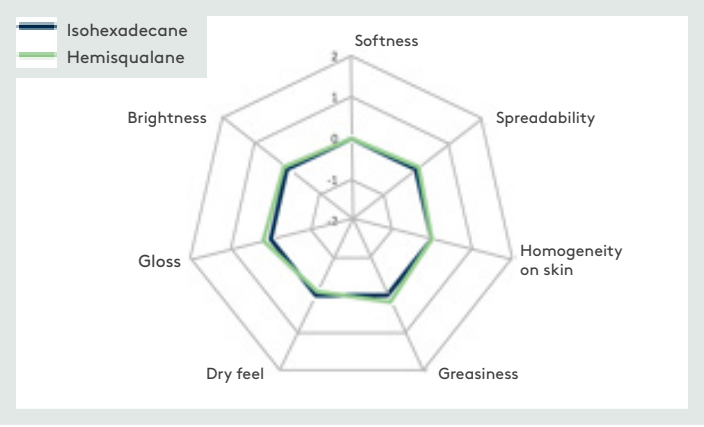


Sensorial evaluation conducted on gel cream containing 10% of oil (NEOSSANCE® Hemisqualane, isohexadecane, cylomethicone – mix of D5 & D6).

Protocol: A panel of 14 persons evaluated gel creams containing 10% of Hemisqualane, isohexadecane and cyclomethicone – mixture of cyclopentasiloxane and cyclohexasiloxane.

Results: The sensory profile of Hemisqualane is comparable to cyclomethicone and isohexadecane.

Spreads smoothly & evenly on the skin, ideal for color cosmetics products



Protocol: A panel of 11 persons evaluated liquid blush containing 10% of Hemisqualane and isohexadecane.

Results: Sensory profile of Hemisqualane is comparable to isohexadecane.

Typical properties

Test Description	Typical Value	Unit of Measure
Purity by GC	99	weight %
Density @ 20°C	0.770	g/cm³
Refractive Index @ 20°C	1.431	
Appearance & Color	Colorless liquid	
Odor	Nearly odorless	
Viscosity @ 20°C	2.7	cP
Flash point	110	°C

Learn more about Hemisqualane at www.aprinnova.com where you can request a sample or quote of one of our innovative emollients today.

Neossance®, peace of mind ingredients are made by Aprinnova whose mission is to deliver sustainable solutions for responsible brands without compromise in cost or performance.

APRINNOVA

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Formulation guidelines

BI-PHASE MAKEUP REMOVER

Phase	INCI	Commercial Name	%
A	Water	-	Qs to 100.00
	Glycerin	-	28.50
	Alcohol	-	5.00
	Butylene Glycol, Water, Citrus Reticulata (Tangerine) Peel Extract	MandarinClear (Ichimaru Pharcos)	2.00
	Water, Glycerin, Propanediol, Phenoxyethanol, Beta Glucan, Ethylhexylglycerin	PF SC-Glucan (Sochibios Nature, Science & Life)	1.00
	Benzyl Alcohol, Dehydroacetic acid, Water	Sharomix 721 (Sharon Laboratories)	0.90
	C.I. 14720	Azorubin 85E122 aqueous solution 0.5% (BASF)	0.12
	C.I. 42090	FD&C Blue 1 aqueous solution 0.5% (BASF)	0.03
B	C13-15 Alkane	NEOSSANCE® Hemisqualane	30.00
	Ethyl Macadamiate	Floramac® 10 (Floratech)	28.00
	Tocopheryl Acetate	Vitamin E Acetate-USP (Protameen Chemicals)	0.20

PROCEDURE

- Mix phase A until homogeneous. Adjust pH to 5.0-6.5 if needed
- Mix phase B until homogeneous.
- Fill bottle starting with phase A & then phase B.

LIQUID BLUSH

Phase	INCI	Commercial Name	%
A	Squalane, Rosa Damascena Flower extract	Aroma Squalane Rose (Nikkol Group)	5.00
	Polyglyceryl-6 Polyricinoleate, Polyglyceryl-2 isostearate, disteardimonium hextorite	Nikkomulese WO-NS (Nikkol Group)	4.00
	Methylheptyl Laurate	Nikkol GS-MHL (Nikkol Group)	12.00
	C13-15 Alkane	NEOSSANCE® Hemisqualane	10.00
	Titanium dioxide, diisostearyl malate, isopropyl titanium triisostearate	Lipsi White 60U (Nikkol Group)	3.30
	Iron oxides, diisostearyl malate, isopropyl titanium triisostearate	Lipsi Red 70ER (Nikkol Group)	0.70
	CI 15850, RED 7, diisostearyl malate, isopropyl titanium triisostearate	Lipsi Red 30R7C (Nikkol Group)	1.00
	Methyl methacrylate crosspolymer, HDI/Trimethylolhexyllactone crosspolymer	UP-611 (Toshiki Pigment)	3.00
	Fragrance	-	qs
B	Water	-	Qs to 100.00
	Sodium Chloride	-	2.00
	Propanediol	-	3.00
	Preservative	-	qs
	Angelicaacutiloba Root Extract, Water, Butylene Glycol	Japanese Angelica Root Extract BG-J (Maruzen Pharmaceuticals)	1.00
	Acer Palmatum Leaf Extract, Butylene Glycol, Water	Japanese Maple Leaf Extract BG (Maruzen Pharmaceuticals)	1.00

PROCEDURE

- Mix Phase A with homogenizer until homogenous
- Mix Phase B until homogeneous
- Add Phase B to Phase A gradually while mixing with homogenizer to emulsify
- Initial viscosity (B type viscometer No.3, 6rpm/30sec): 4000 mPa.s

HAIR CARE TREATMENT

Phase	INCI	Commercial Name	%
A	Water	-	Qs to 100.00
	Stearamidopropyl Dimethylamine	Chemidex™S Surfactant (Lubrizol)	2.00
B	Lactic Acid	Lactic Acid 85%	1.20
C	Behentrimonium Methosulfate and Cetearyl Alcohol	Incroquat Behenyl TMS	3.00
	Methyl Gluceth-20	Glucam™ E-20 Humectant (Lubrizol)	0.50
	C13-15 Alkane	NEOSSANCE® Hemisqualane	2.00
	Cetearyl Alcohol	Alcohol Cetearyl 30/70	4.00
	BHT		0.05
D	Water		20.00
E	Water, DMDM Hydantoin, Methylchloroisothiazolinone/ Methylisothiazolinone	Euxyl® K 120 (Schülke Inc.)	0.10

PROCEDURE

- Add Phase A to the main vessel. Heat to 75˚C. Neutralize with lactic acid (Phase B) to pH 4.0
- Heat Phase C to 75˚C
- Add Phase C to the main vessel and homogenize for 15 min, maintaining temperature and stirring
- Start cooling, adding phase D to the main vessel
- At 40˚C add phase E and homogenize
- Appearance: white cream. pH 3.6, viscosity: 6300cps (Brookfield RVT @ 20rpm, #5 spindle)

SUN CREAM

Phase	INCI	Commercial Name	%
A	Water	-	Qs to 100.00
	Glycerin	-	4.00
	Water, Sodium Dilauramidoglutamide Lysine, Butylene Glycol	Pellicer™ LB-30G (Asahi Kasei)	0.30
B	C13-15 Alkane	NEOSSANCE® Hemisqualane	4.00
	Octocrylene	Neo Heliopan® 303 (Symrise)	10.00
	Benzophenone-3	Neo Heliopan® BB (Symrise)	5.00
	Butyl Methoxydibenzoylmethane	Neo Heliopan® 357 (Symrise)	2.00
	Mauritia Flexuosa Fruit Oil	Melscreen® Buriti FG (Chemyunion)	2.00
C	Sodium Polyacrylate, C18-21 Alkane, Trideceth-6	Gelinnov® (Safic Alcan)	1.50
D	Nylon 6	Orgasol® 1002 D Nat Cos (Arkema)	4.00
E	Benzyl Alcohol, Dehydroacetic Acid, Water	Sensicare® C 3000 (Chemipol)	0.90
	Fragrance	-	0.20

PROCEDURE

- Phase A: Heat to 75˚C under stirring until homogeneous
- Phase B: Heat to 75˚C under stirring until homogeneous
- Add phase B to phase A under high stirring. Stir with rotor-stator during 1min. Stir again without heating.
- Add phase C and stir during 15 min until homogeneous
- Cool to 40˚C then add slowly phase D and homogenize
- Cool to 25˚C then add phase E and homogenize
- Supplement in water then adjust pH to 5.5-6.5

Applications

Skincare	Haircare	Color cosmetics	Suncare	Makeup removal	Deodorant/AT
Creams, Lotions	Conditioners, Treatment, Styling, Dry shampoo	Foundation, Lipsticks, Mascaras, Pressed powders	Creams, Lotions	Milks, Lotions, Bi-phase	Stick, Lotions