



## NATURALLY-ENHANCED EMOLLIENTS

Experience the Penreco® difference. Our expertise and reputation were built by more than 100 years of dedicated partnerships with our customers. We are devoted to understanding the unique chemistry required to deliver customized solutions that meet the specific needs of today's consumer products.

As an industry leader in specialty products like gels, petrolatums and white mineral oils, we rely on our experience, high standards, research and development, and innovation to create PenBio™, a new premium line of naturally enhanced emollient products. PenBio delivers optimal moisturization and emollient benefits similar to petrolatum, along with a wide range of sensory attributes, perfect for your personal care and cosmetic formulations. PenBio contains shea butter, castor oil and candelilla wax. PenBio Ultra also contains petrolatum while PenBio Supreme contains microcrystalline wax, ingredients which optimize cost and performance across the product line.

## APPLICATIONS

■ Cosmetics ■ Personal Care ■ Creams, Balms, Ointments & Lotions ■ Salves & Rubs

## PRODUCT SPECIFICATIONS

Test Method	Petrolatum	PenBio Ultra	PenBio Supreme
Lovibond Color	2.0Y max	7.0Y 1.1R	16Y 2.0R
Melting Point, °F	125 - 135	128.0	135.0
Viscosity @ 210 °F, SUS	64 - 75	74.7	84.8
Consistency, dmm	170 - 205	170	120
*Stability @ 45 °C	Stable	Stable	Stable
*Stability @ 190 °F	Stable	Stable	Stable

\*Accelerated aging study is ongoing (1-month data shown)

\*\*Preliminary Data: these products are not yet commercially available. Please inquire if you have questions and/or would like to sample our products.

Product Specifications are subject to change. All product sales are subject to the applicable terms and conditions.

### International Nomenclature of Cosmetic Ingredients (INCI)

PenBio Supreme: Butyrospermum Parkii (Shea) Butter, Ricinus Communis (Castor) Seed Oil, Euphorbia Cerifera (Candelilla) Wax, and Microcrystalline Wax  
PenBio Ultra: Petrolatum, Butyrospermum Parkii (Shea) Butter, Ricinus Communis (Castor) Seed Oil, and Euphorbia Cerifera (Candelilla) Wax

PenBio does not contain GMOs.

## BIODEGRADABILITY

- PenBio products meet the requirements for ultimate biodegradability.
- Biodegradability testing method OECD 301B was performed by an accredited and certified bioenvironmental laboratory.

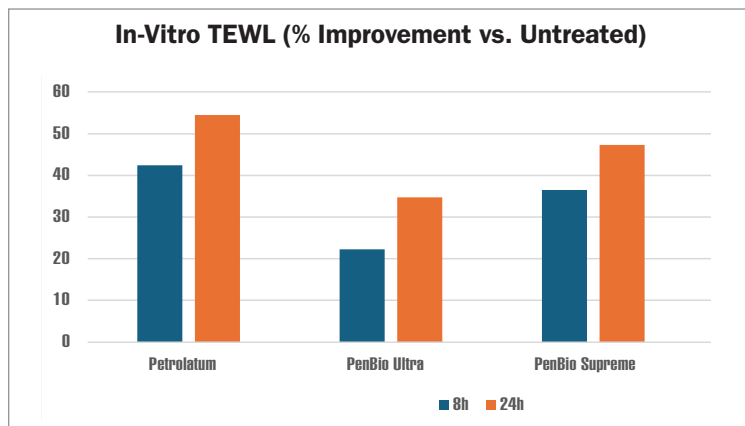
**ISO 16128 NATURAL ORIGIN INDEX:** PenBio Supreme (0.98), PenBio Ultra (0.50)



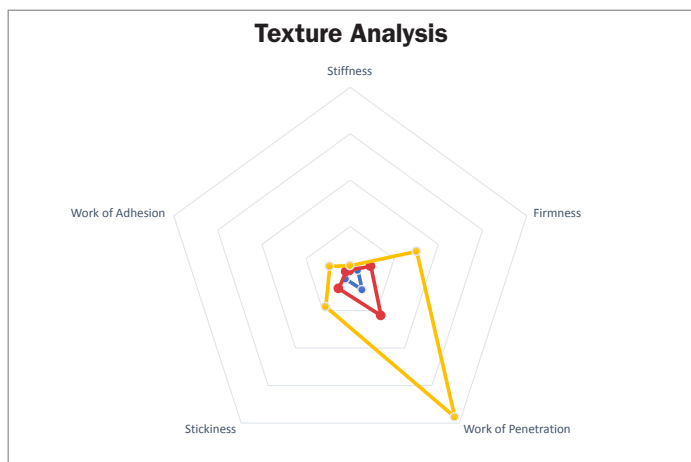
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### Transepidermal Water Loss (TEWL) In-Vitro Study

The graph to the right shows significant improvement in TEWL reduction over the duration of the study for PenBio and Petrolatum control vs. untreated control. Petrolatum shows high level of occlusive moisturization as expected. PenBio Ultra retains significant moisturizing benefits of Petrolatum. PenBio Supreme has an improved performance with the inclusion of microcrystalline wax. The PenBio products are thus expected to deliver high and long-lasting moisturizing benefits.



Study #24-064 – 24-068



### Texture Profiling of PenBio and Petrolatum

The PenBio naturally enhanced emollients were evaluated using instrumental texture profiling methods against Petrolatum benchmark product. The textural properties measured included stiffness, firmness, penetration, stickiness and adhesion. The naturally based emollients have texture profiles that resemble Petrolatum. PenBio Ultra most closely mirrored Petrolatum results across all measured parameters. PenBio Supreme was most different from Petrolatum in this test because it contained an additional wax structurant.

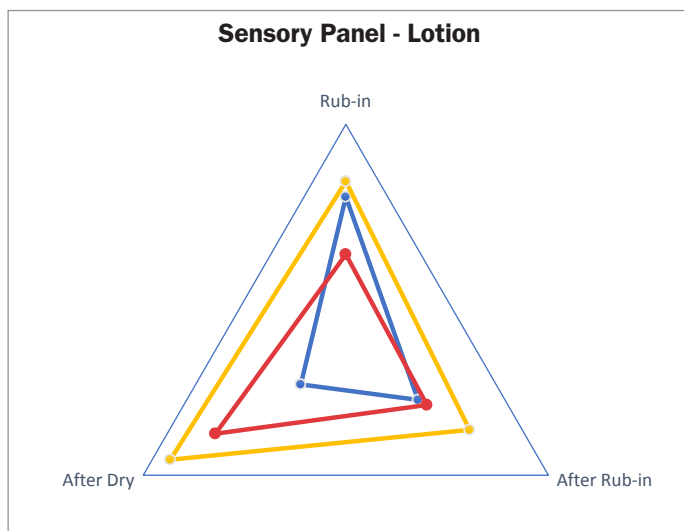
\*Texture Profiling measurements were done on TA.XT Plus texture analyzer using the TA-23 round end probe.

### Sensory Evaluation of Lotion Formulations

Petrolatum and PenBio were separately added at 3% into a lotion formulation base. These lotions were tested at three use stages: rub-in, immediately after rub-in, and 7 minutes after drying. The graph shows average preference on a 5-point scale. Panelists (N = 9) also wrote comments at each use stage.

#### Key Learnings

- PenBio Supreme absorbed well and applied well on the skin, and had a thicker, more luxurious feel.
- PenBio Ultra went on smooth and took slightly longer to be absorbed onto the skin.



#### PRODUCT KEY:

—○— Petrolatum    —○— PenBio Ultra    —○— PenBio Supreme



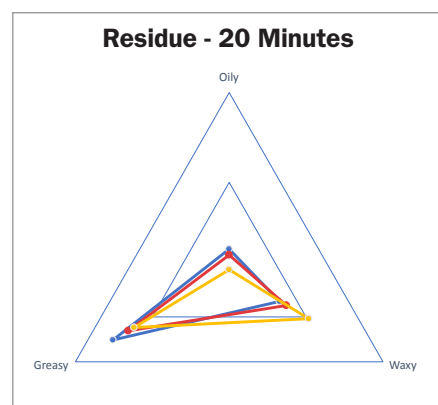
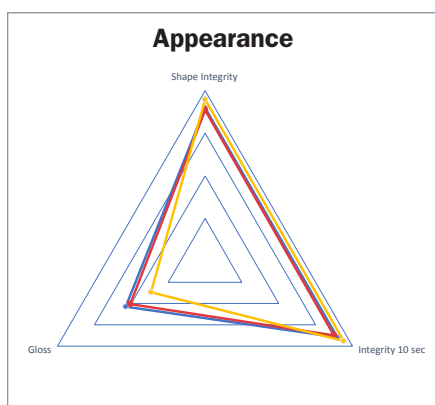
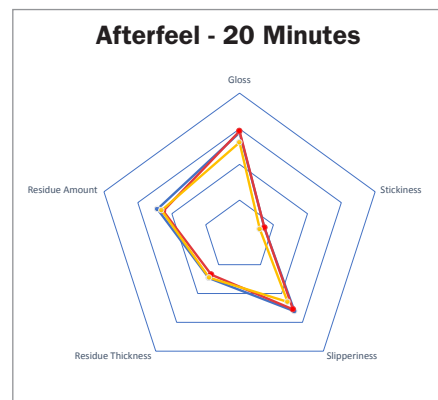
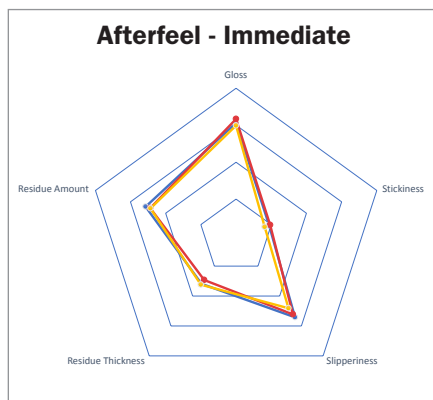
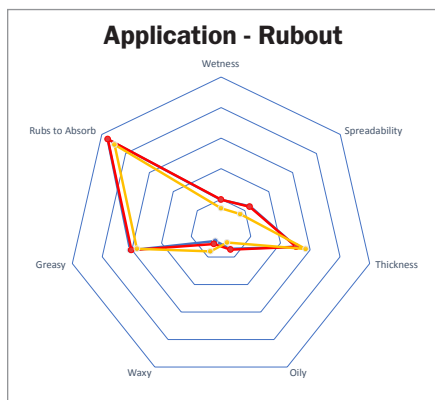
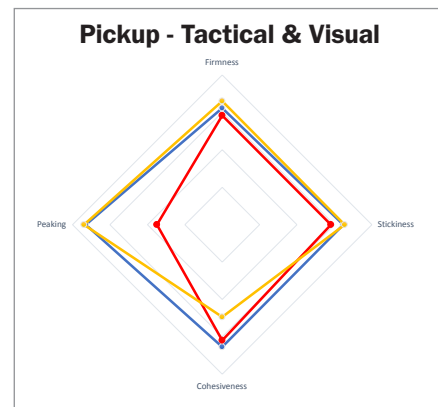
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### Sensory Evaluation of Petrolatum and PenBio

An expert panel descriptive sensory analysis was performed to assess the appearance and skin feel attributes of PenBio and Petrolatum.

#### Key Learnings

- These products had similar overall sensory profiles.
- PenBio Ultra differs mostly from Petrolatum in stickiness and peaking.
- PenBio Supreme shows the most difference from Petrolatum of the samples tested — especially in appearance, pickup and residue.



**PRODUCT KEY:** Petrolatum PenBio Ultra PenBio Supreme

Study #10605

# LOTION FORMULATION

This formulation creates a creamy, nourishing lotion that delivers the moisturizing and skin feel benefits of Petrolatum and PenBio. It has a light, soothing, breezy and indulgent tropical fragrance.

## PROCEDURE

1. Heat Phase 1 and Phase 2 components separately to 50 – 70 °C.
2. Pour Phase 1 into Phase 2 and blend well.
3. Cool to 40 °C then add Phase 3 components sequentially.
4. Blend to homogenize.

PHASE	INGREDIENT	INCI NOMENCLATURE	W/W%
1	Distilled Water	Aqua	68.00
1	Glycerin, USP	Glycerin	5.00
2	Sunflower Oil	Helianthus Annuus (Sunflower) Seed Oil	8.00
2	CreamMaker WAX (HLB 12-13)	Cetearyl Alcohol (and) Polysorbate 60	5.00
2	Shea Butter	Butyrospermum Parkii (Shea) Butter	8.00
2	<b>PenBio or Petrolatum*</b>	refer to the INCI listing on page 1	3.00
3	Hexanediol CG	1,2-Hexanediol (and) Caprylyl Glycol	0.80
3	Phenoxyethanol	Phenoxyethanol	0.90
3	Vitamin E	Tocopheryl Acetate	1.00
3	Fragrance: Coral Reef	Fragrance	0.30

\*Products in **bold** are supplied by Calumet, Inc.

\*Each lotion formulation was created using either Petrolatum, PenBio Ultra or PenBio Supreme.

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## TECHNICAL ASSISTANCE

For product or technical questions, contact your Sales Representative or Calumet Product Support at (800) 437-3188 or email [technical@calumet.com](mailto:technical@calumet.com).



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