Lubrizol

TECHNICAL DATA SHEET

TDS-117
Edition: October 15, 2007
Previous Edition: January, 2002

Skin Care Products Formulated with Pemulen®* Polymeric Emulsifiers

Today's skin care formulations must meet standards of efficacy and aesthetic appeal which are higher than ever before. The contemporary consumer is increasingly responsive to product claims and is looking for products that truly deliver high performance. Pemulen® polymeric emulsifiers are ideal core ingredients for skin care emulsions which can deliver this level of performance.

Pemulen® polymeric emulsifiers TR- 1 and TR-2 (CTFA name: Acrylates/C10-30 Alkyl Acrylate Crosspolymer) are novel oil-in-water (o/w) emulsifiers which provide numerous benefits to emulsions prepared with them, as shown below. For more detail regarding the benefits of using Pemulen® primary polymeric emulsifiers, please consult TDS-114.

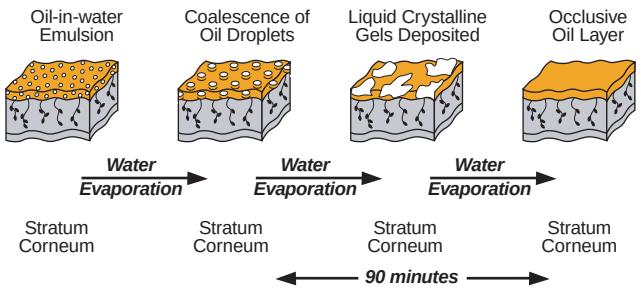
Pemulen® emulsifiers can emulsify any oil type into long-term stable o/w emulsions. In addition, emulsions created with Pemulen® polymeric emulsifiers have a triggered release mechanism. Pemulen® emulsifiers instantly deswell upon contact with the electrical charge on the skin to release the oil phase and provide immediate coverage, eliminating the lengthy lag time seen using traditional surfactant systems.

Benefits of Pemulen® Polymeric Emulsifiers

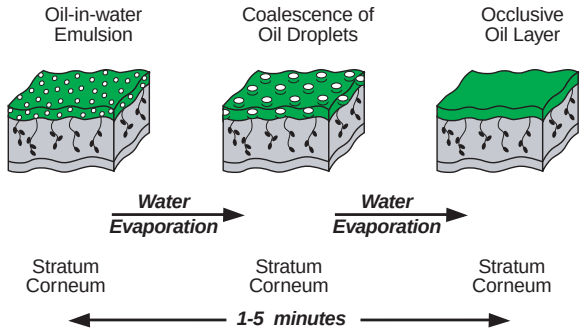
1. Universal Emulsifier of Any Oil Into an O/W Emulsion
2. Excellent Emulsion Stability
3. High Efficiency/Low Usage Levels
4. Low Irritancy
5. Rapid Release of the Oil Phase Upon Emulsion Application
6. Simplifies Emulsion Formulation Procedures
7. Effective Emulsions at Low Oil Phase Loadings
8. Reduction of Application Frequency
9. Enables Unusual New Product Forms

In traditional emulsions, liquid crystals, comprised of oil, water, and surfactant, inhibit deposition of the oil phase to the skin. These lamellar liquid crystals can persist up to 90 minutes after application and can be seen easily when viewed through a microscope.[1,2] The time lag from application to the formation of the continuous oil phase is caused by the slow evaporation of the water phase from the liquid crystal phase.

Moisturizing lotions on the skin with traditional surfactant-stabilized emulsions lotions often go through a liquid crystalline phase on the skin.



With Pemulen polymeric emulsifiers, lotions form an immediate occlusive layer on the skin.



[1] H. Tsutsumi, T. Utsugi and S. Hayashi, Journal of the Society of Cosmetic Chemistry, 30, 345, 1979
[2] R.Y. Lochhead, W.J. Hemker, J.Y. Castaneda and D. Garlen, Cosmetics and Toiletries, vol. 101, No. 11, 125, 1986

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For further information, please visit www.pharma.lubrizol.com

Moisturizing Lotion
P0001

This lotion exhibits the soft feel and emolliency of a traditional stearate soap formulation without the greasiness and potential irritation. It is easily absorbed and is formulated near to the skin's pH of 6.

Ingredients (CTFA)	Weight, %	Function
Part A:		
Deionized Water	72.20	Diluent
Hydroxypropyl Methylcellulose[1]	10.00	Smoothing Aid
Glycerine	2.00	Humectant
Disodium EDTA	0.05	Chelating Agent
Triethanolamine (99%)	0.25	Neutralizing Agent
Part B:		
Petrolatum	5.00	Occlusive Emollient
Mineral Oil[2]	3.00	Occlusive Emollient
Glycol Stearate	2.00	Opacifier
Isostearyl Benzoate[3]	2.00	Emollient
Paraffin	2.00	Texture Modifier
Dimethicone (100 cs.)	0.50	Emollient
Pemulen® TR-1[4]	**0.30**	**Emulsifier/Stabilizer**
Part C:		
Propylene Glycol (and) Diazolidynyl Urea (and) Methyl Paraben (and) Propyl Paraben[5]	0.70	Preservatives

[1] Methocel® E4M (Dow Chemical)
[2] Drakeol® 7 (Penreco)
[3] Finsolv® SB (Finetex)
[4] Acrylates/C10-30 Alkyl Acrylate Crosspolymer (Lubrizol Advanced Materials, Inc.)
[5] Germaben® IIE (Sutton Labs)

Mixing Procedure

1. Mix Part A ingredients until homogeneous.
2. Combine all Part B ingredients except Pemulen polymer in a separate vessel. Heat both phases to 60-65°C. Add Pemulen® polymer to homogeneous Part B. Agitate to break up soft lumps of polymer.
3. With vigorous (800-1200 rpm) agitation, promptly add Part B to Part A. Maintain temperature at 60°C.
4. Discontinue heating. Mix vigorously (800-1200 rpm) for 15-30 minutes or until a smooth, non-grainy emulsion is apparent.
5. When the temperature falls to 40-45°C, add Part C. Continue mixing until the product temperature is 30-35°C. Cease agitation and fill containers.

Hair Styling Cream with Natural Oils & Conditioners Using Pemulen® TR-1 Polymeric Emulsifier & Carbopol® Ultrez 10 Polymer P0048*

This styling cream contains natural oils to provide moisturization and shine. This light emulsion can be used to style and define hair without leaving a heavy greasy feel. This formula also contains cationic conditioners to provide excellent static control and feel, and a sunscreen to help protect the hair from UV damage.

Ingredient / INCI-CTFA Name	Weight, %	Function	Tradenames / Supplier
Part A:			
Meadowfoam Seed Oil	3.00	Moisturizer	EmCom Limnathes Alba / Fanning
Apricot Kernel Oil	3.00	Moisturizer	Super Refined Apricot Kernel Oil / Croda, Inc.
Phenyl Trimethicone	2.00	Shine Enhancer	Dow Corning® 556 Fluid / Dow Corning
C12-15 Alkyl Benzoate	2.00	Emollient	Finsolv® TN / Finetex
Glyceryl Stearate	2.00	Bodifying Agent	Cerasynt® SD / Van Dyk
Octyl Methoxycinnamate	4.00	UV Absorber	Neo Helipan™ AV / Haarman & Reimer Corp.
Tocopheryl Acetate	0.50	Antioxidant/Free Radical Scavenger	Vitamin E Acetate / BASF
Acrylates/C10-30 Alkyl Acrylate Crosspolymer	**0.25**	**Emulsifier**	**Pemulen® TR-1 / Lubrizol Advanced Materials, Inc.**
Carbomer	**0.15**	**Thickener**	**Carbopol® Ultrez 10 / Lubrizol Advanced Materials, Inc.**
Part B:			
Deionized water	78.92	Diluent	
PVP (100%)	1.00	Hair Setting Agent	Luviskol™ K90 Powder / BASF
Triethanolamine (99%)	0.38	Neutralizer	
Part C:			
PEG-20 Almond Glycerides	0.20	Particle Size Reducer	Crovol® A-40 / Croda, Inc.
Linoleamidopropyl PG-Dimonium Chloride Phosphate	0.30	Hair Conditioner	Phospholipid EFA / Mona
Cocodimonium Hydroxylpropyl Hydrolyzed Wheat Protein	0.30	Hair Conditioner	Hydrotriticum QM / Croda, Inc.
Fruity Floral Fragrance	1.00	Fragrance	Fragrance #A42017 / Haarman & Reimer Corp.
Propylene Glycol, Methylparaben, Propylparaben, Diazolidinyl Urea	1.00	Preservative	Germaben™ II E / Sutton Labs

Properties

Appearance: Thick, glossy, creamy emulsion

pH: 6.0 - 6.8

Viscosity†(cP): 20,000 - 40,000

†Brookfield RVT @ 20 rpm, 25°C, #6 spindle

Preparation Procedure

Part A:

1. Combine all oil phase ingredients, heat mixture to 60-65°C, mix until uniform.
2. Disperse Pemulen® TR-1 and Carbopol® Ultrez 10 polymers in oil phase. Mix until powders are dispersed well.

Part B:

1. Disperse PVP K-90 in deionized water (55-60°C). Mix until polymer is hydrated.
2. Add triethanolamine to solution.
3. Add Part A to Part B.

Part C:

1. Add Crovol® A-40 to batch. **Note:** Batch may invert to a water-in-oil emulsion (batch will look curdled). Keep mixing and cool batch to 40-45°C. Keep mixing until batch reinverts to an oil-in-water emulsion (extra shear agitation may be necessary if the batch has still not reinverted at 40°C).
2. After the batch has cooled to 40-45°C and inversion is complete, add the remaining Part C ingredients. Mix until uniform.

*Based on Formulation P0045

Liposome Emulsion Using Pemulen® TR-1 Polymeric Emulsifier & Carbopol® Ultrez 10 Polymer
P0050

This light, milky white emulsion contains liposomes that deliver Evening Primrose Oil, which are rich in gamma-linolenic acid and provide excellent moisturizing and softening benefits.

Ingredient / INCI-CTFA Name	Weight, %	Function	Tradenames / Supplier
Part A:			
Acrylates/C10-30 Alkyl Acrylate Crosspolymer	**0.25**	**Emulsifier**	**Pemulen® TR-1 / Lubrizol Advanced Materials, Inc.**
Carbomer	**0.20**	**Thickener**	**Carbopol® Ultrez 10 / Lubrizol Advanced Materials, Inc.**
Octyl Stearate	8.00	Emollient	Cetiol® 868 / Henkel
Mineral Oil	10.00	Emollient	
Part B:			
Deionized water	75.55	Diluent	
Glycerin	2.00	Humectant	
Part C:			
Sodium Hydroxide (18%)	0.50	Neutralizer	
Part D:			
Phenoxyethanol, Methylparaben, Butylparaben, Ethylparaben, Propylparaben	0.50	Preservative	Phenonip® / NIPA
Lecithin and Evening Primrose Oil	3.00	Moisturizer	Brooksome® EPO / Brooks Industries

Properties

Appearance: Milky-white emulsion

pH: 6.2 - 6.6

Viscosity*(cP): 11,000 - 14,000

*Brookfield RVT @ 20 rpm, 25°C, #5 spindle

Preparation Procedure

1. Combine the ingredients of Part A in the container that will hold the final product. Mix the ingredients well to disperse the polymers.
2. Combine the ingredients of Part B and mix until homogenous.
3. Add 3/4 of Part B to Part A slowly with strong mixing. Mix for about 15 minutes to swell the polymers.
4. When the emulsion is smooth and white, add part of the sodium hydroxide and bring the pH to about 7.0. Continue mixing until smooth and uniform.
5. Slowly add the remainder of Part B with moderate mixing.
6. Add remaining sodium hydroxide.
7. Add the preservative and mix until uniform. Add the liposomes using slow agitation to avoid rupturing liposomes. Mix until uniform.

Light Night Cream with Pemulen® TR-2 Polymeric Emulsifier & Carbopol® Ultrez 10 Polymer
P0053

Designed for normal to oily skin, this emulsion features a light, dry feel.

Ingredient / INCI-CTFA Name	Weight, %	Function	Tradenames / Supplier
Part A:			
Acrylates/C10-30 Alkyl Acrylate Crosspolymer	**0.25**	**Emulsifier**	**Pemulen® TR-2 / Lubrizol Advanced Materials, Inc.**
Carbomer	**0.50**	**Thickener**	**Carbopol® Ultrez 10 / Lubrizol Advanced Materials, Inc.**
Laneth-5, Ceteth-5, Oleth-5, Steareth-5	1.00	Particle Size Reducer	Solulan® 5 / Amerchol
Mineral Oil	10.00	Emollient	Drakeol® 21 / Penreco
Octyl Stearate	8.00	Emollient	Cetiol® 868 / Henkel
Part B:			
Deionized water	77.20	Diluent	
Glycerin	2.00	Humectant	Pricerine® 9083 / Unichema
Phenoxyethanol, Methylparaben, Butylparaben, Ethylparaben, Propylparaben	0.50	Preservative	Phenonip® / NIPA
Part C:			
Sodium Hydroxide Solution (18% w/w)	0.40	Neutralizer	
Part D:			
Fragrance	0.15	Fragrance	Fruity Floral Scent NY-16 / Novarome

Properties

Appearance: Creamy white viscous emulsion

pH: 5.0 - 5.1

Viscosity*(cP): 55,000 - 60,000

*Brookfield RVT @ 20 rpm, 25°C, #7 spindle

Preparation Procedure

1. Combine Part A ingredients. Heat until completely liquid and mix until homogenous. Add the powdered polymers to the liquid and mix until completely dispersed.
2. Combine Part B ingredients and mix until solution is complete. Add Part A to Part B with good mixing until the polymers hydrate well (about 15 minutes).
3. Add neutralizer slowly until thickening is observed. While the emulsion is still of mixable consistency, increase mixing until the emulsion is creamy white and homogenous.
4. Finish by adding the fragrance and remaining neutralizer and mixing until homogenous.