

Fragrance Products Formulated with Pemulen®* Polymeric Emulsifiers

Colognes, after shave preparations and other fragrance products have traditionally been formulated with alcohol because of its solubility and diluency effects. Alcohol can dry and defat the skin, however, and consumers recognize these negative attributes. Pemulen polymeric emulsifiers allow the fine fragrance formulator to enter a new realm of innovative, alcohol-free products. Light, greaseless aqueous based products are possible with these unique emulsifiers. Pemulen® TR-1 and Pemulen® TR-2 deliver the elegant, alcohol-free fragrances that consumers demand.

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 in the side bar below.

Pemulen® polymeric emulsifiers, in addition to these general benefits in formulations, have benefits specific to fragrance formulations. Most importantly, Pemulen® polymeric emulsifiers are capable of emulsifying virtually any hydrophobic substance.

These polymers are thus well suited for the emulsification of a wide variety of fragrance oils, which are comprised of many linear, branched and aromatic organic compounds. In addition to this property of *universal emulsification*, Pemulen® polymeric emulsifiers provide a range of other benefits to fragrance formulations.

Pemulen® emulsions enable non-stinging, alcohol-free products to be made at the skin's pH of 5.5. Fragrance oils can be emulsified with as little as 0.05% Pemulen® emulsifier. Stearate soaps and other surfactants are not required, resulting in fragrance formulations with the potential for *low irritancy*. Pemulen® emulsions give products with *excellent aesthetics*. Products rub in easily and are typically non-greasy, delivering a smooth afterfeel. Products can be formulated to give emolliency or to give virtually no tactile afterfeel at all. Product appearance can easily be made semi-translucent or opaque, without jeopardizing emulsion stability, by controlling fragrance oil droplet size. Also, fragrance notes are readily released, unaltered by the polymeric emulsifier. Pemulen® emulsions are *highly flexible*, allowing a broad range of product types, such as creams, lotions and sprayable "milk" fragrance formulations to be produced over the range of pH 4-9.

Highly appealing, alcohol-free fragrance products are a formulating reality with Pemulen® polymeric emulsifiers. A broad range of effects are readily achievable, with unsurpassed stability and low irritancy.

For more details on the benefits of using Pemulen® polymeric emulsifiers, please consult TDS-114.

For further information, samples or to place an order, please call our customer service department at 800-379-5389 or 216-447-5000.

Benefits of Pemulen® Polymeric Emulsifiers

- Universal Emulsifier of Any Oil Into an O/W Emulsion
- Excellent Emulsion Stability
- High Efficiency/Low Usage Levels
- Low Irritancy
- Rapid Release of the Oil Phase Upon Emulsion Application
- Simplifies Emulsion Formulation Procedures
- Effective Emulsions at Low Oil Phase Loadings
- Reduction of Application Frequency
- Enables Unusual New Product Forms

Lubrizol Advanced Materials, Inc. / 9911 Brecksville Road, Cleveland, Ohio 44141-3247 / TEL: 800.379.5389 or 216.447.5000

The information contained herein is believed to be reliable, but no representations, guarantees or warranties of any kind are made as to its accuracy, suitability for particular applications or the results to be obtained therefrom. The information is based on laboratory work with small-scale equipment and does not necessarily indicate end product performance. Because of the variations in methods, conditions and

equipment used commercially in processing these materials, no warranties or guarantees are made as to the suitability of the products for the application disclosed. Full-scale testing and end product performance are the responsibility of the user. Lubrizol Advanced Materials, Inc. shall not be liable for and the customer assumes all risk and liability of any use of handling of any material beyond Lubrizol Advanced

Materials, Inc.'s direct control. THE SELLER MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Nothing contained herein is to be considered as permission, recommendation, nor as an inducement to practice any patented invention without permission of the patent owner.

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

After Shave Balm Using Pemulen[®] TR-1 Polymeric Emulsifier P0003

Ingredient / INCI-CTFA Name	Weight, %	Function	Trade Name (Supplier)
PART A			
Deionized Water	89.50	Diluent	
Glycerin	3.00	Humectant	
Dimethicone Copolyol	1.00	Humectant/Lubricant	Dow Corning [®] 190 (Dow Corning)
Polysorbate 80	0.10	Surfactant	Tween [®] 80 (ICI Americas)
Allantoin	0.10	Skin Conditioner	
PART B			
Cyclomethicone	4.00	Lubricant	Dow Corning [®] 245 Fluid (Dow Corning)
Decyl Oleate	0.50	Emollient	Cetiol V (Henkel)
Acrylates/C10-30 Alkyl Acrylate Crosspolymer	0.25	Emulsifier/Stabilizer	Pemulen[®] TR-1 (Lubrizol Advanced Materials, Inc.)
PART C			
Triethanolamine (99%)	0.25	Neutralizing Agent	TEA (99%)
Propylene Glycol (and) Diazolidinyl Urea (and) Methylparaben (and) Propylparaben	0.80	Preservative	Germaben [™] IIE (Sutton Labs)
Fragrance	0.50		"Polo Sport" type, #A11518 (Haarman & Reimer)

Properties

Appearance	Translucent emulsion
pH	6.3 - 6.6
Viscosity* (mPa·s) at 25°C	4,000 - 6,000

*Brookfield RVT @ 20 rpm, #4 spindle

Preparation Procedure

1. Combine PART A ingredients. Mix until homogeneous.
2. Combine all PART B ingredients in a separate vessel. Mix to break up any soft lumps of **Pemulen[®] TR-1 polymer**.
3. With moderate agitation, add PART B to PART A. Mix for 15-30 minutes.
4. Add TEA. As emulsion thickens, increase rate of mixing to produce a smooth, opaque product.
5. Mix Germaben II and fragrance into emulsion.

Alcohol-Free Cologne Using Pemulen[®] TR-2 Polymeric Emulsifier P0013

This sprayable product is light, elegant and will not sting the skin.

Ingredient / INCI-CTFA Name	Weight, %	Function	Trade Name (Supplier)
PART A			
Deionized Water	91.53	Diluent	
DMDM Hyantoin	0.30	Preservative	Glydant [®] (Lonza)
Oleth-10	0.30	Particle Size Reducer	Brij [®] 97 (ICI)
PART B			
Cyclomethicone	4.00	Lubricant	Dow Corning [®] 245 Fluid (Dow Corning)
Fragrance	2.00		Noville #31337 (Noville, Inc.)
Isostearyl Benzoate	0.50	Fragrance Fixer	
Acrylates/C10-30 Alkyl Acrylate Crosspolymer	0.15	Emulsifier/Stabilizer	Pemulen[®] TR-2 (Lubrizol Advanced Materials, Inc.)
PART C			
Propylene Glycol (and) Diazolidinyl Urea (and) Methylparaben (and) Propylparaben	1.00	Preservative	Germaben [™] II E (Sutton Laboratories)
PART D			
Triethanolamine	0.12	Neutralizer	
PART E			
Disodium EDTA	0.10	Chelating Agent	

Properties

pH	5.5 - 6.0
Viscosity* (mPa·s)	600 - 900

*Brookfield RVT @ 20 rpm, 25°C, #2 spindle

Preparation Procedure

1. Combine PART A ingredients in a vessel which will contain the entire formulation.
2. Blend PART B ingredients in a separate vessel. The **Pemulen[®] TR-2 polymer** should be slurried in this phase. Disrupt any soft agglomerates of the polymer.
3. With moderate agitation, add PART B to PART A. Mix for 10-20 minutes to allow polymer to swell. Add PART C and mix until uniform.
4. Add PART D and mix vigorously to produce a smooth emulsion.
5. Mix PART E into emulsion incrementally to adjust viscosity downward to 600 - 900 cP.