RHEOLUMEXE®
ASSOCIATIVE THICKENERS

The next big idea in Rheology
Elementis Specialties is a global supplier of natural hectorite clay and provider of natural biofunctional and active ingredients for hair care, skin care and anti-aging formulations.

Get to know us better.
Rheoluxe® Associative Thickeners

The Rheoluxe® family of rheology modifiers are non-ionic polymeric thickeners designed specifically for the personal care market. Rheoluxe® consists of Urethane based and Polyether Polyol based associative thickeners with superior performance in difficult systems such as those containing high salt levels or with extreme pH levels.

Due to its structure, Rheoluxe® is soluble in water, but associates with lipophilic materials to build viscosity.

Chemistry of the Polymers

Rheoluxe® polymeric thickeners were designed to provide the formulator with the broadest variety of rheological profiles. Each of the Rheoluxe® associative thickeners provides viscosity build with multifunctional benefits while maintaining a superior aesthetic profile.

The polymeric backbone in the Rheoluxe series consists of one of two chemistries. The Rheoluxe® 800 series is built on a Urethane chain and the Rheolxue® 8000 series is built on a Polyether Polyol chain. The polymeric backbone remains water soluble while the alkyl end groups provide a hydrophobic site for molecular associations to develop viscosity.

The Rheoluxe® 800 series provides exceptional viscosity build with a shear thinning flow for ease of application.

The Rheoluxe® 8000 series provides viscosity build with improved tolerance to high HLB surfactants.

Rheoluxe structure

Hydrophilic Chain

Hydrophobic Cap

Hydrophobic Cap
Associative Thickeners Mechanism of Action

Associative thickeners increase the viscosity of aqueous systems through a system of molecular associations and interactions. The thickeners consist of water soluble polymeric chains modified with hydrophobic caps.

The hydrophobic caps of the polymer associate, that is, build a structured network, with other hydrophobes in the formula. This results in micelle type structures that form a network resulting in significant viscosity build.

The easy to use solutions thicken aqueous phases for use in single phase or emulsion type formulations. Rheoluxe® can be added at any point in the emulsification process.
Rheoluxe® Associative Thickeners

<table>
<thead>
<tr>
<th>INCI Name</th>
<th>Typical use level:</th>
<th>Chemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rheoluxe® 812</td>
<td>Bis-Lauryl Cocaminopropylamine/HDI/PEG-100 Copolymer (and) Butylene Glycol</td>
<td>1.0 – 3.0%</td>
</tr>
<tr>
<td>Rheoluxe® 880</td>
<td>Bis-C16-20 Isoalkoxy TMHDI/PEG-90 Copolymer</td>
<td>1.0 – 3.0%</td>
</tr>
<tr>
<td>Rheoluxe® 8015</td>
<td>PEG/PPG-450/50 Trimethylolpropane Dodecyl Ether</td>
<td>0.5 – 5.0%</td>
</tr>
</tbody>
</table>

### Typical Properties

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Active content</th>
<th>Viscosity</th>
<th>pH as supplied</th>
<th>Tg</th>
<th>Heavy Metals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rheoluxe® 812</td>
<td>Translucent liquid</td>
<td>25%</td>
<td>5,000-20,000cps</td>
<td>7.5—8.5</td>
<td>Crystalline structure</td>
</tr>
<tr>
<td>Rheoluxe® 880</td>
<td>Translucent liquid</td>
<td>30%</td>
<td>3,000-10,000cps</td>
<td>7.0—8.0</td>
<td>Crystalline structure</td>
</tr>
<tr>
<td>Rheoluxe® 8015</td>
<td>Transparent liquid</td>
<td>50%</td>
<td>1,000-10,000cps</td>
<td>6.0—7.0</td>
<td>-78°C</td>
</tr>
</tbody>
</table>

### Benefits

- Stable at pH 2-12
- Rheoluxe® polymers are supplied as easy to handle liquids
- Cold processable
- Outstanding sensory profile – smooth, soft to the touch, no tacky or negative aesthetics
- Compatible with anionic, non-ionic and cationic emulsifiers
- Compatible in systems with extreme pH or high electrolyte concentration
- Electrolyte tolerant
- Superior viscosity build
- No impact on stability
### Effect on Viscosity in a simple non-ionic emulsion

<table>
<thead>
<tr>
<th>Phase</th>
<th>Ingredient</th>
<th>%w/w</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Water</td>
<td>81.00</td>
</tr>
<tr>
<td></td>
<td><strong>RHEOLUXE®</strong> (812, 880 or 8015)</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td><strong>FANWAX® SEW-P</strong> (Cetearyl Alcohol (and) Polysorbate 60 (and) Steareth-20 (and) Polysorbate 65)</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td><strong>EMCON SUN</strong> (Helianthus Annuus (Sunflower) Seed Oil)</td>
<td>10.00</td>
</tr>
<tr>
<td></td>
<td>Lexemul 561 Glyceryl Stearate (and) PEG-100 Stearate</td>
<td>4.00</td>
</tr>
<tr>
<td>C</td>
<td>Preservative</td>
<td>1.00</td>
</tr>
</tbody>
</table>

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**Graphs:**

- **Rheoluxe 812**
- **Rheoluxe 880**
- **Rheoluxe 8015**
Rheoluxe® 812

Rheoluxe® 812 efficiently develops viscosity in all types of emulsion systems. Systems containing Rheoluxe® 812 are highly shear thinning, allowing light textures to remain light and soft to the touch.

Rheoluxe® 812, like the entire Rheoluxe family is salt tolerant and stable at pH 2-12, allowing for use in difficult to thicken systems.
Rheoluxe® 880

Rheoluxe® 880 was designed to impart rheological control and film forming benefits in aqueous and emulsion systems. It is a highly efficient rheological modifier for use in formulations with difficult to thicken conditions such as extreme pH or high electrolyte concentration.

Rheoluxe® 880 provides the added benefit of film forming, which can help improve transfer resistance in color cosmetics as seen below.
Rheoluxe® 8015

Rheoluxe® 8015 imparts rheological control and high shear viscosity build with a Newtonian type flow. Rheoluxe® 8015 imparts a rich feel to emulsion systems and contributes to increased film thickness.
Rheoluxe® 8015 is based on Polyether Polyol, which is more resistant to the influence of other surfactants, making it useful in sulfate-free cleansing.

Emulsions containing Rheoluxe® do not negatively impact stability. In the temperature sweep below, the sunscreen formula maintains formula integrity over the range of 25—80°C.

$G'$ represents the storage modulus, which measures how elastic or solid like a material behaves. A solid material exhibits elastic behavior, where any deformation reverses spontaneously when an applied force is removed.

$G''$ represents the loss modulus, which measures how viscous, or liquid-like a material appears. Water is an ideal viscous material, where any deformation ceases when the applied force is removed.
Formulation Guidelines

Rheoluxe® rheology modifiers are supplied as easy to handle liquid dispersions that can be added at any point during the emulsion process. They are heat stable, salt tolerant and pH stable. Rheoluxe® can be used in cold process systems and should be mixed with moderate to high shear for best results.

Compatibility

Rheoluxe® rheology modifiers are compatible with a wide range of cosmetic ingredients including traditional thickeners such as carbomer, natural and synthetic gums and clays. In the presence of high HLB surfactants, the Rheoluxe® 800 series may not achieve full viscosity development.

Applications

- Color Cosmetics
- Sunscreens
- Creams and Lotions
- Eye Products
- Facial Make-Up
- Treatment Products
- Hair Care Products
- Hair Color Products
**Daily UV Protecting Lotion**

A  
- KF-6038 (Shin Etsu)  
- SPD-T5 (Shin Etsu)  
- SPD-Z5 (Shin Etsu)  
  
  **FANCOL® Abyshea (Elementis Specialties)**  
  Beeswax  
  Finsolv TN (Innospec)  

B  
- Deionized Water  
- Sodium Chloride  
- Euxyl K701 (Schulke & Mayr)  
- Glycerin  

C  
- Rheoluxe® 8015 (Elementis Specialties)  

Procedure:  
1. Heat phase A ingredients to 60°C with propeller mixing.  
2. Combine phase B ingredients and mix until uniform. Heat phase B to 60°C,  
3. Very slowly, add phase B to phase A with moderate speed propeller mixing.  
4. Cool to room temperature under slow sweep mixing.  

Viscosity: RV T-E @ 20rpm: 28,000cps

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**Hydrating Serum**

A  
- Deionized Water  
- Butylene Glycol  
- Sodium Chloride  

B  
- **Multiple Hydration Complex (Elementis Specialties)**  
- Dow Corning 245 Fluid (Dow Corning)  
- Dow Corning 200 Fluid 10cts (Dow Corning)  
- Abil EM90 (Evonik)  
- KF6017 (Shin Etsu)  
- Crodamol ISNP-LQ (Croda)  
  
  **Fancorsil A (Elementis Specialties)**  

C  
- Euxyl K701 (Schulke & Mayr)  
- Rheoluxe® 8015 (Elementis Specialties)  
- Cucumber Extract  

Procedure:  
1. Combine phase A ingredients with propeller mixing. Heat to 70°C.  
2. Combine phase B ingredients and heat to 70°C with propeller mixing.  
4. Cool to 45°C and add phase C ingredients to batch.  
5. Cool to room temperature with mixing.  

Viscosity: RV T-E @ 20rpm: 28,500cps

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Rheoluxe® 8015 disperses quickly in water with standard mixing. It can be added at any point in the emulsion process.
## Soothing Eye Hydration Creme

**A**
- **FANCOR® ABYSSINIAN OIL (Elementis Specialties)**: 4.00
- **MULTIPLE HYDRATION COMPLEX (Elementis Specialties)**: 2.00
- Sweet Almond Oil: 4.00
- Botanisil CPM-10 (Botanigenics): 2.00
- Botanisil PD 151 CS (Botanigenics): 2.00
- Abil EM90 (Evonik): 1.60
- Botanisil DM90 (Botanigenics): 1.60
- Xiameter 245 Fluid (Dow Corning): 7.00
- Citrol PG32IS LQ (Croda): 2.00
- Crodamol ISNP (Croda): 1.50

**B**
- Deionized Water: 59.80
- Glycerin: 3.00
- Butylene Glycol: 2.00
- Sodium Chloride: 0.50

**C**
- Euxyl K701 (Schulke & Mayr): 1.00
- Neutrazen (Lucas Meyer): 1.00
- Chamomile PB (Bio-Botanica): 1.00
- Green Tea Extract (Bio-Botanica): 1.00
- Cucumber Extract (Bio-Botanica): 1.00
- **Rheoluxe® 8015 (Elementis Specialties)**: 2.00

### Procedure:
1. Heat phase A and phase B to 70°C separately.
2. Very slowly, add phase B to phase A with moderate speed propeller mixing.
3. Cool to 40°C with slow mixing.
4. Add phase C ingredients to batch. Mix until uniform.
5. Cool to room temperature.

**Viscosity**: RV T-E @ 20rpm: 50,750cps
### CURL ENHANCING REPAIRING CREAM

<table>
<thead>
<tr>
<th>A</th>
<th>64.40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td></td>
</tr>
<tr>
<td>Disodium EDTA</td>
<td>0.10</td>
</tr>
<tr>
<td>Glycerin</td>
<td>3.00</td>
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<tr>
<td>Panthenol</td>
<td>0.50</td>
</tr>
<tr>
<td><strong>FANCORSIL® LIM-1 (Elementis Specialties)</strong></td>
<td>3.00</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>B</th>
<th>6.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lipomulse 165</td>
<td></td>
</tr>
<tr>
<td>(Lipo Chemicals)</td>
<td></td>
</tr>
<tr>
<td>Mineral Oil</td>
<td>10.00</td>
</tr>
<tr>
<td>(Penreco)</td>
<td></td>
</tr>
<tr>
<td>Cetearyl Alcohol</td>
<td>2.00</td>
</tr>
<tr>
<td><strong>FANCOL® Abysea (Elementis Specialties)</strong></td>
<td>5.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C</th>
<th>3.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meadowquat® HG-70 (Elementis Specialties)</td>
<td></td>
</tr>
<tr>
<td>Euxyl K701</td>
<td>1.00</td>
</tr>
<tr>
<td>(Schulke &amp; Mayr)</td>
<td></td>
</tr>
<tr>
<td><strong>Rheoluxe® 812 (Elementis Specialties)</strong></td>
<td>2.00</td>
</tr>
</tbody>
</table>

Procedure:
1. Combine phase A ingredients and heat to 80°C with propeller mixing.
2. Combine phase B ingredients and heat to 80°C. Mix until uniform.
3. Add phase B to phase A with propeller mixing.
5. At 40°C, add phase C ingredients to batch one at a time.
6. Cool to room temperature with propeller mixing.

Viscosity: RV T-E @ 20rpm: 35,8010cps
pH: 4.40

### OIL BASED EYE SHADOW

<table>
<thead>
<tr>
<th>A</th>
<th>43.80</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FANCOL® ID-CG (Elementis Specialties)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>BENTONE GEL® ISD V (Elementis Specialties)</strong></td>
<td>10.00</td>
</tr>
<tr>
<td>Hydrogenated Coco Glycerides</td>
<td>10.00</td>
</tr>
<tr>
<td>Ozokerite</td>
<td>8.00</td>
</tr>
<tr>
<td>Carnauba Wax</td>
<td>5.00</td>
</tr>
<tr>
<td>Beeswax</td>
<td>2.00</td>
</tr>
<tr>
<td>Propylparaben</td>
<td>0.20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B</th>
<th>10.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun Prizma Concord Crush (Sun Chemical)</td>
<td></td>
</tr>
<tr>
<td>Timiron Pearl Flake (EMD)</td>
<td>5.00</td>
</tr>
<tr>
<td>Nylon-12</td>
<td>1.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C</th>
<th>5.00</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rheoluxe® 880 (Elementis Specialties)</strong></td>
<td></td>
</tr>
</tbody>
</table>

Procedure:
1. Combine Phase A and heat to 75-80°C.
2. Mix Phase A together using a Silverson Homogenizer.
3. Add Phase B and continue to mix for 15 minutes.
4. Transfer product to a stirrer.
5. Add Phase C at 1000rpm.
6. Increase speed to 2000rpm and mix for 10 minutes.
7. Pour off and allow to cool.
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8-14

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