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HAJMER EC-1

TECHNICAL DATA SHEET

HAJMER EC-1 Multifunctional Liquid Polymer for Skin and Sun Care in O/W Emulsions

Function

HAJMER EC-1 polymer offers a new and easy way to formulate skin care emulsions:

- Enhances skin-feel, providing soft after-feel.
- Modifies rheology, stabilizes, emulsifies and/or co-emulsifies.
- Stabilizes emulsions containing active ingredients with electrolytes.
- Suspends inorganic pigments, including zinc oxide.

Properties

- **CTFA/INCI Designation:** Acrylates/Acrylamide Copolymer and Mineral Oil and Polysorbate 85.
- **Product Form:** Liquid pre-neutralized polymer dispersed in oil.

| | |
|--|----------------------|
| • Chemical Composition: | Weight % |
| Acrylates/Acrylamide Copolymer | 25 – 27 |
| NF Grade Light Mineral Oil | 22 - 24 |
| Polysorbate 85 | 1 - 3 |
| • Polymer Solids: | 25 – 27 % by weight. |
| • Recommended Use Level: | |
| <input type="checkbox"/> As supplied: | 1 - 3% |
| <input type="checkbox"/> Polymer Solids: | 0.25 - 0.80% |
| • Operating pH Range: Typically | 5.5 - 11.0. |

Product Specifications

| | |
|---|-----------------------|
| Appearance | Opaque liquid |
| Viscosity ¹ as Supplied | 1,000 - 6,000 mPa·s |
| pH (4.0% mucilage ²) | 6.3 - 7.3 |
| Viscosity ¹ (2.0% mucilage ²) | 12,000 - 28,000 mPa·s |
| 1 Brookfield Viscometer RV at 20 rpm, 25°C | |
| 2 Mucilage is defined as a dispersion of polymer, as supplied, into water | |

I. Multifunctional Liquid Polymer

- Pre-neutralized anionic rheology modifier.
- Stabilizer for oil-in-water emulsions.
- Emulsifier or co-emulsifier of various oils.
- Suspends physical sunscreens.
- Enhances sensory benefits.

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II. Easy to Use

- Anionic pre-neutralized liquid polymer provides rapid thickening upon addition to water with moderate agitation.
- Versatility of use in formulations:
 - Add to water for rapid thickening.
 - Disperse in oil phase prior to emulsification.
 - Post-addition feasible allowing for final viscosity adjustment.
- Emulsifies/Co-emulsifies a broad range of oils.
- Freedom from HLB formulating constraints.
- Enables cold process formulations.
- Reduces process time.
- Efficient at low use levels.

Summary of Benefits

- Multifunctional liquid polymer.
 - Easy to use.
 - Maintains high performance in the presence of electrolytes.
 - Maintains product integrity under challenging processing conditions.
 - Simplifies emulsification and provides formulation versatility.
 - Enhances sensory benefits.
- Formulations made with HAJMER EC-1 polymer can withstand high processing temperatures.
 - HAJMER EC-1 polymer is a robust polymer, withstanding harsh process conditions.

Simplifies Emulsification and Provides Formulation Versatility

Because HAJMER EC-1 polymer is lightly cross-linked, highly branched, and contains very low levels of high HLB

emulsifier, it works to emulsify or co-emulsify a large variety of oil phase ingredients.

HAJMER EC-1 polymer can work as either a primary or auxiliary emulsifier in oil-in-water emulsion systems depending upon the polarity of the oil phase ingredients. In formulations where oil phase compositions contain low polarity components, the use of an additional auxiliary emulsifier at levels as low 0.2 - 0.5 percent by weight may be required to help stabilize the system.

VERSATILITY OF USE IN OIL-IN-WATER EMULSION SYSTEMS:

This polymer can be added at various stages in the formulation process:

- Add to water with moderate agitation for rapid thickening.
- Can be dispersed in various oil phases prior to addition to water phase. The polarity of the oil phase should be considered, however. In the presence of highly polar oil phase ingredients, hydrogen bonding may take place causing the polymer to swell slightly. In this case, it is best to add the polymer directly to the water phase. When preparing hot process formulations where HAJMER EC-1 polymer is dispersed in the oil phase, always ensure adequate mixing is used.
- HAJMER EC-1 polymer can also be added with moderate agitation to a dispersion containing both the water and the oil phases to thicken rapidly and stabilize an emulsion.
- Post addition of HAJMER EC-1 polymer allows the formulator to adjust the final product viscosity.

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Application Tips

Formulating Emulsion Skin Care Systems with HAJMER EC-1 Polymer :

GENERAL:

- HAJMER EC-1 polymer is recommended for creams and lotions. It can be used to formulate sprayable systems containing high levels of electrolyte.
- Cold process formulating feasible.

ORDER OF ADDITION:

- Electrolyte-containing ingredients (botanicals, humectants, water soluble actives, etc.), when added to a formula, should be added at the end of the formulation process after the polymer has been added and allowed to swell.

USE AS AN EMULSIFIER:

- Effective as a primary or secondary emulsifier.
- Use HAJMER EC-1 polymer as a sole emulsifier when a cream-gel aspect is desired.
- Additional auxiliary emulsifiers at levels as low as 0.2 - 0.5 percent by weight may be required to help stabilize difficult to emulsify oil packages.

pH:

- Recommended for formulations between pH 5.5 to 11; to formulate at pH of 5 to 6, we recommend low levels of addition of mild acid.
- Neutralization is not required.

HAJMER EC-1 Polymer

Brookfield Viscometer RV; 20 rpm, samples measured hot

VI. Enhances Sensory Benefits

1. Preliminary findings

Formulations containing HAJMER EC-1 polymer demonstrate a distinctive skinfeel.

- Leaves the skin feeling soft and supple.
- Imparts a light sensory feel while maintaining firmness and cream cohesion.
- Spreads evenly and slowly.
- Provides good visual appeal to creams and lotions.
- Appears less glossy on the skin.

2. First sensory test evaluation

To evaluate the sensory properties a comparative study was performed. HAJMER EC-1 polymer was compared to the following two rheology modifier chemistries in similar formulations:

- A Carbopol® 980/981 polymer blend.
- A mixture of magnesium aluminum silicate and xanthan gum.

The formulations tested are as follows:

| Ingredient | Wt.% | Wt.% | Wt.% |
|-----------------------------|-------------|-------------|-------------|
| DI Water | 89.85 | 89.10 | 80.90 |
| Glycerin | 1.00 | 1.00 | 1.00 |
| Carbopol® 981 Polymer | 0.20 | | |
| Carbopol® 980 Polymer | 0.35 | | |
| Magnesium Aluminum Silicate | 4.50 | | |
| Xanthan Gum | 0.20 | | |
| Isopropyl Palmitate | 7.00 | 7.00 | 7.00 |
| Steareth-2 | 0.65 | 0.65 | 0.65 |
| Steareth-21 | 0.35 | 0.35 | 0.35 |
| HAJMER EC-1 Polymer | 0.75 | | |
| NaOH (18%) | 0.65 | | |
| Citric Acid (10%) | 5.00 | | |
| Phenonip® antimicrobial | 0.40 | 0.40 | 0.40 |

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Method:

- The test was performed on the inner forearms of 11 women aged 25-55.
- Prior to testing, the panelists' forearms were cleansed and thoroughly dried.
- Three 20-cm² circles, located somewhere between 51-mm above the wrist and 51-mm below the elbow were drawn on the inner forearm of each panelist.
- 50 μ L of each cream were applied to one of the 20-cm² surfaces using a micropipette.
- The creams were evaluated using a forced ranking test for the following parameters:
 - Skinfeel during rubout: wetness, absorbency, spreadability.
 - Afterfeel: softness, stickiness, residue.

Evaluation

- Formulations containing HAIJMER EC-1 polymer are significantly less sticky when compared to formulations containing alternative rheology modifying systems.
- There is no statistical difference in stickiness between creams containing a blend of Carbopol 980/981 polymers versus creams containing a mixture of magnesium aluminum silicate and xanthan gum.
- HAIJMER EC-1 polymer containing formulations leave a low amount of residue on the skin.