Galsoft GLI 21
Cleansing Without Compromise
Contents

- Mild Cleansing
- Galsoft GLI 21

- Mildness
- Performance
- Applications
- Summary
Mild Cleansing
Stratum Corneum: A bioactive layer

- **Corneocytes**
- **Cornified Envelope**
- **Cornified Envelope lipids**
- **Corneodesmosome**
- **Lamellar bodies**
- **Intercellular lipids**
- **Natural Moisturizing factor**

**Layers of the Stratum Corneum**:
- **Stratum basale**
- **Stratum spinosum**
- **Stratum granulosum**
- **Stratum lucidum**
- **Stratum corneum**

**Key Components**:
- Dead keratinocytes
- Lamellar granules
- Keratinocyte
- Langerhans cell
- Melanocyte
- Merkel cell
- Tactile disc
- Sensory neuron

[www.galaxysurfactants.com](http://www.galaxysurfactants.com)
Cleansing process helps to promote normal exfoliation and thereby rejuvenates the skin.

Cleansers are designed to remove dirt, sweat, sebum, oil & bacteria.

Harsh surfactants strip off NMF, lipids and proteins of Stratum Corneum

Seriously impair barrier and moisture balancing function of skin.

AWT (after-wash tightness), increase in TEWL (dryness), erythema, irritation and even itch.

Disturbed hydration levels lead to loss of visco-elastic properties of skin (flexibility and extensibility)

Swelling of proteins and intercalation of surfactants in upper layers of SC

Cleansing without compromise: Cleansing without disturbing the constituents of Stratum Corneum
Amino Acid Composition of Skin and Hair

Amino Acid Composition of Human Skin Collagen

- Glycine: 34%
- Alanine: 14%
- Proline: 10%
- Hydroxyproline: 8%
- Glutamic Acid: 7%
- Arginine: 5%
- Aspartic Acid: 4%
- Serine: 3%
- Others: 15%

Amino Acid Composition of Hair

- Cysteine: 17%
- Serine: 12%
- Glutamic Acid: 11%
- Threonine: 7%
- Leucine: 7%
- Valine: 6%
- Arginine: 6%
- Alanine: 5%
- Aspartic Acid: 5%
- Others: 18%

*J. E. Eastoe in Treatise on collagen Ch.1 p52-53
*Nogei Kagaku [Agricultural Chemistry], Vol.48, No.5 (1974)
Mild Surfactants Market – Last 5 years

- Cocamidopropyl Betaine: 61%
- Coco-glucoside: 13%
- Disodium Cocoamphodiacetate: 5%
- Sodium Lauroyl Sarcosinate: 3%
- Sodium Cocoyl Glutamate: 3%
- Coco-betaine: 3%
- Sodium Cocoyl Isethionate: 2%
- Lauramidopropyl Betaine: 2%
- Disodium Cocoamphodiacetate: 5%
- Sodium Cocoamphodiacetate: 5%
- Sodium Lauroyl Glutamate: 1%
- Sodium Lauroyl Isethionate: 1%
- Others: 0%

Source: Mintel
Acyl Glutamate
A versatile surfactant
Glutamate has sufficient detergency to remove surface lipids but does not strip off constitutive lipids and NMF of the stratum corneum.


Cleansing by N-Acyl Glutamate

Order Parameter: $S = 1$

Order Parameter: $S = 0$

Sample | Order Parameter
--- | ---
Water | 0.89
SCGL | 0.73
Soap | 0.65
SLES | 0.62
SLS | 0.47

Glutamate does not affect TEWL by disordering of intercellular lipid layers of stratum corneum


Cytotoxicity of $N$-Acyl Glutamate

The cytotoxicity data by Neutral Red Cell Viability Assay shows Glutamate as mild surfactant

<table>
<thead>
<tr>
<th>Surfactant</th>
<th>NR 50 (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium Lauroyl-L-Glutamate</td>
<td>100</td>
</tr>
<tr>
<td>Sodium Lauroyl-N-Methyl Taurate</td>
<td>15.5</td>
</tr>
<tr>
<td>Sodium Lauroyl Sarcosinate</td>
<td>12.5</td>
</tr>
<tr>
<td>Sodium Laurate</td>
<td>10</td>
</tr>
<tr>
<td>Sodium Lauryl Sulfate</td>
<td>5.3</td>
</tr>
</tbody>
</table>


Baby Products Containing Glutamate

- Fravin, Finland: Hypoallergenic Hair and Bodywash

- Unilever, Netherland: Neutral Baby Shampoo

- Avalon Natural Products, Canada: Baby Avalon Organics

- Derbe, Italy: Delicate Baby Shampoo

- Wellsoon Technology, Taiwan: Baby Bubble Bath

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Galsoft GLI 21
Cocoyl Isethionate

Cocoyl Glutamate

CAS No: 30134-29-7

Ideal primary surfactant for cleansing formulations at skin pH

WO 2014/181342 A1
### Galsoft GLI 21

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th><strong>Typical Value</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance/Nature</td>
<td>Clear Thin Liquid</td>
</tr>
<tr>
<td>Color</td>
<td>200 APHA Max</td>
</tr>
<tr>
<td>Solids Content, % by mass</td>
<td>45 %</td>
</tr>
<tr>
<td>Active Content, % by mass</td>
<td>38 % min</td>
</tr>
<tr>
<td>KCl, % by mass</td>
<td>7 % max</td>
</tr>
<tr>
<td>Viscosity (in cps)</td>
<td>&lt; 500 max</td>
</tr>
<tr>
<td>(Brookfield LV1 @12 rpm)</td>
<td></td>
</tr>
<tr>
<td>pH Value</td>
<td>6.0 to 7.0</td>
</tr>
<tr>
<td>Solidification Point</td>
<td>&lt; 15 °C</td>
</tr>
</tbody>
</table>
**Galsoft GLI 21 : Stability Profile**

**pH Vs Temperature**

- pH at 20 °C
- pH at 40 °C

**Anionic Activity Vs Temp**

- Activity at 20 °C
- Activity at 40 °C

Days vs pH & Activity % for Galsoft GLI 21 across different temperatures.
Galsoft GLI 21: Preservative-Free

- Staphylococcus aureus ATCC 6538
- Escherichia coli ATCC 8739
- Propionibacterium acnes MTCC 1951
- Pseudomonas aeruginosa ATCC 15442
- Candida albicans ATCC 10231
- Aspergillus niger ATCC 16404
- Malassezia furfur MTCC 1374
- Escherichia coli ATCC 8739
- Staphylococcus aureus ATCC 6538

Graph showing the growth of various bacteria over time with a decrease from 0 day to 28 days.
Mildness
Relative Mildness – Zein Score

- SLS
- Blend of SCG and SCI
- Sodium Cocoyl Isethionate
- Potassium Cocoyl Glutamate
- Galsoft GLI 21
- Sodium Cocoyl Glycinate
- CAPB

mg N/100 g Surfactant

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<table>
<thead>
<tr>
<th>Surfactant</th>
<th>% Protein Denaturation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocoamidopropyl Betaine</td>
<td>0</td>
</tr>
<tr>
<td>Blend of SCG and SCI</td>
<td>10</td>
</tr>
<tr>
<td>Galsoft GLI 21</td>
<td>20</td>
</tr>
<tr>
<td>Potassium Cocoyl Glutamate</td>
<td>30</td>
</tr>
<tr>
<td>Sodium Cocoyl Glycinate</td>
<td>40</td>
</tr>
<tr>
<td>Sodium Cocoyl Isethionate</td>
<td>50</td>
</tr>
<tr>
<td>Sodium Cocoyl Taurate</td>
<td>60</td>
</tr>
<tr>
<td>Sodium Lauryl Sulfate</td>
<td>70/80/90/100</td>
</tr>
</tbody>
</table>

Relative Mildness: Red Blood Cell Test: % Protein Denaturation
Performance of Galsoft GLI 21 at skin pH
Foam and lather: Superlative Performance

Foaming Property at 6.0 pH and 150 ppm Hard Water at 25°C

<table>
<thead>
<tr>
<th>Surfactant</th>
<th>Lather Drainage time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium cocoyl glycinate</td>
<td>10 Sec</td>
</tr>
<tr>
<td>Blend of Glycinate and Isethionate</td>
<td>10 Sec</td>
</tr>
<tr>
<td>Sodium Cocoyl Isethionate</td>
<td>10 sec</td>
</tr>
<tr>
<td>Physical blend of Glutamate and Isethionate</td>
<td>Above 5 mins</td>
</tr>
<tr>
<td>Potassium cocoyl glutamate</td>
<td>Above 5 mins</td>
</tr>
<tr>
<td>Galsoft GLI 21</td>
<td>Above 5 mins</td>
</tr>
</tbody>
</table>

**J. Clinical and Aesthetic Dermatology, 23-30, 6(6), (2013)), US Pat 8, 268,767 and 8, 114,824 (2012)**
Galsoft GLI 21 has significantly creamy and stable foam as compared to the combination of SCG and SCI which is very unstable and bubbles grow in size and become coarse.
Physical blend of Glutamate and Isethionate

\[ \text{pH} = 6.0, \text{ water hardness of 150 ppm} \]

*J. Clinical and Aesthetic Dermatology, 23-30, 6(6), (2013))*,
US Pat 8, 268,767 and 8, 114,824 (2012)
**Body Wash Formulation at skin pH (6.0)**

**Formulation based on Physical blend of KCGL and SCI**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>wt %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical blend of KCGL and SCI</td>
<td>26.5</td>
</tr>
<tr>
<td>CAPB</td>
<td>10</td>
</tr>
<tr>
<td>PEG 150 DS</td>
<td>2</td>
</tr>
<tr>
<td>Water</td>
<td>q.S to 100</td>
</tr>
</tbody>
</table>

**Analysis**

- **pH**: 6.0
- **Viscosity at 25 °C** (Brookfield spindle 3, rpm 12): 4500 cP
- **Total surfactant content**: 12%

**Formulation based on Galsoft GLI 21**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>wt %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galsoft GLI 21</td>
<td>26.5</td>
</tr>
<tr>
<td>CAPB</td>
<td>10</td>
</tr>
<tr>
<td>PEG 150 DS</td>
<td>2</td>
</tr>
<tr>
<td>Water</td>
<td>q.S to 100</td>
</tr>
</tbody>
</table>

**Analysis**

- **pH**: 6.0
- **Viscosity at 25 °C** (Brookfield spindle 3, rpm 12): 4100 cP
- **Total surfactant content**: 12%

---

Weighted foam height (ml)
Viscosity Building in Galsoft GLI 21

Viscosity at 25 deg. C

Viscosity (cP)

% of rheology modifier

6% Galsoft GLI 21 + 6% CAPB with PEG 150 DS

6% Galsoft GLI 21 + 6% CAPB with Carbopol Ultrez

6% Galsoft GLI 21 + 6% CAPB with Carbopol Aqua S

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Galsoft GLI 21 vs Glycinate-Isethioniate: Corneometry / TEWL

- Galsoft GLI 21 does not disorder the lipids of Stratum Corneum and no increase in TEWL
- Galsoft GLI 21 does not remove NMF and hence hydration level is maintained

![Decrease in TEWL](chart1)

![Increase in Skin Hydration](chart2)
Applications
Galsoft GLI 21: Ideal for Transparent, skin-pH Cleansers

Clear Anti-Dandruff Shampoos

Clear Facewash

Clear Anti-acne Facewash

Clear Body Cleansers

Clear Anti-bacterial Bodywash

Clear Men’s Grooming

Clear Baby cleansing products

Clear Shampoos

Clear Feminine Hygiene Products

www.galaxysurfactants.com
Face Wash Formulations

- Anti-acne Facewash
### Acne Cleanser: Clear, Sulphate-Free

#### Phase Ingredients

<table>
<thead>
<tr>
<th>Phase</th>
<th>Ingredients</th>
<th>Weight %</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Water</td>
<td>q.s to 100</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Galsoft GLI 21</strong></td>
<td>14.7</td>
<td>Surfactant</td>
</tr>
<tr>
<td></td>
<td>Cocoamidopropyl Betaine</td>
<td>10</td>
<td>Surfactant</td>
</tr>
<tr>
<td></td>
<td>PEG 150 DS</td>
<td>2</td>
<td>Rheology Modifier</td>
</tr>
<tr>
<td></td>
<td>Salicylic Acid</td>
<td>2</td>
<td>Anti-acne agent</td>
</tr>
<tr>
<td></td>
<td>Capryloyl glycine and Undecylenoyl glycine</td>
<td>2</td>
<td>Skin care agent</td>
</tr>
<tr>
<td>B</td>
<td>Glycerin</td>
<td>5</td>
<td>Humectant</td>
</tr>
<tr>
<td></td>
<td>EDTA</td>
<td>0.1</td>
<td>Chelating agent</td>
</tr>
<tr>
<td></td>
<td>Fragrance</td>
<td>0.5</td>
<td>Fragrance</td>
</tr>
</tbody>
</table>

#### Product Properties

- Surfactants (%Actives): 8
- pH: 4.3 – 4.5
- Viscosity (cP): 1500
- Clarity (NTU): <10
Feminine Intimate Cleanser
# Feminine Intimate Cleanser: pH balanced formula

<table>
<thead>
<tr>
<th>Phase</th>
<th>Ingredients</th>
<th>Weight %</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Water</td>
<td>q.s to 100</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Galsoft GLI 21</strong></td>
<td>20.6</td>
<td>Surfactant</td>
</tr>
<tr>
<td></td>
<td>Cocoamidopropyl Betaine</td>
<td>16.7</td>
<td>Surfactant</td>
</tr>
<tr>
<td></td>
<td>Tween 80</td>
<td>2</td>
<td>Surfactant</td>
</tr>
<tr>
<td></td>
<td>SCT 40</td>
<td>6.4</td>
<td>Surfactant</td>
</tr>
<tr>
<td></td>
<td>Lactic Acid</td>
<td>1</td>
<td>Skin Active</td>
</tr>
<tr>
<td></td>
<td>PEG 7 Glyceryl Cocoate</td>
<td>2</td>
<td>Emollient</td>
</tr>
<tr>
<td></td>
<td>PEG 150 DS</td>
<td>2</td>
<td>Rheology Modifier</td>
</tr>
<tr>
<td></td>
<td>Capryloyl glycine and Undecylenoyl glycine</td>
<td>1</td>
<td>Skin care agent</td>
</tr>
<tr>
<td></td>
<td>Glycerin</td>
<td>2</td>
<td>Humectant</td>
</tr>
<tr>
<td></td>
<td>DC 8500 (silicone)</td>
<td>0.5</td>
<td>Conditioning</td>
</tr>
<tr>
<td></td>
<td>EDTA</td>
<td>0.1</td>
<td>Chelating agent</td>
</tr>
<tr>
<td>B</td>
<td>Fragrance</td>
<td>0.5</td>
<td>Fragrance</td>
</tr>
</tbody>
</table>

- **Surfactants (%Actives):** 9
- **pH:** 3.5 – 3.7
- **Viscosity (cP):** 500
- **Clarity (NTU):** <10
Shampoo Formulations

- Anti-Dandruff Shampoo
# Anti-dandruff Shampoo: Transparent, Sulphate-Free

## Product Properties

- Surfactants (%Actives) 14
- pH 5.4 – 5.6
- Viscosity (cP) 5000

## Phase Ingredients

<table>
<thead>
<tr>
<th>Phase</th>
</tr>
</thead>
</table>
| **A** | Water q.s to 100
| **Galsoft GLI 21** | 34 8 23.6 Surfactant
| Cocoamidopropyl Betaine | 30 6 20 Surfactant
| PEG 150 DS | 100 2 2 Rheology Modifier
| Ketoconazole | 100 1 1 Anit-dandruff Agent
| Capryloyl glycine and Undecylenoyl glycine | 100 1 1 Scalp care agent
| DC 8500 | 100 1 1 Conditioning Agent
| EDTA | 100 0.1 0.1 Chelating agent
| **B** | Fragrance

## B

**Fragrance**

- **Actives %**
- **Weight %**
- **Function**

---

**Galaxy**

Galaxy Surfactants Ltd.

100ml

Clear Skin pH Sulfate Free

Anti-dandruff Shampoo

1% ketoconazole

www.galaxysurfactants.com

Global Supplier to Global Brands
Baby Shampoo
### Shampoo: Sulphate-free, Transparent baby shampoo

<table>
<thead>
<tr>
<th>Phase</th>
<th>Ingredients</th>
<th>Activity %</th>
<th>Actives %</th>
<th>Weight %</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Water</td>
<td>-</td>
<td></td>
<td>q.s to 100</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Galsoft GLI 21</strong></td>
<td>34</td>
<td>4</td>
<td>11.8</td>
<td>Surfactant</td>
</tr>
<tr>
<td></td>
<td>Cocoamidopropyl Betaine</td>
<td>30</td>
<td>4</td>
<td>13.4</td>
<td>Surfactant</td>
</tr>
<tr>
<td></td>
<td>Lauryl Glucoside</td>
<td>50</td>
<td>4</td>
<td>8</td>
<td>surfactant</td>
</tr>
<tr>
<td></td>
<td>Polyquaternium 10</td>
<td>100</td>
<td>0.4</td>
<td>0.4</td>
<td>Rheology Modifier</td>
</tr>
<tr>
<td>B</td>
<td>Capryloyl glycine and Undecylenoyl glycine</td>
<td>100</td>
<td>1</td>
<td>1</td>
<td>Skin care ingredient</td>
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<tr>
<td></td>
<td>EDTA</td>
<td>100</td>
<td>0.1</td>
<td>0.1</td>
<td>Chelating agent</td>
</tr>
</tbody>
</table>

**Product Properties**

- Surfactants (%Actives) 12
- pH                     5.0 – 5.2
- Viscosity (cP)         9000
- Appearance             Clear

www.galaxysurfactants.com
Super-mild to skin
Maintains the hydration level of skin
Exceptional foam & lather at skin pH
Transparent formulation at skin pH
Preservative-free formulations
Synergistic combination of Cocoyl Glutamate and Cocoyl Isethionate
Liquid carrier of sod. cocoyl isethionate, high active and easy to process
Cleansers for sensitive skin (baby and face)
Cleansers for skin with conditions like eczema or psoriasis
Anti-acne formulations
Feminine hygiene
Please visit us at booth 6F60
Super-mild to skin
Moisturizing
Exceptional foam & lather at skin pH
Transparent formulation at skin pH
Preservative-free formulations
Synergistic combination of Cocoyl Glutamate and Cocoyl Isethionate
Liquid carrier of sodium cocoyl isethionate, High active and easy to process
Cleansers for sensitive skin (baby and face)
Cleansers for skin with conditions like eczema or psoriasis
Anti-acne formulations
Feminine hygiene
### Shampoo: Sulphate-free, Transparent

<table>
<thead>
<tr>
<th>Phase</th>
<th>Ingredients</th>
<th>Activity %</th>
<th>Actives %</th>
<th>Weight %</th>
<th>Function</th>
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<tbody>
<tr>
<td>A</td>
<td>Water</td>
<td>-</td>
<td></td>
<td>q.s to 100</td>
<td></td>
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<tr>
<td></td>
<td>Galsoft GLI 21</td>
<td>34</td>
<td>4</td>
<td>11.8</td>
<td>Surfactant</td>
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<tr>
<td></td>
<td>Cocoamidopropyl Betaine</td>
<td>30</td>
<td>4</td>
<td>13.4</td>
<td>Surfactant</td>
</tr>
<tr>
<td></td>
<td>Lauryl Glucoside</td>
<td>50</td>
<td>4</td>
<td>8</td>
<td>Pearling agent</td>
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<tr>
<td></td>
<td>Polyquaternium 10</td>
<td>100</td>
<td>0.4</td>
<td>0.4</td>
<td>Rheology Modifier</td>
</tr>
<tr>
<td>B</td>
<td>Capryloyl glycine and Undecylenoyl glycine</td>
<td>100</td>
<td>1</td>
<td>1</td>
<td>Preservative</td>
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<td></td>
<td>EDTA</td>
<td>100</td>
<td>0.1</td>
<td>0.1</td>
<td>Chelating agent</td>
</tr>
</tbody>
</table>

### Product Properties

- Surfactants (%Actives): 12%
- pH: 5.0 – 5.2
- Viscosity (cP): 9000
- Appearance: Clear
Foaming Properties

Foam Performance at 6.0 pH and 25°C

High foaming than individual surfactants
High foaming than Physically blended surfactants

Foam Volume (ml)
KCGlutamate
SCI
GLI 21 (Synthetic)
GLI 21 (Physical)
Lather Potential (sec)

www.galaxysurfactants.com
Foaming Properties

Foam Performance at 6.5 pH and 25°C

GI 21 is a blend of SCG and SCI

Foam Volume (ml)

Lather Potential (sec)

GI 21 is a blend of SCG and SCI
Foam Performance at 6.5 pH and 25°C

- **Foam Volume (ml)**
  - GI 21
  - GLI 21

- **Lather Potential (sec)**
  - GI 21
  - GLI 21

**pH of Samples**
- 3.5
- 4
- 6
- 6.5
- 7
- 7.5
- 8.5

**Foam Volume (ml) GI 21**
- 200
- 300
- 400

**Foam Volume (ml) GLI 21**
- 200
- 300
- 400

**Lather Potential (sec) GI 21**
- 900
- 800

**Lather Potential (sec) GLI 21**
- 900
- 800

www.galaxysurfactants.com
**Galsoft GLI 21 Performance**

pH = 6.5  
Water Hardness = 150 ppm

- **Sodium Cocoyl Glycinate**
  - Thin Foam
  - Poor lather
  - Low foam vol

- **Sodium Cocoyl Isethionate**
  - Thin Creamy Foam
  - Okay lather

- **Sodium Cocoyl Glutamate**
  - Thin but stable
  - Okay lather

- **Galsoft GLI 21**
  - Dense creamy foam
  - High and Stable foam
  - High lather compared to SCGL and SCI

**www.galaxysurfactants.com**
<table>
<thead>
<tr>
<th>Company</th>
<th>Derbe</th>
<th>Wellsoon Technology</th>
<th>Unilever</th>
<th>Fravin</th>
<th>Avalon Natural Products</th>
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<tbody>
<tr>
<td>Category</td>
<td>Shampoo</td>
<td>Bath additive</td>
<td>Shampoo</td>
<td>Shower Products</td>
<td>Shampoo</td>
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<td>Country</td>
<td>Italy</td>
<td>Taiwan</td>
<td>Netherlands</td>
<td>Finland</td>
<td>Canada</td>
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