Abstract: A solubilizer for essential oils and/or fragrances in water-based compositions comprising at least one N-acyl derivative of proline, of formula (I) in which R is an alkyl radical of from 5 to 21 carbons, M is an alkaline earth metal cation, an alkaline earth metal cation, (NH4)+, an organic cation, I is 1 or 2 and is 2 when M is an alkaline earth metal cation. This solubilizing agent is less toxic than oxoethylene-type known solubilizers and, if contains an added salt formed from an organic or inorganic monovalent cation and an anion of an organic or inorganic acid, it exhibits a decidedly superior solubilizing activity than the aforesaid solubilizers of the known art.
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SOLUBILIZING AGENT FOR ESSENTIAL OILS AND/OR FRAGRANCES

Field of the invention
The present invention relates to a solubilizing agent for essential oils and/or fragrances to be used mainly in essentially aqueous or aqueous-alcoholic cosmetic and pharmaceutical formulations such as perfume, eau de cologne, tonic lotion, and in water-based cleansing formulations such as bath foam, shower foam, shampoo and liquid soap.

The present invention relates to a pre-formulated product containing said solubilizing agent in combination with said essential oil suitable for preparing the aforesaid aqueous cosmetic formulations and cleansing compositions.

Finally a further aspect of the present invention are the aforesaid aqueous formulations for cosmetic use and cleansing compositions.

State of the art
In the cosmetics industry, non-ionic surfactants derived from ethylene oxide are required to water-solubilize essential oils and fragrances, whether of natural or synthetic origin, and to obtain clear solutions. It is now widely known that these substances are damaging to the skin, as metabolites of the oxyethylene chain are toxic. Moreover, these types of substance are non-biodegradable and therefore highly polluting.

Today's cosmetics and cleansing products industries aim to use substances which give the same level of performance while at the same time are non-toxic to the skin and have a low environmental impact.

Lipo-amino acids, or rather N-acyl amino acid derivatives in which the acyl group is derived from a fatty acid, are already widely known as their use in the cosmetics industry is also widely known.

For example, FR2771632 describes a composition containing a lipo-amino acid and glycol combination with antimicrobial activity for the treatment of acne; EP1 147765 A1 describes a cosmetic composition containing as active ingredients a lipo-amino acid and a salt of methicone copolyol phosphate with skin protecting action. In EP1013266, lipo-amino acids are used in cosmetic formulations as texture agents, or as coatings for cosmetic powders.
Lipo-amino acids are also used as surfactants in oil-based cosmetic cleansing compositions as described in WO2005/013927. Finally WO2007/003658, in the name of the applicant, describes a lipogel containing at least one lipophilic substance, at least one lipoprotein and at least one lipo-amino acid, again for use in the cosmetics and cleansing fields. Some of the lipo-amino acids cited in the aforesaid prior art, such as glutamate and glycine derivatives, are barely effective as solubilizers of oily components in water.

**Summary of the invention**

The applicant has now surprisingly found a solubilizing agent for essential oils and/or fragrances in water-based compositions comprising at least one N-acyl derivative of proline, of formula (I)

\[
\begin{align*}
\left(\begin{array}{c}
\text{RO} \\
\text{COO}^-
\end{array}\right) \quad M^{+} \quad l^{-}
\end{align*}
\]

in which R is an alkyl radical from 5 to 21 carbon atoms, M is an alkali metal cation, an alkaline earth metal cation, \((\text{NH}_4)^+\), an organic cation, l is 1 or 2 and is 2 when M is an alkaline earth metal cation.

The applicant has also found that the addition of a salt formed from an organic or inorganic monovalent cation and the corresponding anion of an organic or inorganic type acid substantially enhances (in some cases by 1 or 2 fold) the solubilizing activity of the solubilizer of formula (I).

A further aspect of the present invention is therefore a pre-formulated product for water-based compositions, containing essential oil and/or fragrance, and the solubilizer of formula (I) possibly in association with the aforesaid salt.

A further aspect of the present invention are essentially aqueous or aqueous-alcoholic cosmetic formulations, and water-based cleansing formulations containing essential oil and the solubilizer of formula (I) optionally added with said
Description of the figures

Figures 1A, 2A, 3A, 4A are graphs showing the solubilizing capacity of a solubilizer of formula (I) of the invention, in particular of cocooyl proline sodium salt (NATISOL) and cocooyl proline sodium salt added with sodium chloride (NATISOL/SALT) compared to that of the known surfactant (PEG LRI), in aqueous formulations containing respectively: 1% essential oil of basil (Fig. 1A), eucalyptus (Fig. 2A), mint (Fig. 3A) and sage (Fig. 4A), where the y-axis shows the nephelometric turbidity units (NTU) and the x-axis shows the % of solubilizing oil.

Figures 1B, 2B, 3B 4B are three-dimensional graphs showing the solubilizing capacities of a known surfactant (PEG LRI), cocooyl proline sodium salt (NATISOL) and cocooyl proline sodium salt with added sodium chloride (NATISOL/SALT) relating to the respective aqueous formulations of Fig. 1A-4A, as a function of the essential oil:solubilizing agent ratio.

Figures 5, 6, 7, 8 are graphs showing the solubilizing capacities of cocooyl proline sodium salt (NATISOL) and a known surfactant (PEG LRI) for bath foams, containing respectively: 1% essential oil of pine (Fig. 5), lavender (Fig. 6), basil (Fig. 7), lemon (Fig. 8). Specifically, the x-axis shows the solubilizing agent concentrations in the aqueous formulations, while the y-axis shows turbidity units (NTU).

Finally, figure 9 shows the variation in viscosity of bath foam containing 1% mint essential oil with added known solubilizer (PEG LRI) at 3% and cocooyl proline sodium salt (NATISOL), as a function of added sodium chloride.

Detailed description of the invention

For the purposes of the present invention water-based compositions include essentially aqueous and aqueous-alcoholic cosmetic formulations such as perfume, cologne, after-shave, lotions, tonics, as well as cleansing formulations of different viscosities, such as bath foam, shampoo, shower foam and liquid soap.

Preferably the solubilizer of the present invention consists of a mixture of the N-acyl derivates of formula (I) having different, preferably saturated, alkyl residues, and having preferably from 7 to 20 carbon atoms.

Even more preferably said mixtures are N-acyl derivatives of proline with fatty
acids contained in coconut and palm oils.
In accordance with a particularly preferred embodiment the solubilizer consists of
a mixture of N-acyl derivatives of proline with coconut oil fatty acids, which will
hereinafter be defined as cocoyl proline.

5 In the compounds of formula (I) M is preferably an alkali metal chosen from
sodium and potassium, (NH₄)⁺ or an organic cation of an amine such as
monoethanolamine, triethanolamine.
In accordance with a particularly preferred embodiment of the present invention
the solubilizing agent of formula (I) is cocoyl proline sodium or potassium salt
obtained by condensing proline with coconut fatty acids. Preferably this
solubilizing agent is mixed with water at a concentration between 30 and 70% by
weight, being even more preferably between 55 and 65%. In this case it is a clear
viscous liquid of pH 6.0-7.5 with a light straw colour and a density of 1.08-1.12
g/ml.

The pre-formulated products for water-based compositions, being a further aspect
of the present invention, contain essential oil and the solubilizing agent of formula
(I); if the latter is cocoyl proline sodium or potassium salt, then the latter is added
to the essential oil in weight ratios, relative to the essential oil, dependent on the
specific essential oil and are preferably comprised between 0.1 :1 and 10:1.

If said pre-formulated product is intended for the preparation of essentially
aqueous or aqueous-alcoholic cosmetic formulations, such as perfume, eau de
cologne, after shave, lotions and tonics, said ratio is preferably comprised between
3:1 and 8:1.

In this case if the relative aqueous formulations contain 1% essential oil and/or
fragrance, they will contain between 3 and 8% cocoyl proline sodium or potassium
salt.

If the pre-formulated product is intended instead for the preparation of water-based
cleansing formulations, the weight ratios of cocoyl proline sodium or potassium
salt to essential oil and/or fragrance are preferably comprised between 0.2:1 and
5:1. In this case if the final cleansing compositions contain 1% essential oil, they
will contain between 0.2 and 5% by weight of solubilizer.

Preferably the pre-formulated product also contains salt formed from an inorganic
monovalent cation such as an alkali metal, ammonium, or organic cation such as an organic amine cation, and an anion of an organic or inorganic acid in addition to the solubilizing agent of the present invention. Preferably this salt is chosen from sodium chloride, sodium lactate, ammonium chloride, and is even more preferably chosen from sodium chloride and sodium lactate.

If the solubilising agent of the present invention is cocoyl proline sodium or potassium salt and the salt is sodium chloride or sodium lactate, the weight ratio of solubilizer:salt:essential oil/fragrance is preferably comprised between 0.1:10:1 and 10:0.1:1.

If the pre-formulated product is specifically used for preparing essentially aqueous or aqueous-alcoholic cosmetic formulations, the weight ratio of cocoyl proline sodium or potassium saltsodium lactate or sodium chloride:essential oil and/or fragrance is preferably comprised between 1:10:1 and 6:0.1:1.

Hence in this case, if the essentially aqueous or aqueous-alcoholic cosmetic formulations of the present invention contain 1% essential oil, they will therefore contain between 1 and 6% by weight of cocoyl proline sodium or potassium salt and between 0.1 and 10% by weight of sodium chloride or sodium lactate.

If the pre-formulated product is used for the preparation of water-based cleansing compositions and the solubilizing agent of the present invention is cocoyl proline sodium or potassium salt and the salt is sodium chloride or sodium lactate, the weight ratio of cocoyl proline sodium or potassium saltsodium chloride:essential oil is preferably comprised between 0.25:4:1 and 5:0.5:1.

In this case if the cleansing compositions obtained using these pre-formulated products contain 1% essential oil, they will contain between 0.25 and 5% by weight of cocoyl proline sodium or potassium salt and between 0.5 and 4% by weight of sodium chloride or sodium lactate.

The following examples of the preparation of the essentially aqueous cosmetic formulations and of the water-based cleansing formulations containing various types of essential oils solubilized with cocoyl proline sodium salt are provided by way of non-limiting illustration, the degree of solubility of said formulations being compared with commercially known surfactants.
Examples

The degree of solubility of said water-based compositions was assessed on the basis of their clarity, determined by turbidimetric measurements with a portable nephelometric TB1 turbidimeter by Velp Scientifica.

The nephelometric turbidimeter is based on a comparison between the intensity of a light beam scattered through a sample and the intensity of a light beam scattered through a reference standard under the same sample conditions. The electronic light detector is positioned at 90° to the light source and measures reflected light, which strikes the surface of the sample tube. The greater the light reflected, the greater the sample turbidity.

Solutions are considered to be clear if the turbidity value (NTU) is less than 30. It can be deduced that the lower this value, the clearer the solution. Below a value of 5 NTU, the clarity is said to be crystal-clear.

Example 1: Essentially aqueous formulations

Preparation

The essential oil, the cocoyl proline sodium salt and the optional sodium chloride added in the form of a 20% aqueous solution are mixed with a magnetic stirrer in the ratios indicated in the following tables, adding sufficient water so that the aqueous formulation weighs 100 g in total.

The solubilizing capacity of the cocoyl proline sodium salt optionally combined with sodium chloride was compared with a solubilizing agent having the following composition:

♦ 40-50% PEG-40 Hydrogenated castor oil
♦ 30-40% PPG-26 Buteth-26
♦ 10-15% Trideceth-9
♦ 5-10% Water

For the sake of simplicity, in the subsequent pages this type of product will be known as "PEG LRI".

In the following tables the degrees of solubility of the essentially aqueous formulations obtained with the solubilizing agent of the present invention and optional added sodium chloride are given and compared with those obtained with the state of the art surfactant.
Table 1. Aqueous formulation containing basil essential oil

<table>
<thead>
<tr>
<th>Essential Solubilizer (g/g)</th>
<th>Clarity (NTU)</th>
<th>Clarity (NTU)</th>
<th>Clarity (NTU)</th>
<th>Sodium chloride (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PEG LRI</td>
<td>Cocoyl proline sodium salt</td>
<td>Cocoyl proline sodium salt + sodium chloride</td>
<td></td>
</tr>
<tr>
<td>1:1</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>-</td>
</tr>
<tr>
<td>1:2</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>-</td>
</tr>
<tr>
<td>1:3</td>
<td>986</td>
<td>1000</td>
<td>1000</td>
<td>-</td>
</tr>
<tr>
<td>1:4</td>
<td>525</td>
<td>920</td>
<td>13.10</td>
<td>2.5</td>
</tr>
<tr>
<td>1:5</td>
<td>42.3</td>
<td>840</td>
<td>5.81</td>
<td>1.4</td>
</tr>
<tr>
<td>1:6</td>
<td>40.5</td>
<td>13.29</td>
<td>4.20</td>
<td>0.7</td>
</tr>
<tr>
<td>1:7</td>
<td>10.70</td>
<td>2.56</td>
<td>2.56</td>
<td>-</td>
</tr>
<tr>
<td>1:8</td>
<td>10.05</td>
<td>2.30</td>
<td>2.30</td>
<td>-</td>
</tr>
<tr>
<td>1:9</td>
<td>9.69</td>
<td>1.90</td>
<td>1.90</td>
<td>-</td>
</tr>
</tbody>
</table>

The data given in table 1 have also been represented in the form of a two-dimensional and a three-dimensional graph.

As apparent from both the tabulated data and graphs in Figures 1A and 1B, the solution clarifies when using respectively a 7:1 ratio of known solubilize π essential oil (7% solubilizer in the final aqueous formulation) but only 6:1 (6% of solubilizer) with the solubilizer of the invention; the solubilize π essential oil ratio is further reduced to 4:1 (4% of solubilizer in the final aqueous formulation) if sodium chloride (2.5 g) is also added to the solubilizer of the present invention.

Neither does the aqueous formulation become crystal-clear by using a high solubilize π essential oil ratio of 9:1 with the solubilizer of the known art, whereas with the solubilizer of the present invention it already becomes crystal-clear by using only a 7:1 solubilize π essential oil ratio (7% in the final formulation); this ratio falls further to 6:1 by adding only 0.7 g of sodium chloride.
Table 2. Formulation containing eucalyptus essential oil

<table>
<thead>
<tr>
<th>Essential oil Solubilizer (g/g)</th>
<th>Clarity (NTU) PEG LRI</th>
<th>Clarity (NTU) Cocoyl proline sodium salt</th>
<th>Clarity (NTU) Cocoyl proline sodium salt + sodium chloride (g)</th>
<th>Sodium chloride (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>-</td>
</tr>
<tr>
<td>1:2</td>
<td>787</td>
<td>741</td>
<td>22.43</td>
<td>5.4</td>
</tr>
<tr>
<td>1:3</td>
<td>40.0</td>
<td>10.17</td>
<td>10.5</td>
<td>1.2</td>
</tr>
<tr>
<td>1:4</td>
<td>7.71</td>
<td>10.54</td>
<td>11.59</td>
<td>0.85</td>
</tr>
<tr>
<td>1:5</td>
<td>7.56</td>
<td>2.08</td>
<td>7.60</td>
<td>0.40</td>
</tr>
<tr>
<td>1:6</td>
<td>7.04</td>
<td>1.90</td>
<td>2.87</td>
<td>0.4</td>
</tr>
<tr>
<td>1:7</td>
<td>6.59</td>
<td>1.71</td>
<td>1.71</td>
<td>-</td>
</tr>
<tr>
<td>1:8</td>
<td>5.29</td>
<td>1.60</td>
<td>1.60</td>
<td>-</td>
</tr>
<tr>
<td>1:9</td>
<td>4.74</td>
<td>1.60</td>
<td>1.60</td>
<td>-</td>
</tr>
</tbody>
</table>

The data given in table 2 have also been represented in the form of a two-dimensional and a three-dimensional graph in Figures 2A and 2B respectively.

As apparent from both the tabulated data and graphs in Figures 2A and 2B, the solution clarifies when using a 4:1 ratio of known solubilizer essential oil (4% in the final aqueous formulation), whereas with the cocoyl proline sodium salt, in accordance with the present invention the solution clarifies when using a solubilizing agent essential oil ratio of 3:1 (3% of solubilizer in the final aqueous formulation); if sodium chloride (5.4 g) is also added, this ratio is further reduced to 2:1.

The aqueous formulation becomes clear when using a high known-art solubilizer essential oil ratio of 9:1 (9% of solubilizer in the final aqueous formulation), whereas this ratio is lower at 5:1 when using cocoyl proline sodium salt (5% in the final aqueous formulation). Addition of sodium chloride does not affect the solubilizing capacity of the cocoyl proline sodium salt.
Table 3. Formulation containing mint essential oil

<table>
<thead>
<tr>
<th>Essential oil: solubilizer (g/g)</th>
<th>Clarity (NTU)</th>
<th>Clarity (NTU)</th>
<th>Clarity (NTU)</th>
<th>Sodium chloride (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEG LRI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:1</td>
<td>1000</td>
<td>1000</td>
<td>256</td>
<td>9.7</td>
</tr>
<tr>
<td>1:2</td>
<td>1000</td>
<td>1000</td>
<td>11.52</td>
<td>5</td>
</tr>
<tr>
<td>1:3</td>
<td>1000</td>
<td>890</td>
<td>5.96</td>
<td>1.4</td>
</tr>
<tr>
<td>1:4</td>
<td>976</td>
<td>863</td>
<td>6.61</td>
<td>0.8</td>
</tr>
<tr>
<td>1:5</td>
<td>27.9</td>
<td>4.96</td>
<td>4.10</td>
<td>0.3</td>
</tr>
<tr>
<td>1:6</td>
<td>14.76</td>
<td>3.10</td>
<td>3.10</td>
<td>-</td>
</tr>
<tr>
<td>1:7</td>
<td>13.20</td>
<td>2.60</td>
<td>2.60</td>
<td>-</td>
</tr>
<tr>
<td>1:8</td>
<td>12.41</td>
<td>2.10</td>
<td>2.10</td>
<td>-</td>
</tr>
<tr>
<td>1:9</td>
<td>12.50</td>
<td>2.05</td>
<td>2.05</td>
<td>-</td>
</tr>
</tbody>
</table>

The data given in Table 3 have also been represented in the form of a two-dimensional and a three-dimensional graph in Figures 3A and 3B respectively.

As apparent from both the tabulated data and graphs in Figures 3A and 3B, the solution clarifies when using respectively a 5:1 ratio of known solubilizer essential oil (5% in the final aqueous formulation) whereas with the cocoyl proline sodium salt and using the same ratio, the formulation actually becomes crystal-clear. A clear solution is instead obtained using a low cocoyl proline sodium salt essential oil ratio of 2:1 (2% in the final solution) if 5 g of sodium chloride are added.

Table 4. Formulation containing sage essential oil

<table>
<thead>
<tr>
<th>Essential oil: solubilizer (g/g)</th>
<th>Clarity (NTU)</th>
<th>Clarity (NTU)</th>
<th>Clarity (NTU)</th>
<th>Sodium chloride (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEG LRI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:1</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>-</td>
</tr>
<tr>
<td>1:2</td>
<td>1000</td>
<td>1000</td>
<td>15.03</td>
<td>9.1</td>
</tr>
<tr>
<td>1:3</td>
<td>1000</td>
<td>1000</td>
<td>12.16</td>
<td>3</td>
</tr>
<tr>
<td>1:4</td>
<td>505</td>
<td>564</td>
<td>4.77</td>
<td>2.1</td>
</tr>
</tbody>
</table>
The data given in table 4 have also been represented in the form of a two-dimensional and a three-dimensional graph in Figures 4A and 4B respectively.

As apparent from both the tabulated data and graphs in Figures 4A and 4B, the solution clarifies when using a 5:1 ratio of known solubilizer: essential oil (5% in the final aqueous formulation) whereas with the cocoyl proline sodium salt, a ratio of only 6:1 need be used for the solution to be already crystal-clear. This ratio drops to 4:1 when 2.1 g of sodium chloride are added.

In conclusion in the essential oils tested, cocoyl proline sodium salt has a comparable solubilizing capacity to that of the known surfactant, although in the illustrated cases it is actually higher. However, if moderate amounts of only 1-5% sodium chloride are added to the cocoyl proline sodium salt, the latter shows a solubilizing capacity 1 or 2 times greater than that of the known surfactant.

**Example 2: Water-based cleansing formulations**

The solubilizing agents of the present invention are an important option for formulating skin-compatible and ecological cosmetic products (containing fragrances and essential oils to be solubilized).

As already shown for these products, solubilization of the various perfumes in cosmetic cleansers can be enhanced, particularly in highly perfumed products such as bath foam and shower foam which often have clarity problems and hence require the aid of ethoxylated substances.

For example a bath foam with 1% essential oil remains turbid. If this EO (essential oil) is first dissolved in a 1:0.5 ratio (EO:cocoyl proline sodium salt), it spontaneously clarifies in the bath foam.

It can be stated that cocoyl proline sodium salt is a potent solubilizer of vegetable origin for cosmetic cleansers, being also active at low concentrations.

By way of illustration, figures 5-8 show some non-limiting examples of the

<table>
<thead>
<tr>
<th>Ratio</th>
<th>EO (%)</th>
<th>Proline (%)</th>
<th>Clarity (visual)</th>
<th>Sodium Chloride (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:5</td>
<td>16.69</td>
<td>443</td>
<td>2.90</td>
<td>1.05</td>
</tr>
<tr>
<td>1:6</td>
<td>13.53</td>
<td>2.02</td>
<td>3.44</td>
<td>0.2g</td>
</tr>
<tr>
<td>1:7</td>
<td>7.87</td>
<td>1.90</td>
<td>1.90</td>
<td>-</td>
</tr>
<tr>
<td>1:8</td>
<td>7.39</td>
<td>1.90</td>
<td>1.90</td>
<td>-</td>
</tr>
<tr>
<td>1:9</td>
<td>6.72</td>
<td>1.85</td>
<td>1.85</td>
<td>-</td>
</tr>
</tbody>
</table>
solubilizing capacity of cocoyl proline sodium salt compared with PEG LRI whose composition is given above, in a standard cleansing formula composed as follows:

- 30% SLES (28% sodium lauryl ether sulphate)
- 3% of 30% Cocobetaine
- 1% Cocamide DEA

Figure 5 shows a graph of variation in the solubility of bath foam containing pine essential oil from which it can be seen that a concentration of just 0.25% of the solubilizer of the present invention is sufficient to transform the bath foam from turbid to clear, while with the known surfactant a quantity of 1.25%, that is to say a quantity equal to 5 times the quantity of cocoyl proline sodium salt, is necessary. Figure 6 clearly shows that if about 0.7% by weight of the solubilizer of the present invention is added to bath foam containing lavender oil, a clear bath foam is obtained whereas about 1% of the known surfactant must be added to attain comparable results.

Figure 7 demonstrates that if about 0.5% of the solubilizer of the present invention is added to a bath foam containing basil oil, a clear bath foam can be obtained; with the known surfactant, a quantity of 1.25% is required to attain comparable results.

Figure 8 demonstrates that in a bath foam containing lemon oil the solubilizer of the present invention is more effective than the known product even though to a lesser extent than in the other aforegiven examples.

We can therefore state that if the solubilizer of the present invention is introduced into a surfactant system such as cosmetic cleansers, it is far more effective than traditional solubilizers for solubilizing significant quantities of perfume, in some cases by up to 100-200%, and with considerable savings. Moreover, it does not reduce viscosity as do oxyethylene derivatives but results in a higher decreasing viscosity curve as indicated in the graph shown in figure 9.

In this respect if we examine a basic cleansing formula composed as follows:

- 30% of 28% SLES
- 3% of 30% Cocobetaine
- 1% Cocamide DEA
1% mint essential oil
% NaCl as shown in the x-axis in figure 8
3% solubilizer (cocoyl proline/PEG-LRI)
to 100% with water,
it can be noted that bath foam viscosity does not decrease and is much higher than that of the bath foam containing the known solubilizer. Another point greatly in favour of cocoyl proline sodium salt usage is the nature of said compound, being a lipo-amino acid very gentle on the skin, as it is derived from one of the amino acids with the most presence thereon, i.e. proline.
Furthermore, it has a strong foam-producing capacity and, in contrast to oxyethylated castor oil solubilizers, does not knock down foam but strengthens it significantly such as to replace any secondary surfactants suited to this purpose. The solubilizers of the present invention, being foam-producing lipo-amino acids, also become secondary surfactants with positive effects on skin hydration; below pH 5, however, they lose their activity in systems devoid of surfactants and must hence, if required, be supported by traditional solubilizers.
CLAIMS

1. Solubilizing agent for essential oils and/or fragrances in water-based compositions comprising at least one N-acyl derivative of proline of formula (I)

\[
\begin{align*}
\text{RO} & \quad \text{COO}^- \quad M^+ \quad I \quad (I)
\end{align*}
\]

in which R is an alkyl radical from 5 to 21 carbon atoms, M is chosen from an alkali metal cation, an alkaline earth metal cation, an organic cation and \((\text{NH}_4)^+\), I is 1 or 2 and is 2 when M is an alkaline earth metal cation.

2. Solubilizing agent according to claim 1, characterized by consisting of a mixture of N-acyl derivatives of formula (I) having different saturated alkyl residues R having from 7 to 20 carbon atoms.

3. Solubilizing agent according to claim 2, characterized by being a mixture of N-acyl derivatives of proline and fatty acids contained in coconut and palm oils.

4. Solubilizing agent according to claim 3, characterized by being a mixture of N-acyl derivatives of proline and coconut oil fatty acids.

5. Solubilizing agent according to any one of claims 1-4, wherein M is an alkali metal chosen from sodium or potassium, an organic cation of an amine or \((\text{NH}_4)^+\).

6. Solubilizing agent according to claim 3, characterized in that M is chosen from sodium or potassium.

7. Pre-formulated product for preparing water-based compositions, containing essential oil and/or fragrance, the solubilizer of formula (I) according to any of claims 1-6 optionally in combination with a salt formed from an organic type monovalent cation and an anion of an organic or inorganic type acid.

8. Pre-formulated product according to claim 7, characterized in that said salt is chosen from sodium chloride, sodium lactate and ammonium chloride.

9. Pre-formulated product according to either of claims 7 or 8, containing as solubilizing agent cocooyl proline sodium or potassium salt in weight ratios
comprised between 0.1:1 and 10:1.

10. Pre-formulated product according to claim 9, characterized in that if intended for the preparation of essentially aqueous or aqueous-alcoholic cosmetic formulations, the said ratio is comprised between 3:1 and 8:1.

11. Pre-formulated product according to claim 9, characterized in that if intended for the preparation of water-based cleansing formulations, the said ratios are comprised between 0.2:1 and 5:1.

12. Pre-formulated product according to claim 8, characterized in that if the solubilizing agent is cocoyl proline sodium or potassium salt and it also contains sodium chloride or sodium lactate, the weight ratio of solubilizeπ salt essential oil is comprised between 0.1:10:1 and 10:0.1:1.

13. Pre-formulated product according to claim 12, characterized in that if it is used for the preparation of essentially aqueous or aqueous-alcoholic cosmetic formulations, the said ratio is comprised between 1:10:1 and 6:0.1:1.

14. Pre-formulated product according to claim 12, characterized in that if it is used for the preparation of water-based cleansing formulations, the said weight ratio is comprised between 0.25:4:1 and 5:0.5:1.

15. Essentially aqueous or aqueous-alcoholic cosmetic formulations containing an essential oil and/or fragrance and the solubilizing agent according to any one of claims 1-7 possibly in combination with a salt formed from an organic or inorganic monovalent cation and an anion of an organic or inorganic type acid.

16. Water based cleansing formulations containing the solubilizing agent according to any one of claims 1-7 possibly in combination with a salt formed from an organic or inorganic monovalent cation and an anion of an organic or inorganic type acid.
FIGURA 9

Viscosity mPa*s

3800
3300
2800
2300
1800
1300
800
300

0,8 1,2 1,6 2 2,4 2,8 3,2 3,6

g NaCl

-NATISOL
-PEG LRI
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61K8/44 A61Q19/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61K A61Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal , CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Category</th>
<th>Citation of document with indication, where appropriate, of the relevant passages</th>
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X Further documents are listed in the continuation of Box C

X See patent family annex

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

Date of the actual completion of the international search 26 January 2009

Date of mailing of the international search report 03/02/2009

Name and mailing address of the ISA

European Patent Office, P B 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel (+31-70) 340-2040, Fax (+31-70) 340-3016

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