Stable emulsions of perfluoropolyethers and fat substances and process for preparing them

Stabile Emulsionen aus Perfluoropolyäthern und Fettsubstanzen und Verfahren zu ihrer Herstellung

Emulsions stables de perfluoropolyéthers et de graisses et procédé pour les préparer

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Description

The present invention relates to stable emulsions of perfluoropolyethers having perfluoroalkyl end groups and of fat substances.

It is known that said perfluoropolyethers exhibit a very high hydrophobicity and lipophobicity, wherefor it was possible to prepare stable aqueous emulsions thereof by by means of particular combinations of components of the same emulsions.

U.S. patent 4,803,067 discloses stable emulsions of perfluoropolyethers having perfluoroalkyl end groups in oil/water emulsions or water/oil emulsions obtained by using emulsifiers. These emulsions are utilized, in particular, in lotions and creams for cosmetology and dermatology, in consideration of the excellent properties of said perfluoropolyethers in said applications, due to the particular formation, on the skin, of a water-repellent, oxygen-permeable and carbon dioxide-permeable protective film, which permits the normal skin respiration.

European Patent Application No. 390,206 describes stable emulsions of perfluoropolyethers having perfluoroalkyl end groups in glycerol or other polyhydroxylated compounds, prepared by using emulsifiers. In the preparation of cosmetic or dermatological products, the abovesaid emulsions are added to basic formulations containing the other components.

So far it was not possible to obtain stable emulsions of perfluoropolyethers with fat substances, although the need for such emulsions of anhydrous or substantially anhydrous nature was strongly felt in the cosmetic and dermatological sectors or in industrial appliances, wherein said anhydrous or substantially anhydrous emulsions would have permitted to preserve the hydrophobic nature of the anhydrous products whereinto they would have been introduced.

It has now been found that it is possible to obtain stable emulsions of perfluoropolyethers having perfluoroalkyl end groups (hereinafter briefly referred to as perfluoropolyethers) and fat substances if one or more fat substances in the liquid state is or are added, under stirring, to an emulsion of perfluoropolyether in glycerol or other polyhydroxylated compounds in the presence of a surfactant which is soluble in glycerol or in the other polyhydroxylated compounds.

The existence of said stable emulsions of perfluoropolyethers and fat substances in glycerol or other polyhydroxylated compounds is very surprising since it is not possible to emulsify a fat substance in glycerol or in another polyhydroxylated compound and it is not possible to emulsify a perfluoropolyether in a fat substance. It has surprisingly been found that the presence of a perfluoropolyether in emulsion in glycerol or other polyhydroxylated compounds makes it possible to emulsify the fat substance in the perfluoropolyether-glycerol system or in the perfluoropolyether-other polyhydroxylated compounds system.

Thus, it is an object of the present invention to provide stable, anhydrous or substantially anhydrous emulsions of perfluoropolyethers and fat substances.

Another object is to provide a process for preparing such emulsions.

The former object is achieved by the

stable emulsion of a first dispersed phase consisting of perfluoropolyethers having perfluoroalkyl end groups and of a second dispersed phase consisting of one or more fat substances, selected from:
a liquid product (oil) insoluble in water and in the polyhydroxylated compounds mentioned below, and a product which is solid at room temperature (fat), is insoluble in water and in the polyhydroxylated compounds and has a melting temperature not exceeding 100° C.,
said two phases being dispersed in a continuous phase, characterized in that the continuous phase consists of one or more polyhydroxylated compounds selected from glycerol and polyalcohols other than glycerol and saccharides, containing at least three hydroxyl groups, said emulsion having the following weight composition:

(a) perfluoropolyether or perfluoropolyethers: 1-50% by weight of the emulsion;
(b) polyhydroxylated compound or compounds: 10 or more per cent by weight of the emulsion;
(c) fat substance or substances: 10-80% by weight of the emulsion, and
(d) one or more emulsifiers which are soluble in the polyhydroxylated compound or compounds and which are selected from:

- sodium laurylsulphate,
- sulphosuccinate (sulphosuccinic hemiester),
- coco amphotearboxyglyciniate,
- potassium cetylphosphate,
- sodium alkyl-polyoxyethylene-ether carboxylate,
- benzalconium chloride,
- alkylamidopropylbetaine,
coco amidopropylbetaine:

0.1 - 10% by weight of the emulsion;

and in that the emulsion optionally comprises up to 20% by weight of the total emulsion of water or of an alcohol wherein components (a), (b), (c) and (d) retain their relative proportions.

The perfluoropolyethers having perfluoroalkyl end groups, i.e. free from functional groups, are well-known compounds, which are described, along with their method of preparation, in several documents, among which British patent 1,104,482, U.S. patents 3,242,218; 3,665,041; 3,715,578; 4,523,039; European patent applications 148,462; 151,877 and 191,490 and international patent applications WO 87/00538 and WO 87/02992. Several perfluoropolyethers are available on the market under the trademarks Fomblin(R), Galden(R), Kyteox(R) and Demnum(R).

Suitable perfluoropolyethers are the ones characterized by the presence of one or more repeating perfluoroalkylene units:

a) \((\text{CF}_2\text{-CF}_2\text{-O})\)
b) \((\text{CF}_3\text{-O})\)
c) \((\text{C}_3\text{F}_6\text{O})\), simplified formula for

d) \((\text{CF}_2\text{-CF}_2\text{-CF}_2\text{-O})\)
e) \((\text{CF}_2\text{-CF}_2\text{-CF}_2\text{-O})\)
f) \((\text{CF}_3\text{-O})\)
g) \((\text{CF}_3\text{-O})\)

where the \(R\) groups, like or unlike each other, are a fluorine atom or a perfluoroalkyl group preferably containing 1 to 3 carbon atoms.

Preferably the perfluoropolyethers suitable for the present invention exhibit the following individual perfluoroalkylene units or the following combinations of perfluoroalkylene units:

I) \((\text{CF}_2\text{-CF}_2\text{-O})\) and \((\text{CF}_2\text{-O})\), these units being statistically distributed along the perfluoropolyether chain; or

II)
EP 0 494 412 B1

\[
\begin{align*}
(F_2-CF_0) \\
\text{CF}_3
\end{align*}
\]

and (CFXO), where X is F or CF_3, said units being statistically distributed along the chain; or

III) (CF_2-CF_2O),

\[
\begin{align*}
(F_2-CF_0) \\
\text{CF}_3
\end{align*}
\]

and (CFXO),

wherein X is F or CF_3, said units being statistically distributed along the chain; or

IV)

\[
\begin{align*}
(F-CF_2O) \\
\text{CF}_3
\end{align*}
\]

or

V) (CF_2-CF_2-CF_2O); or

VI) (CF_2-CF_2O); or

VII)

\[
\begin{align*}
\text{CF}_3 & \quad \text{R}_t^+ \quad \text{R}_f^- \\
\text{C} & \quad \text{C} \quad \text{C} & \quad \text{C} \\
\text{CF}_3 & \quad \text{R}_f'' & \quad \text{R}_f'' & \quad \text{R}_f''
\end{align*}
\]

where the R_t^+ groups, like or unlike each other, are a fluorine atom or a perfluoroalkyl group preferably containing 1 to 3 carbon atoms; or

VIII) (CF_2O-CF_2-CF_2O)

Suitable are also the perfluoropolyethers containing perfluoroxyethane rings

\[
\begin{align*}
\text{T} & \quad \text{B} \quad \text{O} \\
\text{C} & \quad \text{C} & \quad \text{CF} & \quad \text{A} \\
\text{CF} & \quad \text{O} & \quad \text{CF}_2 & \quad \text{CF}_2
\end{align*}
\]

wherein T, A, B and R, like or different from one another, are perfluoroxyalkyl, perfluoropolyoxyalkyl or perfluoroalkyl radicals preferably containing 1 to 6 carbon atoms.
Examples of suitable perfluoropolyethers having repeating perfluoroalkylene units are the ones belonging to the following classes:

\[ \text{CF}_3 \]

\[ \text{CF}_2 \text{O} \]

where: \( R_f \) and \( R'_f \), like or unlike each other, are selected from the group consisting of \( \text{CF}_3, \text{C}_2\text{F}_5 \) and \( \text{C}_2\text{F}_7 \); units \( \text{C}_2\text{F}_4\text{O} \) (oxytrifluoromethyltrifluoroethylene),

\[ a \]  
\[ b \]  
\[ c \]  
\[ d \]  
\[ e \]  
\[ f \]  

and \( \text{CF}_2\text{O} \) are statistically distributed along the chain;

\( a \) is an integer;

\( b \) and \( c \) are integers or zero;

when the sum \( b+c \) is other than zero, the \( \frac{a}{b+c} \) ratio ranges from 5 to 40;

B) \( \text{CF}_3\text{O}-(\text{C}_2\text{F}_4\text{O})_d(\text{CF}_2\text{O})_e\text{CF}_3 \)

where units \( \text{C}_2\text{F}_4\text{O} \) and \( \text{CF}_2\text{O} \) are statistically distributed along the chain; \( d \) and \( e \) are integers; the d/e ratio varies from 0.3 to 5;

C) \( \text{CF}_3\text{O}-(\text{C}_2\text{F}_4\text{O})_d(\text{C}_2\text{F}_4\text{O})_e(\text{CFXO})_g\text{CF}_3 \)

where units \( \text{C}_2\text{F}_6\text{O}, \text{C}_2\text{F}_4\text{O} \) and \( \text{CFXO} \) are statistically distributed along the chain;

\( X \) is \( \text{F} \) or \( \text{CF}_3 \);

\( f, g \) and \( h \) are integers;

the \( \frac{f}{g} \) ratio ranges from 1 to 50,

and the \( \frac{g}{h} \) ratio ranges from 1 to 10;

D) \( \text{R}_1\text{O}-(\text{CF}_2\text{CF}_2\text{CF}_2\text{O})_g\text{R}_1\text{O} \)

where \( \text{R}_1 \) and \( \text{R}_1' \), like or different from each other, are \( -\text{CF}_3 \) or \( -\text{C}_2\text{F}_5 \) and \( j \) is an integer.

The perfluoropolyethers suitably used in the present invention have generally a number average molecular weight ranging from 500 to 20,000 and, more commonly, from 1,000 to 10,000.

The polyhydroxylated compounds suitably used in the present invention are described in detail in the cited European patent application 390,206 in the name of the same Applicant.

When the polyhydroxylated compound is solid, it is dissolved in water or in a hydrophilic solvent. It is advisable to use the minimum amount of water or of hydrophilic solvent which is necessary to dissolve the compound.

Suitable hydrophilic solvents are, for example, glycols, glycerol, lower alcohols, ethereal solvents and diglymes, also admixed with water.

However, water is usually utilized as a solvent. Suitable are the concentrated aqueous solutions (syrups) of polyalcohols and saccharides, which are commercially available.

Usually the concentration of the solutions ranges from 50% to 80% by weight.

Best preferred polyhydroxylated compounds are glycerine, diglycerol, triglycerine and tetracylycerine.

The oils and the fats according to the present invention can be of vegetable, animal, hydrocarbon or synthetic nature. They are in particular fatty acids, esters and amides, silicone oils and hydrocarbon oils and fats.

The emulsifier shall be soluble in the polyhydroxylated compound and in particular it is of the ionic type. The emulsifier is selected from the following:

- sodium laurylsulphate,
- sulphasuccinate (sulphosuccinic hemiester),
- coco amphocarboxyglycinatet,
- potassium cetylphosphate,
- sodium alkyl-polyoxyethylene-ether carboxylate,
- benzenonium chloride,
- alkylamidopropylbetaine,
- coco amidopropylbetaine.

The emulsions according to the present invention have preferably the following composition:

- perfluoropolyether or perfluoropolyethers: 5-25% by weight;
- one or more polyhydroxylated compounds: 10-59% by weight;
- fat substance or substances: 35-50% by weight;
- emulsifier or emulsifiers: 0.3-3% by weight.

The most preferred emulsions contain from 10 to 40% by weight of polyhydroxylated compounds. Commonly, the emulsions contain only one perfluoropolyether and only one polyhydroxylated compound. Depending on the nature and proportion of the components, the emulsions of the present invention exhibit a very wide viscosity range, which makes them suitable for a broad applicative field. The least viscous emulsions have, for example, a viscosity of 2,000 cps (centipoises) at 25°C, while the most viscous emulsions have, for example, a viscosity of 1,000,000 cps or above.

The viscosity increases with the concentration of the fat substances and of the perfluoropolyethers and when use is made of more viscous polyhydroxylated compounds. At equal concentration, also the nature of the fat substances influences the viscosity.

The viscosity of the emulsions can be lowered, if so desired, by addition of water or of alcohols. Suitable alcohols are, for example, alkyl alcohols having 1 to 4 carbon atoms, and ethylene glycols containing 2 to 4 carbon atoms.

The addition of water or alcohol tends to lower the stability of the emulsions, therefore it is not advisable to add more than about 20% thereof, calculated on the total weight of the emulsion.

The minimum added amount of water or alcohol is, for example, equal to 1%. If water or alcohol is added, the per cent amount of the other components, of course, is reduced, although maintaining unaltered their reciprocal proportions.

The water- or alcohol-containing emulsions are useful in those applications in which a low or relatively low viscosity without a high hydrophobicity is desired.

According to the present invention, stable emulsions are considered the ones, which do not give rise to phase separation phenomena after centrifugation at 4,000 rpm for a time of 30 minutes and a subsequent treatment in oven at 50°C for a week.

The emulsions according to the present invention can be prepared as follows: to an emulsion of one or more perfluoropolyethers in one or more polyhydroxylated compounds containing one or more emulsifiers which are soluble in said polyhydroxylated compounds (such emulsion will be briefly referred to as "pre-emulsion") there are added, under stirring, one or more fat substances in the liquid state.

The pre-emulsion is at a temperature, which is not critical; in most cases it is at room temperature.

When the fat substance is solid at room temperature, it is added to the pre-emulsion in the molten state or dissolved, in particular, in a liquid fat substance conforming to the present invention, preferably a hydrocarbon oil, while heating, if necessary, in order to favour the dissolution.

When the fat substance is added at a temperature above the room temperature, it is advisable to preheat the pre-emulsion to a temperature next or equal to the temperature of the fat substance.

The preparation of the pre-emulsions is described in detail in European patent application 390,206 already cited herein.

Such emulsions are preparable by adding the perfluoropolyether or perfluoropolyethers, under stirring, to a solution of one or more emulsifiers in one or more polyhydroxylated compounds.

At the end of the addition it is advisable to go on stirring at a lower speed, for example for 30-120 minutes, in order to obtain the best homogenization.

It is assumed that the outer phase of the emulsions according to the present invention consists of the polyhydroxylated compound or compounds, while the perfluoropolyether or perfluoropolyethers and the fat substance or sub-
stances constitute inner dispersed phases. In fact, these emulsions are dilutable with glycerol and with water (without having recourse to mechanical stirring), but are not dilutable with perfluoropolyethers and fat substances (unless mechanical stirring is utilized). Also the fact that the viscosity increases as the content of perfluoropolyethers or of fat substances increases, indicates that these two types of components form the inner phases.

The emulsions of the present invention have a wide field of uses in cosmetology and dermatology and in the industrial sector.

The introduction of liposoluble substances into the oily phase (such as, for example, vitamins or solar filters) or of glycerol-soluble substances permits to functionalize the cosmetic and dermatological preparations.

Among the cosmetic applications there are to be cited for example, barrier creams, sun-preparations, lip-ointments and anhydrous cosmetics, such as lipsticks and sticks.

Among the dermatological applications there are to be cited, for example, the skin protective preparations and the medicament-slow-release preparations.

Among the industrial applications there are to be cited the lubrication and the water-repellent treatments of textiles and leather.

The anhydrous nature of the emulsions, or in any case, the presence therein of little water amounts, makes biologically more stable the cosmetic and dermatological products prepared with said emulsions. In fact, said products do not require, usually, the presence of preservatives. Also the anhydrous nature of the emulsions secures a higher persistence of said products on the skin. A further advantage in the same applicative fields consists in the fact that the emulsions according to the present invention require the presence of lesser amounts of surfactant than the ones which are contained in the emulsions of perfluoropolyethers in water/oil or oil/water emulsions described in the above-cited U.S. patent 4,803,067.

The following examples are given merely for illustrative purposes and should not be construed to be a limitation of the scope of the present invention.

Examples 1 to 33 illustrate various emulsions conforming to the present invention and the modalities for preparing them. All the compositions are indicated in % by weight.

The stability test is the one previously described.

The utilized perfluoropolyethers have the structure and the characteristics indicated hereinbelow:

- **Fomblin® HC/25**

  \[ CF_3 - (O-CF - CF_2) \_ \_ (O - CF_2) \_ m - OCF_3 \]

  \[ CF_3 \]

  \[ n/m = 20 \text{ to } 40 \]

  M.W. (number average molecular weight) = 3,200.

- **Galden® D03**

  the same formula as the preceding product

  \[ n/m = 20 \text{ to } 40 \]

  M.W. = 870

- **Fomblin® HC/R**

  the same formula as the preceding product

  \[ n/m = 20 \text{ to } 40 \]

  M.W. = 6,600

- **Demnum® S-65**

  \[ F(CF_2-CF_2-CF_2-O)_nCF_2CF_3 \]

  M.W. = 4,500

- **Fomblin® Z25**

  \[ CF_3(OCF_2CF_2O)^p(OCF_2)_q-OCF_3 \]

  \[ p/q = 0.6 \text{ to } 0.7 \]

  M.W. = 9,400
Unless otherwise specified, the emulsions illustrated in the following examples were prepared as follows. Into a pre-emulsion of Fomblin® HC/25, glycerol and Texapon® N/40 (sodium lauryl sulphate—solution at 28%) produced by Henkel), vaseline oil was added at room temperature, while stirring by means of a Silverson L2R turbomulsifier at 6,000 - 6,000 rpm.

The viscosity of the emulsions of the subsequent examples was determined by means of a Brookfield digital eight-speed viscosimeter, model RTV-II, following the manufacturer’s rules.

**EXAMPLE 1**

| Fomblin® HC/25 | 29% |
| Glycerol       | 59% |
| Texapon® N/40  | 2%  |
| Vaseline oil   | 10% |

Viscosity: 2,000 cps (5 rpm, impeller 29) at 25°C. Stable emulsion.

**EXAMPLE 2**

| Fomblin® HC/25 | 20% |
| Glycerol       | 39% |
| Texapon® N/40  | 2%  |
| Vaseline oil   | 39% |

Viscosity: 50,000 cps (5 rpm, impeller 29) at 25°C. Stable emulsion.

**EXAMPLE 3**

| Fomblin® HC/25 | 15% |
| Glycerol       | 29% |
| Texapon® N/40  | 2%  |
| Vaseline oil   | 54% |

Viscosity: 950,000 cps (1 rpm, impeller 29) at 25°C. Stable emulsion.

**EXAMPLE 4**

| Fomblin® HC/25 | 10% |
| Glycerol       | 59% |
| Texapon® N/40  | 2%  |
| Vaseline oil   | 29% |

Viscosity: 3,100 cps (5 rpm, impeller 29) at 25°C. Stable emulsion.

**EXAMPLE 5**

| Fomblin® HC/25 | 20% |


Glycerol 39%  
Texapon® N/40 2%  
Silicone oil (350 cps) 39%

Stable emulsion.

**EXAMPLE 6**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
</tbody>
</table>

Mixture of 50% of silicone oil and 50% of vaseline oil 39%

Stable emulsion.

**EXAMPLE 7**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Abil® K4 (volatile silicone)</td>
<td>39%</td>
</tr>
</tbody>
</table>

Stable emulsion.

**EXAMPLE 8**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Wheat germ oil</td>
<td>39%</td>
</tr>
</tbody>
</table>

Stable emulsion.

**EXAMPLE 9**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
</tbody>
</table>

Glycerol 39%  
Texapon® N/40 2%  
Jojoba oil 39%

Stable emulsion.

**EXAMPLE 10**
Stable emulsion.

**EXAMPLE 11**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Eulanol® G (2-octyl-dodecanol) produced by Henkel</td>
<td>39%</td>
</tr>
</tbody>
</table>

Stable emulsion.

**EXAMPLE 12**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Octyl stearate (Cetiol® 668 produced by Henkel)</td>
<td>39%</td>
</tr>
</tbody>
</table>

Stable emulsion.

**EXAMPLE 13**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Olive oil</td>
<td>39%</td>
</tr>
</tbody>
</table>

Stable emulsion.

**EXAMPLE 14**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Paraffin C10/C13</td>
<td>39%</td>
</tr>
</tbody>
</table>

Stable emulsion.

**Example 15**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Ropy vaseline</td>
<td>39%</td>
</tr>
</tbody>
</table>

The ropy vaseline was introduced in the molten state at a temperature of about 55°C into the pre-emulsion preheated to 45°C. Stable emulsion.
EXAMPLE 16

Fomblin® HC/25 20%
Glycerol 39%
Texapon® N/40 2%
Ropy vaseline 13%
Paraffin C10/C13 26%

The ropy vaseline and the paraffin were premixed before being introduced into the pre-emulsion. Stable emulsion.

EXAMPLE 17

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Castor-oil</td>
<td>39%</td>
</tr>
</tbody>
</table>

Stable emulsion.

EXAMPLE 18

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Linseed-oil</td>
<td>39%</td>
</tr>
</tbody>
</table>

Stable emulsion.

EXAMPLE 19

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>14%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>27%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Vaseline oil</td>
<td>52%</td>
</tr>
<tr>
<td>Water</td>
<td>5%</td>
</tr>
</tbody>
</table>

Water was added last.
Stable emulsion. Viscosity: 37,500 cps at 25°C (5 rpm, impeller 21).

EXAMPLE 20

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>13%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>27%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Vaseline oil</td>
<td>43%</td>
</tr>
</tbody>
</table>
Stable emulsion.
Viscosity: 7,000 cps at 25°C (15 rpm, impeller 21).

**EXAMPLE 21**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>12%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glycerol</td>
<td>23%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaseline oil</td>
<td>43%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>20%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Stable emulsion.

**EXAMPLE 22**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Galden® D03</td>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaseline oil</td>
<td>39%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Stable emulsion.

**EXAMPLE 23**

- **Fomblin® HC/R** 20%
- Glycerol 39%
- Texapon® N/40 2%
- Vaseline oil 39%

Stable emulsion.

**EXAMPLE 24**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Demnum® S/65</td>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaseline oil</td>
<td>39%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Stable emulsion.

**EXAMPLE 25**
Stable emulsion.

**EXAMPLE 26**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® Z 25</td>
<td>20%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Vaseline oil</td>
<td>39%</td>
</tr>
</tbody>
</table>

Stable emulsion.

**EXAMPLE 27**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>39%</td>
</tr>
<tr>
<td>Coco amidopropylbetaine</td>
<td>2%</td>
</tr>
<tr>
<td>Vaseline oil</td>
<td>39%</td>
</tr>
</tbody>
</table>

Benzalconium chloride

(solution at 50% in water) 2%

Vaseline oil 39%

Stable emulsion.

**EXAMPLE 28**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Diglycerol</td>
<td>39%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Vaseline oil</td>
<td>39%</td>
</tr>
</tbody>
</table>

Highly viscous, stable emulsion.
Viscosity: 1,000,000 cps (5 rpm, impeller 29) at 25°C.

**EXAMPLE 29**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Sorbitol (70% in water)</td>
<td>39%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>2%</td>
</tr>
<tr>
<td>Vaseline oil</td>
<td>39%</td>
</tr>
</tbody>
</table>

Stable emulsion.
EXAMPLE 30

Fomblin® HC/25  8%
Glycerol        27%
Diglycerol      5%
Vaseline oil    55%
Texapon® N/40   2%

Stable emulsion.
Viscosity: 180,000 cps (1 rpm, impeller 4) at 20°C.

EXAMPLE 31

<table>
<thead>
<tr>
<th>Composition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>5%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>30%</td>
</tr>
<tr>
<td>Amphisol® K (*)</td>
<td>2%</td>
</tr>
<tr>
<td>Cetiol® 868 (**)</td>
<td>53%</td>
</tr>
<tr>
<td>Abil® K4 (****)</td>
<td>10%</td>
</tr>
</tbody>
</table>

(*) potassium cetyl-phosphate produced by Glaudan
(**) cetyl stearate produced by Henkel
(****) volatile silicone produced by Tego Cosmetics.
Viscosity: 340,000 cps at 20°C.
Stable emulsion.

EXAMPLE 32

<table>
<thead>
<tr>
<th>Composition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>10%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>20%</td>
</tr>
<tr>
<td>Amphisol® K</td>
<td>3%</td>
</tr>
<tr>
<td>Cetiol® 868</td>
<td>63%</td>
</tr>
<tr>
<td>Abil® K4</td>
<td>4%</td>
</tr>
</tbody>
</table>

This preparation was effected in hot conditions by preheating the pre-emulsion to about 50°C since the viscosity increase which occurs at high oil concentrations makes it difficult to obtain it in cold conditions.
Viscosity: 500,000 cps at 20°C
Stable emulsion.

EXAMPLE 33

Examples 33 to 36 illustrate, for comparative purposes, compositions which are not conforming to the present invention.

<table>
<thead>
<tr>
<th>Composition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycerol</td>
<td>50%</td>
</tr>
<tr>
<td>Vaseline oil</td>
<td>49%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>1%</td>
</tr>
</tbody>
</table>

The emulsion was fully unstable, with quick separation when at rest.

EXAMPLE 34

<table>
<thead>
<tr>
<th>Composition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fomblin® HC/25</td>
<td>20%</td>
</tr>
<tr>
<td>Vaseline oil</td>
<td>79%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>1%</td>
</tr>
</tbody>
</table>

The emulsion was fully unstable, with quick separation of Fomblin HC/25 when at rest.
Example 35

<table>
<thead>
<tr>
<th>Fomblin® HC/25</th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaseline oil</td>
<td>49%</td>
</tr>
<tr>
<td>Texapon® N/40</td>
<td>1%</td>
</tr>
</tbody>
</table>

Stability: as in example 35.

Example 36

<table>
<thead>
<tr>
<th>Fomblin® HC/25</th>
<th>30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaseline oil</td>
<td>67%</td>
</tr>
<tr>
<td>Arlacel® 989 (*)</td>
<td>3%</td>
</tr>
</tbody>
</table>

(*) Ethoxylated fatty acid produced by I.C.I.

Stability: as in example 34.

Example 37

This example illustrates a barrier cream and its preparation:

A) Glycerine 20%

B) Fomblin® HC/R 10%

Potassium cetyl phosphate (Amphisol® K produced by Givaudan) 2%

B) Mineral oil 48%

Dimethicone 20%

To pre-emulsion A, preheated to about 55°C, phase B was gradually added under stirring. Stirring was then carried on less intensely until room temperature was reached.

The cream viscosity was of 250,000 cps (1 rpm, impeller 6) at 20°C.

Example 38

This example illustrates a vitaminic hydrating cream, prepared according to the modalities of example 38:

A) Glycerine 30%

Fomblin® HC/25 10%

Potassium cetyl phosphate 2%

B) Octyl dodecanol (Eutanol® G produced by Henkel) 50.5%

Cyclomethicone (Abil® K4 produced by Tego Cosmetics) 5%

Tocopherol acetate 2%

Retinyl palmitate 0.5%

The cream viscosity was of 180,000 cps (1 rpm, impeller 6) at 20°C.

Example 39

Another vitaminic hydrating cream like the preceding one was prepared, with the exception that 1% of camomile
glycolic extract was added.

The presence of this little amount of glycol was sufficient to bring the viscosity from 180,000 cps to 50,000 cps.

**EXAMPLE 40**
This example relates to a sun-cream prepared as in example 36, with the only exception that phase B was preheated:

<table>
<thead>
<tr>
<th>A)</th>
<th>glycerine</th>
<th>30%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Formolin® HC/R</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>potassium cetyl phosphate</td>
<td>2%</td>
</tr>
<tr>
<td>B)</td>
<td>octyl stearate</td>
<td>46%</td>
</tr>
<tr>
<td></td>
<td>ethyl hexyl p-methoxycinnamate (Parisol MCX produced by Gavardan)</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>cyclomethicone</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>&quot;Karité butter&quot;</td>
<td>2%</td>
</tr>
</tbody>
</table>

The cream viscosity was of 460,000 cps (1 rpm, impeller 6) at 20°C.

**Claims**

1. A stable emulsion of a first dispersed phase consisting of perfluropolyethers having perfluoroalkyl end groups and of a second dispersed phase consisting of one or more fat substances, selected from:

   a liquid product (oil) insoluble in water and in the polyhydroxylated compounds mentioned below, and a

   product which is solid at room temperature (fat), is insoluble in water and in the polyhydroxylated compounds and

   has a melting temperature not exceeding 100°C,

   said two phases being dispersed in a continuous phase, characterized in that the continuous phase consists of

   one or more polyhydroxylated compounds selected from glycerol and polyalcohols other than glycerol and saccharides,

   containing at least three hydroxyl groups, said emulsion having the following weight composition:

   (a) perfluropolyether or perfluropolyethers: 1-50% by weight of the emulsion;

   (b) polyhydroxylated compound or compounds: 10 or more per cent by weight of the emulsion;

   (c) fat substance or substances: 10-60% by weight of the emulsion, and

   (d) one or more emulsifiers which are soluble in the polyhydroxylated compound or compounds and which are

   selected from

   - sodium laurylsulphate,
   - sulphosuccinate (sulphosuccinic hemiester),
   - coco amphocarboxyglycinate,
   - potassium cetylphosphate,
   - sodium alkyl-polyoxyethylene-ether carboxylate,
   - benzoalconium chloride,
   - alkylamidopropylbetaine,
   - coco amidopropylbetaine:

   0.1 - 10% by weight of the emulsion;

   and in that the emulsion optionally comprises up to 20% by weight of the total emulsion of water or of an

   alcohol wherein components (a), (b), (c) and (d) retain their relative proportions.

2. A stable emulsion according to claim 1, wherein, when the polyhydroxylated compounds are solid, the polyhydroxylated compounds are dissolved in water or in a hydrophilic solvent selected form glycols, glycerol, lower alcohols, etheral solvents, diglymes and mixtures thereof with water, so that the concentration of polyhydroxylated compound is from 50 to 80% by weight of the solution.

3. The stable emulsions according to claim 1 or 2, characterized in that the perfluropolyether or perfluropolyethers have a number average molecular weight ranging from 500 to 20,000.

4. The stable emulsions according to claim 1, 2 or 3, characterized in that the polyhydroxylated compounds are
5. The stable emulsions according to one or more of the preceding claims, characterized in that the fat substances are selected from the group composed of fat alcohols, acids, esters and amides, silicone oils, and hydrocarbon oils and fats.

6. The stable emulsions according to one or more of the preceding claims, characterized in that the emulsifiers are of the ionic type.

7. The stable emulsions according to one or more of the preceding claims, consisting of:
   - one or more perfluoropolyethers having perfluoralkyl end groups: 5-25% by weight,
   - one or more polyhydroxylated compounds: 10-59%,
   - one or more fat substances: 35-80%,
   - one or more emulsifiers: 0.3-3%.

8. The stable emulsions according to claim 7, containing from 10 to 40% by weight of one or more polyhydroxylated compounds.

9. A process for preparing the stable emulsions as claimed in claims 1 to 8, characterized in that one or more fat substances in the liquid state are added under stirring to a pre-emulsion of one or more perfluoropolyethers in one or more polyhydroxylated compounds, containing one or more emulsifiers which are soluble in said compounds.

10. The process according to claim 9, characterized in that when the fat substance is solid at room temperature, it is added to the pre-emulsion in the molten state or dissolved in a liquid fat substance.

11. Use of the stable emulsions as claimed in claims 1 to 8 in the preparation of cosmetic and dermatological products.

30 Patentansprüche

1. Stabile Emulsion einer ersten dispergierten Phase, bestehend aus Perfluoropolyethern mit Perfluoralkylenendgruppen und einer zweiten dispergierten Phase, bestehend aus einer oder mehreren Fettsubstanzen, ausgewählt aus:
   - einem flüssigen Produkt (Öl), das in Wasser und in den nachstehend erwähnten polyhydroxylierten Verbindungen unlöslich ist und einem Produkt, das bei Raumtemperatur fest ist (Fett), in Wasser und in den polyhydroxylierten Verbindungen unlöslich ist und eine Schmelztemperatur von nicht größer als 100°C aufweist,
   - wobei diese zwei Phasen in einer kontinuierlichen Phase dispergiert sind, dadurch gekennzeichnet, daß die kontinuierliche Phase aus einer oder mehreren polyhydroxylierten Verbindungen besteht, ausgewählt aus Glycerin und Polyalkoholen, die von Glycerin und Sacchariden verschieden sind, und mindestens drei Hydroxygruppen enthalten, wobei die Emulsion die nachstehende Gewichtszusammensetzung aufweist:
   - (a) der Perfluoropolyether oder die Perfluoropolyether: 1 - 50 Gew.-% der Emulsion;
   - (b) polyhydroxierte Verbindung oder Verbindungen: 10 oder mehr Gew.-% der Emulsion;
   - (c) Fettsubstanz oder -substanzen: 10 - 80 Gew.-% der Emulsion und
   - (d) einen oder mehrere Emulgatoren, die in der/den polyhydroxylierten Verbindung oder Verbindungen löslich sind und ausgewählt sind aus
     - Natriumaurylsulfat,
     - Sulfoassay (Sulfobenzenesäuremiester),
     - Cocoamphocarboxyglycinat,
     - Kaliumcarboxylphosphat,
     - Natriumauryl-Polyoxymethylenethercarboxylat,
     - Benzalkoniumchlorid,
     - Alkylamidpropylbetain,
     - Cocoamidpropylbetain:
     0.1 - 10 Gew.-% der Emulsion;
   und dadurch, daß die Emulsion gegebenenfalls bis zu 20 Gew.-% der gesamten Emulsion Wasser oder
2. Stabile Emulsion nach Anspruch 1, worin, wenn die polyhydroxylierten Verbindungen fest sind, die polyhydroxylierten Verbindungen in Wasser oder in einem hydrophilen Lösungsmittel, ausgewählt aus Glycolen, Glycerin, Niederalkoholen, etherischen Lösungsmitteln, Diglycinen und Gemischen davon mit Wasser, so geköst sind, daß die Konzentration der polyhydroxylierten Verbindung 50 bis 80 Gew.-% der Lösung beträgt.

3. Stabile Emulsionen nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Perfluoropolyether oder die Perfluoropolyether ein zahlenmittleres Molekulargewicht im Bereich von 500 bis 20000 aufweisen.

4. Stabile Emulsionen nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß die polyhydroxylierten Verbindungen ausgewählt sind aus Glycerin, Diglycerin, Triglycerin und Tetruglycerin.

5. Stabile Emulsionen nach einem oder mehreren der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Fettsubstanzen ausgewählt sind aus der Gruppe, bestehend aus Fettkoholen, -säuren, -estern und -amiden, Siliconölen und Kohlenwasserstoffölen und Fetten.

6. Stabile Emulsionen nach einem oder mehreren der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Emulgatoren vom ionischen Typ sind.

7. Stabile Emulsionen nach einem oder mehreren der vorangehenden Ansprüche, bestehend aus:
   - einem oder mehreren Perfluoropolyethern mit Perfluoralkylandgruppen: 5 bis 25 Gew.-%,
   - einer oder mehreren polyhydroxylierten Verbindungen: 10 - 59 %,
   - einer oder mehreren Fettsubstanzen: 35 - 80 %,
   - einem oder mehreren Emulgatoren: 0,3-3 %.

8. Stabile Emulsionen nach Anspruch 7, die 10 bis 40 Gew.-% eine oder mehrere polyhydroxylierte Verbindungen enthalten.

9. Verfahren zur Herstellung der stabilen Emulsionen nach Ansprüchen 1 bis 8, dadurch gekennzeichnet, daß eine oder mehrere Fettsubstanzen im flüssigen Zustand unter Rühren zu der Vormulsion von einem oder mehreren Perfluoropolyethern in einer oder mehreren polyhydroxylierten Verbindungen, die einen oder mehrere in diesen Verbindungen lösliche Emulgatoren enthalten, gegeben werden.

10. Verfahren nach Anspruch 9, dadurch gekennzeichnet, daß, wenn die Fettsubstanz bei Raumtemperatur fest ist, sie zu der Vormulsion im geschmolzenen Zustand oder gelöst in einer flüssigen Fettsubstanz gegeben wird.

11. Verwendung der stabilen Emulsionen nach Ansprüchen 1 bis 8 zur Zubereitung von kosmetischen und dermatologischen Produkten.

Revidications

1. Emulsion stable d'une première phase dispersée constituée de perfluoropolyméthiers ayant des groupes terminaux perfluoroalkyle, et d'une deuxième phase dispersée constituée d'une ou plusieurs substances grasses, choisies parmi :
   - un produit liquide (huile) insoluble dans l'eau et dans les composés polyhydroxyliés mentionnés ci-dessous, et un produit qui est solide à la température ambiante (graisse), est insoluble dans l'eau et dans les composés polyhydroxyliés, et a une température de fusion non supérieure à 100°C,
   - lesdites deux phases étant dispersées en une phase continue, caractérisée en ce que la phase continue est constituée d'un ou plusieurs composés polyhydroxyliés choisir parmi le glycérol et les polyalcools autres que le glycérol et les saccharides, contenant au moins trois groupes hydroxyle, ladite émulsion ayant la composition pondérale suivante :

   (a) perfluoropolyether ou perfluoropolyméthiers : 1 à 50 % en poids par rapport à l'émulsion ;
   (b) composé ou composés polyhydroxyliés : 10 % en poids, ou plus, par rapport à l'émulsion ;
   (c) substances ou substances grasses : 10 à 80 % en poids par rapport à l'émulsion, et
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(d) un ou plusieurs émulsifiants, qui sont solubles dans le ou les composés polyhydroxylés, et qui sont choisis parmi :

- le laurylsulfate de sodium,
- les sulfosuccinates (hémiesters de l'acide sulfosuccinique),
- les coco-amphocarboxyglycinates,
- le cétylpomophosphate de potassium,
- les alkylcarboxylates de sodium polyéthoxylés,
- le chlorure de benzalkonium,
- les alkylamidopropylbétaines,
- les coco-amidpropylbétaines.

0,1 à 10 % en poids par rapport à l'émulsion ;
et en ce que l'émulsion comprend éventuellement jusqu'à 20 % en poids, par rapport à l'émulsion totale, d'eau
ou d'un alcool, où les constituants (a), (b), (c) et (d) conservent leurs proportions relatives.

2. Emulsion stable selon la revendication 1, dans laquelle, quand les composés polyhydroxyés sont solides, les
composés polyhydroxyés sont dissous dans l'eau ou dans un solvant hydrophile choisi parmi les glycols, le gly-
céréol, les alcools inférieurs, les solvants de type éther, les diglymes et leurs mélanges avec l'eau, de façon que la
concentration du composé polyhydroxyé soit de 50 à 90 % en poids par rapport à la solution.

3. Emulsions stables selon la revendication 1 ou 2, caractérisées en ce que le perfluoropolyéther ou les perfluoro-
polyéthers ont une masse moléculaire moyenne en nombre comprise entre 500 et 20 000.

4. Emulsions stables selon la revendication 1, 2 ou 3, caractérisées en ce que les composés polyhydroxyés sont
choisis parmi le glycérol, le diglycérol, le triglycérol et le tétraglycérol.

5. Emulsions stables selon l'une ou plusieurs des revendications précédentes, caractérisées en ce que les substan-
ces grasses sont choisies parmi l'ensemble comprenant les alcools, acides, esters et amides gras, les huiles de
silicone et les huiles et graisses hydrocarbonées.

6. Emulsions stables selon l'une ou plusieurs des revendications précédentes, caractérisées en ce que les émulsi-
fiants sont du type ionique.

7. Emulsions stables selon l'une ou plusieurs des revendications précédentes, constituées :

- d'un ou plusieurs perfluoropolyéthers ayant des groupes terminaux perfluoroalkyle : 5 à 25 % en poids,
- d'un ou plusieurs composés polyhydroxyés : 10 à 59 %,
- d'une ou plusieurs substances grasses : 35 à 80 %,
- d'un ou plusieurs émulsifiants : 0,3 à 3 %.

8. Emulsions stables selon la revendication 7, contenant de 10 à 40 % en poids d'un ou plusieurs composés poly-
hydroxyés.

9. Procédé pour préparer les émulsions stables selon les revendications 1 à 8, caractérisé en ce que, sous agitation,
on ajoute une ou plusieurs substances grasses à l'état liquide à une pré-émulsion d'un ou plusieurs perfluoro-
polyéthers dans un ou plusieurs composés polyhydroxyés, contenant un ou plusieurs émulsifiants qui sont solubles
dans lesdits composés.

10. Procédé selon la revendication 9, caractérisé en ce que, quand la substance grasse est solide à la tempéra-
ture ambiante, elle est ajoutée à la pré-émulsion à l'état fondu ou est dissoute dans une substance grasse liquide.

11. Utilisation des émulsions stables selon les revendications 1 à 8, pour préparer des produits cosmétiques et der-
matologiques.