REGULATION 9

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952-1973

APPLICATION FOR A PATENT 592553

LODGED AT SUB-OFFICE
27 MAR 1986
Sydney

XK, We, AUSIMONT S.p.A.

of 31, Foro Buonaparte, MILAN, ITALY

hereby apply for a grant of a Patent for an invention entitled:

COMPOSITIONS FOR COSMETICS
COMPRISING PERFLUOROPOLYETHERS

which is described in the accompanying complete specification.
This Application is a Convention Application and is based on the Application(s) numbered : 20161 A/85

for a Patent or similar protection made in Italy

on 29 March 1985

APPLICATION ACCEPTED AND AMENDMENTS ALLOWED 2.11.89

MXX Our address for service is care of GRIFFITH HASSEL & FRAZER, Patent Attorneys of 71 York Street, Sydney 2000, in the State of New South Wales, Commonwealth of Australia.

Dated this 27th day of March 1986

AUSIMONT S.p.A.

By ~~his~~ their Patent Attorney

GRIFFITH HASSEL & FRAZER

To : THE COMMISSIONER OF PATENTS
COMMONWEALTH OF AUSTRALIA

FORM 8

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT

In support of an application made by: AUSIMONT S.r.l. (formerly AUSIMONT S.p.A.)

for a patent for an invention entitled: "COMPOSITIONS FOR COSMETICS COMPRISING PERFLUOROPOLYETHERS"

I, Otilio Masseroli,
of AUSIMONT S.r.l. - 31, Foro Buonaparte - Milan, Italy

do solemnly and sincerely declare as follows:

1. I am authorised by the above mentioned applicant for the patent to make this declaration on its behalf.

2. The name and address of each actual inventor of the invention is as follows:

Fabio BRUNETTA of 1, via Zanini, 31041 Cornuda, Treviso, ITALY
Stefano BADER of 44, via Gorizia, 2066 Melzo, Milan, ITALY
Giovanni PANTINI of 74, via Teodosio, 20121 Milan, ITALY

and the facts upon which the applicant is entitled to make this application are as follows:

The inventors made the invention for and on behalf of the basic applicant, MONTEFLUOS S.p.A., in the course of their duties as employees of MONTEFLUOS S.p.A.. MONTEFLUOS S.p.A. was a wholly owned subsidiary of AUSIMONT S.p.A. and the basic application was erroneously filed in the name MONTEFLUOS S.p.A. rather than in the name AUSIMONT S.p.A.. A Deed confirming that the basic application was erroneously filed and that all right, title and interest in the invention was the property of AUSIMONT S.p.A. was executed on 9 April 1986 and filed at the Italian Patent Office on 10 June 1986, whereby at the time of application in Australia, AUSIMONT S.p.A. was entitled to apply pursuant to Section 34(1)(fa) Patents Act 1952. AUSIMONT S.p.A. was incorporated by merger in AUSIMONT S.r.l. on 30 September 1988.

3. The basic application as defined by Section 141 of the Act was made as follows:

In Italy on 29 March 1985
in the name MONTEFLUOS S.p.A.

4. The basic application referred to in the preceding paragraph of this Declaration was the first application made in a Convention country in respect of the invention the subject of this application.

Declared at Milan this 19th day of Sept. 1989

Signed: _____
AUSIMONT S.r.l.
(ing. Otilio Masseroli)
Position: Chief Executive Officer

GRIFFITH HACK & CO., G.P.O. BOX 4164, SYDNEY N.S.W 2001
AUSTRALIA

(12) PATENT ABRIDGMENT (11) Document No. AU-B-55362/86
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 592553

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PERFLUOROPOLYETHER COMPOSITIONS

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(56) Prior Art Documents
AU 53615/86 C08L 71/02; C10M 105/18, 107/32
AU 456183 20004/70 47.7-671, 76, 09.4-85; 41.9

(57) Claim

1. A composition comprising a perfluoropolyether liquid with a molecular weight of mean numeric greater than 500 and the said perfluoropolyether is stably dispersed in an oil/water (O/W) emulsion or in a water/oil (W/O) emulsion, or in a solid phase suited to form a gel, suspended in a liquid organic phase; the perfluoropolyether being present in the range 0.05 to 30 parts for 100 parts of the total of other components present.

10. Creams, ointments, pastes and formulations for cosmetics and dermatology prepared from the compositions of the preceding claims 1 through 9.

592553

Form 10

PATENTS ACT 1952

COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE

Short Title:

Int. Cl:

Application Number: 55362/86

Lodged:

This document contains the amendments made under Section 49 and is correct for printing.

Complete Specification—Lodged:
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Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

Name of Applicant: AUSIMONT S.p.A.

Address of Applicant: 31, Foro Buonaparte, MILAN, ITALY

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Complete Specification for the invention entitled: COMPOSITIONS FOR COSMETICS COMPRISING PERFLUOROPOLYETHERS

The following statement is a full description of this invention, including the best method of performing it known to me:—*

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* Note: The description is to be typed in double spacing, pica type face, in an area not exceeding 250 mm in depth and 160 mm in width, on tough white paper of good quality and it is to be inserted inside this form.

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The invention relates to new compositions which are particularly suitable for applications in the field of cosmetics and dermatology, which comprise, as the essential component, a perfluoropolyether liquid dispersed in an aqueous or organic phase.

It is well known in literature how to prepare oil/water emulsions in which the oil consists in a perfluorinated compound. These emulsions were chiefly prepared in order to provide synthetic plasma, exploiting the high solubility of oxygen and of carbon dioxide in the perfluorinated compounds which, therefore, acted as oxygen carriers. The perfluorinated compounds, to which the researchers' attention was drawn, belong to the classes of the perfluorinated cyclo-alkanes (preferably with two or more condensed cycles), of the heterocyclic perfluorinated compounds and of the perfluorinated amines, while the compounds having the structure of perfluoropolyethers have proved at once to be little suited to this kind of application.

In preparing these emulsions, two main difficulties were met, which consisted in the choice of an emulsifier effective for the perfluorinated compounds, and in the obtainment of sufficiently stable products. As regards the emulsifiers, the best results were obtained with the so-called pluronic polyols (non-ionic emulsifiers with the chemical structure of polyalkyloxanes and prepared starting from mixtures of ethylene oxide and propylene oxide in a proper ratio); as an alternative, also perfluorinated emulsifiers were used, which, however, were not capable of performing the other functions performed by the pluronic polyols in the synthetic plasma.

The problem of the stability was partially solved by using together different types of perfluorinated compounds (the addition of perfluoroamines is useful to stabilize the emulsions), however, the emulsions obtained so far are to be preserved in cold conditions.

It has now surprisingly been found that it is

possible to prepare stable dispersions of perfluoropolyether liquids in water or in an organic liquid immiscible with the perfluoropolyether by using, as a dispersant for the perfluorinated liquid, an emulsion of oil in water (O/W) or of water in oil (W/O) or a solid phase suited to form a gel, suspended in an organic liquid (in the last case, the solid phase is a substance capable of forming a reticular structure by formation of links of the hydrogen-hydrogen type or links by Van der Waal forces).

Thanks to the film-forming characteristics of the perfluoropolyether component, the compositions of the invention have the property of forming a transparent and water-repellent liquid film endowed, furthermore, with permeability to oxygen and other gases, which remains on the surface, to which it has been applied, during relatively long stretches of time.

The water-repellency characteristic of the liquid film renders the compositions particularly suitable for applications in field of the water-repellent cosmetics and for high-efficiency applications in the field of the skin-conditioning treatments. As compared with the cosmetics of the conventional type, the water-repellent cosmetics offer the great advantage of retaining the cosmetic effect for long times and of making useless the frequent retouchings which, conversely, are necessary in the case of the conventional cosmetics.

In the skin-rehydration treatments it is highly desirable to have available stable, cosmetically acceptable (non-oily, non-tacky, etc.) compositions which, besides the property of carrying to the subcutaneous layers and to make available therein, water amounts as are sufficient to obtain the desired moistening effect, are also capable of exerting a "barrier" effect towards the

outside, without adversely affecting, however, the skin respiration.

In spite of the fact that the skin respiration process exhibits several aspects which are still to be clarified, it is sure, however, that the absorption of oxygen and the elimination of carbon dioxide are of essential importance for the health of the skin.

As already mentioned herein, the compositions comprise a perfluoropolyether liquid dispersed in an aqueous or organic phase immiscible with said liquid. More in particular, the perfluoropolyether liquid is maintained dispersed (or emulsified) in a liquid phase through an (aqueous or organic) phase present as an emulsion in the dispersing liquid phase or through a solid phase suited to form a gel, suspended in a liquid organic phase.

The emulsion in which the perfluoropolyether liquid is dispersed is an oil/water emulsion (O/W) or a water/oil emulsion (W/O) of the conventional type, preparable according to known techniques. In particular, the oily phase immiscible with water is selected from amongst the fat acid esters, the hydrogenated and non-hydrogenated vegetal oils, the linear hydrocarbons of different length, the ramified hydrocarbons containing for example from 14 to 36 carbon atoms.

The emulsifiers are selected as a function of the oily substance; they may be of the anionic, cationic or non-ionic type.

In the above-cited O/W and W/O emulsions, the perfluoropolyether represents a "third phase". Through observations under the optical microscope, which dispersions of perfluoropolyether at 20-30% by weight were subjected to, it was possible to evidence the perfluoropolyether phase, which appears in the form of droplets of different sizes, some of which having a larger diameter than those of the emulsified phase (inner phase). The microdrops of the perfluoropolyether compound

cannot be coloured, wherefore they can be distinguished from the drops of the inner phase, which, conversely, can be coloured.

The compositions of the present invention are therefore consisting of at least three phases immiscible with one another, in which the perfluorinated phase is dispersed in the structure of the emulsified oily or aqueous phase.

The present invention provides a composition comprising a perfluoropolyether liquid with a molecular weight of mean numeric greater than 500 and the said perfluoropolyether is stably dispersed in an oil/water (O/W) emulsion or in a water/oil (W/O) emulsion, or in a solid phase suited to form a gel, suspended in a liquid organic phase; the perfluoropolyether being present in the range 0.05 to 30 parts for 100 parts of the total of other components present.

The perfluoropolyether dispersions are prepared according to various methods. The preferred one consists in dispersing the perfluoropolyether in water or in the dispersing organic phase. This step is carried out in the presence of heat (e.g. at 70-80°C) and with the mixing turbine running at the maximum speed (e.g. 5,000-10,000 rpm).

The inner phase is then added (which may be an aqueous or oily phase), whereafter it is cooled under stirring (in like manner as for the preparation of conventional emulsions).

Conversely, by adopting the technique of adding the perfluoropolyether to the O/W or W/O emulsions when they are already prepared and cooled down, no good dispersion of the perfluoropolyether can be obtained: the droplets have a rather great diameter, higher by 10-20 times than the one of the microdrops of the inner phase.

The compositions so prepared are endowed with a high stability. Accelerated ageing tests by means of thermoregulation at 40°C alternated with cooling in a refrigerator at 4°C in alternated cycles of 24 hours each during one week, and allowing then to stand for 4 months, have proved that the perfluoropolyether does not demix, not even partially.

Centrifugation tests (5000 rpm during 30 minutes) have proved that the dispersions in the W/O or O/W emulsions are stable even under these conditions.

The perfluoropolyether for preparing the emulsion or dispersion according to the present invention ranges from 0.01 to 30 parts for 100 parts of the total sum of the other components. Preferably 0.2 to 5 parts perfluoropolyether for 100 parts of the total of the other components are used for preparing the dispersions. "Parts" in the present invention are intended by weight.

The perfluoropolyethers utilizable in the compositions of the invention are compounds which contain perfluoroalkylene oxide units or perfluoroxetane rings.

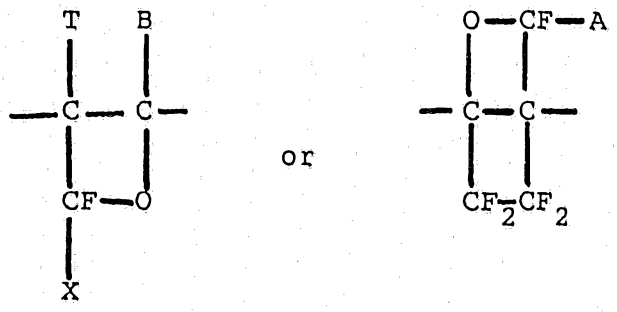
In particular, the preferred repeating units are chosen from the following :

a) C_2F_4O and CF_2O statistically distributed along the chain;

b) C_2F_4O, C_3F_6O and CFXO (X = radical F or CF_3) statistically distributed along the chain

c) C_3F_6O and C_3F_6O copolymerised with CFXO. statistically distributed along the chain;

d) oxetane rings



in which B, T, X and A, equal to or different from each other are perfluorooxyalkyl, perfluoropolyoxyalkyl or perfluoroalkyl radicals.

The end groups of the perfluoropolyethers may be like or unlike each other and are selected in particular from radicals F, CF_3, C_2F_5, C_3F_7, Br, or from polar groups containing one or more electron donor atoms from groups containing one or more aromatic rings, either or not containing heteroatoms, capable of giving rise to coordinated bonds or charge-transfer bonds.

The polar groups are bound to the perfluoropolyether

chain through divalent groups CH_2O, CH_2-O-CH_2, CF_2, CF_2O.

The mean numeric molecular weight is generally higher than 500 and ranges in particular from 1,000 to 10,000. The viscosity values (cSt at 20°C) are generally in the range of from 30 to 5,000.

Particular examples of perfluoropolyethers are :

1) $CF_3O-(C_3F_6O)_m-(CFXO)_n-CF_2Y$
in which X and Y are a radical F or CF_3 and m and n are integers, the m/n ratio ranging from 5 to 40. These compounds and the method of preparing them are described in British patent 1,104,482.

2) $C_3F_7O-(C_3F_6O)_m-Rf$
in which Rf may be $-C_2F_5$, $-C_3F_7$, $-CFHCF_3$, m is an integer higher than 2, preferably from 10 to 100. These compounds and the method of preparing them are described in US patent 3,242,218.

3) $CF_3O(C_3F_6O)_m(C_2F_4O)_n(CFXO)_q-CF_3$
where X = -F, CF_3, m, n and q are integers; m+n+q = 10-300; $\frac{n}{m}$ = 0,5-5; $\frac{m}{n}$ = 0,01-0,4. These compounds and the method of preparing them are described in US patent 3,665,041.

4) $CF_3O(C_2F_4O)_p(CF_2O)_q-CF_3$
where p and q are integers like or different from each other and the p/q ratio ranges from 0.5 to 1.5. Examples of these compounds and the method of preparing them are described in US patents 3,715,378 and 3,665,041. Examples of perfluoropolyethers containing polar end groups are described in US patent 4,094,311 and in European patent applications Nos. 165,649 and 165,650 filed in the name of the Applicant hereof.

5) The compounds having an oxetane structure are described in European patent application No. 191,490 filed in the name of the Applicant hereof.

6) Perfluoropolyethers comprising $(CF_2CF_2CF_2O)$ units.

7) Perfluoropolyethers comprising (CF_2CF_2O) units.

The perfluoropolyethers of class 6) and 7) are prepared respectively according to published application EP 148,482 (Daikin) and US patent 4,523,039 (Lagow).

In addition to the neutral perfluoropolyethers indicated above can be used also perfluoropolyethers with functionalized end groups as those described for examples in European patent applications 165,649 and 165,650, US patent 3,810,874 (3M), EP 148,482 (Daikin), EP 151,877 (3M) or in an Italian patent of the number 1190,423.

As already mentioned hereinbefore, the compositions of the present invention give rise to considerable film-forming effects: the liquid film obtained is transparent and permeable to gases. A significant proof of the waterproof effect is furnished by applying a cream according to the invention onto the hands and by successively washing the hands. After washing, the water slides away leaving the skin dry and particularly glossy.

Such effect, contrary to what happens with other water-repellent creams, occurs also when washing is carried out with surfactants.

Thanks to the above-mentioned properties, the compositions of the present invention are particularly suited to applications in the field of cosmetics and of dermatology.

Examples of these applications are :

a) as protective creams and barrier creams (handcreams, ointments (unguents) or pastes to prevent irritations or dermatitis due to contact; water-repellent creams for dermatitis caused by household surfactants or for occupational dermatitis);

(b) in paedocosmetics (child cosmetics) as protective creams or pastes for children, for example in the treatment or prevention of the milk crust of the skin

or of the scalp;

c) as sun-products, where the waterproofing effect on the skin secures the permanence of the sunlight-filtering active components;

d) as products against wrinkles and for decorative cosmetics, for example in foundation products, eye-shadows, etc. In this case the presence of the fluorinated compound promotes the flowability and therefore facilitates the spreading of the products, thus avoiding or minimizing the unaesthetic cakings (agglomerations) of the product on the skin; in lipsticks and lipglosses, for example, an improvement of both flowability and glossiness is obtained;

e) as creams for massages : since the perfluorinated compound is not absorbed by the skin, it permits also prolonged massages, allowing furthermore the penetration of active substances, if any;

f) in dermatological applications, as a carrier for the absorption of the drugs.

The perfluoropolyether content in the cosmetic emulsions varies as a function of the kind of use, of the number of daily applications and of the application period. Generally it ranges from 0.5-1% for anti-wrinkle creams to be used every day up to 5-10% for high-protective creams. The persistence of the perfluoropolyether on the skin is rather long: the removal occurs by washing or by diffusion on clothes or by natural desquamation of the skin.

The following examples are given merely to illustrate and not to limit the scope of the invention.

EXAMPLE 1

Preparation of non-ionic O/W emulsions

The preparation was carried out by using a mixing turbine SILVERSTON L2R.

As perfluoropolyethers there were utilized various types of FOMBLIN Y (registered trade mark) having formula

$$CF_3-[(O-\underset{\displaystyle CF_3}{\underset{|}{CF}}-CF_2)_n-(O-CF_2)_m]-O-CF_3$$

manufactured by Montefluos S.p.A. : FOMBLIN Y04 (mean molecular weight 1,500 and viscosity 35 cSt at 20°C), FOMBLIN Y25 (mean molecular weight 3,000 and viscosity 250 cSt at 20°C) and FOMBLIN YR (mean molecular weight 6,000-7,000 and viscosity 1,000-2,000 cSt at 20°C).

Except slight variations in viscosity, no particular differences caused by the utilization of the three different types of FOMBLIN Y were observed in the final product.

The preparation was accomplished by emulsifying the Fomblin in water at 75°C (mixing turbine SILVERSTON L2R at 6000 rpm).

Subsequently - while keeping the mixing turbine running - the oily phase consisting of the fatty acid C_{12}-C_{18} polyethoxylated with 8 molecules of ethylene oxide the fluid triglycerid and the cetyl and stearyl alcohols, is heated to 75°C and containing the emulsifying agents, i.e. the fatty acids C_{12}-C_{18} polyethoxylated with 8 molecules of ethylene oxide was added; finally, the preparation was completed under continuous and prolonged stirring.

The formula employed for preparing a series of creams was the following :

- water contained in the cream	76 parts
- glycerine	5 parts
- fat acids C_{12}-C_{18} polyethoxylated with 8 molecules of ethylene oxide	8 parts
- fluid triglycerid	4 parts
- cetyl and stearyl alcohols	7 parts
- Fomblin Y, various types	1-3-5 parts

The creams had a viscosity ranging from 2500 to 3500 cSt at 5 rpm (revolutions per minute). In spite of the not high viscosity, the creams have proved to be stable to the accelerated ageing tests.

To increase the viscosity, the percentage of fat phase was raised :

- water contained in the cream	70 parts
- glycerine	4 parts
- fat acids C_{12}-C_{18} polyethoxylated with 8 ethylene oxide molecules	8 parts
- fluid triglycerid	10 parts
- cetyl and stearyl alcohols	8 parts
- Fomblin Y, various types	1-3-5 parts

The viscosity of the emulsion was of 9,000-10,000 cSt at 20°C. By addition of glyceryl monostearate the emulsion viscosity and glossiness was further improved; that permitted also to reduce the concentration of the cetyl and stearyl alcohols.

Conversely, by using ethoxylated cetyl and stearyl alcohols it was possible to obtain highly stable emulsions:

- water contained in the emulsion	76.5 parts
- glycerin	5 parts
- cetyl and stearyl alcohols ethoxylated with 12 molecules of ethylene oxide	3.5 parts
- cetyl and stearyl alcohols	15 parts
- Fomblin Y, various types	1-3-5 parts

EXAMPLE 2

Preparation of anionic O/W emulsions

Following the procedure of example 1, emulsions according to the following recipe were prepared :

- water contained in the emulsion	85 parts
- selfemulsifying glyceryl mono- and di-stearate	10 parts
- glycerine	5 parts
- Fomblin Y	1-3-5 parts

The glyceryl mono- and distearate contained small amounts of alkaline stearates, which rendered the emulsifying agent anionic. The emulsions passed all the accelerated ageing tests, including a test in the centrifuge (30 minutes at 5000 rpm).

The addition of triglycerids to this type of emulsion resulted in a lower glossiness and a lower stability of the preparation.

EXAMPLE 3

Preparation of W/O emulsions

the W/O emulsions show generally the tendency to be less stable than the O/W emulsions: however, the presence of Fomblin Y did not further destabilize the system.

For the tests, Arlacel (registered trade mark) 481 (HLB 4.5) (sorbitan sesquioleate) was utilized as an emulsifier:

- Arlacel (registered trade mark) 481	10 parts
- liquid paraffin	38 parts
- beeswax	2 parts
- water contained in the emulsion	45 parts
- magnesium sulphate	0.7 parts
- glycerin	4.3 parts
- Fomblin, various types	1-3-5 parts.

EXAMPLE 4

Anhydrous ointments and pastes

An ointment based on triglycerids and hydrogenated castor-oil was utilized.

The hydrogenated castor-oil exhibited a gelifying effect due to the fact that after melting and subsequent cooling, under stirring and in the presence of oils, it formed a solid reticulated structure, which imparted to the system a rheologic behaviour similar to the one of the emulsions.

Castor-oil doses below 15% proved unsuitable for preparing stable compositions.

- Hydrogenated castor-oil, m.p. 46°C	15%
- fluid triglycerid	80%
- Fomblin Y25	5%.

The emulsion proved to be rather stable to thermostat and to storage tests on shelves, but highly unstable to centrifugation (5000 rpm, 30 minutes).

A higher stability, also to the test in the centrifuge, was exhibited by the following preparation :

- hydrogenated castor-oil	15%
- fluid triglycerid	77%
- glyceryl monostearate	3%

- Fomblin Y25 5%.

On the guideline of the preceding formulas, pastes useful e.g. in paedocosmetics (child cosmetics) were prepared:

- hydrogenated castor-oil 10%
- paraffin oil 50%
- zinc oxide 20%
- lanolin 13%
- glyceryl monostearate 2%
- Fomblin Y25 5%.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A composition comprising a perfluoropolyether liquid with a molecular weight of mean numeric greater than 500 and the said perfluoropolyether is stably dispersed in an oil/water (O/W) emulsion or in a water/oil (W/O) emulsion, or in a solid phase suited to form a gel, suspended in a liquid organic phase; the perfluoropolyether being present in the range 0.05 to 30 parts for 100 parts of the total of other components present.

2. A composition of claim 1 wherein the perfluoropolyether is present in the range 0.2 to 5 parts for 100 parts of the total of other components present.

3. A composition of any one of claims 1 to 2, in which the O/W emulsions are of the non-ionic or anionic type and in which the W/O emulsions are of the non-ionic type.

4. Ointments and pastes according to any one of claims 1 to 2, in which the perfluoropolyether is dispersed in hydrogenated castor-oil suspended in a liquid triglycerid.

5. The compositions according to the preceding claims, in which the perfluoropolyether is present in amounts ranging from 1 to 30% by weight of the total of other components present.

6. The compositions according to the preceding claims, in which the perfluoropolyether liquid includes repeating units C_2F_4O and/or C_3F_6O or units C_2F_4O and CF_2O and optionally C_3F_6O, or units C_3F_6O and units CFXO (X = radical F or CF_3) statistically distributed along the chain, or includes perfluorooxetane units.

7. The compositions according to claim 4, in which the perfluoropolyether is selected from the compounds having formulas :

a) $CF_3O-(C_3F_6O)_m\ (CFXO)_n-CF_2Y$
where Y is -F or CF_3; X is the same as Y; m and n are integers; the m/n ratio ranges from 5 to 40 and units C_3F_6O and CFXO are statistically distributed along the chain;

b) $C_3F_7O(C_3F_6O)_m$-Rf
where Rf = $-C_2F_5$, $-C_3F_7$, $-CFHCF_3$ and m is an integer;

c) $CF_3O(C_3F_6O)_m(C_2F_4O)_n(CFXO)_q-CF_3$
where X = -F or $-CF_3$; m, n and q are integers and their sum is comprised between 10 and 300;

$\frac{n}{q}$ = 0,5 - 5; $\frac{m}{q+n}$ = 0,01 - 0,4
and units C_3F_6O, C_2F_4O and CFXO are statistically distributed along the chain;

d) $CF_3O(C_2F_4O)_p(CF_2O)_q-CF_3$
where p and q are integers like or different from each other and the p/q ratio ranges from 0.5 to 1.5 and the units are statistically distributed along the chain.

e) perfluoropolyethers having an oxetane structure.

f) Perfluoropolyethers comprising $(CF_2CF_2CF_2O)$ units.

g) Perfluoropolyethers comprising (CF_2CF_2O) units.

8. The compositions according to claim 6, in which one or both end groups of the perfluoropolyether chain consist of polar groups or aromatic rings.

9. The compositions according to claims 6 through 9, in which the mean numeric molecular weight of the perfluoropolyethers is higher than 500 and ranges in particular from 1,000 to 10,000.

10. Creams, ointments, pastes and formulations for cosmetics and dermatology prepared from the compositions of the preceding claims 1 through 9.

11. A composition containing a perfluoropolyether substantially as herein described with reference to the Examples.

Dated this 3rd day of April, 1989
AUSIMONT S.p.A.
By their Patent Attorneys
GRIFFITH HACK & CO

3956S/sy