

Field of the Invention:

This invention relates to cosmetics and more particularly to hair cosmetics which comprise a specific type of α -monoglyceryl ethers. By the term "hair cosmetics" used herein meant are all the cosmetics applied to hair, such as hair rinse, hair treatment, hair tonic, hair conditioner, pomade, hair stick, hair oil, hair cream, hair liquid, hair spray, set lotion and the like.

Description of the Prior Art:

Conventional hair cosmetics have the following drawbacks and their improvement has been demanded. That is, known hair rinses comprise as effective component quaternary ammonium salts such as distearyldimethylammonium chloride and are used to impart to hair softness, smoothness, antistatic property and the like properties. However, the use of quaternary ammonium salts alone is not satisfactory in respect of softness and smoothness. In order to improve these properties, it is general to incorporate oils such as higher alcohols, glycerides, liquid paraffin and the like, to give emulsifying dispersion systems using quaternary ammonium salts in combination therewith.

However, quaternary ammonium salts have no capability of stably emulsifying and dispersing oils in amounts enough to show their effects and hence there have been made attempts to keep the emulsifying dispersion system stable by incorporating nonionic surface active agents of high hydrophilicity. However, highly hydrophilic nonionic surface active agents act to considerably lower the rinsing effect. Accordingly, a hair rinse using such a nonionic surface active agent in combination with quaternary ammonium salts and oils can not show its inherent rinsing effect.

Further, known hair rinse compositions were not satisfactory in rinsing effects, i.e. effects of imparting softness, smoothness and anti-static property to hair.

On the other hand, in order to give to hair suitable styling force and gloss, smooth feeling to the touch and affinity for hair, other cosmetics such as hair tonic, hair conditioner, pomade, hair stick, hair oil, hair cream, hair liquid and the like are usually incorporated, for example, with hydrocarbons such as liquid paraffin, squalane and the like, animal and plant oils, synthetic oils such as 2-octyldodecyl myristate, isopropyl myristate and the like, and oils for cosmetics such as lanolin.

However, these oils have the following disadvantages.

(1) Hydrocarbons are a non-polar oil and when they are applied to hair, a disagreeable feeling remains on hair because of the lack of affinity for water and poor removability by washing. Additionally, if hydrocarbons are attached to clothes, there is the possibility of their leaving of stain on the clothes. As regards liquid paraffin of low viscosity, it has been reported that there is some fear of skin irritativeness.

(2) Animal and plant oils and synthetic oils are polar oils but because of the lack of their affinity for water, they cannot supply moisture to hair. As a consequence, hair cannot be rendered smooth. Where these oils are used to make hair tonics or hair liquids, it is necessary to use a large amount of solubilizing agent or dissolve them in alcoholic solution of high concentration in order to make up for their poor hydrophilic property. However, these measures involve problems from a viewpoint of irritativeness of scalp or inflammability.

(3) Lanolin and derivatives thereof are hydrophilic in nature but have a problem in stable supply because lanolin is of natural origin. In addition, they have a problem in color and odor and are usually present in the form of a paste or high in viscosity, so that they are

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sticky and bad to the touch with their application being limited. Further, it has been recently reported to involve a fear of allergy.

Accordingly, we have made an intensive study of materials which can overcome the above disadvantages when incorporated in hair cosmetics and can satisfy all the requirements for these hair cosmetics and found (1) that α -monoalkyl glyceryl ethers of the specific type meet the above requirements, (2) that the ethers themselves show no skin irritativeness and have an effect of supplying moisture to hair to render it smooth, and (3) that especially in the case of hair rinse, an excellent hair rinsing effect can be obtained even when the ethers are incorporated singly.

SUMMARY OF THE INVENTION

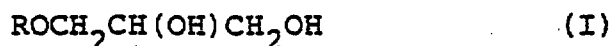
It is accordingly an object of the present invention to provide hair cosmetics which can impart good softness, smoothness and anti-static property to hair as will not be experienced in prior art counterparts.

It is another object of the present invention to provide hair cosmetics which comprise as its essential component glyceryl ethers of the specific type which are compatible with water and show no ill effects on human

skin or hair.

It is a further object of the invention to provide hair cosmetics which can stably be kept emulsified even when quaternary ammonium salts are incorporated therein.

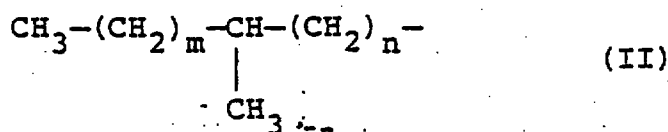
The above objects can be achieved, according to the present invention, by a hair cosmetic which comprises 0.1 - 30 wt% of α -mono(methyl-branched alkyl) glyceryl ether of the general formula (I)



in which R represents a methyl-branched saturated hydrocarbon group having 12 - 24 carbon atoms.

The α -mono(methyl-branched alkyl) glyceryl ethers to be used in the present invention are novel compounds and can be prepared, for example, by reacting an alkyl halide represented by R - X, in which X represents a halogen atom and R has the same meaning as defined above, with an alkali metalalcoholate of isopropylidene glycerol by usual manner to give 2,3-o-isopropylidene-1-o-methyl-branched alkyl glyceryl ether, and hydrolyzing it.

Among these α -mono(methyl-branched alkyl) glyceryl ethers, preferable ethers are those of the formula (I) in which R represents a group of the formula (II)



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in which m is an integer of 2 - 14, and n is an integer of 3 - 11 provided that m + n is an integer of 9 - 21, preferably 11 - 17. Above all, a mixture of groups which is composed of over 75% of a group of the formula (II) in which the number of carbon atoms is 18 and m is an integer of 6 - 8 is most preferable.

The α -mono(methyl-branched alkyl) glyceryl ethers are liquid at room temperature and chemically stable because they are free of any double bonds, ester bonds and the like and have no skin irritativeness. A typical α -mono(methyl-branched alkyl) glyceryl ether has the following physical properties.

Methyl-branched alkyl group	Melting point	Specific density (30°C)	Viscosity (30°C)
Mainly composed of a group of the formula (II) wherein m = 7 and n = 8	23°C	0.912	856

10 5 5 5

The hair cosmetic according to the invention can be prepared by usual manner by providing 0.1 - 30 wt% (hereinafter referred to simply as %) of a mono(methyl-branched alkyl) glyceryl ether, mixing the ether with other known cosmetic ingredients and agitating the

mixture.

Preparation of hair cosmetics is described in more detail.

(1) Preparation of Hair Rinse:

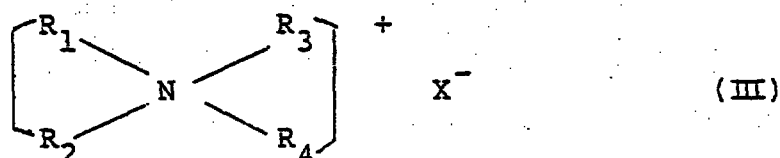
For the preparation of hair rinse, α -mono(methyl-branched alkyl) glyceryl ethers can be used singly but when they are used in combination with quaternary ammonium salts, a more excellent hair rinsing effects can be obtained.

A hair rinse can be prepared by providing an α -mono-(methyl-branched alkyl) glyceryl ether singly or in combination with a quaternary ammonium salt and dissolving the ether or its mixture with the ammonium salt in water or if necessary, in a suitable solvent such as alcohol, propylene glycol, glycerine or the like. In this case, it is preferable to adjust the pH of a 5% solution of the ether to 3 - 8 which is at the same level of ordinary hair rinses by the use of organic acids such as citric acid, lactic acid and the like, inorganic acids such as phosphoric acid, hydrochloric acid and the like, inorganic alkalis such as caustic soda, organic alkalis such as triethanolamine, and the like.

Where α -mono(methyl-branched alkyl) glyceryl ethers are incorporated singly, the content thereof is in the

range of 0.1 - 30%, preferably 0.5 - 15%. On the other hand, when used in combination with quaternary ammonium salts, the ether is used in an amount of 0.1 - 20%, preferably 0.5 - 5% with the ammonium salt being used in an amount of 0.1 - 20%, preferably 0.5 - 5%. Less amounts than 0.1% of the ether which is used in combination with the quaternary ammonium salt are unfavorable since a satisfactory effect cannot be obtained. On the other hand, larger amounts than 20% result in the difficulty in keeping the composition stable.

Quaternary ammonium salts are, for example, compounds of the general formula (III)



in which one or two of R_1 , R_2 , R_3 and R_4 independently represent a long-chain alkyl group or long-chain hydroxy-alkyl group having 8 - 20 carbon atoms, the others represent an alkyl group having 1 - 3 carbon atoms, a hydroxyalkyl group having 1 - 3 carbon atoms, a benzyl group or a polyoxyethylene group in which the total of addition moles is below 10, and X represents a halogen atom or an alkylsulfate group having 1 - 2 carbon atoms.

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Preferable examples of these salts include distearyldimethylammonium chloride, stearyltrimethylammonium metasulfate, N-stearyl-N,N,N-tri(polyoxyethylene)ammonium chloride (addition of 3 moles in total), cetyltriethylammonium bromide, stearyldimethylammonium chloride and the like. These may be used singly or in combination.

The hair rinse may be further incorporated, if necessary, with oils such as fatty higher alcohols, lanolin oil, esters, liquid paraffin and the like, thickeners such as hydroxyethyl cellulose, ethyl cellulose, hydroxypropyl cellulose and the like, bactericides, perfumes, and the like.

- (2) Preparation of Hair Tonic, Hair Conditioner, Pomade, Hair Stick, Hair Oil, Hair Cream, Hair Liquid, Hair Spray, Set Lotion, Hair Treatment, etc.

These hair cosmetics can be prepared as usual by incorporating the ester in defined amounts together with known cosmetic ingredients. Examples of the known cosmetic ingredients include oily bases, emmollients, gelling agents, various emulsifying agents, perfumes, preservatives such as parahydroxybenzoate, antioxidants such as butylhydroxyanisole, colorants such as dyes, refrigerants such as menthol, bactericides such as hinokitiol, wetting agents such as propylene glycol, and solvents such as alcohol, water and the like. These ingredients may

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appropriately be added without any specific limitations.

The thus obtained hair cosmetics are free of various drawbacks derived from known oils and are imparted with excellent properties in respect of skin irritativeness and feeling to the touch in practical application.

The present invention is described in more detail by way of references and examples, which are not intended to limit the present invention. It will be noted that preparation of the starting alcohol is shown in references.

Reference 1

Into a 20 l autoclave were charged 4770 g of isopropyl isostearate (Emery 2310, isopropyl isostearate, commercially available from U.S. Emery Co., Ltd.) and 239 g of copper-chromium catalyst (Nikki K.K.). Then, hydrogen gas was charged under a pressure of 150 kg/cm² and the reaction mixture was heated up to 275°C. After hydrogenation under pressure of 150 kg/cm² at 275°C for about 7 hours, the reaction product was cooled and the residual catalyst was removed by filtration to obtain 3500 g of a crude product. The crude product was distilled under reduced pressure to obtain 3300 g of colorless transparent isostearyl alcohol as a distillate of 80 - 167°C/0.6 mmHg. The thus obtained isostearyl alcohol (methyl-branched stearyl alcohol) had an acid

value of 0.05, a saponification value of 5.5, and a hydroxyl value of 181.4. The IR analysis (liquid film) revealed absorptions at 3340, 1055 cm^{-1} and the NMR analysis (CCl_4 solvent) showed an absorption at δ 3.50 (broad triplet, $-\text{CH}_2-\text{OH}$). The main components of the alcohol were found from gas chromatograph to be composed of about 75% of an alcohol whose alkyl group had 18 carbon atoms in total and the balance of alcohols which had 14 and 16 carbon atoms, respectively, the branched alkyl groups of the respective alcohols being positioned near the central portion of the respective alkyl main chains.

Reference 2

(i) A 5 l reaction container equipped with a thermometer, a reflux condenser, a dropping funnel, a nitrogen gas-introducing tube and an agitator was provided, into which 2444 g of the isostearyl alcohol obtained in Reference 1 was charged. Thionyl chloride was dropped from the dropping funnel under agitation in a stream of nitrogen gas. The reaction mixture generated heat with a gas being generated simultaneously. The reaction mixture was raised up to 31°C at an initial stage of the reaction and its temperature gradually lowered, as the amount of thionyl chloride increased, down to about 18°C.

At this time, the reaction mixture was heated up to about 40°C, followed by continuing the dropping of thionyl chloride. After the generation of gas had become slight, the reaction mixture was heated to 70 - 80°C, whereupon the gas again generated violently, so that thionyl chloride was subsequently dropped. The dropping of thionyl chloride was stopped at the time when no generation of the gas was recognized. The total amount of dropped thionyl chloride was 2200 g. The reaction product was cooled, followed by continuing agitation at 70 - 80°C for about 1 hour.

The reaction product was cooled and subjected to distillation to remove distillates of low boiling points (mainly composed of unreacted thionyl chloride) at 40 - 50°C. The residue was cooled in ice, to which ice pieces were added portion by portion while agitating. After it was confirmed that violent generation of gas was stopped, ether was added, followed by adding water and agitating sufficiently. The ether phase was collected and neutralized with sodium bicarbonate, followed by distilling off the solvent and distilling under reduced pressure to obtain 2217 g of isostearyl chloride from a distillate of 103 - 163°C/0.1 - 1.0 mmHg.

IR (liquid film): 725, 650 cm^{-1}

NMR (CCl_4): δ 3.50 (triplet $-\text{CH}_2\text{Cl}$)

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(ii) A 5 l reaction container equipped with a thermometer, an agitator, a dropping funnel and a Dean-Stark trap was provided, into which were charged 798 g of isopropylidene glycerol, 1500 ml of xylol, 340 g of 93% sodium hydroxide and 300 g of water, followed by heating under reflux at 130 - 140°C while agitating. The distilled water/xylene mixture was discharged into the Dean-Stark trap where water was separated from the mixture and removed outside the reaction system while recycling the xylene to the reaction system. After heating under reflux for about 16 hours and at the time when no discharge of water was recognized, 777 g of the isostearyl chloride obtained in (i) was dropped from the dropping funnel in 30 minutes. After completion of the dropping, the reaction mixture was further heated under reflux at 130 - 140°C for about 9 hours to complete the reaction. After cooling, the sodium chloride settled in the reaction container was removed by filtration and the solvent was distilled off under reduced pressure, after which 800 g of a distillate of 176 - 206°C/0.25 - 0.50 mmHg was obtained. This distillate was found to be 2,3-o-isopropylidene-1-o-isostearyl glyceryl ether.

IR (liquid film): cm^{-1}

1200 - 1260, 1050 - 1120

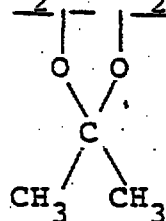
(C - O stretching vibrations)

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NMR (CCl₄): δ

3.1 - 4.2 (multiplet, -CH₂-O-CH₂CH-CH₂)



(iii) A 5 l reaction container quipped with an agitator, a thermometer and a reflux condenser was provided, into which was charged 1103 g of isopropylideneisostearyl glyceryl ether obtained (ii), followed by adding 1500 ml of ethanol and 2000 ml of 0.1N sulfuric acid. The mixture was heated under reflux at 80 - 85°C while agitating. Ten hour after commencement of the heating, the reaction system was followed by the gas chromatograph, by which it was confirmed that hydrolysis of the ether was completely carried out. The reaction system was cooled as it is and allowed to stand, thereby separating it into an oil phase and aqueous phase. The aqueous phase was extracted with ether and the extract was combined with the oil phase, to which an aqueous sodium bicarbonate solution was added to neutralize the remaining acid. The organic phase was collected and the solvent was removed by distillation under reduced pressure, followed by heating and drying under conditions of 100°C/0.1 mmHg for 3 hours to obtain 900 g of α-mono(isostearyl) glyceryl

ether which was a colorless transparent liquid.

IR (liquid film): 3400, 1050 - 1140 cm^{-1}

NMR (CCl_4): δ

3.2 - 3.8 (multiplet, $-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}-\text{CH}_2$)
 $\begin{array}{c} | \quad | \\ \text{OH} \quad \text{OH} \end{array}$

Acid value: 0.08, Saponification value: 0.36,

Hydroxyl value: 313.8, Iodine value: 0.32

Reference 3

(i) A 3 l reaction container equipped with a thermometer, a reflux condenser, a dropping funnel and an agitator was provided, into which 250 g (0.93 moles) of the isostearyl alcohol obtained in Reference 1 was charged, followed by adding 2 ml of boron trifluoride-diethyl ether complex at room temperature while agitating. The mixture was heated up to 85°C, in which 150 g (1.63 moles) of epichlorohydrin was dropped from the dropping funnel in about 2 hours. The exothermic reaction took place and the reaction system was so cooled that the temperature of the mixture was in the range of 100 - 110°C to keep the reaction temperature at a level. After completion of the dropping, the mixture was kept at 100°C for 3 hours and agitation was continued. The gas chromatograph revealed that a proportion of the

unreacted alcohol and isostearyl chlorohydrin ether was almost 1 : 3.

(ii) Without isolating the isostearyl chlorohydrin ether, the production mixture of (i) was agitated, in which were dropped from the dropping funnel 400 g of an aqueous 40% sodium chloride solution and then 400 g of tertiary butyl alcohol. After completion of the dropping, the mixture was continuedly heated under reflux while agitating at 80°C for 2 hours. Simultaneously with commencement of the refluxing, sodium chloride started to precipitate and its amount increased as time went. The reaction was followed by the gas chromatograph and the reaction was stopped when complete disappearance of the chlorohydrin ether was observed. The precipitated sodium chloride was removed by filtration and the filtrate was allowed to stand, thereby separating into an oil phase and an aqueous phase. The oil phase was distilled under reduced pressure to remove the solvent therefrom to obtain first 50 g of unreacted alcohol and then 170 g of isostearyl glycidyl ether to be a distillate of 160 - 170°C/0.4 mmHg.

IR (liquid film): cm^{-1}

1250, 1100, 920, 845

NMR (CCl_4): δ

2.3 - 3.7 (multiplet, $-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}-\text{CH}_2$)

(iii) A 3 l reaction container equipped with an agitator, a thermometer, a reflux condenser and a dropping funnel was provided, into which were charged 140 g of the isostearyl glycidyl ether obtained in (ii) and 400 ml of diethylene glycol dimethyl ether. The mixture was agitated, into which 800 ml of 0.5N sulfuric acid was dropped. After completion of the dropping, the mixture was heated to 100 - 110°C, followed by continuing the heating and agitation at the same temperature for about 8 hours. The gas chromatograph revealed that the glycidyl ether completely disappeared. The reaction product was cooled and allowed to stand thereby to separate into an oil phase and an aqueous phase. The aqueous phase was extracted with ether and the extract was combined with the oil phase, to which sodium bicarbonate was added to neutralize the remaining acid. The oil phase was collected and the solvent was distilled off under reduced pressure, followed by heating and drying under conditions of 100°C/0.1 mmHg for 3 hours to obtain 120 g of a colorless transparent liquid. This liquid had the same gas-chromatographic, IR and NMR characteristics as the α -mono(isostearyl) glyceryl ether obtained in Reference 1.

Example 1

Various hair rinse compositions of the following formulations were prepared and their effect was evaluated by measuring combing forces of hair under wet and dry conditions. The test results are shown in Table 1.

Formulations:

Cationic surface active agent	2.0 (%)
α -mono(methyl-branched alkyl) glyceryl ethers (of the general formula (II) in which m = 7 and n = 8) or comparative compounds (Table 1)	2.0
Water	96.0

Measurement of Combing Force:

Each 20 g of hair (15 cm in length) of Japanese females which had never undergone any beauty treatments such as cold perm, bleaching and the like was bundled. This hair bundle was immersed in 500 ml of water dissolving 10 g of each hair rinse sample and held at 40°C for 30 seconds, followed by rinsing with running water for 30 seconds and then drying with a towel. The towel-dried, half-dried hair bundle (containing about 0.7 g of moisture per unit gram of hair) and a hair bundle which had subsequently dried by a hair dryer for

about 5 minutes (having a moisture content of about 0.1 g per unit gram of hair) were subjected to the measurement of the combing load using a strain gauge (20°C).

Twenty bundles were measured and an average of the measured values was determined as combing force.

Results:

As will be appreciated from the results of Table 1, the compositions of the present invention show excellent combing force in both the dried and semi-wetted conditions.

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Table 1

	Cationic Surface Active Agent	α -mono(methyl-branched alkyl) glyceryl ether or comparative compounds	Combining Force (g)	
			Dry Condition	Wet Condition
Products of I. - Invention	Cetyltrimethylammonium chloride	α -mono(isostearyl) glyceryl ether	107	111
	Distearyltrimethylammonium chloride	α -mono(isostearyl) glyceryl ether	98	76
Comparative Products	Cetyltrimethylammonium chloride	—	275	206
	—	α -monooleyl glyceryl ether	185	156
	—	Stearic acid monoglyceride	299	283
	Distearyldimethylammonium chloride	—	196	171
	—	α -monooleyl glyceryl ether	217	179
	—	Stearic acid monoglyceride	198	175
	Heptylbenzyltrimethylammonium chloride	—	371	316
	—	α -mono(isostearyl) glyceryl ether	249	317
	—	α -monooleyl glyceryl ether	256	291
	—	Stearic acid monoglyceride	297	288
	—	α -mono(isostearyl) glyceryl ether	251	365
	—	α -monooleyl glyceryl ether	271	323
	—	Stearic acid monoglyceride	311	305

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Example 2

Several α -mono(methyl-branched alkyl) glyceryl ethers of the formula (II) with values of n and m were used to prepare rinse compositions of the following formulations. The combing force was measured in a manner similar to Example 1. The results are shown in Table 2.

Formulation:

Cetyltrimethylammonium chloride	2.0 (%)
α -mono(methyl-branched alkyl) glyceryl ether	2.0
Water	96.0

Results:

Table 2

Composition No.		in formula (II)		Combing Force (g)	
		m	n	dry	wet
Comparative Product	1	1	6	175	20.1
Products of Invention	2	7	6	105	11.5
	3	9	6	104	11.0
	4	11	6	121	12.9

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Example 3

Creamy Hair Rinse:

A. Distearyltrimethylammonium	chloride	1.0 (%)
B. Stearyltrimethylammonium	chloride	1.0
C. α -mono(isostearyl) glyceryl	ether (in formula (II), $m = 7$, $n = 8$)	2.0
D. Hydroxyethyl cellulose		0.7
E. Glycerine		5.0
F. Citric acid		0.2
G. Dyestuff	suitable	amount
H. Perfume		"
I. Water	balance	

I was heated to 70°C, to which were added D, G and F while agitating. After dissolution, a mixture of A, B, C and D which had been heated to 70°C was added to the solution. The mixture was cooled under agitation and H was added to the mixture at 45°C and further cooled down to 30°C to obtain a rinse composition.

The present composition exhibited excellent properties and stability.

Example 4

Transparent Hair Rinse:

A.	Cetyltrimethylammonium chloride	1.0 (%)
B.	α -mono(isostearyl) glyceryl ether (in formula (II), $m = 7$, $n = 8$)	2.5
C.	Ethanol	10.0
D.	Hydroxymethylpropyl cellulose	0.5
E.	Polyoxyethylene hardened castor oil (80 E.O.)	0.5
F.	Perfume	suitable amount
G.	Dyestuff	"
H.	Water	balance

G was dissolved in H, to which was added a mixture of A, B, C, D, E and F, followed by agitating to obtain the present composition.

This composition exhibited excellent properties and storage stability.

Example 5

Hair Rinse Composition:

Rinse ingredient (Table 3)	2.5 (wt%)
Water	97.5

The above components were mixed uniformly.

Rinsing Treatment:

A hair which had been washed by a usual manner was immersed in an aqueous solution of each 5% hair rinse composition for 5 minutes, rinsed with running water for 1 minute, dried with a towel, and dried under constant temperature and constant humidity conditions (20°C, 65% R.H.) for 24 hours to give a sample to be tested.

Evaluation:

(1) Softness of Hair

The flexural moment of a rinsed hair (40.- 50 μ) was measured by a bending moment measuring instrument (Model KES-FZ, made by K.K. Kato Tekko-sho), an average of ten measured values being shown.

(2) Sensory Evaluation

Rinsed hairs were sensorily evaluated by an expert panel of ten members and the results were indicated by an average value of their evaluations.

Evaluation Standard:

+2	Very good
+1	Slightly good
0	Moderate
-1	Slightly Poor

Results:

As indicated in Table 3.

Table 3

	Ingredient for Rinse	Hair Softening Ability (g/cm)	Sensory Evaluation
Products of Invention	α -mono(methyl-branched alkyl) glyceryl ether obtained in Reference 1	0.2	+1.7
	α -mono(methyl-branched alkyl) glyceryl ether obtained in Reference 2	0.2	+1.5
Products for Comparison	α -monooleyl glyceryl ether (celakyl-aleonol)	0.8	+0.2
	Distearyl dimethylammonium chloride	0.2	+1.0
	Oleic acid monoglyceride	0.4	+0.2
	Stearic acid monoglyceride	1.0	-0.1
	Sorbitan monooleate	0.8	-0.3
Reference	Water	0.9	-0.7

Example 6

2% (by weight) of the α -mono(methyl-branched alkyl) glyceryl ether obtained in Reference 1, 1.5% of cetyl alcohol and 96.5% of water were heated and mixed at 70°C and then cooled to room temperature, to which suitable amounts of a perfume and a dye were added to obtain a hair rinse.

Hair prior to washing was treated with this hair rinse and then washed. As a result, an excellent hair rinsing effect was found in the hair after the washing.

Example 7

Hair creams which incorporated α -mono(isostearyl) glyceryl ethers of the compositions indicated in Table 4 and comparative compounds were prepared to evaluate their skin irritativeness and feeling in practical application.

The skin irritativeness was evaluated as follows: Each hair cream was subjected to an open patch test using three groups guinea pigs, each group consisting of three guinea pigs, for successive 4 days and the intensity of the skin reaction was observed at the 5th day. The evaluation was made based on the following standard: No reaction (-); Redness (+); and Chemosis (++) .

The evaluation of the feeling in practical application was made as follows: The sensory examination was conducted by an expert panel of ten members and the evaluation was based on the following standard:

(+2) Very good; (+1) Slightly good; (0) Moderate; and (-1) Slightly Poor.

The results are shown in Tables 4 and 5.

Hair Cream Compositions:

Tested compounds	4 (%)
Liquid paraffin	10
Bees wax	3
Cetanol	2
Polyoxyethylene sorbitan monostearate	3
Methylparaben	0.1
Butylparaben	0.1
Water	balance

Table 4

Tested Compounds		Skin irritativeness	Other changes in skin
Products of invention	-mono(isostearyl) glyceryl ether (in formula (II), $m = 7, n = 8$)	(+)	no changes
	-mono(isopalmityl) glyceryl ether (in formula (II), $m = 7, n = 6$)	(+)	"
Comparative products	-monooleyl glyceryl ether (oleyl alcohol)	(+)	Small cosmetic pieces observed
	Oleic acid monoglyceride	(++)	Very intense skin reaction
	Stearic acid monoglyceride	(+)	Slight gloss
	Sorbitan monooleate	(+)	"
	Water	(-)	no changes

Table 5

Tested Compounds	Styling ease	Set Retention	Stickiness	Gloss	Spreadability	Touch	Hardness
Ingredients of	α-mono(isostearyl) glyceryl ether	+1.8	+1.2	-0.9	+1.6	+0.3	+1.8 -0.2
	α-mono(isopalmityl) glyceryl ether	+1.8	+0.9	-1.1	+1.0	+0.2	+1.6 0.0
Comparative Products	α-monooleoyl glyceryl ether (celakyl alcohol)	-1.1	+1.2	+1.1	+0.1	+0.2	+0.2 -1.4
	Oleic acid monoglyceride	+1.4	+1.1	+1.8	-0.1	+0.1	+0.1 -0.2
	Sorbitan monnooleate	+0.1	+0.2	+0.1	-1.3	+0.2	+1.4 +0.2
	Sorbitan sesqui-oleate	+0.2	+0.9	+0.9	-0.9	-0.1	-1.1 -0.1
	Stearic acid monoglyceride	-1.8	-1.4	-1.1	-1.8	-1.2	+0.2 -1.1

3 1.3 4 3.5 4 3.2 5
 (Note 1.) The figures in the table show average values of ten members.

(Note 2.) In the column of "Stickiness", the negative value is better than the positive one.

As will be apparent from the results of this experiment, the hair creams of the present invention incorporating the α -mono(methyl-branched alkyl) glyceryl ethers are lower in skin irritativeness, more excellent in styling ease, lower in stickiness and better in gloss than the known creams.

Example 8

Hair Cream:

(Formulation)

(1) α -mono(isostearyl) glyceryl ether	12.5 (%)
(2) Polyoxyethylene stearyl ether	1.5
(3) Bees wax	1.0
(4) Perfume	suitable amount
(5) Preservative	"
(6) Water	balance

(Preparation)

(1) - (3), (5) and (6) were mixed and heated at 70°C. After cooling, (4) was added to the mixture to obtain the cream product. The hair cream exhibited excellent styling property and feeling in practical application.

Example 9

Hair Tonic:

(Formulation)

(1) Ethanol	50.0 (%)
(2) Hinokitiol	0.05
(3) Menthol	0.1
(4) α -mono(isostearyl) glyceryl ether	1.5
(5) Perfume	suitable amount
(6) Colorant	"
(7) Water	balance

(Preparation)

(1) - (7) were mixed at room temperature to give a product. The hair tonic product exhibited an excellent feeling in practical application and rendered hair smooth.

Example 10

Hair Liquid:

(Formulation)

(1) Ethanol	45.0 (%)
(2) α -mono(isostearyl) glyceryl ether	12.0
(3) Propylene glycol	2.0
(4) Perfume	suitable amount

- | | |
|--------------------|-----------------|
| (5) Colorant | suitable amount |
| (6) Purified water | balance |

(Preparation)

(1) - (6) were mixed to give a product. The hair liquid product had excellent styling property and nice feeling in practical application.

Example 11

Hair Cream:

(Formulation)

- | | |
|--|-----------------|
| (1) α -mono(isopalmityl) glyceryl ether | 14.0 (%) |
| (2) Polyoxyethylene stearyl ether | 1.5 |
| (3) Bees wax | 1.0 |
| (4) Perfume | suitable amount |
| (5) Preservative | " |
| (6) Water | balance |

(Preparation)

(1) - (3), (5) and (6) were mixed and heated at 70°C. After cooling, (4) was added to obtain a product. This product exhibited excellent styling property and nice feeling in practical application.

Example 12

Hair Tonic:

(Formulation)

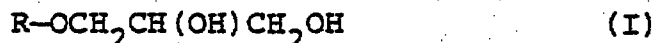
(1) Ethanol	50.0 (%)
(2) Hinokitiol	0.05
(3) Methol	0.1
(4) α -mono(isopalmityl) glyceryl ether	1.0
(5) Perfume	suitable amount
(6) Colorant	"
(7) Water	--balance

(Preparation)

(1) - (7) were mixed at room temperature to give a product. This product gave nice feeling and rendered hair smooth.

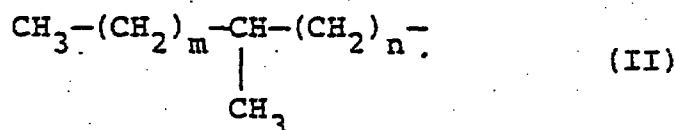
CLAIMS

1) A hair cosmetic comprising 0.1 - 30 wt% of an α -mono(methyl-branched alkyl) glyceryl ether of the general formula (I)



in which R represents a methyl-branched saturated hydrocarbon group having 12 - 24 carbon atoms.

2) A hair cosmetic according to Claim 1, wherein the R in the formula (I) is a group of the following formula (II)



in which m is an integer of 2 - 14, and n is an integer of 3 - 11 provided that m + n is an integer of 9 - 21.

3) A hair cosmetic according to Claim 1 or 2, wherein said α -mono(methyl-branched alkyl) glyceryl ether is present in an amount of 0.5 - 20 wt% of said cosmetic.

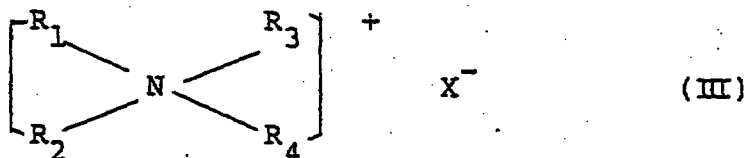
4) A hair cosmetic according to any of Claims 1 through 3, wherein said hair cosmetic is a hair rinse.

5) A hair rinse composition comprising (A) 0.1 - 20 wt% of at least one quaternary ammonium salt of the

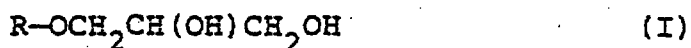


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general formula (III).



in which one or two of R_1 , R_2 , R_3 and R_4 are independently a long-chain alkyl group or a long-chain hydroxylalkyl group having 8 - 20 carbon atoms, the other independently represent an alkyl group having 1 - 3 carbon atoms, a hydroxylalkyl group having 1 - 3 carbon atoms, a benzyl group or a polyoxyethylene group having a total of addition moles of below 10, and X represents a halogen atom or an alkylsulfate having 1 - 2 carbon atoms, and (B) 0.1 - 20 wt% of an α -mono(methyl-branched alkyl glyceryl ether of the general formula (I)



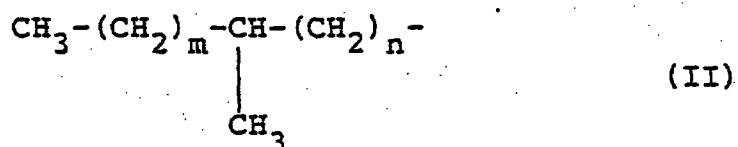
in which R represents a methyl-branched saturated hydrocarbon group having 12 - 24 carbon atoms.

6) A hair cosmetic according to Claim 5, wherein said at least one quaternary ammonium salt is present in an amount of 0.5 - 5 wt% and said glyceryla ether is present in an amount of 0.5 - 5 wt%, both based on the total composition.



* C L M S *

7) A hair rinse composition according to Claim 5 or 6, wherein the R in the formula (I) is a group of the following formula (II).



in which m is an integer of 2 - 14, and n is an integer of 3 - 11 provided that m + n is an integer of 9 - 21.

8) A hair cosmetic according to Claim 2 or 7, wherein the R is a mixture of groups of the formula (II) in which the number of carbon atoms is 18 and m is an integer of 6 - 8.

9) A hair cosmetic as claimed in claim 1 and substantially as herein described in any one of the specific examples hereinbefore set forth.

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