

**AMMONIUM SALTS AND HAIR TREATING AGENT
CONTAINING THE SAME**

FIELD OF THE INVENTION

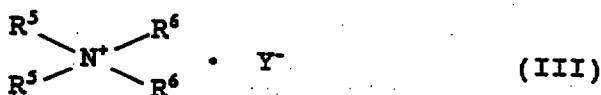
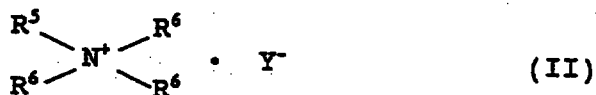
The present invention relates to quaternary ammonium or amine salts, to hair treating agents containing the same, and to a tertiary amine intermediate useful in the production of such salts.

BACKGROUND OF THE INVENTION

Since combing and brushing inflict irreparable mechanical damage to hair, hair rinses containing a cationic surface active agent have been used in order to protect hair from such a damage, as well as for the aftercare of hair from cosmetic point of view. Such a cationic surface active agent is used in the form of an aqueous solution or a suspension together with a nonionic emulsifying agent or an aliphatic alcohol. When applied to hair, such agent decreases friction between hairs or between the hair and a brush, and therefore improves the smoothness of wet hair combing, and also improves a series of other properties such as glossiness, electrostatic protection and smoothness of dry hair combing.

In order to attain such advantages, quaternary ammonium salts have been used, such as stearyl trimethylammonium chloride or bromide, cetyl trimethylammonium chloride, stearyl dimethylbenzylammonium chloride, distearyl dimethylammonium chloride and diisostearyl dimethylammonium chloride. Structurally these

prior art quaternary ammonium salts are divided into two groups; a structure represented by the following general formula (II) which has one long-chain alkyl group and another structure represented by the following general formula (III) which has the two same long-chain alkyl groups:-



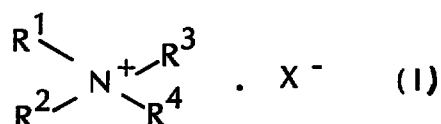
wherein R^5 is a straight or branched long-chain alkyl group and R^6 is a short-chain alkyl group.

These prior art quaternary ammonium salts, however, have the disadvantage that they can only partially satisfy the necessary properties which include flexibility, smoothness and oiliness both during washing and after drying of hair.

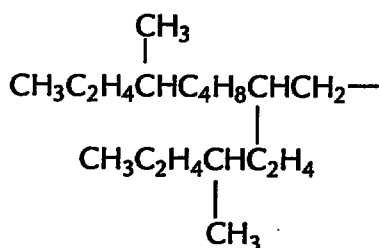
SUMMARY OF THE INVENTION

It is an object of the present invention to obviate or mitigate the above disadvantage.

In accordance with the present invention, there is provided an asymmetric quaternary ammonium or amine salt represented by the following general formula (I) (to be referred to as "asymmetric ammonium salt" hereinafter):



wherein R¹ is represented by the following formula:-



R² is a straight chain alkyl or alkenyl group having 8 to 22 carbon atoms; R³ is an alkyl group having 1 to 4 carbon atoms; R⁴ is a hydrogen atom or an alkyl group having 1 to 4 carbon atoms; and X is a halogen atom or an alkyl sulfate having 1 to 4 carbon atoms; and a tertiary amine which is an intermediate used in the manufacture of the asymmetric ammonium salts.

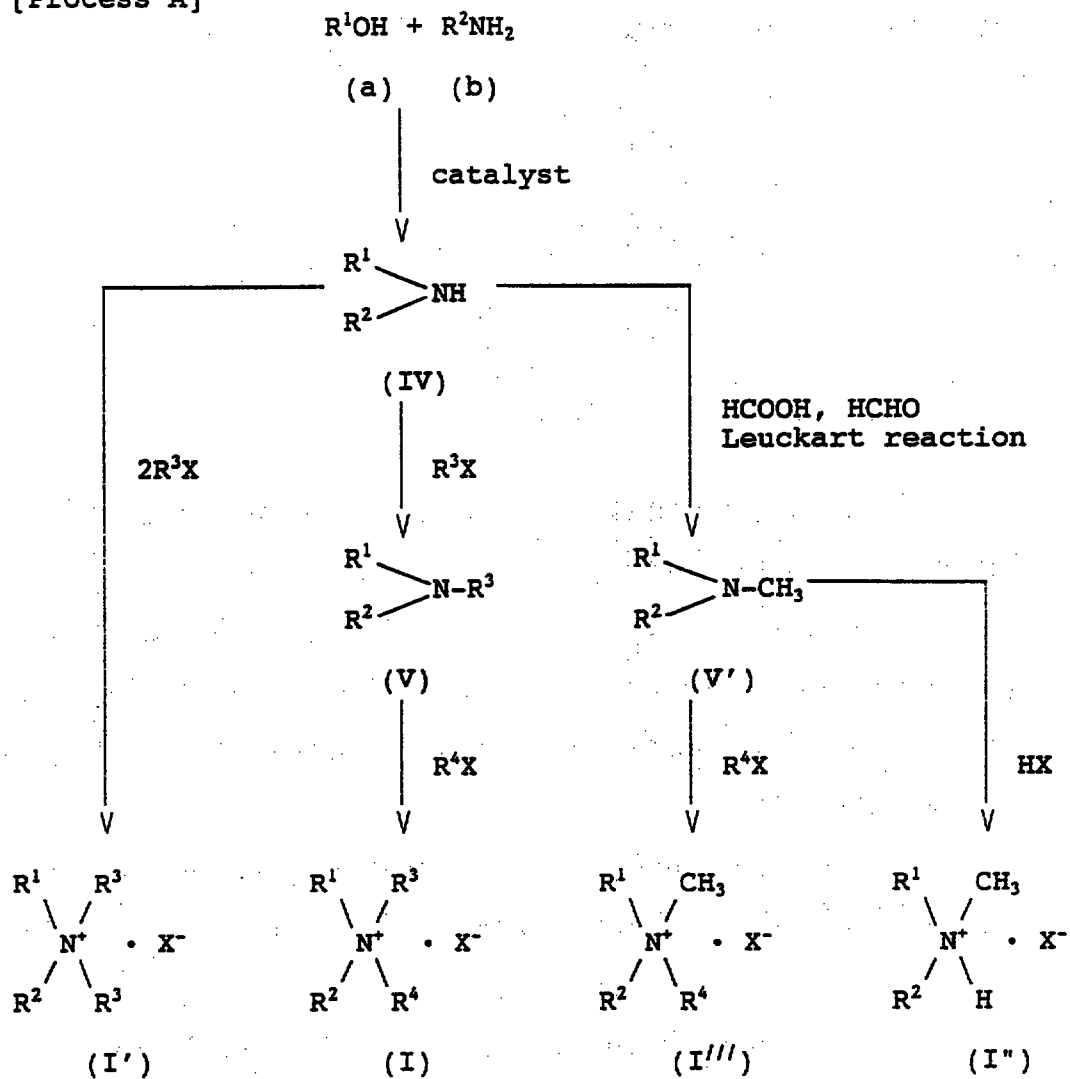
The present invention also provides a hair treating agent which contains at least one of the asymmetric ammonium salts as defined above.

DETAILED DESCRIPTION OF THE INVENTION

The term "a quaternary ammonium salt" herein used means the compounds of the aforementioned general formula (I) wherein R⁴ represents an alkyl group having 1 to 4 carbon atoms, and the term "amine salt" herein used means those wherein R⁴ represents a hydrogen atom.

The asymmetric ammonium salts of the present invention can be obtained according to Process (A) or (B) as described below.

[Process A]

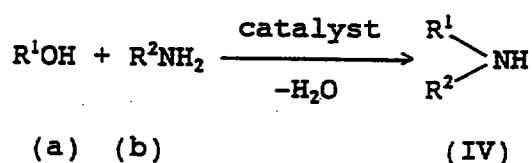


wherein R^1 , R^2 , R^3 , R^4 and X are as defined above.

According to the process (A), an alkyl alcohol (a) having a long-chain branched carbon chain is allowed to react with a straight long-chain alkylamine or alkenylamine (b) to obtain an asymmetric secondary amine (IV), and then the thus obtained secondary amine is converted into an asymmetric

tertiary amine (V) making use of an alkyl halide, or into another asymmetric tertiary amine (V') making use of the Leuckart reaction.

Synthesis of a secondary amine (IV)

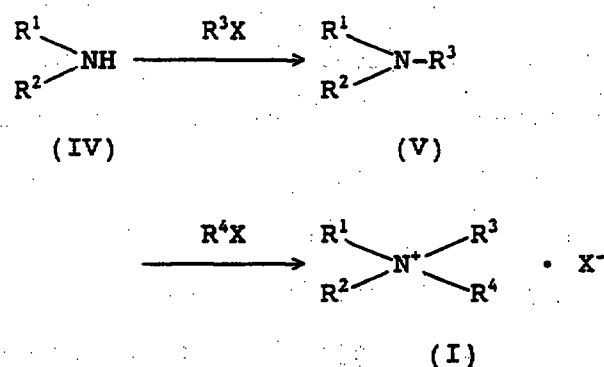


wherein R¹ and R² are as defined above.

A long-chain branched alkyl alcohol to be used as the starting material (a) is provided, together with a catalyst, into a reactor equipped with a tube for use in the introduction of hydrogen and with a condenser and a separator for use in the condensation and separation of water formed by the reaction and oily materials distilled off during the reaction. The catalyst to be used may have a dehydrogenation/hydrogenation function, preferably consisting of copper and nickel as its main components. The amount of the catalyst is not strictly limited, but may generally be in the range of from 1 to 10% based on the amount of alcohol to be used. After replacing the atmosphere in the reaction system with nitrogen gas, hydrogen is introduced together with the elevation of temperature. The straight long-chain alkylamine or alkenylamine (b) may be added either as a whole when the temperature reached to a predetermined level or

little by little by dropwise addition into the reaction system. The reaction may be carried out generally at a temperature of from about 150 to about 250°C, though a temperature outside this range may also be applied to the reaction depending on the type of the materials. The catalyst is reduced and converted into active form during the temperature increasing step. Water formed during the reaction is discharged from the reaction system together with hydrogen and separated from oily materials through the condenser and separator, and the separated oily materials are returned into the reactor. After completion of the reaction, the catalyst is filtered out by an appropriate means and the reaction mixture is subjected to distillation to obtain the asymmetric secondary amine (IV).

Synthesis of quaternary ammonium salt (I)

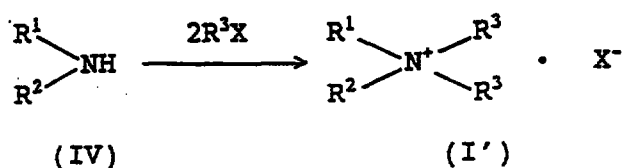


wherein R¹, R², R³, R⁴ and X are as defined above.

The secondary amine (IV) thus obtained is converted into tertiary form by allowing it to react with an alkyl halide or a dialkylsulfate R³X, according to a conventional

manner, and then the resulting tertiary amine (V) is further converted into quaternary form using the compound R^4X , to thereby obtain the desired quaternary ammonium salt (I).

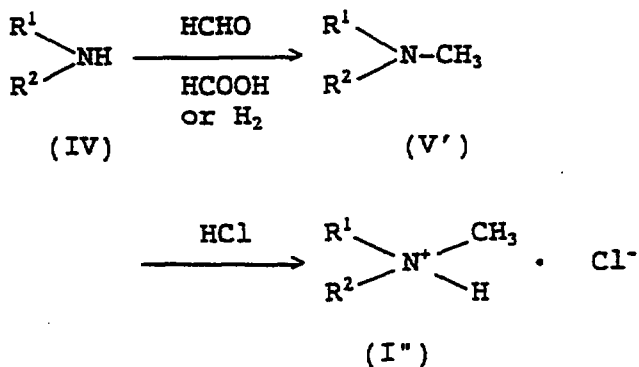
Synthesis of quaternary ammonium salt (I')



wherein R^1 , R^2 , R^3 and X are as defined above.

After transferring into a reactor such as an autoclave, the secondary amine (IV) thus obtained is converted into quaternary form by allowing it to react with an alkyl halide or a dialkylsulfate in the presence of an alkali compound. Thereafter, by-products such as sodium chloride are removed by means of filtration to obtain the quaternary ammonium salt (I') having asymmetric groups.

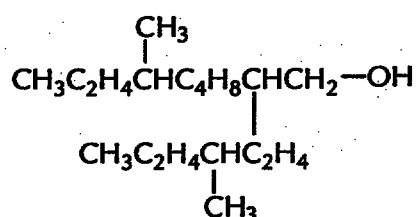
Synthesis of amine salt (I'')



wherein R¹ and R² are as defined above.

The amine salt (I'') is obtained by allowing the secondary amine (IV) to react with formalin and formic acid (Leuckart reaction) to synthesize a tertiary amine (V'), and then neutralizing the thus obtained tertiary amine (V') with an acid such as hydrochloric acid.

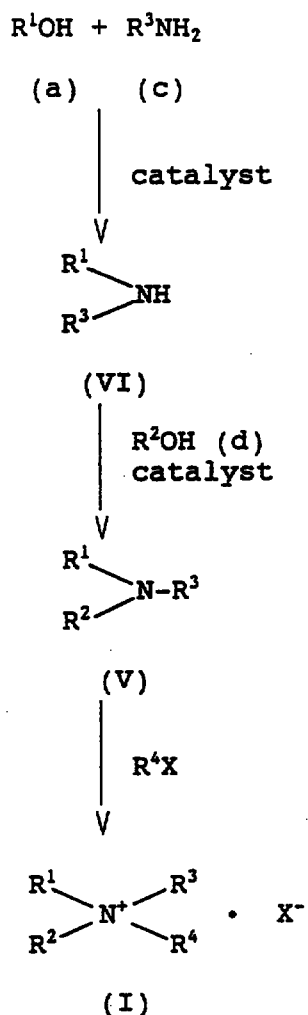
The long-chain branched alkyl alcohol to be used as material (a) in Process (A) is represented by the following formula.



An example of this alcohol is Fine Oxocol 180N (manufactured by Nissan Chemical Industries, Ltd).

Examples of the straight long-chain alkylamine or alkenylamine (b) include amines having 8 to 22 carbon atoms such as laurylamine, stearylamine, behenylamine and oleyamine

[Process (B)]



wherein R^1 , R^2 , R^3 , R^4 and X are as defined above.

The following describes Process (B), wherein all steps are effected by alcohol-amine reactions.

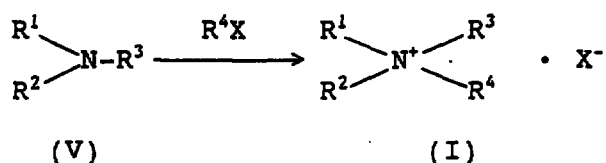
Synthesis of tertiary amine (V)

A long-chain branched alkyl alcohol (a) to be used as a starting material is provided, together with a catalyst, into a reactor equipped with a tube for use in the

introduction of hydrogen and with a condenser and a separator for use in the condensation and separation of water formed by the reaction and oily materials distilled off during the reaction. The catalyst to be used may have a dehydrogenation/hydrogenation function, preferably consisting of copper as its main component. The amount of the catalyst is not strictly limited, but may generally be in the range of from 0.1 to 10% based on the amount of alcohol to be used. After replacing the atmosphere in the reaction system with nitrogen gas, hydrogen is introduced together with the elevation of temperature. When the temperature reaches a predetermined level, an alkylamine (c) may be added little by little into the reaction system. The reaction may be carried out generally at a temperature of from about 150 to about 250°C, though a temperature outside this range may also be applied to the reaction depending on the type of the materials. The catalyst is reduced and converted into active form during the temperature increasing step. Water formed during the reaction is discharged from the reaction system together with hydrogen and separated from oily materials through the condenser and separator, and the separated oily materials are returned into the reactor. After completion of the reaction, the catalyst is filtered out by an appropriate means and the reaction mixture is subjected to distillation to obtain the secondary amine (VI) having asymmetric alkyl or alkenyl group.

Thereafter, similar reaction is repeated using a straight long-chain alkyl or alkenyl alcohol (d), a catalyst and a secondary amine (VI) to obtain the tertiary amine (V) of interest.

Synthesis of quaternary ammonium salt (I)



wherein R^1 , R^2 , R^3 , R^4 and X are as defined above.

The tertiary amine (V) thus obtained is converted into quaternary form by allowing it to react with the compound R^4X , according to a conventional manner, to thereby obtain the quaternary ammonium salt (I) of interest.

The long-chain branched alkyl alcohol to be used as material (a) in Process (B) is as defined in Process (A).

Examples of the alkylamine (c) include methylamine, ethylamine, n-propylamine, isopropylamine, n-butylamine and sec-butylamine.

Examples of the straight long-chain alcohol (d) include alkyl or alkenyl alcohols having 8 to 22 carbon atoms such as octyl alcohol, dodecyl alcohol, octadecyl alcohol, behenyl alcohol and oleyl alcohol.

In Process (A), by-product salts are formed during converting a secondary amine (IV) into a quaternary ammonium salt (I') or converting a secondary amine (IV) into a

quaternary ammonium salt (I) through a tertiary amine (V). That is, Process (B) is preferably employed in the present invention wherein the tertiary amine (V) is important as an intermediate, because Process (A) requires additional step for removing such salts which step may be a considerable disadvantage.

[Hair Treating Agent]

Since the asymmetric ammonium salts represented by the general formula (I) of the present invention shows excellent properties as a surface active agent, it can be applied suitably to a hair treating agent with the aim of protecting hair. The hair treating agent of the present invention contains at least one asymmetric ammonium salts represented by the general formula (I) in an amount similar to that used for known quaternary ammonium compounds, but preferably in an amount of from about 0.1 to about 20% by weight, more preferably from 0.1 to 10% by weight. When the hair treating agent of the present invention is used, excess asymmetric ammonium salt is washed out of hair with no problems, and markedly excellent smoothness of wet hair combing can be attained, as well as excellent combing smoothness of dry hair.

Examples of the form of the hair treating agent to be provided by the present invention include a hair rinse, a hair conditioner, a hair treatment, a hair pack, a hair cream, a styling lotion, a styling mousse, a conditioning

mousse and a hair spray. Other compounds which may be used jointly with the asymmetric ammonium salt in the hair treating agent of the present invention include: cationic active agents such as known mono- or dialkyl quaternary ammonium salts; nonionic active agents; oils and fats such as higher alcohols, higher esters, hydrocarbons, fatty acids and silicone oil; moisture retaining agents such as glycerol and urea; high molecular weight polymer substances such as cationic polymers, high molecular weight polysaccharides and polypeptides; and solvents such as lower alcohols, propylene glycol and diethylene glycol monoethyl ether. These additional compounds may be used in such amounts that the effects of the present invention are not deleteriously affected. Also useful as additive agents are antiseptic agents, emulsifying agents, perfumes and coloring agents.

Compared to prior art hair treating agents in which known cationic active agents are used as the main component, the hair treating agent of the present invention can give hair in both the wet and the dry state markedly excellent flexibility, smoothness and moist feeling with no oiliness.

In addition, the asymmetric ammonium salt of the present invention represented by the general formula (I) is excellent as a fiber softening agent.

Examples of the present invention are given below by way of illustration and not by way of limitation. Unless

otherwise noted, the term "%" used in the following examples means "% by weight".

EXAMPLE 1

In this example, experiments were carried out to synthesize an asymmetric dialkyldimethyl quaternary ammonium salt having a branched chain alkyl group of 18 carbon atoms and a straight chain alkyl group of 12 carbon atoms.

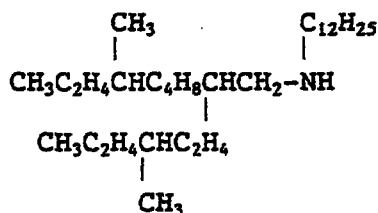
Synthesis of secondary amine

A two liter capacity flask equipped with a condenser and a separator for use in the separation of formed water was charged with 600 g of 2-(3-methylhexyl)-7-methyl-1-decanol (Fine Oxocol 180N, manufactured by Nissan Chemical Industries, Ltd.) and 12 g of a copper-nickel catalyst (2% by weight of the alcohol). With stirring, the atmosphere in the flask was replaced with nitrogen and the temperature was then increased. When the temperature reached 100°C, hydrogen gas was introduced into the reaction system at a flow rate of 40 l/hr using a flow meter, followed by a further increase in the reaction temperature to 230°C. While maintaining the temperature at this level, 413 g of 1-dodecyl amine (Famin 20D, Kao Corp.) was added to the reaction system, and the course of the reaction was followed by checking partial amine values. After about 5 hours of reaction, the catalyst was removed by filtration and the reaction mixture was subjected to distillation to obtain an asymmetric dialkyl secondary amine. Parent ion peak (437) was confirmed by mass

spectrometric analysis of the thus formed product which was further subjected to gas chromatographic analysis (yield, >95%) and analyses of total, partial and tertiary amine values (cf. Table 1) to confirm formation of an asymmetric dialkyl secondary amine having the following construction.

TABLE 1

	<u>Amine values</u>		
	<u>total</u>	<u>partial</u>	<u>tertiary</u>
Measured	127	127	0.0
Theoretical	128	128	0.0



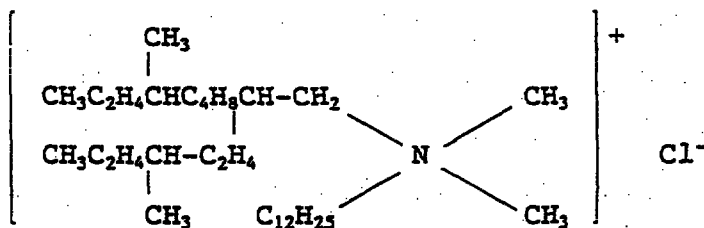
In this example, the copper-nickel catalyst used in the reaction was prepared in the following manner:-
A one liter capacity flask containing synthetic zeolite was charged with copper nitrate and nickel nitrate at a molar ratio of the metal atoms (Cu:Ni) of 4:1, the metal salts were dissolved in water and the temperature in the flask was increased to 90°C with stirring, followed by gradual dropwise addition of 10% aqueous solution of Na₂CO₃. After 1 hour of aging, precipitated materials were filtered and washed with water, dried at 80°C for 10 hours and then calcined at 600°C for 3 hours to obtain the copper-nickel catalyst of interest.

Synthesis of quaternary ammonium salt

A one liter capacity autoclave was charged with 300 g of the asymmetric dialkyl secondary amine obtained above, 145 g of isopropyl alcohol and 90 g of methyl chloride. After elevating temperature to 90°C, 66 g of 48% NaOH solution was added under pressure continuously over a period of about 2 hours, followed by about 6 hours of aging. Thereafter, by-produced NaCl was removed by filtration to obtain an asymmetric dialkyldimethyl quaternary ammonium salt. On the basis of the analytical data as shown in Table 2, the formation of a quaternary ammonium salt having the structure below was confirmed.

TABLE 2

<u>Items analysed</u>	<u>Measured values</u>
Residual amine value	6.5
Acid value	3.0
Effective contents (cation %)	68%



EXAMPLE 2

In this example, experiments were carried out to synthesize an asymmetric quaternary ammonium salt having a branched chain alkyl group of 18 carbon atoms and a straight chain alkyl group of 12 carbon atoms.

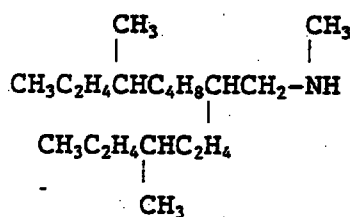
Preparation of copper based catalyst (copper-zinc-ruthenium catalyst)

A one liter capacity flask containing synthetic zeolite was charged with copper nitrate, zinc nitrate and ruthenium chloride at a weight ratio of the metal atoms (Cu:Zn:Ru) of 4:1:0.01, the metal salts were dissolved in water and temperature in the flask was increased to 90°C with stirring, followed by gradual dropwise addition of 10% aqueous solution of Na_2CO_3 . After 1 hour of aging, precipitated materials were filtered and washed with water, dried at 100°C for 9 hours and then calcined at 600°C for 1 hour. The amount of the thus obtained metal oxides supported on the carrier was determined to be 50% by weight.

Synthesis of secondary amine

A two liter capacity separable flask was charged with 1200 g of 2-(3-methylhexyl)-7-methyl-1-decanol (Fine Oxocol 180N, manufactured by Nissan Chemical Industries, Ltd.) and 24 g of the copper-zinc-ruthenium catalyst (2.0% by weight of the alcohol). With stirring, the atmosphere in the flask was replaced with nitrogen and the temperature was then

increased. When the temperature reached 100°C, hydrogen gas was introduced into the reaction system at a flow rate of 40 l/hr using a flow meter, followed by a further increase in the temperature to 190°C. While maintaining the temperature at this level, the reaction was started by introducing methylamine gas into the reaction system at such a rate that the amount of methylamine in the exhaust gas was 20% by volume. The reaction was carried out under standard pressure until the amount of the unreacted alcohol was reduced to 1% by weight or less. In this example, the amount of the unreacted alcohol and the composition of the reaction product were analyzed by gas chromatography. As the results, the secondary amine of interest having the following structure was obtained with a yield of 93%:-



Next, the thus-obtained secondary amine was purified by distillation, with a yield of 92%.

Measured and theoretical values of the secondary amine are shown in Table 3.

TABLE 3

	<u>Total amine value</u>	<u>Partial amine value</u>	<u>Tertiary amine value</u>	<u>Purity (%)*</u>
Measured	197.2	197.1	<0.1	99.5
Theoretical	198	198	0	—

*Determined by gas chromatography

Synthesis of tertiary amine (V)

A two liter capacity separated flask was charged with 330 g of n-dodecyl alcohol (Calcol 20, Kao Corp.) and 3.3 g of the copper-zinc-ruthenium catalyst. With stirring, the atmosphere in the flask was replaced with nitrogen and the temperature was then increased. When the temperature reached 100°C, hydrogen gas was introduced into the reaction system at a flow rate of 40 l/hr using a flow meter, followed by further increase in the temperature to 190°C. While maintaining the temperature at this level, 500 g of the secondary amine obtained above was added to the reaction system, and the reaction was carried out for about 6 hours.

After removing the catalyst by filtration, the reaction product was purified by distillation to obtain a tertiary amine of the structure below at a yield of 90%. Its measured and theoretical values are shown in Table 4.

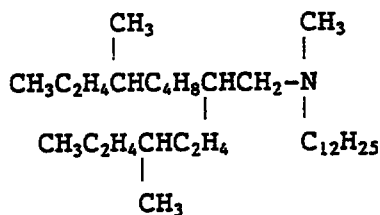


TABLE 4

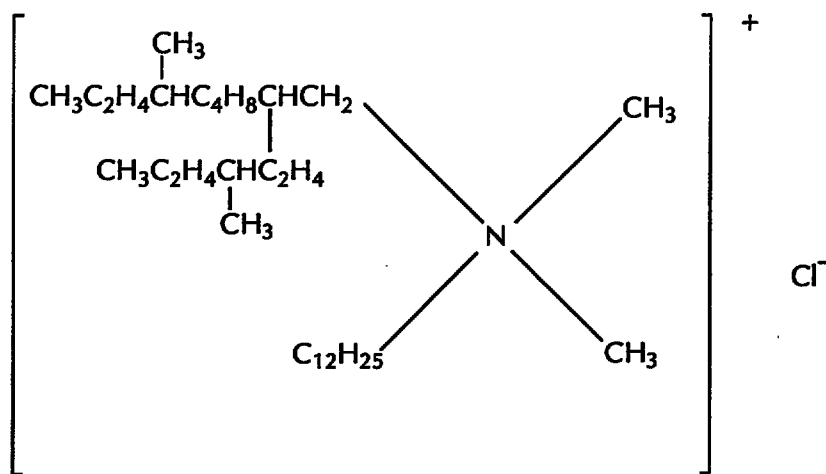
	<u>Measured value</u>	<u>Theoretical value</u>
Total amine value	123.8	124
Partial amine value	123.5	124
Tertiary amine value	123.0	124
Molecular weight	451	451
Purity (%) by gas chromatography	99.0	—

Synthesis of quaternary ammonium salt

A one liter capacity autoclave was charged with 300 g of the tertiary amine obtained above, 145 g of isopropyl alcohol and 45 g of methyl chloride. After elevating temperature to 90°C, 33 g of 48% NaOH solution was added under pressure continuously over a period of about 2 hours, followed by about 6 hours of aging. Thereafter, by-produced NaCl was removed by filtration to obtain an asymmetric dialkyldimethyl quaternary ammonium salt. On the basis of the analytical data as shown in Table 5, formation of a quaternary ammonium salt having the structure below was confirmed.

TABLE 5

<u>Items analysed</u>	<u>Measured values</u>
Residential amine value	6.5
Acid value	3.0
Effective contents (cation %)	68%

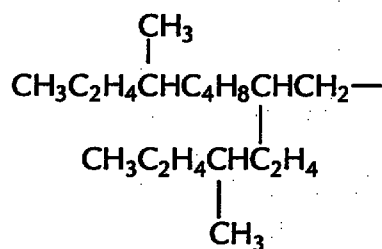


EXAMPLE 3

In the same manner as the process of Example 2, an asymmetric tertiary amine (V) with R^1 , R^2 , and R^3 groups as shown in Table 6 was synthesized using various branched long-chain alcohols and straight long-chain alcohols and methylamine. The measured and theoretical values are shown in Table 6.

TABLE 6

R¹



(Fine Oxocol 180N as R¹OH)*

R ²	n-oleyl
R ³	methyl
Total amine (theoretical)	104.9 (105)
Partial amine (theoretical)	104.5 (105)
Tertiary amine (theoretical)	102.5 (105)
Molecular weight (theoretical)	535 (535)
Purity (%) ***	97.5

*: Manufactured by Nissan Chemical Industries, Ltd

***: Analyzed by gas chromatography

The following illustrates examples of hair treating agent formulations proposed by the present invention.

Formulation Example 1: Hair rinse

Asymmetric quaternary ammonium salt synthesized in Example 1	1.0%
Stearyl trimethylammonium chloride	1.0%
Cetyl alcohol	3.0%
Hydroxyethyl cellulose	0.2%
Polyoxyethylene (10 mol) oleyl alcohol ether	1.0%
Glycerol	5.0%
Polypeptide	2.0%
Perfume	0.3%
Methylparaben	0.1%
Pigment	trace
Purified water	balance

Formulation Example 2: Styling lotion

Asymmetric quaternary ammonium salt synthesized in Example 1	0.5%
Polyvinyl pyrrolidone	3.0%
Propylene glycerol	2.0%
Polyoxyethylene (20 mol) stearyl alcohol ether	1.5%
Ethyl alcohol	15.0%
Perfume	0.3%
Methylparaben	0.1%
Pigment	trace
Purified water	balance

TEST EXAMPLE 1

Components shown below were dissolved by heating at 70°C.
With stirring, ion-exchanged water at 70°C was added

gradually to the solution to obtain an emulsified hair rinse composition (hair treating agent).

Composition

Quaternary ammonium salt or amine salt	1%
Octadecyltrimethylammonium chloride	1%
Cetyl alcohol	3%
Water	balance

The hair rinse composition thus obtained was applied to hair bundles in an amount of 10% per bundle. After 3 minutes, the thus treated hair bundles were washed with hot water at 30°C for an appropriate period of time and subjected to towel drying to evaluate performance of wet hair.

Thereafter, the hair bundles were dried using a dryer to evaluate performance of dry hair. The evaluation was based on the sense of touch by 10 panelists using the following evaluation criteria. The results are shown in Table 7.

Flexibility

- 3: soft feeling
- 2: insufficient soft feeling
- 1: lack of soft feeling

Smoothness

- 3: smooth
- 2: not so smooth
- 1: not smooth

Moist feeling

- 3: moist

2: not so moist

1: not moist

Oiliness

3: no stickiness

2: slightly sticky

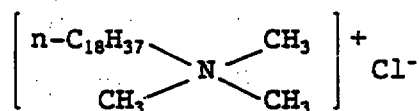
1: sticky

TABLE 7

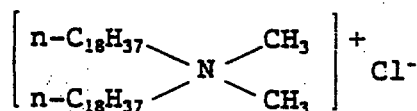
Quaternary ammonium salt or amine salt	Hair Treating Agent					
	(a)	(b)	(c)	(d)	(e)	(f)
	Ammonium salt of Example 1	Comparative compound				
		(b)	(c)	(d)	(e)	(f)
Wet						
Flexibility	2.7	2.3	1.6	1.8	2.2	2.0
Smoothness	2.6	1.5	1.8	1.8	2.1	2.1
Moist feeling	2.8	1.6	1.9	1.9	1.7	1.8
Oiliness	2.7	1.8	2.1	2.0	2.0	1.9
Dry						
Flexibility	2.7	2.1	1.5	1.8	2.0	1.8
Smoothness	2.6	1.4	1.9	1.8	2.0	1.8
Moist feeling	2.8	1.5	1.7	1.7	1.6	1.7
Oiliness	2.8	1.7	2.0	1.7	1.6	1.8

(Notes on Table 7)

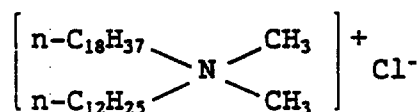
Comparative Compound (b)



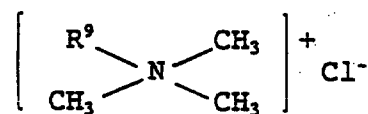
Comparative Compound (c)



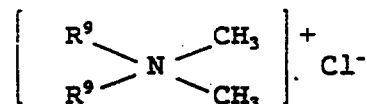
Comparative Compound (d)



Comparative Compound (e)



Comparative Compound (f)



(in the above formulae, R^9 is an alkyl group represented by the formula $-(\text{CH}_2)_n\text{CH}(\text{CH}_3)(\text{CH}_2)_m\text{CH}_3$ wherein n is an integer of 1 to 16 and m is an integer of 0 to 16 with the proviso that the sum of n and m is 10 to 16, which is originated from isostearyl alcohol manufactured by Emery Co., Ltd.)

TEST EXAMPLE 2

As a performance evaluation, the hair rinse composition of the above Formulation Example 1 and a control hair rinse composition as shown below were applied to hair bundles in an amount of 10% per bundle. After 3 minutes, the thus treated hair bundles were washed with hot water at 30°C for an appropriate period of time and subjected to towel drying to evaluate performance of wet hair. Thereafter, the

hair bundles were dried using a dryer to evaluate performance of dry hair. Evaluation of the inventive composition was made based on a relative comparison with the control composition below in terms of flexibility (softness), smoothness (slipping of hair bundle) and moist feeling using the following evaluation criteria, with the results shown in Table 8.

<Evaluation criteria in comparison with the control>

o: superior to control

Δ: equivalent to control

X: inferior to control

Control composition

Distearyl dimethylammonium chloride	1.0%
Stearyl trimethylammonium chloride	1.0%
Cetyl alcohol	3.0%
Hydroxyethyl cellulose	0.2%
Polyoxyethylene (10 mol) oleyl alcohol ether	1.0%
Glycerol	5.0%
Polypeptide	2.0%
Perfume	0.3%
Methylparaben	0.1%
Pigment	trace
Purified water	balance

TABLE 8:

Wet

Smoothness 0

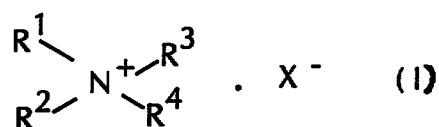
Dry

Smoothness o

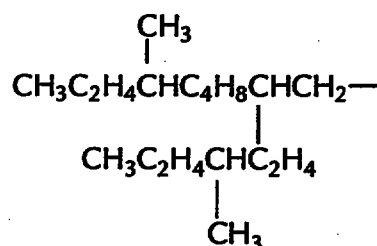
Thus, it is apparent that there has been provided, in accordance with the present invention, a quaternary ammonium salt or an amine salt which shows markedly excellent effects in terms of all of the necessary properties when applied to both wet and dry hair, including flexibility, smoothness and moist feeling with no oiliness.

CLAIMS

1. An asymmetric quaternary ammonium or amine salt represented by the following general formula (I):



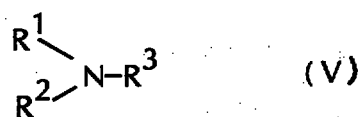
wherein R¹ is represented by the following formula:-



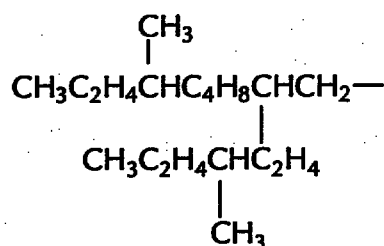
R² is a straight chain alkyl or alkenyl group having 8 to 22 carbon atoms; R³ is an alkyl group having 1 to 4 carbon atoms; R⁴ is a hydrogen atom or an alkyl group having 1 to 4 carbon atoms; and X is a halogen atom or an alkyl sulfate having 1 to 4 carbon atoms.

2. A salt as claimed in claim 1, which is substantially as hereinbefore described in any one of Examples 1 to 3.
3. An asymmetric tertiary amine represented by the following general formula (V):





wherein R¹ is represented by the following formula:-



R² is a straight chain alkyl or alkenyl group having 8 to 22 carbon atoms and R³ is an alkyl group having 1 to 4 carbon atoms.

4. A hair treating composition which contains at least one salt as claimed in claim 1 or 2.
5. A hair treating composition as claimed in claim 4, substantially as hereinbefore described in Formulation Example 1 or 2.

