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(71) Applicant *(for all designated States except AL)*: **L'OREAL** [FR/FR]; 14, rue Royale, 75008 Paris (FR).

(72) Inventors; and

(71) Applicants *(for AL only)*: **XU, Chensu** [CN/CN]; 550 Jinyu Lu, Shanghai 201206 (CN). **JIA, Haidong** [CN/CN]; 550 Jinyu Lu, Shanghai 201206 (CN). **LI, Jinyong** [CN/CN]; 550 Jinyu Lu, Shanghai 201206 (CN).

(74) Agent: **CHINA PATENT AGENT (H.K.) LTD.**; 22/F., Great Eagle Center, 23 Harbour Road, Wanchai, Hong Kong (CN).

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(54) Title: COMPOSITION FOR TREATING KERATIN FIBERS

(57) Abstract: A composition for treating keratin fibers comprises at least one cationic surfactant, at least one nonionic surfactant selected from alkyl(poly)glycosides, fatty acids esters of glycerol and of polyglycerol, or a mixture thereof, at least one protein extract of moringa genus plant seed, and at least one cationic alkyldiallylamine or dialkyldiallylammonium cyclopolymer, and at least one oil selected from hydrocarbon oil, plant oil, or a mixture thereof.

COMPOSITION FOR TREATING KERATIN FIBERS

FIELD OF THE INVENTION

The present invention relates to hair care cosmetic field, more specifically, it relates to new compositions having desired anti particle deposition and good conditioning effect to the keratin fibers.

BACKGROUND OF THE INVENTION

Air pollution, for example the airborne dust particles, becomes a severe public concern, poses threat to the human health, and attracts consumers attention for the impact on keratin fibers, in particular the hair.

The human hair is damaged or weakened by the chemical action of environmental agents and/or of hair treatments such as permanent-waving, dyeing or bleaching. In particular, being exposed to the air, hair is damaged and weakened by air pollution.

Among different types of pollutants existing in the air, dust or fine particles such as PM 2.5, PM 10, carbon powders, gases such as CO, SO_2, NO_x, have been raising attentions of the consumers, in particular since recent years.

As used herein, the term “PM 2.5 (or PM 10)”, also knowns as particulate matters, or fine particles, refers to particles which pass through a size-selective inlet with a 50% efficiency cut-off at 2.5 μm (or 10 μm for PM 10) aerodynamic diameter, as defined in ISO 7708:1995, 7.1. The particulate matters are understood as a complex mixture comprising small particles and liquid droplets, which float in the air. Fine particles existing in the air tend to be adherent to the hair. They will deposit on the hair and stay even after washing. This deposition makes the hair dirty, lank, and greasy.

It is known to the art to use active agents for reducing the deposition of pollutants on the hair, and thus reducing the hair dirty, greasy, and lank issue faced by the consumers.

Moringa oleifera seed extract is known for its use in hair care cosmetic compositions. In particular, it is used in anti-pollution hair care products. For example, shampoos containing surfactants, Moringa oleifera seed extract, and various types of conditioning agents are known.

However, the compositions as mentioned above are still not satisfying, in particular regarding the balance between conditioning of the hair, as well as anti particle deposition effect. This is to say, it is difficult to formulate a composition with an improved anti particle deposition effect, and meanwhile providing good conditioning effect to the hair.

Moreover, although there exists products for washing and conditioning the hair with an

esthetic aspect such as transparent or translucent appearance, these products do not provide anti particle depositions to the hair.

There is thus a need for new products displaying improved balance of the properties mentioned above.

In particular, there exists a need for formulating a composition which provides to keratin fibers, in particular the hair, an improved balance between conditioning effect as well as anti particle deposition effect.

The improved balance as mentioned herein refers to an improved anti particle deposition effect without impacting reversely the conditioning effect.

Advantageously, there is a need for a new product which possesses a pleasant transparent or translucent appearance. The present invention is directed towards meeting these needs.

BRIEF DESCRIPTION OF THE INVENTION

The aim of the present invention is achieved by a composition for treating keratin fibers, comprising at least one cationic surfactant, at least one specific nonionic surfactant, at least one protein extract of moringa genus plant seeds, at least one cationic alkyldiallylamine or dialkyldiallylammonium cyclopolymer, and at least one specific oil.

Preferably, the composition of the present invention is transparent or translucent.

The term “transparent or translucent” is understood to mean a composition having a turbidity of less than 400 NTU (Nephelometric Turbidity Units) at 25°C and preferably of less than 250 NTU at 25°C, measured with a 2100N Turbidimeter machine from HACH, wherein the sample cells for turbidity testing are made of quartz glass with reference Cat. 2084900.

Preferably, the composition of the present invention is silicone-free.

As used herein, the term “silicone” is understood to mean any compound comprising at least one silicon atom, and preferably comprising Si-O groups.

As used herein, the term “silicone-free” means the composition of the present invention comprising no silicone or comprising silicone in an amount no more than 1% by weight of silicones relative to the total composition. Preferably, the composition may contain no more than 0.5% by weight, more preferably no more than 0.2% by weight, of silicones relative to the total weight of the composition.

More preferably, the composition of the present invention does not contain silicone.

Preferably, the composition of the present invention is a leave-on hair conditioning composition.

Preferably, the “keratin fiber” according to the present invention is the hair.

The term “anti particle deposition” as used herein refers to a reduction of particle deposition on keratin fibers, in particular hair.

Another aspect of the invention is a process for conditioning keratin fibers, especially the hair, comprising the steps of applying to said fibers the composition of the invention.

Yet another aspect of the present invention is the use of the above composition of the invention for conditioning keratin fibers, especially hair.

One aspect of the present invention is the use of the composition as defined above in reducing the deposition of fine particles contained in the air on keratin fibers, in particular the hair.

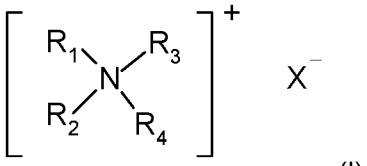
In the description, the terms “at least a” or “at least one” are equivalent to “one or more”.

Other characteristics and advantages of the invention will emerge more clearly on reading the description and the examples that follow.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

Cationic surfactant(s)

The composition of the present invention comprises at least one cationic surfactant. The cationic surfactant is chosen from the compound of formula (I),



(I)

in which,

R_1 to R_4, which may be identical or different, represent a linear or branched aliphatic group comprising from 1 to 30 carbon atoms or an aromatic group such as aryl or alkylaryl, and at least one of the groups R_1 to R_4 comprising from 8 to 30 carbon atoms.

More preferably, at least one of the groups R_1 to R_4 comprises from 12 to 24 carbon atoms.

The aliphatic groups may comprise heteroatoms such as, in particular, oxygen, nitrogen, sulfur and halogens.

The aliphatic groups are chosen, for example, from C_1-C_{30} alkyl, C_1-C_{30} alkenyl, C_1-C_{30} alkoxy, polyoxy(C_2-C_6)alkylene, C_1-C_{30} alkylamide, (C_{12}-C_{22})alkylamido(C_2-C_6)alkyl, (C_{12}-

C_{22})alkylacetate, C_1-C_{30} hydroxyalkyl.

X^- is an anionic counterion chosen from halides.

Preferably X^- is chloride.

Among the quaternary ammonium salts of formula (I), preference is given firstly to tetraalkylammonium halides such as tetraalkylammonium chlorides, for instance tetraalkylammonium or alkyltrimethylammonium halides such as dialkyldimethylammonium or alkyltrimethylammonium chlorides in which the alkyl group contains from approximately 12 to 22 carbon atoms, in particular halides such as behenyltrimethylammonium chloride, distearyldimethylammonium chloride, cetyltrimethylammonium chloride, benzyldimethylstearylammonium chloride, hydroxyethyl oleyldimethylammonium chloride, or else, and palmitylamidopropyltrimethylammonium halide, such as the chloride or stearamidopropyldimethyl(myristyl acetate)ammonium chloride.

Mentions may be made of the products, for example, sold under the name Dehyquart A OR by Cognis (INCI name: Cetrimonium chloride), products sold under the name Chimexane CL by the company Chimex (INCI name: hydroxylethyl oleyldimonium chloride), products sold under the name Fentacare® 2232 EF by the company Rhodia (INCI name: behentrimonium chloride), or a mixture thereof.

More particularly, according to one embodiment of the invention, the cationic surfactant is present in an amount ranging from 0.01% to 10% by weight, preferably 0.05% to 5% by weight, relative to the total weight of the composition.

Nonionic surfactant(s)

According to the present invention, the composition comprises at least one second surfactant, which is different from the first surfactant, selected from the nonionic surfactants of alkyl(poly)glycoside, fatty acid esters of glycerol and of polyglycerol, or a mixture thereof. Preferably, according to an embodiment, the composition comprises, as the second surfactant, a mixture of nonionic surfactants of alkyl(poly)glycoside and fatty acid esters of glycerol and of polyglycerol.

i) Alkyl(poly)glycoside nonionic surfactant(s)

The term “alkyl(poly)glycoside” denotes an alkylpolyglycoside or an alkylmonoglycoside, also referred to in the present patent application as an alkylglycoside, which may be alkoxylated with one or more alkylene oxide groups, preferentially of C_2-C_4.

The alkyl(poly)glycoside nonionic surfactant(s) used, alone or as mixtures, in accordance

with the present invention may be represented by formula (II) below:

$$R_1O\text{-}(R_2O)_t\text{-}(G)_v \qquad (II)$$

in which:

R_1 represents a linear or branched, saturated or unsaturated alkyl group, containing from about 8 to 24 carbon atoms, or an alkyl phenyl group in which the linear or branched alkyl radical contains from 8 to 24 carbon atoms,

R_2 represents an alkylene group containing from about 2 to 4 carbon atoms,

G represents a saccharide unit containing 5 or 6 carbon atoms,

t denotes a value ranging from 0 to 10 and preferably from 0 to 4, and

v denotes a value ranging from 1 to 15.

Preferably, the alkyl(poly)glycoside nonionic surfactant(s) correspond to formula (IV) in which:

R_1 denotes a linear or branched, saturated or unsaturated alkyl group containing from 8 to 18 carbon atoms,

G denotes glucose, fructose or galactose, preferably glucose,

t denotes a value ranging from 0 to 3, and is preferably equal to 0,

and R_2 and v are as defined previously.

The degree of polymerization of the alkyl(poly)glycoside nonionic surfactant(s) as represented, for example, by the index v in formula (II) ranges on average from 1 to 15 and preferably from 1 to 4. This degree of polymerization more particularly ranges from 1 to 2 and better still from 1.1 to 1.5, on average.

The glycoside bonds between the saccharide units are 1,6- or 1,4- bonds; preferably 1,4-bonds.

The compounds of formula (II) that may be used in the present invention are especially represented by the products sold by the company Cognis under the names Plantaren® (600 CS/U, 1200 and 2000) or Plantacare® (818, 1200 and 2000). It is also possible to use the products sold by the company SEPPIC under the names Triton CG 110 (or Oramix CG 110) and Triton CG 312 (or Oramix® NS 10), the products sold by the company BASF under the name Lutensol GD 70, or those sold by the company Chem Y under the name AG10 LK.

It is also possible, for example, to use the 1,4- (C_8-C_{16})alkylpolyglucoside as an aqueous solution at 53% by weight relative to the total weight of the solution, sold by Cognis under the reference Plantacare® 818 UP.

Among all these alkyl(poly)glycoside nonionic surfactants, the decyl glucoside (INCI:

Decyl glucoside) sold by Cognis under the reference Plantacare® 2000 UP is preferably used.

ii) Fatty acid ester(s) of glycerol and of polyglycerol

According to the invention, the composition may comprise at least one fatty acid ester of glycerol and/or of polyglycerol.

According to a preferred embodiment, the fatty acid ester(s) of polyglycerol is (are) chosen from esters resulting from the reaction of polyglycerol comprising from 2 to 12 glycerol units, preferably from 3 to 10 glycerol units, and of at least one fatty acid containing from 8 to 24 carbon atoms, preferably from 8 to 22 carbon atoms, better still from 10 to 20 carbon atoms and even better still from 10 to 18 carbon atoms. The fatty acids containing from 8 to 24 carbon atoms may be linear or branched, and saturated or unsaturated.

The fatty acids may be chosen from oleic acid, stearic acid, isostearic acid, lauric acid, palmitic acid, myristic acid, linoleic acid, capric acid and caprylic acid, or mixtures thereof.

The fatty acid esters of polyglycerol can be chosen from monoesters, diesters, triesters and tetraesters, polyesters and mixtures thereof. Use is preferably made of esters with a low degree of esterification, for instance fatty acid monoesters, diesters or triesters of polyglycerol, or a mixture. The fatty acid ester of polyglycerol can be in the form of a mixture of esters with a low degree of esterification, for instance a mixture of monoester and diester or a mixture of monoester, diester and triester.

According to one embodiment, the fatty acid ester of polyglycerol is chosen from esters resulting from the reaction of polyglycerol comprising from 3 to 10 glycerol units and of at least one fatty acid containing from 8 to 20 carbon atoms, preferably from 10 to 18 carbon atoms, such as oleic acid or linoleic acid.

Mention may in particular be made of polyglyceryl-2 distearate, in particular as sold by NIHON EMULSION under the name Emalex PGSA; polyglyceryl-10 decastearate, in particular as sold by TAIYO KAGAKU under the name Sunsoft Q-1810S; glyceryl oleate, in particular as sold by COGNIS under the name Monomuls 90-O 18; glyceryl stearate, in particular as sold by COGNIS under the name Cutina GMS V; polyglyceryl-5 hexastearate, in particular as sold by TAIYO KAGAKU under the name Sunsoft A-186E; polyglyceryl-10 pentaoleate, in particular as sold by TAIYO KAGAKU under the name Sunsoft Q-175S; polyglyceryl-10 pentastearate, in particular as sold by TAIYO KAGAKU under the name Sunsoft Q-185S; glyceryl caprylate/caprate, in particular as sold by STEPAN under the name Stepan Mild GCC; polyglyceryl-10 heptaoleate, in particular as sold by TAIYO KAGAKU under the name Sunsoft Q-177S; polyglyceryl-4 isostearate, in particular as sold by EVONIK GOLDSCHMIDT under the name Isolan GI 34; diisostearoyl polyglyceryl-3 dimer dilinoleate, in particular as sold by

EVONIK GOLDSCHMIDT under the name Isolan PDI; glyceryl laurate, in particular as sold by COGNIS under the name Monomuls 90-L 12; polyglyceryl-5 trioleate, in particular as sold by TAIYO KAGAKU under the name Sunsoft A-173E; polyglyceryl-2 oleate, in particular as sold by TAIYO KAGAKU under the name Sunsoft Q-17B; polyglyceryl-5 trimyristate, in particular as sold by TAIYO KAGAKU under the name Sunsoft A-143E; polyglyceryl-2 caprylate, in particular as sold by TAIYO KAGAKU under the name Sunsoft Q-81B; polyglyceryl-2 laurate, in particular as sold by TAIYO KAGAKU under the name Sunsoft Q-12D.

According to one particular embodiment, the fatty acid which is suitable for the reaction with the ester(s) of polyglycerol comprises at least one hydroxyl group. This is the case for ricinoleic acid. Mention may in particular be made of polyglyceryl-3 ricinoleate (and) sorbitan isostearate, in particular as sold by CRODA under the name Arlacel 1690, polyglyceryl-3 ricinoleate, in particular as sold by AARHUSKARLSHAMN under the name Akoline PGPR.

According to another embodiment, the fatty acid which is suitable for the reaction with the ester(s) of polyglycerol is a polyacid comprising at least one hydroxyl group.

For the purpose of the present invention, the second surfactant(s) is(are) present in the composition ranging from 0.05% to 20% by weight, preferably from 0.1% to 10% by weight, more preferably 1% to 5% by weight, relative to the total weight of the composition.

Protein extract of Moringa genus plant seeds

The composition according to the present invention comprises at least one protein extract of Moringa genus plant seeds.

The genus Moringa comprises some 14 species of plants (of which particularly Moringa peregrina, M. aptera, M concane six, M. drouhardii, M. hildebrandtit', M. longituba), among which Moringa pterygosperma (synonym: Moringa oleifera) is the best known.

It is a tree that grows rapidly and which adapts very well to variable conditions, spread throughout the tropics, in Asia, Africa and South America. The fruits are 30 to 50 cm long, hanging like drumsticks, from which comes the English name "drumstick tree", and its green pods are used as vegetables throughout the world.

The seeds of Moringa are characterized by the presence of an oil whose content varies between 21 and 53% according to the species and maturity of the seeds.

In addition to their oil content, Moringa seeds are found to comprise compounds of proteic nature (see particularly the article “Isolation and characterization of a flocculating protein from Moringa oleifera lam” by U. Gassenschmidt, K.D. Jany, B. Tausche and H.R. Niebergall, Biochimica and biophysics acta, 1243:477-481, 1995-“Active agents and mechanism of coagulation of turbid waters using Moringa oleifera”, of A. Ndabigengesere, K.Subba Narasiah

and B.G. Talbot, Water research, 29,2:703-710, 1995).

According to a preferred embodiment, the composition of the present invention comprises at least one protein extract of the seeds of Moringa oleifera.

The extract is preferably obtained from delipidated flour of Moringa oleifera seeds, and was then extracted in a buffered aqueous medium, and then isolated by cation exchange chromatography.

Preferably, the protein extract is obtained in an aqueous medium with a pH of greater than or equal to 3, preferably from 3 to 8.

The protein extract according to the present invention is also disclosed, for example, in the patent application US 6,500,470 B1.

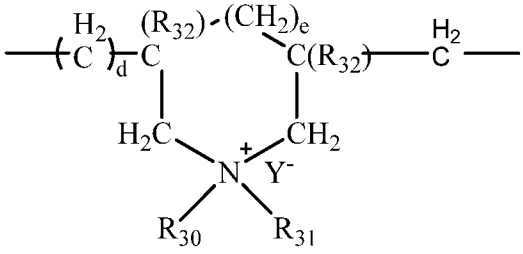
Mentions maybe made of commercially available products, such as those sold under the name Purisoft POE LS 9726 by the company BASF.

Preferably, for the purpose of the present invention, the protein extract of Moringa genus plant seeds is present in the composition in an amount ranging from 0.001% to 5% by weight, preferably from 0.001% to 2% by weight, relative to the total weight of the composition.

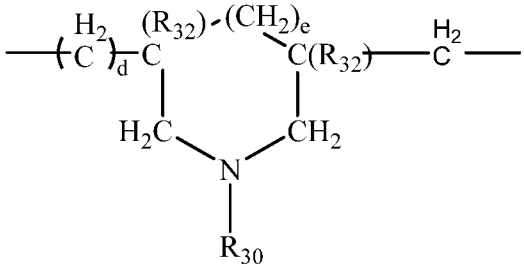
Cationic alkyldiallylamine or dialkyldiallylammonium cyclopolymer

The composition according to the present invention comprises at least one cationic alkyldiallylamine or dialkyldiallylammonium cyclopolymer.

Said cationic cyclopolymer is a homopolymer or copolymer contains, as main constituent of the chain, units corresponding to formula (IV) or (V):



(IV)



(V)

in which formula d and e are equal to 0 or 1, the sum d + e being equal to 1; R_{32} denotes a hydrogen atom or a methyl radical; R_{30} and R_{31}, independently of each other, denote a C_1-C_8 alkyl group, a hydroxyalkyl group in which the alkyl group is C_1-C_5, an amidoalkyl group in which the alkyl is C_1-C_4; R_{30} and R_{31} can also denote, together with the nitrogen atom to which they are attached, a heterocyclic group such as piperidyl or morpholinyl; R_{30} and R_{31}, independently of each other, preferably denote a C_1-C_4 alkyl group; Y^- is an organic or mineral anion such as bromide, chloride, acetate, borate, citrate, tartrate, bisulfate, bisulfite, sulfate or phosphate.

These polymers are described in particular in FR 2 080 759 and FR 2 190 406.

The cationic cyclopolymer of the present invention is a water soluble polymer having a charge density greater than 4 meq/g, preferably greater than 5 meq/g. The charge density of the water soluble cationic cyclopolymer may be measured by the colloid titration method using, for example, potassium polyvinylsulfate as a titration solution.

Among the polymers defined above, mention may be made more particularly of the dimethyldiallylammonium chloride homopolymer sold under the name “Merquat 100” by the company Nalco (and its homologues of low weight-average molecular mass) and the copolymers of diallyldimethylammonium chloride and of acrylamide, sold under the name Merquat 550.

According to a preferred embodiment, the cationic alkyldiallylamine or dialkyldiallylammonium cyclopolymer is present in the composition of the present invention, ranging from 0.01% to 3% by weight, preferably from 0.05% to 2% by weight, more preferably 0.1% to 1.5% by weight, relative to the total weight of the composition.

Oil(s)

The composition of the present invention comprises at least one oil, selected from hydrocarbon oil, plant oil, or a mixture thereof.

The term "oil" in this application means any nonionic lipophilic compound that is insoluble in water and liquid at room temperature (25°C) and at atmospheric pressure, which is different from silicone oil as defined previously. In other words, the oil(s) herein refers to hydrocarbon-based oil(s).

For the purposes of the present invention, the term "water-insoluble" refers to a compound whose solubility at spontaneous pH in water at 25°C and at atmospheric pressure is less than 1% and preferably less than 0.5%. The oils preferably have a melting point of less than 5°C and a viscosity of less than 500 cPs at 25°C at a shear rate of 1 s^{-1}.

The term “hydrocarbon-based oil” is understood to mean oil essentially formed and even

composed, of carbon and hydrogen atoms and optionally of oxygen and nitrogen atoms which does not comprise a silicone or fluorine atom; it can comprise ester, ether, amine and amide groups.

The oil may be volatile or non-volatile.

The term "non-volatile" means an oil of which the vapor pressure at 25°C and atmospheric pressure is non-zero and is less than 0.02 mmHg (2.66 Pa) and better still less than 10-3 mmHg (0.13 Pa).

The term “volatile oil” means an oil of which the vapor pressure at 25°C and atmospheric pressure is from 0,13 Pa to 40.000 Pa (0,001 to 300 mmHg) and preferably from 1,3 to 1300 Pa (0,01 to 10 mm Hg).

Hydrocarbon oils are also referred to as mineral oils. The term “hydrocarbon oils” or "mineral oils" means complex substances of hydrocarbons in the form of linear, branched, or cyclic, saturated or unsaturated oils. These oils are obtained from crude petroleum oils by distillation and refining. Hydrocarbon oils, or mineral oils are a complex of alkanes, cycloalkanes, aromatic hydrocarbons, or mixtures thereof. More preferably the hydrocarbon oils contain a chain with 15-40 carbon atoms.

The term "plant oil" means oil as defined above, obtained from a species belonging to the plant kingdom.

As examples of hydrocarbon oils that may be used in the present invention, mention may be made of:

- mixtures of hydrocarbon-based oils derived from petroleum (INCI name: Mineral Oil),
- volatile or non-volatile liquid paraffin,
- liquid petroleum jelly,
- polyolefins and in particular polydecenes,
- isoparaffins such as isohexadecane, isododecane and hydrogenated polyisobutylenes such as Parleam® oil sold by the company NOF Corporation (INCI name: Hydrogenated polyisobutene).

Among the hydrocarbon oils mentioned above, the following are preferably used:

- mixtures of hydrocarbon-based oils derived from petroleum,
- volatile or non-volatile liquid paraffin, and
- liquid petroleum jelly, and
- polyolefins and in particular polydecenes.

The term "polydecenes" means any compound of formula $C_{10n}H_{(20n)+2}$ in which n ranges from 3 to 9, corresponding to the name “polydecene” in the CTFA dictionary, 7th edition, 1997 of

the Cosmetic, Toiletry and Fragrance Association, USA, and also to the same INCI name in the USA and in Europe. These are poly-1-decene hydrogenation products. Among these compounds, those for which, in the formula, n ranges from 3 to 7 are more particularly chosen according to the invention.

Examples that may be mentioned include the products sold under the name Silkflo® 366 NF Polydecene by the company Amoco Chemical, and those sold under the names Nexbase® 2002 FG, 2004 FG, 2006 FG and 2008 FG by the company Fortum.

The preferred hydrocarbon oil is mixtures of hydrocarbon-based oils derived from petroleum (INCI name: Mineral Oil), volatile or non-volatile liquid paraffin, or a mixture thereof.

Mentions may be made of the product (INCI name: mineral oil) sold under the tradename Emcaplus 70 by the company Oxiteno.

As examples of plant oils that are suitable for the present invention, mentions maybe made of:

- sweet almond oil,
- argan oil,
- avocado oil,
- peanut oil,
- camellia oil,
- safflower oil,
- calophyllum oil,
- coconut oil,
- colza oil,
- copra oil,
- coriander oil,
- cucurbit oil,
- wheatgerm oil,
- jojoba oil or jojoba liquid wax,
- linseed oil,
- macadamia oil,
- maize germ oil,
- hazelnut oil,
- walnut oil,
- vernonia oil,
- apricot kernel oil,

- olive oil,
- evening primrose oil,
- palm oil,
- passionflower oil,
- grapeseed oil,
- rose oil,
- castor oil,
- rye oil,
- sesame oil,
- rice bran oil,
- soya oil, or soybean oil, and
- sunflower oil.

Preferably, the composition of the present invention comprises at least one oil selected from volatile or non-volatile liquid paraffin, coconut oil, soybean oil, or a mixture thereof.

The total amount of oil(s), when they are present in the composition, preferably ranges from 0.01% to 20% by weight, better still from 0.05% to 10% by weight and more particularly from 0.1% to 5% by weight relative to the total weight of the final composition.

Ether useful in the composition of the invention

According to a preferred embodiment, the composition further comprises at least one additional oil, selected from ethers of formula (VI),

R_5-O-R_6 formula (VI)

In the formula (VI):

R_5 and R_6, which may be identical or different, denote a linear or branched C_6-C_{25} alkyl or alkenyl radical.

Preferably, the ether of formula (VI) is chosen from compounds for which the radicals R_5 and R_6, which may be identical or different, denote a linear or branched C_6-C_{12} alkyl or alkenyl radical.

More particularly, according to the present invention, the radicals R_5 and R_6 are identical.

In accordance with one particular embodiment of the invention, the preferred dialkyl ether is chosen from di-n-hexyl ether, di-n-heptyl ether, di-n-octyl ether, di-n-nonyl ether, di-n-decyl ether, di-isodecyl ether, di-n-dodecyl ether, di-n-eteradecyl ether, di-n-hexadecyl ether, di-n-oxtadecyl ether, or a mixture thereof.

R_5 and R_6 preferentially denote a C_8 radical.

These compounds may be prepared according to the process described in patent

application DE 41 27 230.

Most preferably, the ether of formula (VI) is di-n-octyl ether (INCI name: dicaprylyl ether). Such product is commercially available, for example those sold under the name Cetiol OE by the company Cognis (BASF), or Rofetan OE by the company Ecogreen Oleochemicals.

Advantageously, when exists, the ether of formula (VI) is present in an amount generally ranging from 0.01% to 15% by weight, preferably from 0.1% to 10% by weight, more preferably from 0.5% to 5% by weight, relative to the weight of the composition.

According to a preferred embodiment, the present invention relates to a composition for treating keratin fibers, comprising: comprising:

a) at least one cationic surfactant;

b) at least one nonionic surfactant selected from alkyl(poly)glycosides, fatty acid esters of glycerol and of polyglycerol, or a mixture thereof;

c) at least one protein extract of moringa genus plant seed;

d) at least one cationic alkyldiallylamine or dialkyldiallylammonium cyclopolymer;

e) at least one oil selected from mineral oil, plant oil, or a mixture thereof; and

f) at least one ethers of formula (VI),

$$R_5\text{-}O\text{-}R_6 \quad \text{formula (VI)}$$

wherein:

R_5 and R_6, which may be identical or different, denote a linear or branched C_6-C_{25} alkyl or alkenyl radical.

According to a preferred embodiment, the present invention relates to a composition for treating keratin fibers, comprising, by weight relative to the total weight of the composition:

a) from 0.05% to 5% of at least one cationic surfactant;

b) from 1% to 5% of at least one nonionic surfactant selected from alkyl(poly)glycosides, fatty acid esters of glycerol and of polyglycerol, or a mixture thereof;

c) from 0.001% to 2% of at least one protein extract of moringa genus plant seed;

d) from 0.05% to 2% of at least one cationic alkyldiallylamine or dialkyldiallylammonium cyclopolymer; and

e) from 0.1% to 5% of at least one oil selected from mineral oil, plant oil, or a mixture thereof.

Preferably, the composition further comprises from 0.1% to 10% by weight of the ether of formula (VI) as disclosed above, relative to the total weight of the composition.

Galenic form

The composition according to the invention may take the form of thickened liquid, creams

or gel. It is preferable that the composition according to the present invention be in the form of an nano- or micro-emulsion, more particularly oil-in-water nano- or micro-emulsion.

These emulsions can be prepared in particular by the phase inversion temperature technique (PIT emulsions), in which the average size of the globules constituting the oily phase is within given limits, namely between 0.1 and 4 μm (100 to 4000 nm). The principle of phase inversion temperature (or PIT) emulsification is, in theoretical terms, well known to those skilled in the art; it was described in 1968 by K. Shinoda (J. Chem. Soc. Jpn., 1968, 89, 435). It was shown that this emulsification technique makes it possible to obtain stable fine emulsions (K. Shinoda and H. Saito, J. Colloïd Interface Sci., 1969, 30, 258). This technology was applied in cosmetics as early as 1972 by Mitsui et al. ("Application of the phase-inversion-temperature method to the emulsification of cosmetics"; T. Mitsui, Y. Machida and F. Harusawa, American. Cosmet. Perfum, 1972, 87,33).

The compositions according to the invention may naturally contain, in addition, all the standard adjuvants encountered in the field of shampoos, such as, for example, perfumes, preservatives, sequestering agents, thickeners, hydrating agents, anti-dandruff or antiseborrhoeic agents, vitamins, sunscreen agents, suspending agents and the like.

Method and use

The present invention also relates to a process for treating keratin fibers, especially the hair, comprising the steps of applying to said fibers the composition of the invention.

The process as mentioned above is preferably a process for conditioning keratin fibers, in particular the hair.

Another aspect of the present invention is the use of the above composition of the invention for conditioning keratin fibers, especially hair.

Preferably, the present invention further relates to the use of the above composition in reducing the deposition of fine particles contained in the air on keratin fibers, in particular the hair.

Non limiting examples illustrating the invention are given.

EXAMPLES

Four leave-on hair conditioners were prepared, one according to the invention (Invention formula **A**) and three comparative (Comparative formula **B**, **C** and **D**):

Ingredient INCI name	% by weight of active ingredient

	Invention formula	Comparative formula		
	A	**B**	**C**	**D**
Hydroxyethylcellulose, (Natrosol 250 MR, Ashland)	1	1	1	1
Cetrimonium chloride (Dehyquart A OR, Cognis)	0.15	0.15	0.15	0.15
Hydroxyethyl oleyldimonium chloride, (Chimexane CL, Chimex)	0.25	0.25	0.25	0.25
Behentrimonium Chloride, (Fentacare 2231 EF, Rhodia)	0.12	0.12	0.12	0.12
Glycerin (Glicenat GC K, Oxiteno)	5	5	5	5
Polyquaternium-6 (Merquat 106 polymer, Nalco)	0.35	0	0	0.35
Polyquaternium-37 (Optasense RMC700, CRODA)	0	0.35	0	0
Guar Hydroxypropyltrimonium Chloride (Jaguar C-13-S, Rhodia (Solvay))	0	0	0.35	0
Alcohol (Alcool Anidro Neutro, Etil Rio)	3.75	3.75	3.75	3.75
Dicaprylyl Ether (Cetiol OE, Cognis)	2	2	2	2
Phenoxyethanol (Neolone PH 100, Dow Chemical)	0.70	0.70	0.70	0.70
Decyl Glucoside (Plantacare 2000 UP, Cognis)	1	1	1	1
Glyceryl Oleate (Monomuls 90-O 18, Cognis)	0.6	0.6	0.6	0.6

Coconut oil (AGRIPURE AP-20, Cargill)	0.2	0.2	0.2	0
Dimethicone (Xiameter pmx-200 silicone fluid 60000cs, Dow Corning)	0	0	0	0.2
Glycerin (and) Moringa Pterygosperma Seed Extract (PURISOFT POE LS 9726, BASF)	0.03	0.03	0.03	0.03
Ethylhexylglycerin (Sensiva SC 50, Schulke&Mayr)	0.4	0.4	0.4	0.4
Fragrance	0.2	0.2	0.2	0.2
Water	To 100	To 100	To 100	To 100

Comparative formula **B** and **C** contain, respectively, a polymer other than the one claimed in the present invention; Comparative formula **D** contains silicone oil instead of the oil as claimed in the present invention.

The invention and comparative formulas were prepared according to the conventional methods for preparing condition formulations. The aqueous phase and oily phase were mixed separately at 70°C until homogenous, then the two phases were mixed at 70°C by stirring with a speed 600rpm using VMI.

The invention and comparative formulas were subject to the evaluations, including the transparency, conditioning effect, as well as anti-particle deposition effect.

The transparency was evaluated by the turbidity, using a 2100N Turbidimeter machine from HACH.

The term “transparent or translucent” is understood to mean a composition having a turbidity of less than 400 NTU (Nephelometric Turbidity Units) at 25°C and preferably of less than 250 NTU at 25°C.

The conditioning effect was evaluated by a hair dresser by using each of the invention or comparative formulas on 6 women consumers as leave on hair conditioners on dry hair. Then the hair were combed. Finally the scores were given to the formulas, respectively:

1: very poor conditioning effect, hair is totally tangled and very dry after application, very difficult to comb;

2: poor conditioning effect, hair is tangled or dry after application, not easy to comb;

3: good conditioning effect, hair is smooth, soft, and detangled, easy to comb;

4: very good conditioning effect, hair is very smooth and supple, very easy to comb.

The formula was considered to have an expected conditioning when the average score of the formula is greater than or equal to 2.5.

Lastly, the anti-particle deposition effect of the invention and comparative formulas was evaluated following the protocol of:

1. apply the invention formula **A**, comparative formula **B**, **C** and **D**, respectively, on dry hair swatch as leave on conditioning product;

2. apply carbon powders to the hair swatch prepared from the previous step using a fan blowing the carbon powders to the swatch;

3. take photo of the hair swatch using SEM image analyzing equipment SEM sold by the company JOEL under the name JSM-606OLA, and analyze the carbon powder deposition on the hair swatch using image analyzing process.

The carbon powders used in the evaluation were intended to simulate the fine particles or in particular PM 2.5 contained in the air. The particle size of the carbon powder in aqueous solution, when tested with Malvern Mastersizer 3000, distributed from 0.5 μm to 10 μm, which corresponds to the particle size of the fine particles in the air, including PM 2.5.

The composition of the PM 2.5, or fine particles is dependent on location and season. As an example in China, PM 2.5 comprises, but not limited to: geological materials such as paved or unpaved roads, constructions, agricultural operations, wind-blown soil; organic matters from cooking, residential heating, field burning of crop residue, forest fires, and grassland fires; organic carbon such as conversion of volatile organic compounds; ammonium, sulfates, nitrates, and fugitive dust, see in “Winter and Summer PM 2.5 Chemical Compositions in Fourteen Chinese Cities” Jun-ji CAO, etc., Journal of the Air and Waste Management Association, 24th, Sep, 2012.

More specifically, the swatch treated with invention formula and comparative formulas were placed in a chamber equipped with carbon powders, one fan, and one particle detector, by fixing one end of the hair swatch on a horizontally positioned shelf.

The fan was placed in the center of the chamber. A watch glass with 0.1 g carbon black powder was placed under the fan, right in the center. A particle detector (Dust Trak II Model 8532 sold by the company TSI) was placed in the chamber and finally the chamber of the device was closed.

The fan was then turned on for 10 minutes, and then turned off. After 5 minutes, the

swatches were moved out from the chamber and observed under SEM.

The anti-particle deposition effect of the formulas was represented by particle deposition coverage value, obtained by image analyzing tools which are conventionally available.

The lower the value of particle deposition coverage, the better the anti-particle deposition effect is.

The results of the evaluation were listed herewith.

Attributes	Invention formula	Comparative formula		
	A	**B**	**C**	**D**
Conditioning effect / dry supple	2.90	2.00	2.20	3.30
Conditioning effect / dry smooth	3.10	1.50	2.00	3.50
Anti-particle deposition (particle deposition coverage)	8.39	7.86	8.17	12.45
Transparency (turbidity (NTU))	74.4	69.3	64.9	531

As shown in the results listed above, comparing to the formula **B**, **C** and **D**, the invention formula **A** showed an improved balance between conditioning effect and anti-particle deposition effect. Moreover, the invention formula **A** has an expected transparent appearance. Whereas the comparative formula **B** and **C**, although showing good anti-particle deposition effect, did not provide to the hair sufficient conditioning effect; and comparative formula **D** had poor anti-particle deposition effect. Besides, the comparative formula **D** is not transparent.

What is claimed is

1. A composition for treating keratin fibers, comprising:

a) at least one cationic surfactant;

b) at least one nonionic surfactant selected from alkyl(poly)glycosides, fatty acid esters of glycerol and of polyglycerol, or a mixture thereof;

c) at least one protein extract of moringa genus plant seed;

d) at least one cationic alkyldiallylamine or dialkyldiallylammonium cyclopolymer; and

e) at least one oil selected from mineral oil, plant oil, or a mixture thereof.

2. Composition of claim 1 is transparent or translucent, which preferably contain at least one ether of formula (VI),

$$R_5\text{-}O\text{-}R_6 \quad \text{formula (VI)}$$

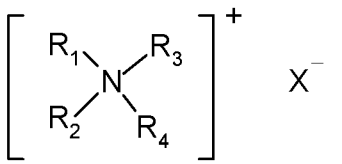
wherein:

R_5 and R_6, which may be identical or different, denote a linear or branched C_6-C_{25} alkyl or alkenyl radical;

preferably, the ether of formula (VI) is chosen from compounds for which the radicals R_5 and R_6, which may be identical or different, denote a linear or branched C_6-C_{12} alkyl or alkenyl radical.

3. Composition of claim 1 or 2 being silicone-free, preferably the composition does not contain silicone.

4. Composition of any one of the preceding claims 1 to 3, wherein the cationic surfactant is selected from the compound of formula (I),



(I)

in which,

R_1 to R_4, which may be identical or different, represent a linear or branched aliphatic group comprising from 1 to 30 carbon atoms or an aromatic group such as aryl or alkylaryl, and at least one of the groups R_1 to R_4 comprising from 8 to 30 carbon atoms, and

X^- is an anionic counterion chosen from halides;

preferably in formula (I), R_1 to R_4, which may be identical or different, represent a linear or branched aliphatic group comprising C_1-C_{30} alkyl, C_1-C_{30} alkenyl, C_1-C_{30} alkoxy, polyoxy(C_2-C_6)alkylene, C_1-C_{30} alkylamide, (C_{12}-C_{22})alkylamido(C_2-C_6)alkyl, (C_{12}-C_{22})alkylacetate, C_1-C_{30} hydroxyalkyl, and

X^- is chloride.

5. Composition of claim 4, wherein the cationic surfactant is selected from the group consisting of tetraalkylammonium halides, alkyltrimethylammonium halides, palmitylamidopropyltrimethylammonium halides, or a mixture thereof; preferably selected from the group consisting of tetraalkylammonium chloride, dialkyldimethylammonium chloride, alkyltrimethylammonium chloride, behenyltrimethylammonium chloride, distearyldimethylammonium chloride, cetyltrimethylammonium chloride, benzyldimethylstearylammonium chloride, hydroxyethyl oleyldimethylammonium chloride, stearamidopropyldimethyl(myristyl acetate)ammonium chloride, or a mixture thereof; more preferably selected from behenyltrimethylammonium chloride, cetyltrimethylammonium chloride, hydroxyethyl oleyldimethylammonium chloride, or a mixture thereof.

6. Composition of any one of the preceding claims 1 to 5, wherein the cationic surfactant is present in an amount ranging from 0.01% to 10% by weight, preferably 0.05% to 5% by weight, relative to the total weight of the composition.

7. Composition of any one of the preceding claims 1 to 6, wherein the alkyl(poly)glycoside nonionic surfactant is chosen from, alone or as a mixture, compounds of formula (II),

$$R_1O\text{-}(R_2O)_t\text{-}(G)_v \qquad (II)$$

in which:

R_1 represents a linear or branched, saturated or unsaturated alkyl group, containing from 8 to 24 carbon atoms, or an alkyl phenyl group in which the linear or branched alkyl radical contains 8 to 24 carbon atoms, preferably R_1 represents a linear or branched, saturated or unsaturated alkyl group containing from 8 to 18 carbon atoms,

R_2 represents an alkylene group containing from 2 to 4 carbon atoms,

G represents a saccharide unit containing 5 or 6 carbon atoms, preferably glucose, fructose or galactose, more preferably glucose, t denotes a value ranging from 0 to 10 and preferably from 0 to 4, and

v denotes a value ranging from 1 to 15, preferably 1 to 4.

8. Composition of any one of the preceding claims 1 to 7, wherein the fatty acid ester of glycerol and of polyglucerol is selected from the group consisting of esters resulting from the

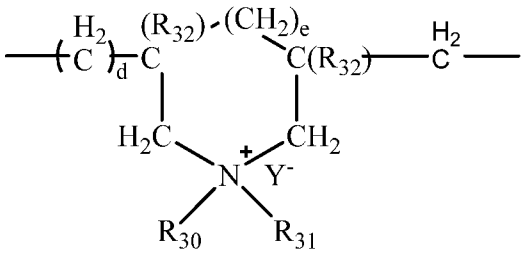
reaction of polyglycerol comprising from 3 to 10 glycerol units and of at least one fatty acid containing from 8 to 20 carbon atoms, preferably from 10 to 18 carbon atoms; preferably selected from glyceryl oleate.

9. Composition of any one of the preceding claims 1 to 8, wherein the nonionic surfactant is present in an amount ranging 0.05% to 20% by weight, preferably from 0.1% to 10% by weight, more preferably 1% to 5% by weight, relative to the total weight of the composition.

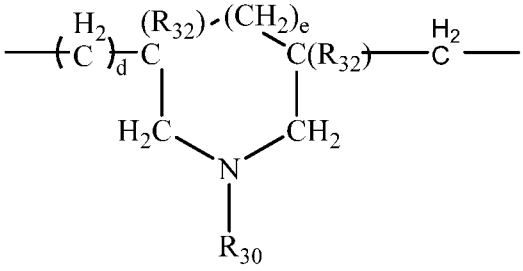
10. Composition of any one of the preceding claims 1 to 9, wherein the protein extract of Moringa genus plant seeds is a protein extract of the seeds of Moringa oleifera.

11. Composition of any one of the preceding claims 1 to 10, wherein the protein extract of Moringa genus plant seeds is present in the composition in an amount ranging from 0.001% to 5% by weight, preferably from 0.001% to 2% by weight, relative to the total weight of the composition.

12. Composition of any one of the preceding claims 1 to 11, wherein the cationic alkyldiallylamine or dialkyldiallylammonium cyclopolymer is chosen from the compounds, which, as main constituent of the chain, units corresponding to the formula (IV) or (V):



formula (IV)



formula (V)

formula (IV) and (V) wherein:

d and e, same or different, equal to 0 or 1,

d + e =1,

R_{32} denotes a hydrogen atom or a methyl radical,

R_{30} and R_{31}, independently of each other, denotes a C_1-C_8 alkyl group, a hydroxyalkyl group in which the alkyl group is C_1-C_5, an amidoalkyl group in which the alkyl is C_1-C_4, together with the nitrogen atom to which they are attached, a heterocyclic group such as piperidyl or morpholinyl,

Y^- is an organic or mineral anion such as bromide, chloride, acetate, borate, citrate, tartrate, bisulfate, bisulfite, sulfate or phosphate,

preferably, R_{30} and R_{31}, independently of each other, preferably denote a C_1-C_4 alkyl group,

Y^- is preferably chloride,

wherein the said cationic alkyldiallylamine or dialkyldiallylammonium cyclopolymer having a unit of formula (IV) or (V) has a charge density greater than 4 meq/g, preferably greater than 5 meq/g, more preferably greater than 6 meq/g.

13. Composition of any one of the preceding claims 1 to 12, wherein the cationic alkyldiallylamine or dialkyldiallylammonium cyclopolymer is polydiallyl dimethyl ammonium chloride homopolymer.

14. Composition of any one of the preceding claims 1 to 13, wherein the cationic alkyldiallylamine or dialkyldiallylammonium cyclopolymer is present in the composition ranging from 0.01% to 3% by weight, preferably from 0.05% to 2% by weight, more preferably 0.1% to 1.5% by weight, relative to the total weight of the composition.

15. Composition of any one of the preceding claims 1 to 14, wherein the oil is selected from the group consisting of volatile or non-volatile liquid paraffin, coconut oil, soybean oil, or a mixture thereof.

16. Composition of any one of the preceding claims 1 to 15, wherein the oil is present in an amount ranging from 0.01% to 20% by weight, better still from 0.05% to 10% by weight and more particularly from 0.1% to 5% by weight, relative to the total weight of the composition.

17. Method for conditioning keratin fibers, especially the hair, comprising the steps of applying to said fibers the composition according to any one of the preceding claims 1 to 16.

18. Use of the composition of any one of the preceding claims 1 to 16 in reducing the deposition of fine particles contained in the air on keratin fibers, in particular hair.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/080197

A. CLASSIFICATION OF SUBJECT MATTER

A61K 8/9789(2017.01)i; A61K 8/92(2006.01)i; A61K 8/84(2006.01)i; A61K 8/60(2006.01)i; A61K 8/41(2006.01)i; A61K 8/37(2006.01)i; A61K 8/33(2006.01)i; A61Q 5/12(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61K; A61Q; C11D

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

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

CNABS,CPRSABS;CNTXT;FRABS;DWPI;SIPOABS;CNKI,CA,alkylpolyglycoside, fatty acid, moringa, cationic polymer, alkyldiallylamine, dialkyldiallylammonium, oil, keratin, fiber, hair, particle, deposition, pollution

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2013302266 A1 (BOURDIN CLAIR) 14 November 2013 (2013-11-14) see description, page 1, paragraph [0016], claims 14, 18	1-18
A	WO 2006029757 A1 (HANS SCHWARZKOPF & HENKEL GMB) 23 March 2006 (2006-03-23) see abstract	1-18
A	WO 2009024360 A1 (HENKEL AG & CO KGA) 26 February 2009 (2009-02-26) see abstract	1-18

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:

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

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

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

"O" document referring to an oral disclosure, use, exhibition or other means

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

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 January 2017	**25 January 2017**

Name and mailing address of the ISA/CN	Authorized officer
STATE INTELLECTUAL PROPERTY OFFICE OF THE P.R.CHINA **6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088** **China**	**LEI,Yaolong**
Facsimile No. **(86-10)62019451**	Telephone No. **(86-10)62412194**

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2016/080197

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
US	2013302266	A1	14 November 2013	WO	2012032055	A1	15 March 2012
				JP	2013536830	A	26 September 2013
				FR	2964319	A1	09 March 2012
				EP	2613761	A1	17 July 2013
				CN	103079537	A	01 May 2013
				BR	112013003030	A2	30 August 2016
WO	2006029757	A1	23 March 2006	EP	1789010	A1	30 May 2007
				DE	102004045274	A1	23 March 2006
				ES	2392642	T3	12 December 2012
				EP	1789010	B1	29 August 2012
WO	2009024360	A1	26 February 2009	DE	102007039741	A1	26 February 2009