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(54) Titre : COMPOSITIONS DE SOINS PERSONNELS COMPRENANT DES LIQUIDES IONIQUES

(54) Title: PERSONAL CARE COMPOSITIONS COMPRISING IONIC LIQUIDS

(57) **Abrégé/Abstract:**

Personal care compositions comprising ionic liquids are disclosed. The ionic liquids may have a clogP value within the range of from 0 to 12, and remain 95 percent to 100 percent non-dissociated in water. The ionic liquid may also comprise a combination of a soft or hard acid and a soft or hard base. In certain applications, the personal care composition comprises an ionic liquid comprising a soft acid and a soft base, the ionic liquid having a melting point of less than 100 °C and a clogP value within the range of from 0 to 12; and a benefit agent that preferentially associates with the ionic liquid relative to water, where the benefit agent provides a benefit to keratinous materials.



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ABSTRACT

Personal care compositions comprising ionic liquids are disclosed. The ionic liquids may have a clogP value within the range of from 0 to 12, and remain 95 percent to 100 percent non-dissociated in water. The ionic liquid may also comprise a combination of a soft or hard acid and a soft or hard base. In certain applications, the personal care composition comprises an ionic liquid comprising a soft acid and a soft base, the ionic liquid having a melting point of less than 100 °C and a clogP value within the range of from 0 to 12; and a benefit agent that preferentially associates with the ionic liquid relative to water, where the benefit agent provides a benefit to keratinous materials.

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PERSONAL CARE COMPOSITIONS COMPRISING IONIC LIQUIDS

FIELD OF THE INVENTION

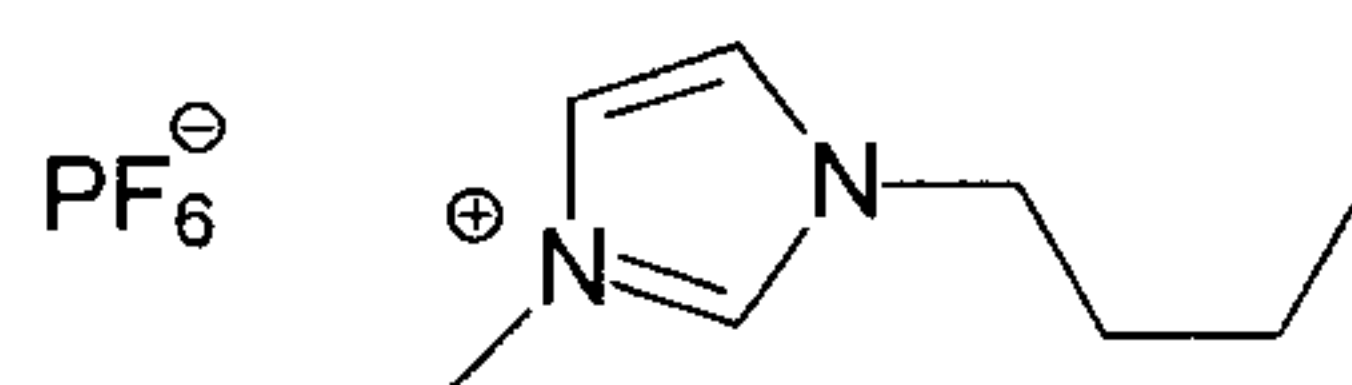
5 The present invention relates to personal care compositions comprising ionic liquids, and methods of using the same.

BACKGROUND OF THE INVENTION

10 In recent years, ionic liquids have been extensively evaluated as environmental-friendly or “green” alternatives to conventional organic solvents for a broad range of applications. For example, ionic liquids have been used in organic synthesis applications as catalysts and in electrochemistry, for example, in fuel cells, electrodeposition processes and other electrochemical applications.

15 Additionally, ionic liquids have been shown to be effective in applications where water-based chemistry can be problematic (for example, applications involving proton transfer or nucleophilicity), or in applications where certain coordination chemistry could have a damaging effect on the substrates involved.

A broad range of ionic liquids have been investigated in the past. One widely studied class of ionic liquids includes imidazolinium salts, such as BMIM/PF₆
 20 (butylmethylimidazolinium hexafluorophosphate):



25 Other well known ionic liquid include N-1-ethyl 3-methylimidazolinium chloride aluminum (III) chloride, which is usually referred to as [emim]Cl-ALCl₃; and N-butyl pyridinium chloride aluminum (III) chloride, which is usually referred to as [Nbupy]Cl-AlCl₃.

Conventional applications of these and similar ionic liquids for a wide range of chemical processes are described in “*Ionic Liquid*” by J.D. Holbrey and K.R. Seddon, and in *Clean Products and Processes*, Vol. 1, pp. 223-236 (1999).

30 In addition to chemical processes, ionic liquids have also been used as microbiocides/plant growth regulators, as described in FR 2434156; as antistatic agents, as

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described in JP10-265674 and U.S. Patent No. 3,282,728; and as fruit and vegetable produce treating agents, as described in WO 01/19200. Other uses of ionic liquids are disclosed in U.S. Patent 6,048,388 as a component of an ink composition; and in J. Am. Chem. Soc. Vol. 124, pp. 4974-4975 (2002) as an agent to dissolve cellulose.

5 However, the use of ionic liquids in personal care applications has not been adequately addressed. The few ionic liquids identified in the art as having applicability to personal care compositions still pose substantial health concerns due to toxicity issues, among others. Therefore, it is desirable to provide personal care compositions comprising ionic liquids suitable for mammalian personal care applications. It is also desirable that such compositions be
10 effective and safe for use. It is further desirable that such compositions contain a mixture of ionic liquids to enhance the desired benefits provided by several ionic liquids.

SUMMARY OF THE INVENTION

 In one general aspect, the various embodiments described herein are directed to a
15 personal care composition comprising an ionic active compound that provides a benefit to keratinous materials; and an oppositely charged counter ion that forms an ionic liquid with the ionic active compound, wherein the ionic liquid has a melting point of less than 100 °C.

 In another general aspect, the various embodiments described herein are directed to a method of treating keratinous materials comprising applying to a keratinous material a
20 composition comprising an ionic active compound that provides a benefit to the keratinous material; and an oppositely charged counter ion that forms an ionic liquid with the ionic active compound; wherein the ionic liquid has a melting point of less than 100 °C.

 In another general aspect, the various embodiments described herein are directed to a personal care composition comprising an ionic liquid comprising a soft acid and a soft base, the
25 ionic liquid having a melting point of less than 100 °C and a clogP value within the range of from 0 to 12; and a benefit agent that preferentially associates with the ionic liquid relative to water, wherein the benefit agent provides a benefit to keratinous materials.

 In another general aspect, the various embodiments described herein are directed to a benefit agent delivery system comprising a benefit agent that provides a benefit to keratinous
30 materials; and an ionic liquid having a melting point of less than 100 °C and a clogP value within the range of from 0 to 12, wherein the benefit agent is releasably associated with the ionic liquid.

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In another general aspect, the various embodiments described herein are directed to a method for delivering a benefit agent to a keratinous material comprising the steps of applying to the keratinous material a composition comprising an ionic liquid comprising a soft acid and a soft base, the ionic liquid having a melting point of less than 100 °C and a clogP value within the range of from 0 to 12; and a benefit agent that preferentially associates with the ionic liquid relative to water.

In another general aspect, the various embodiments described herein are directed to a personal care composition comprising an ionic liquid having a melting point of less than 100 °C; and a solvent, wherein the ionic liquid at least partially dissociates into constituent ions in the solvent and re-associates to form an ionic liquid structure upon evaporation of the solvent from the composition.

In another general aspect, the various embodiments described herein are directed to a method for delivering a beneficial ionic liquid to a keratinous material comprising the steps of providing a composition comprising a solvent and an ionic liquid dissociated in the solvent into constituent ions, wherein the ionic liquid provides a benefit to the keratinous material in associated ionic liquid form; applying the composition to the keratinous material; and evaporating the solvent, wherein upon evaporation the constituent ions re-associate to form an ionic liquid structure thereby delivering the beneficial ionic liquid to the keratinous material.

In another general aspect, the various embodiments described herein are directed to a method for treating keratinous materials comprising applying to a keratinous material a composition comprising an ionic liquid having a melting point of less than 100 °C and a clogP value within the range of 0 to 12, wherein the ionic liquid has preferential solubility for sebum relative to skin ceramides.

In another general aspect, the various embodiments described herein are directed to a personal care composition comprising a first active compound releasably associated with a first ionic liquid; and a second active compound releasably associated with a second ionic liquid, wherein the first ionic liquid and the second ionic liquid are immiscible in a first chemical state but are miscible in a second chemical state.

Other non-limiting aspects of the various embodiments described herein are provided in the following description.

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DETAILED DESCRIPTION OF THE INVENTION

While the specification concludes with claims which particularly point out and distinctly claim the present invention; it is believed that the present invention will be better understood from the following description of various non-limiting embodiments.

5 It is to be understood that certain descriptions of various embodiments have been simplified to illustrate only those elements and/or features that are relevant to a clear understanding of the present invention, while eliminating, for purposes of clarity, other elements and/or features. Those of ordinary skill in the art, upon considering the present description of the various non-limiting embodiments of the present invention, will recognize that other elements
10 and/or features may be desirable in order to implement the present invention. However, because such other elements and/or features may be readily ascertained by one of ordinary skill upon considering the present description of various embodiments of the invention, and are not necessary for a complete understanding of the present invention, a discussion of such elements and/or features is not provided herein. As such, it is to be understood that the description set
15 forth herein is merely exemplary to the present invention and is not intended to limit the scope of the claims.

Other than in the examples herein, or unless otherwise expressly specified, all of the numerical ranges, amounts, values, and percentages, such as those for amounts of materials, elemental contents, times and temperatures of reaction, ratios of amounts, and others, in the
20 specification and attached claims may be read as if prefaced by the word "about," even though the term "about" may not expressly appear with the value, amount, or range. Accordingly, unless indicated to the contrary, the numerical parameters set forth in the specification and claims are approximations that may vary depending upon the desired properties sought to be obtained by the present invention. At the very least, and not as an attempt to limit the application of the doctrine
25 of equivalents to the scope of the claims, each numerical parameter should at least be construed in light of the number of reported significant digits and by applying ordinary rounding techniques.

Notwithstanding that the numerical ranges and parameters setting forth the broad scope of the invention are approximations, the numerical values set forth in the specific examples are
30 reported as precisely as possible. Any numerical value, however, inherently contains error necessarily resulting from the deviation found in its underlying respective testing measurements. Furthermore, when numerical ranges are set forth herein, these ranges are inclusive of the recited

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range end points (i.e., end points may be used). Also, it should be understood that any numerical range recited herein is intended to include all sub-ranges subsumed therein. For example, a range of "1 to 10" is intended to include all sub-ranges between (and including) the recited minimum value of 1 and the recited maximum value of 10, that is, having a minimum value equal to or greater than 1 and a maximum value equal to or less than 10.

All patents, publications, or other disclosure material referenced herein are incorporated by reference in their entirety. Any patent, publication, or other disclosure material, in whole or in part, that is incorporated by reference herein is incorporated herein only to the extent that the incorporated material does not conflict with existing definitions, statements, or other disclosure material set forth in this disclosure. As such, and to the extent necessary, the disclosure as explicitly set forth herein supersedes any conflicting material incorporated herein by reference. Any material, or portion thereof, that is said to be incorporated by reference herein, but which conflicts with existing definitions, statements, or other disclosure material set forth herein will only be incorporated to the extent that no conflict arises between that incorporated material and the existing disclosure material.

The articles "a," "an," and "the" are used herein to refer to one or more than one (i.e., to at least one) of the grammatical objects of the article. By way of example, "a component" means one or more components, and thus, possibly, more than one component is contemplated and may be employed or used.

All percentages, parts and ratios are based upon the total weight of the compositions of the present invention, unless otherwise specified. All such weights as they pertain to listed ingredients are based on the active level and, therefore, do not include solvents or by-products that may be included in commercially available materials, unless otherwise specified.

Definitions

The melting point of a solid is the temperature at which it changes state from solid to liquid.

clogP is the logarithm of the partition coefficient of a molecule between a non-polar solvent (1- octanol) and water. It is typically used as a measure of the hydrophobic character of the molecule.

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The terms hard acids and bases are used as well known in the art, to characterize acid and base species which have small size and are not strongly polarizable as opposed to soft acids and bases which are large and strongly polarizable.

All percentages and ratios used herein are by weight of the total composition and all
5 measurements made are at 25°C, unless otherwise designated.

The term "keratinous tissue," as used herein, refers to keratin-containing layers disposed as the outermost protective covering of mammals (e.g., humans, dogs, cats, etc.) which includes, but is not limited to, skin, mucosa, lips, hair, toenails, fingernails, cuticles, hooves, etc.

The terms "topical application", "topically", and "topical", as used herein, mean to apply
10 (e.g., spread, spray) the compositions of the present invention onto the surface of the keratinous tissue.

The terms "oral", "orally", and "oral administration", as used herein, refer to orally ingesting a composition of the present invention.

The term "dermatologically acceptable," as used herein, means that the compositions or
15 components thereof so described are suitable for use in contact with mammalian keratinous tissue without undue toxicity, incompatibility, instability, allergic response, and the like.

The term "orally acceptable", as used herein, means that the compositions or components thereof so described are suitable for oral ingestion by a mammal without undue toxicity, incompatibility, instability, allergic response, and the like.

20 As used herein, "effective amount" means an amount of a compound or composition sufficient to significantly induce a positive keratinous tissue benefit, including independently or in combination with other benefits disclosed herein. This means that the content and/or concentration of ionic liquid in the formulation is sufficient that when the formulation is applied with normal frequency and in a normal amount, the formulation can result in the treatment of one
25 or more undesired keratinous tissue conditions (e.g., skin wrinkles). For instance, the amount can be an amount sufficient to inhibit or enhance some biochemical function occurring within the keratinous tissue. This amount of ionic liquid may vary depending upon the type of product, the type of keratinous tissue condition to be addressed, and the like.

The term "safe and effective amount" as used herein means an amount of a compound or
30 composition sufficient to significantly induce a positive benefit, preferably a positive keratinous tissue appearance or feel benefit, including independently or in combinations with the benefits

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disclosed herein, but low enough to avoid serious side effects, i.e., to provide a reasonable benefit to risk ratio, within the scope of sound judgment of the skilled artisan.

The term “suitable for application to human hair” and “suitable for application to human skin” as used herein means that the compositions or components thereof so described are suitable
 5 for use in contact with human hair and the scalp and skin without undue toxicity, incompatibility, instability, allergic response, and the like.

The term “shampoo” as used herein means a composition for cleaning hair or skin, including scalp, face, and body. Accordingly, the term “shampoo” includes, but is not limited to, the conventional understanding of a hair shampoo, a body wash, a face wash, or other surface
 10 washing composition, for example. In addition, the term “shampoo” includes compositions for use on humans and/or animals.

The term “conditioner” as used herein means a composition for treating hair or skin, including scalp, face, and body, in order to provide protection to hair or skin from mechanical, chemical, and/or environmental factors that contribute to damaged or weathered hair or skin,
 15 and/or to alleviate the characteristics of such damage. Accordingly, the term “conditioner” includes, but is not limited to, the conventional understanding of a hair conditioner (leave-in and/or rinse-out), a skin lotion, or a facial moisturizer, for example. In addition, the term “conditioner” includes compositions for

The term “personal care product” as used herein means a product such as, for example, lipstick, mascara, rouge, foundation, blush, eyeliner,
 20 lipliner, lip gloss, other cosmetics, facial powder, body powder, sunscreen, sun block, nail polish, mousse, hair spray, styling gel, nail conditioner, bath gel, shower gel, body wash, face wash, shampoo, hair conditioner (leave-in or rinse-out), cream rinse, hair dye, hair coloring product, hair shine product, hair serum, hair anti-frizz product, hair split-end repair product, lip balm, skin conditioner, cold cream, moisturizer, body spray, soap, body scrub, exfoliant, astringent,
 25 scruffing lotion, depilatory, permanent waving solution, antidandruff formulation, antiperspirant composition, deodorant, shaving product, pre-shaving product, after shaving product, cleanser, skin gel, rinse, toothpaste, mouthwash, or oral care strips.

The personal care compositions of the present invention can be useful for treating keratinous tissue (e.g., hair, skin, or nails) condition. As use herein, “treating” or “treatment” or
 30 “treat” includes regulating and/or immediately improving keratinous tissue cosmetic appearance and/or feel. As used herein, “regulating” or “regulation” means maintaining or improving the health and/or cosmetic appearance, and includes both prophylactically regulating and/or

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therapeutically regulating. Regulation of keratinous tissue condition, namely mammalian and in particular human skin, hair, or nail condition, is often required due to conditions which may be induced or caused by factors internal and/or external to the body. Examples include environmental damage, radiation exposure (including ultraviolet radiation), chronological aging, menopausal status (e.g., post-menopausal changes in skin, hair, or nails), stress, diseases, disorders, etc. For instance, "regulating skin, hair, or nail condition" includes prophylactically regulating and/or therapeutically regulating skin, hair, or nail condition, and may involve one or more of the following benefits: thickening of skin, hair, or nails (e.g. building the epidermis and/or dermis and/or sub-dermal [e.g., subcutaneous fat or muscle] layers of the skin, and where applicable the keratinous layers of the nail and hair shaft) to reduce skin, hair, or nail atrophy, increasing the convolution of the dermal-epidermal border (also known as the rete ridges), preventing loss of skin or hair elasticity (loss, damage and/or inactivation of functional skin elastin) such as elastosis, sagging, loss of skin or hair recoil from deformation; melanin or non-melanin change in coloration to the skin, hair, or nails such as under eye circles, blotching (e.g., uneven red coloration due to, e.g., rosacea) (hereinafter referred to as "red blotchiness"), sallowness (pale color), discoloration caused by telangiectasia or spider vessels, and graying hair.

As used herein, prophylactically regulating keratinous tissue condition includes delaying, minimizing and/or preventing visible and/or tactile discontinuities in keratinous tissue (e.g., texture irregularities in the skin, hair, or nails which may be detected visually or by feel), including signs of skin, hair, or nail aging. This is also encompassed within the term "treating."

As used herein, therapeutically regulating keratinous tissue condition includes ameliorating, e.g., diminishing, minimizing and/or effacing, discontinuities in keratinous tissue (e.g., skin, hair, or nails). This is also encompassed within the term "treating."

As used herein, "personal care composition" means a composition in a form intended for topical application to keratinous tissue, and/or oral ingestion, and/or injection, for the purpose of treating keratinous tissue (e.g., skin, hair, nails), and not intended for subsequent manufacture or modification.

The compositions of the present invention can also be useful for immediately improving keratinous tissue (e.g., skin, hair, or nail) cosmetic appearance and/or feel. For example, topical compositions of the present invention can be useful for regulating the cosmetic appearance of skin, hair, or nail condition by providing an immediate visual improvement in skin, hair, or nail appearance following application of the composition to the skin, hair, or nails. Generally

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speaking, topical compositions of the present invention which further contain particulate materials (e.g., pigments) can be most useful for providing immediate visual improvement.

The term "sagging" as used herein means the laxity, slackness, or the like condition of skin that occurs as a result of loss of, damage to, alterations to, and/or abnormalities in dermal elastin, muscle and/or subcutaneous fat.

The terms "smoothing" and "softening" as used herein mean altering the surface of the keratinous tissue such that its tactile feel is improved.

"Signs of keratinous tissue aging" include, but are not limited to, all outward visibly and tactilely perceptible manifestations as well as any other macro or micro effects due to keratinous tissue aging. Such signs may be induced or caused by intrinsic factors or extrinsic factors, e.g., chronological aging and/or environmental damage. These signs may result from processes which include, but are not limited to, the development of textural discontinuities such as wrinkles and coarse deep wrinkles, fine lines, skin lines, crevices, bumps, large pores (e.g., associated with adnexal structures such as sweat gland ducts, sebaceous glands, or hair follicles), or unevenness or roughness, loss of skin elasticity (loss and/or inactivation of functional skin elastin), sagging (including puffiness in the eye area and jowls), loss of skin firmness, loss of skin tightness, loss of skin recoil from deformation, discoloration (including undereye circles), blotching, sallowness, hyperpigmented skin regions such as age spots and freckles, keratoses, abnormal differentiation, hyperkeratinization, elastosis, collagen breakdown, and other histological changes in the stratum corneum, dermis, epidermis, the skin vascular system (e.g., telangiectasia or spider vessels), and underlying tissues (e.g., fat and/or muscle), especially those proximate to the skin.

The phrase "to treat at least one undesired keratinous tissue (e.g., skin, hair, or nail) condition" as used herein means that the dipeptide provides an objectively measurable increase in its effect on some aspect of the keratinous tissue (e.g., skin, hair, or nail) condition when used topically and/or orally in an effective amount. This can be, for example, a greater reduction in wrinkles, increased potency, the ability to stimulate or inhibit at least one biochemical process within the skin, hair, or nails to a greater degree, and the like. Generally, this is determined based on comparison to a control.

All terms such as "skin aging", "signs of skin aging", and the like are used in the sense in which they are generally and widely used in the art of developing, testing and marketing personal care products. "Wrinkles" means furrows in the otherwise smooth surface of the facial skin,

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visible to the naked eye, generally in the average depth of 50 to more than 200 μm and essentially appearing with progressive age.

The compositions of the present invention are described in detail hereinafter.

5 I. PERSONAL CARE COMPOSITIONS

The present invention provides personal care compositions comprising an ionic liquid. In one aspect, the personal care compositions of the present invention comprise:

- (1) an ionic liquid;
- (2) a dermatologically or orally acceptable carrier or injectible liquid; and
- 10 (3) optionally, optional components.

The personal care compositions of the present invention can be in any suitable form. All forms of topical and oral personal care compositions comprising these dipeptides are contemplated and can include, for instance, creams, gels, lotions, emulsions, serums, colloids, solutions, suspensions, ointments, milks, sprays, capsules, tablets, liquids, sticks, solids, pastes, 15 powders, compacts, pencils, spray-on formulations, brush-on formulations, cloths, wipes, and the like.

Non-limiting examples of topical personal care compositions can include, without limitation, lipstick, mascara, rouge, foundation, blush, eyeliner, lipliner, lip gloss, facial or body powder, sunscreens and blocks, nail polish, mousse, sprays, styling gels, nail conditioner, bath 20 and shower gels, shampoos, conditioners, cream rinses, hair dyes and coloring products, leave-on conditioners, sunscreens and sunblocks, lip balms, skin conditioners, cold creams, moisturizers, hair sprays, soaps, body scrubs, exfoliants, astringents, depilatories and permanent waving solutions, antidandruff formulations, antiperspirant compositions, shaving, preshaving and after shaving products, moisturizers, deodorants, cold creams, cleansers, skin 25 gels, and rinses. Furthermore, the composition can be applied topically through the use of a patch or other delivery device. Delivery devices can include, but are not limited to, those that can be heated or cooled, as well as those that utilize iontophoresis or ultrasound.

Non-limiting examples of oral personal care compositions can include, without limitation, tablets, pills, capsules, drinks, beverages, powders, vitamins, supplements, health bars, candies, 30 chews, and drops.

In another aspect, the present invention provides a personal care regimen comprising the use of at least one topical composition in combination with at least one oral composition.

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In another aspect, the method comprises the step of injecting the composition into and/or under the skin. In a particular embodiment, the method comprises a treatment regimen comprising a combination of injection and/or oral administration and/or topical application of a composition of the present invention.

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II. IONIC LIQUID

“Ionic liquid” as used herein refers to a salt that is in a liquid form at room temperature, typically about 20-25°C. Typically, an ionic liquid has a melting temperature of about 40°C or less. Some of these salts may have a nitrogen-containing aromatic moiety as the cationic component. Other salts may have a phosphorous-containing cationic component. Typical anionic components of these salts include, but are not limited to, methylsulfate, PF_6^- , BF_4^- , or halide.

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It should be understood that the terms “ionic liquid”, “ionic liquids”, and “IL” refer to ionic liquids, ionic liquid composites, and mixtures (or cocktails) of ionic liquids.

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Some of the properties that ionic liquids possess and make them attractive alternatives to conventional solvents include:

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- a) ionic liquids have a broad liquid range; some ionic liquids can be in the liquid form down to -96°C , and others can be thermally stable up to 200°C ; this permits effective kinetic control in many organic reactions;
- b) ionic liquids have no effective vapor pressure, thus, they are easy to handle and they reduce the safety concerns where volatility could be an issue;
- c) ionic liquids are effective solvents for a broad range of organic and inorganic materials due to their high polarity;
- d) ionic liquids are effective Bronsted/Lewis acids;
- e) ionic liquids can be tuned to the specific application/chemistry desired, for example, they can be selectively made to have properties ranging from hydrophilic to hydrophobic.

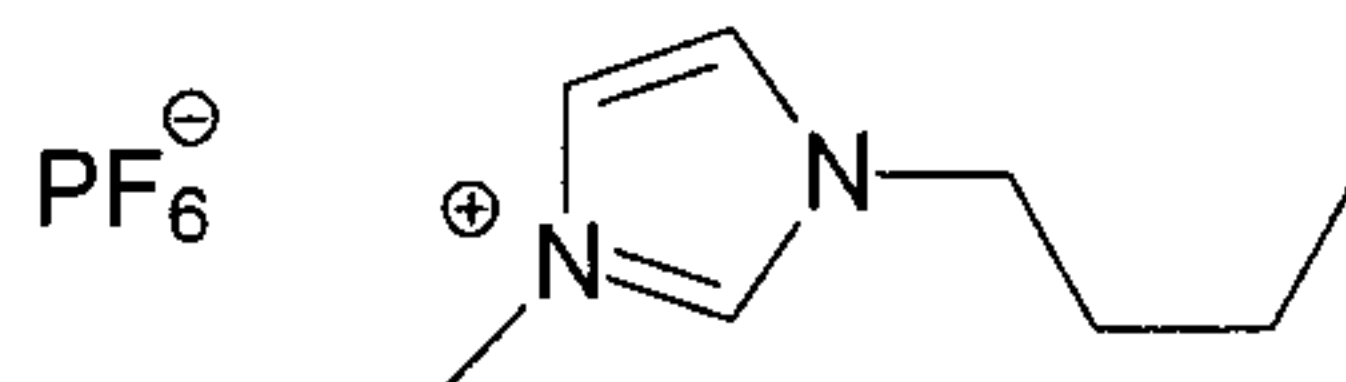
By virtue of their high polarity and charge density, ionic liquids have unique solvating properties, and are being used in a variety of applications. These applications include in organic synthesis as a green solvent, in electrochemistry (batteries, electroplating), in novel materials science (liquid crystals, gels, rubbers), and as novel membranes in fuel cells and separations.

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Examples of ionic liquids suitable for use herein include, but are not limited to, butylmethylimidazolium hexafluorophosphate:

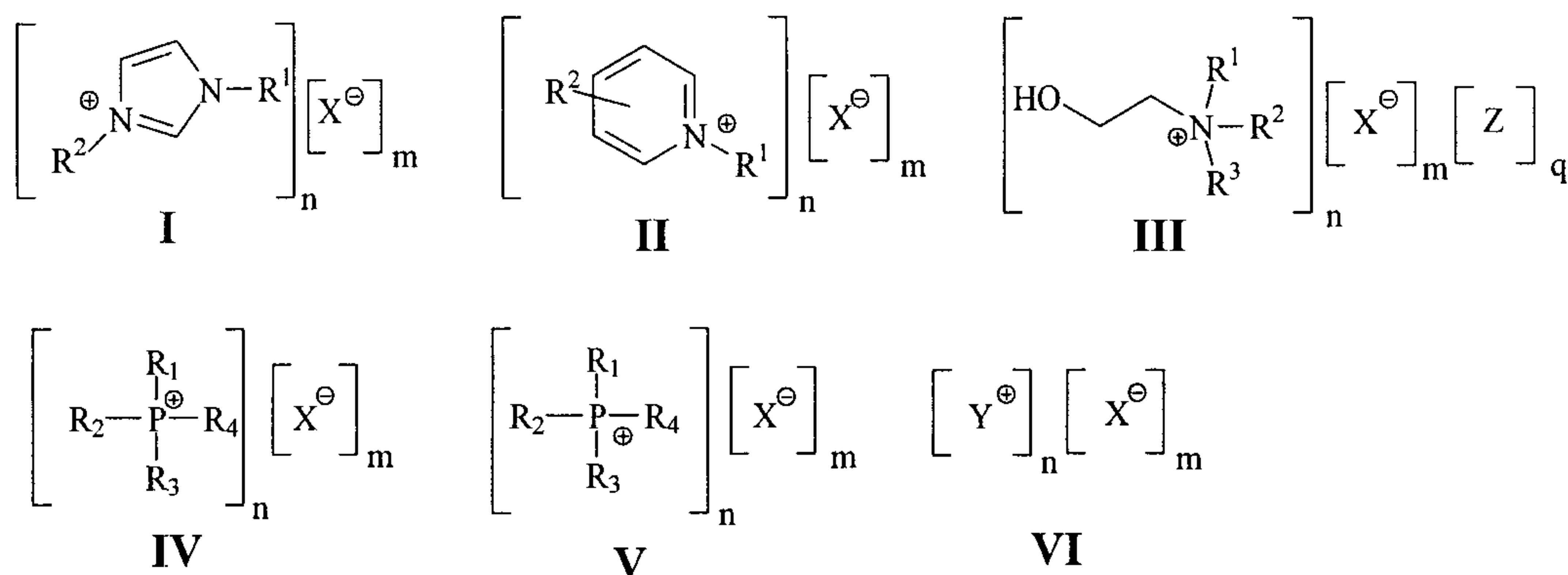


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and numerous analogs having varied counterions, alkyl chain lengths, and alternative ring structures such as pyridium. These variables can be adjusted and mixed such that properties of the ionic liquids can be customized for specific applications. These customized ionic liquids have been referred to as “designer solvents”.

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Representative ionic liquids may have the formula I -VI :



wherein R^1 - R^4 are selected from among the group consisting of linear or branched, substituted or unsubstituted, alkyl, aryl, alkoxyalkyl, alkylenearyl hydroxyalkyl, or haloalkyl; X is an anion; Y is a cation; Z is a neutral molecule capable of hydrogen bonding; m and n are chosen to provide electronic neutrality; and q is an integer from 0 to 1000; the resulting salt is a liquid at about 40°C or less. Nonlimiting examples of X include methylsulfate, PF_6^- , BF_4^- , or halide; nonlimiting examples of Z include glycerol, citric acid, urea, or other such neutral proton donors or acceptors; and Y typically contain a heteroatom, such as nitrogen or phosphate. The R, X, and Z moieties may be varied so as to provide the desired solvating properties, viscosity, melting point, and other properties, for the intended application.

The ionic liquid composite comprises a mixture of a salt (which can be solid at room temperature) with a proton donor Z (which can be a liquid or a solid) as described above. Upon mixing, these components turn into a liquid at about 40°C or less, and the mixture behaves like an

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ionic liquid. Ionic liquid composites comprising various salts and proton donors according to formula III are disclosed in WO 02/26701, and are available from Scionix Ltd. of London, United Kingdom.

The concept of hard/soft acid/base can be used to qualitatively describe the bond strength between ionic species of opposite charge. Therefore, this concept, along with clogP, is useful to provide predictions on the dissociative character of a ionic liquid in water. The use of ionic liquids in beauty formulations containing an aqueous phase is relevant under the following scenarios: (1) non-dissociating cases, and (2) dissociating cases.

Non-dissociating cases

The ionic liquids of interest do not dissociate on mixing with water due primarily to one or both of two factors: the strength of the interaction between the cation and the anion, and the hydrophobicity of the individual ions. If the components of the ionic liquid are sufficiently hydrophobic and the bond between the anion and the cation sufficiently covalent, the material will not dissociate. Therefore, the ionic liquid is practically water-insoluble and it is either forming a separate phase (which may contain some water, e.g. as waters of hydration, and/or may be comprised of aggregates of the undissociated IL), or it is dissolved as a single component (undissociated) in the organic/silicone phase (if present).

Two parameters can be used to define the structural characteristics of the ionic liquid and its components components that would place them in this scenario: (a) Solubility measure (such as clogP) and (b) Acid/base hardness of the corresponding cation/anion.

A common method for quantitating the hydrophobicity of a material is the logarithm of its partition coefficient in a 1-octanol/water mixture (logP, where P is the ratio of the solubility in 1-octanol divided by the solubility in water.). Low hydrophobicity and, therefore, low logP means that the material has low water solubility. Usually, hydrophobicities are reported in the literature by the parameter clogP which is calculated by commercial software programs taking into account the chemical structure of the material. . Suggested range for clogP for ionic liquids: 0-23, preferably 1-21, more preferably 5-20. Examples: DTDMAC-C12/14E6.5 sulfonate (15.9); DTDMAC-HSAS (20.3); Arquad HTLM8-C12-15E2 sulfonate (10.9); CTMAC-C12-15E2 sulfonate (8.0); Arquad HTL8-methylsulfonate (7.5).

As mentioned above, solubility of ionic liquids is also influenced by the strength of the anion-cation interaction. This can be described by the principle of hard and soft acids and bases. For a more comprehensive description of the hard/soft acid/base (HSAB) principle, one may

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refer to the following articles: R.G. Pearson, J. Am. Chem. Soc., 1963, 85, 3533-3543; R.G. Pearson, Science, 1966, 151, 172-177; G. Klopman, R.F. Hudson, J. Am. Chem. Soc., 1968, 90, 223-234.

Generally, hard acids will form strong ionic bonds with hard bases and soft acids will form strong covalent-like bonds with soft bases. The latter (soft acid-soft base) is most favorable combination for water insolubility of the corresponding ionic liquid. Of course, independently of hydrophobicity/water-solubility, organic salts must exhibit low melting point in order to be classified as ionic liquids.

Dissociating Cases

In cases where we have less ionic character of the cation-anion bond, combined with polar structural characteristics of the components, ionic liquids are dissociated into its salt components in water medium. In this case, the term ionic liquid is not meaningful, since the IL does not exist as such once incorporated into the product matrix. However, in some cases, the ionic liquid structure can reform upon water evaporation after the application of the corresponding formula on the substrate (skin, hair, etc). Therefore, we can take advantage of the unique properties of ionic liquids to improve/modify various properties such as ingredient stability, substrate penetration, lubricity, feel, adhesion, film strength, etc.

Low cLogP (say below 1.5) and ionic liquids consisting of hard acid-hard base pair or hard acid-soft base pair or soft acid-hard base pair. For classification of all common Lewis acids/bases into categories of hard acids, hard bases, soft acids, soft bases, see above-mentioned articles.

Other examples of ionic liquids that may be useful in the present invention are described in U.S. Patent No. 6,048,388.

Furthermore, below sets forth additional anions and cations that can be suitable for use in the ionic liquids of the present invention.

Anions

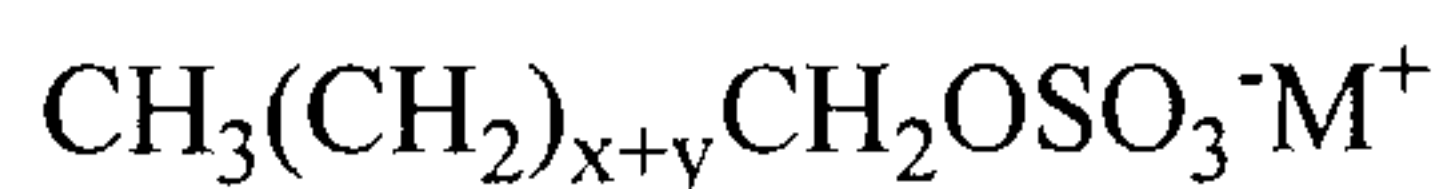
Anions suitable for use in the ionic liquids of the present invention include, but are not limited to, the one or more of the following materials:

- (1) Alkyl sulfates (AS), alkoxy sulfates and alkyl alkoxy sulfates, wherein the alkyl or alkoxy is linear, branched or mixtures thereof; furthermore, the attachment of the sulfate group to the alkyl chain can be terminal on the alkyl chain (AS), internal on the alkyl

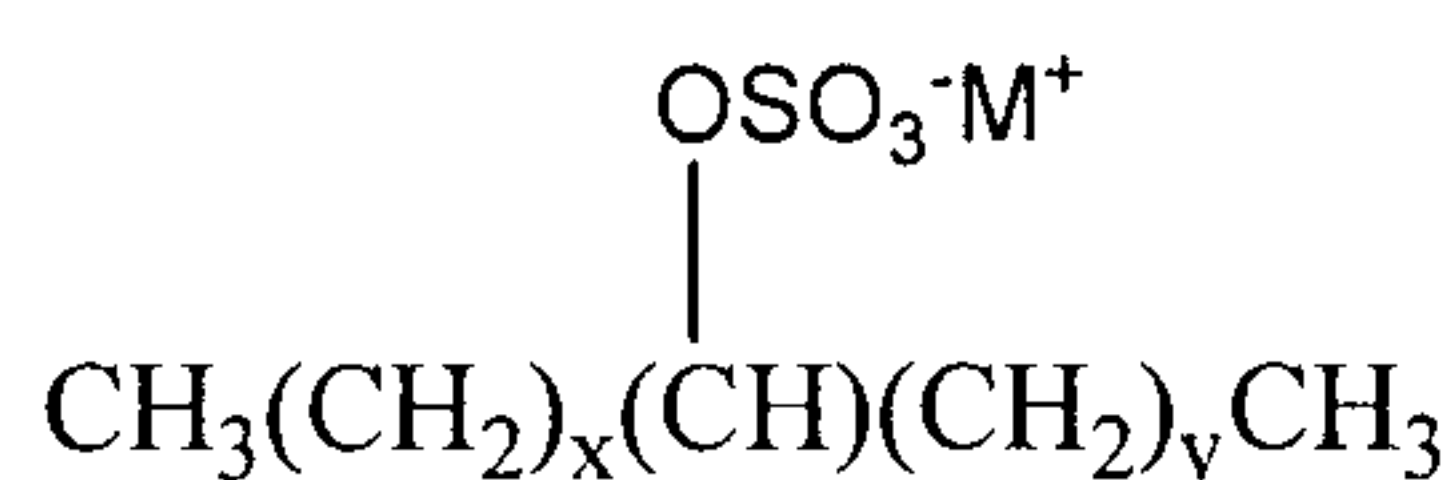
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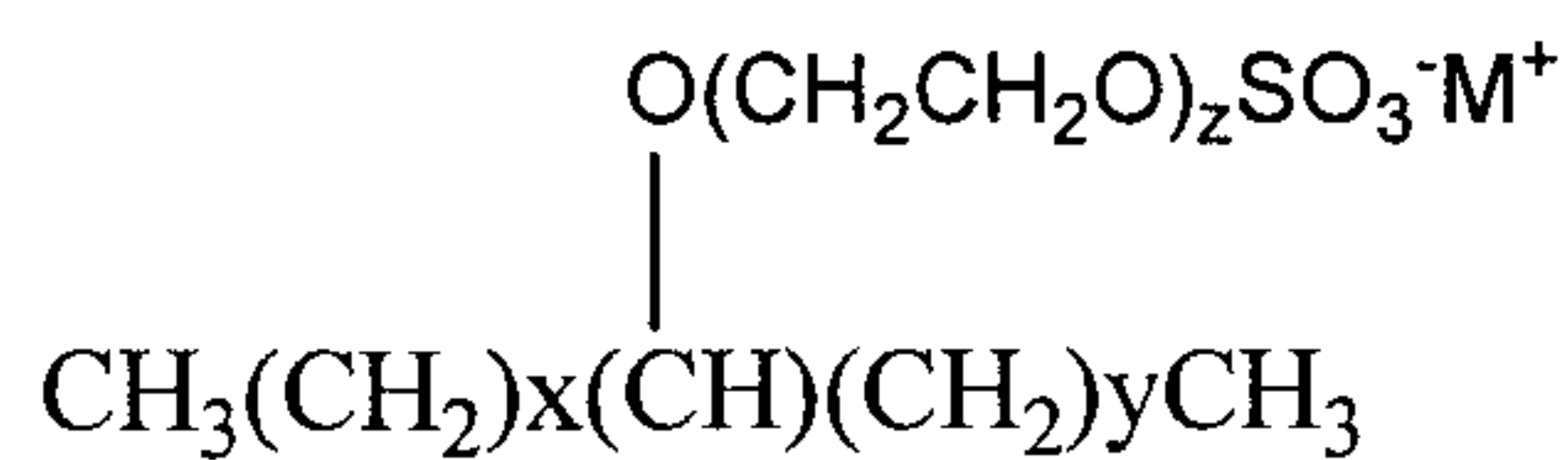
chain (SAS) or mixtures thereof: non-limiting examples include linear C₁₀-C₂₀ alkyl sulfates having formulae:



Wherein x+y is an integer of at least 8, preferably at least about 10; M⁺ is a cation selected from the cations of the ionic liquids as described in detail herein; or linear C₁₀-C₂₀ secondary alkyl sulfates having formulae:



wherein x + y is an integer of at least 7, preferably at least about 9; x or y can be 0, M⁺ is a cation selected from the cations of the ionic liquids as described in detail herein; or C₁₀-C₂₀ secondary alkyl ethoxy sulfates having formulae:



wherein x + y is an integer of at least 7, preferably at least about 9; x or y can be 0, M⁺ is a cation selected from the cations of the ionic liquids as described in detail herein; non-limiting examples of alkoxy sulfate include sulfated derivatives of commercially available alkoxy copolymers, such as Pluronics® (from BASF);

(2) Mono- and di- esters of sulfosuccinates: non-limiting examples include saturated and unsaturated C₁₂₋₁₈ monoester sulfosuccinates, such as lauryl sulfosuccinate available as Mackanate LO-100® (from The McIntyre Group); saturated and unsaturated C₆ - C₁₂ diester sulfosuccinates, such as dioctyl ester sulfosuccinate available as Aerosol OT® (from Cytec Industires, Inc.);

(3) Alkyl aryl sulfonates, non-limiting examples include tosylate, alkyl aryl sulfonates having linear or branched, saturated or unsaturated C₈-C₁₄ alkyls; alkyl benzene sulfonates (LAS) such as C₁₁-C₁₈ alkyl benzene sulfonates; and sulfonates of benzene;

(4) Alkyl glycerol ether sulfonates having 8 to 22 carbon atoms in the alkyl moiety;

(5) Diphenyl ether (bis-phenyl) derivatives: Non-limiting examples include Triclosan (2,4,4'-trichloro-2'-hydroxydiphenyl ether) and Diclosan (4,4'-dichloro-2-hydroxydiphenyl ether), both are available as Irgasan® from Ciba Specialty Chemicals;

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(6) Linear or cyclic carboxylates: non-limiting examples include Citrate, lactate, tartarate, succinate, alkylene succinate, maleate, gluconate, formate, cinnamate, benzoate, acetate, salicylate, phthalate, aspartate, adipate, acetyl salicylate, 3-methyl salicylate, 4-hydroxy isophthalate, dihydroxyfumarate, 1,2,4-benzene tricarboxylate, pentanoate and mixtures thereof;

(7) Mid-chain branched alkyl sulfates (HSAS), mid-chain branched alkyl aryl sulfonates (MLAS) and mid-chain branched alkyl polyoxyalkylene sulfates ; non-limiting examples of MLAS are disclosed in US 6,596,680; US 6,593,285; and US 6,202,303;

(8) Sarcosinates having the general formula $RCON(CH_3)CH_2CO_2^-$, wherein R is an alkyl from about C_{8-20} ; non-limiting examples include ammonium lauroyl sarcosinate, available as Hamposyl AL-30® from Dow Chemicals and sodium oleoyl sarcosinate, available as Hamposyl O® from Dow Chemical;

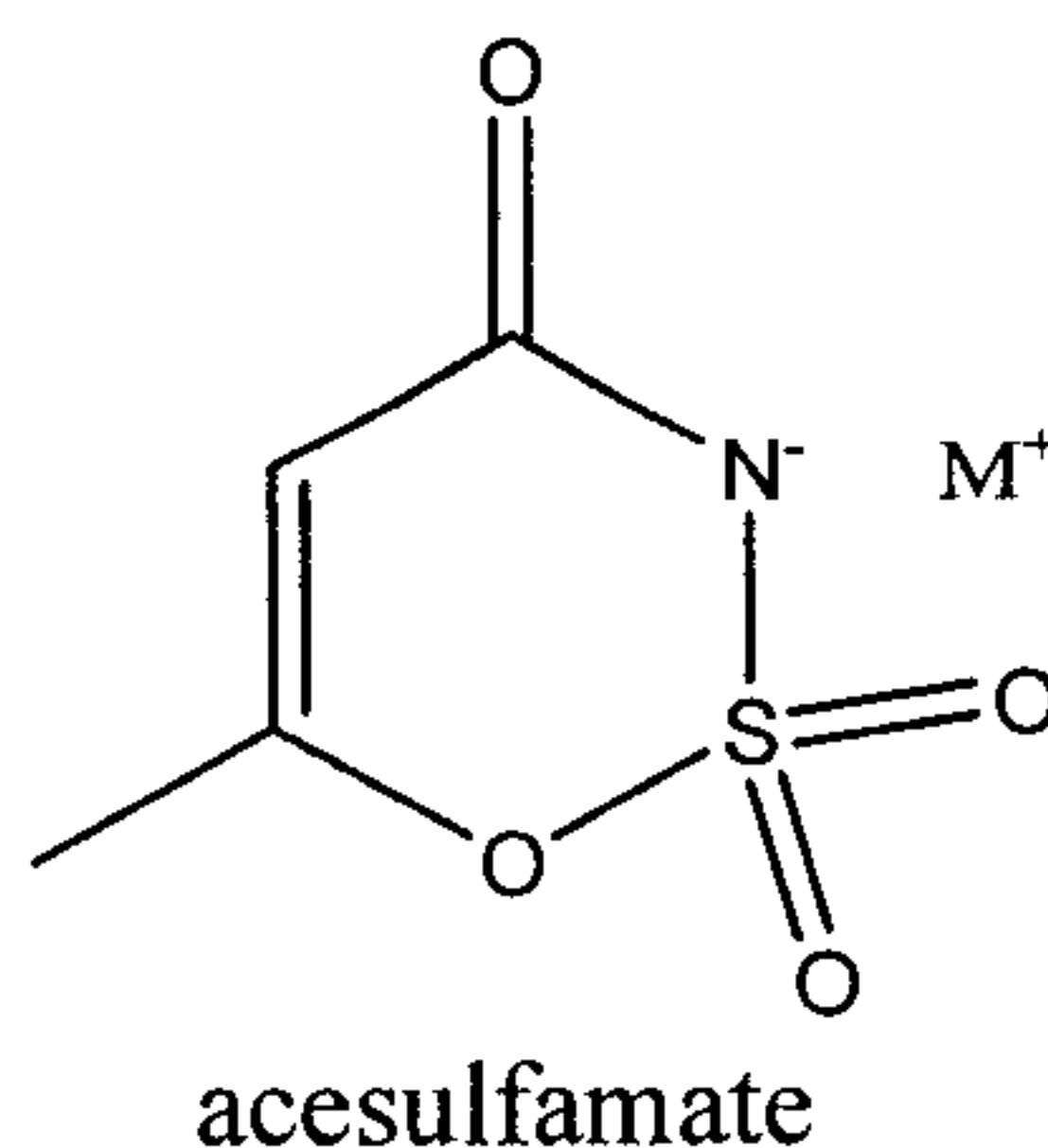
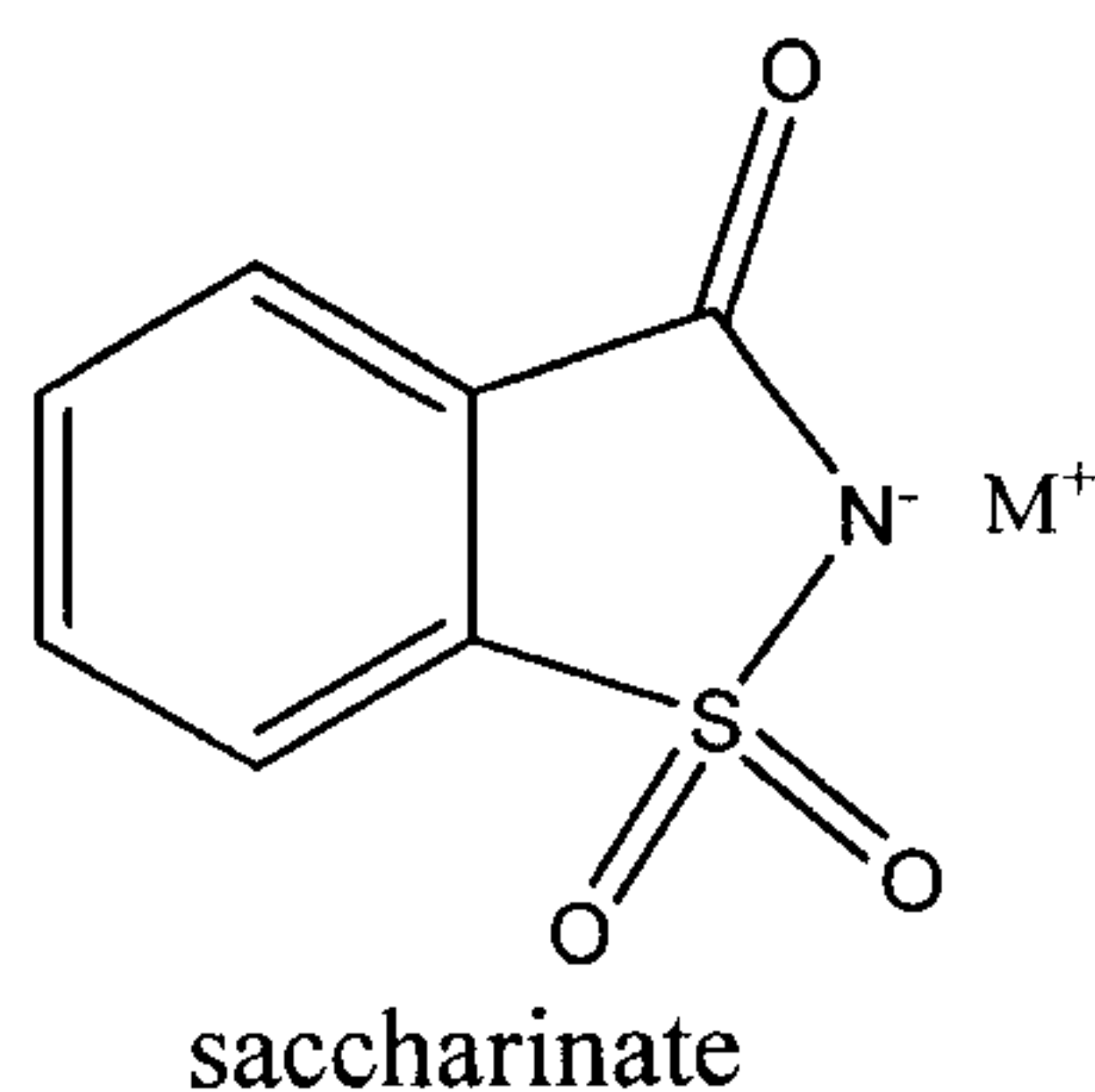
(9) Sulfated and sulfonated oils and fatty acids, linear or branched, such as those sulfates or sulfonates derived from potassium coconut oil soap available as Norfox 1101® from Norman, Fox & Co. and Potassium oleate from Chemron Corp.;

(10) Fatty acid ester sulfonates having the formula:



wherein R_1 is linear or branched C_8 to C_{18} alkyl, and R_2 is linear or branched C_1 to C_6 alkyl;

(11) Sweetener derived anions: saccharinate and acesulfamate;



wherein M^+ is a cation selected from the cations of the ionic liquids as described herein;

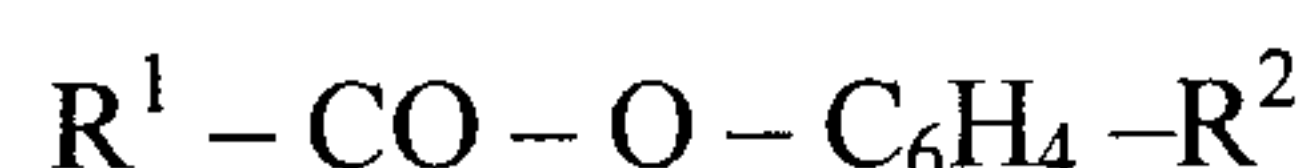
(12) Ethoxylated amide sulfates; sodium tripolyphosphate (STPP); dihydrogen phosphate;

fluoroalkyl sulfonate; bis-(alkylsulfonyl) amine; bis-(fluoroalkylsulfonyl)amide;

(fluoroalkylsulfonyl)(fluoroalkylcarbonyl)amide; bis(arylsulfonyl)amide; carbonate;

tetrafluoroborate (BF_4^-); hexafluorophosphate (PF_6^-);

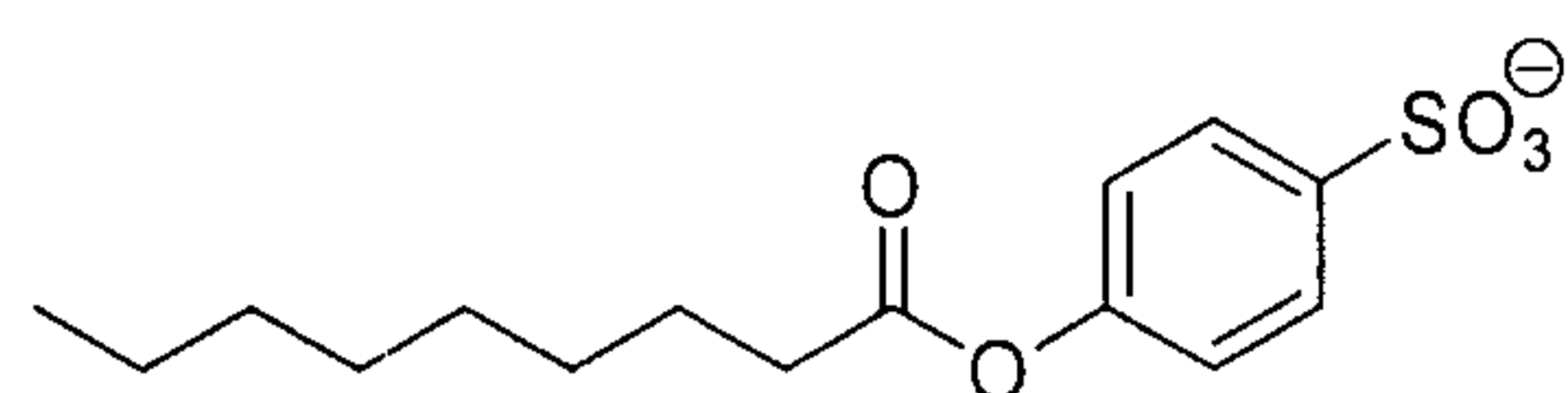
(13) Anionic bleach activators having the general formula:



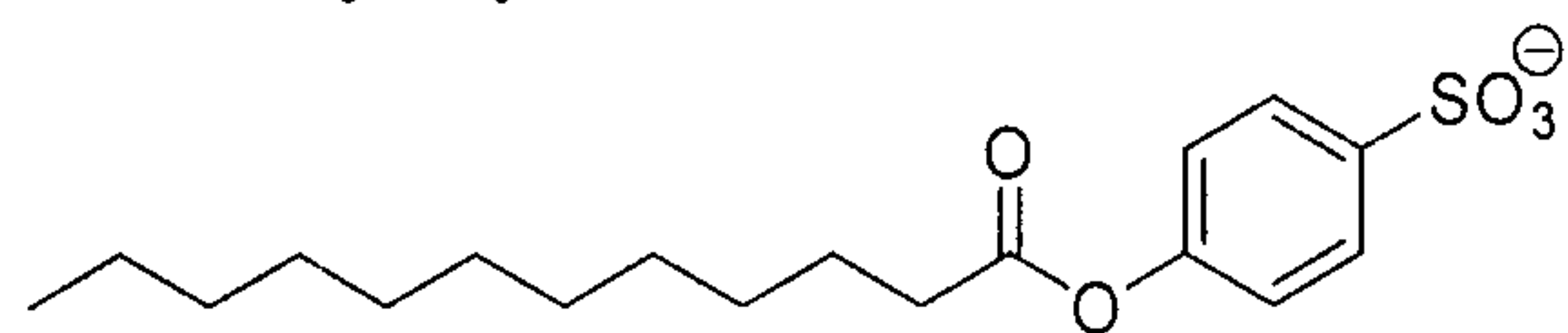
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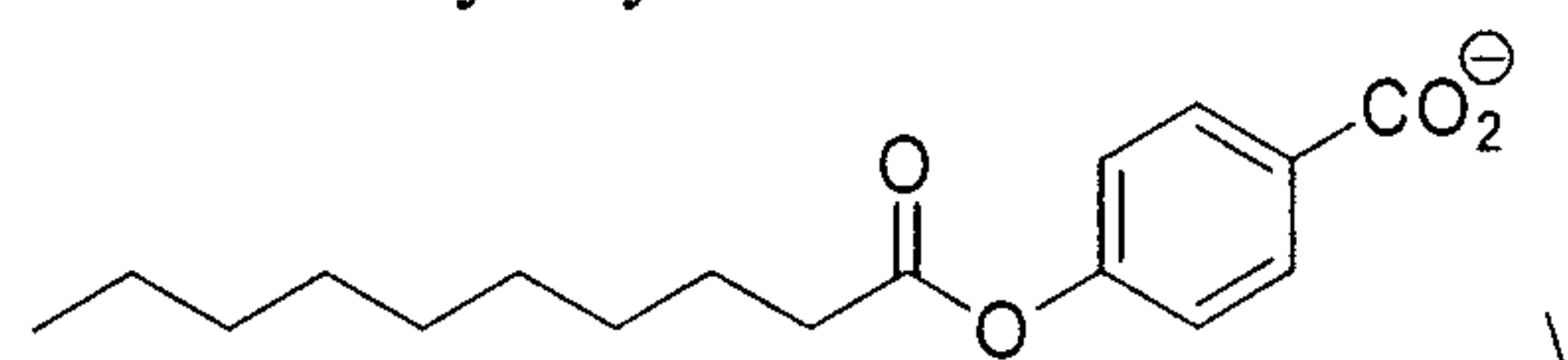
wherein R^1 is C_8 - C_{18} alkyl, C_8 - C_{18} amino alkyl, or mixtures thereof, and R^2 is sulfonate or carbonate; non-limiting examples such as:



4-nonanoyloxybenzene sulfonate



4-dodecanoyloxybenzene sulfonate



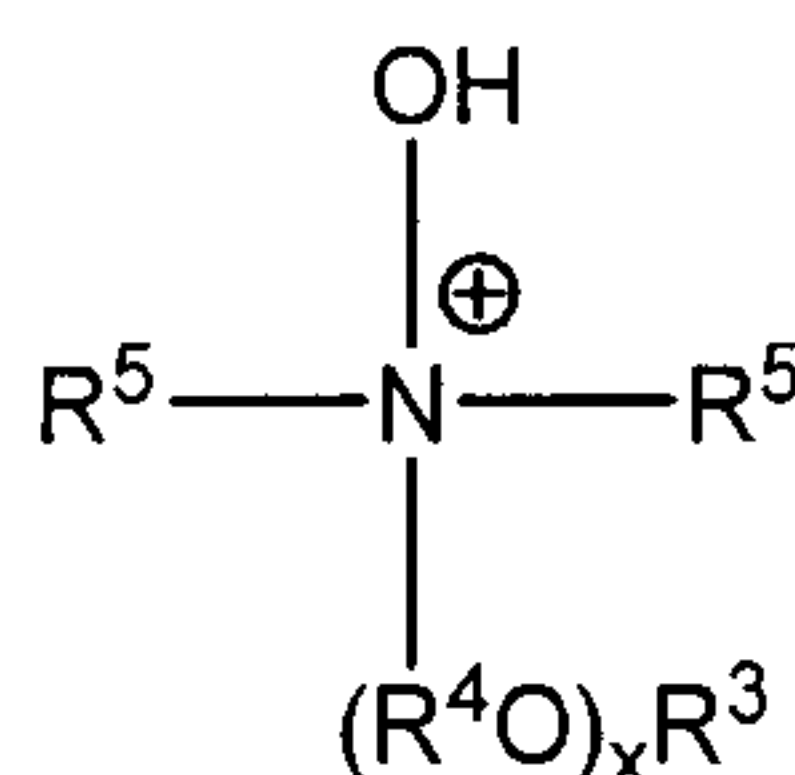
4-decanoyloxybenzoate

are disclosed in US 5,891,838; US 6,448,430; US 5,891,838; US 6,159,919; US 6,448,430; US 5,843,879; US 6,548,467.

Cations

Cations suitable for use in the ionic liquids of the present invention include, but are not limited to, the one or more of the following materials:

(a) Cations of amine oxides, phosphine oxides, or sulfoxides: non-limiting examples include amine oxide cations containing one C_{8-18} alkyl moiety and 2 moieties selected from the group consisting of C_{1-3} alkyl groups and C_{1-3} hydroxyalkyl groups; phosphine oxide cations containing one C_{10-18} alkyl moiety and 2 moieties selected from the group consisting of C_{1-3} alkyl groups and C_{1-3} hydroxyalkyl groups; and sulfoxide cations containing one C_{10-18} alkyl moiety and a moiety selected from the group consisting of C_{1-3} alkyl and C_{1-3} hydroxyalkyl moieties; in some embodiments, the amine oxide cations have the following formula:



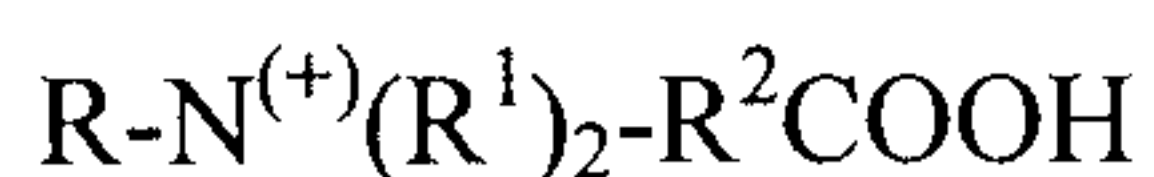
wherein R^3 is an C_{8-22} alkyl, C_{8-22} hydroxyalkyl, C_{8-22} alkyl phenyl group, and mixtures thereof; R^4 is an C_{2-3} alkylene or C_{2-3} hydroxyalkylene group or mixtures thereof; x is from 0

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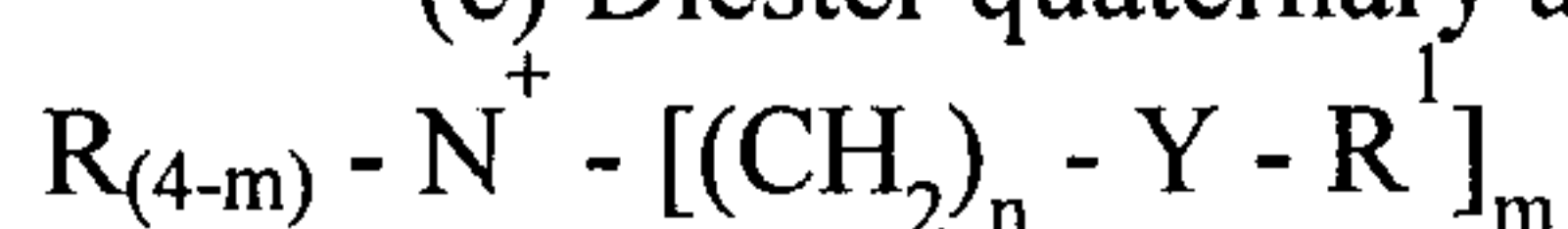
to about 3; and each R^5 is independently an C_{1-3} alkyl or C_{1-3} hydroxyalkyl group or a polyethylene oxide group containing an average of from about 1 to about 3 ethylene oxide groups; the R^5 groups may be attached to each other, e.g., through an oxygen or nitrogen atom, to form a ring structure; other exemplary amine oxide cations include C_{10} - C_{18} , C_{10} , C_{10} - C_{12} , and C_{12} - C_{14} alkyl dimethyl amine oxide cations, and C_8 - C_{12} alkoxy ethyl dihydroxy ethyl amine oxide cations;

(b) Betaines having the general formula:



wherein R is selected from the group consisting of alkyl groups containing from about 10 to about 22 carbon atoms, preferably from about 12 to about 18 carbon atoms, alkyl aryl and aryl alkyl groups containing a similar number of carbon atoms with a benzene ring treated as equivalent to about 2 carbon atoms, and similar structures interrupted by amido or ether linkages; each R^1 is an alkyl group containing from 1 to about 3 carbon atoms; and R^2 is an alkylene group containing from 1 to about 6 carbon atoms; non-limiting examples of betaines include dodecyl dimethyl betaine, acetyl dimethyl betaine, dodecyl amidopropyl dimethyl betaine, tetradecyl dimethyl betaine, tetradecyl amidopropyl dimethyl betaine, dodecyl dimethyl ammonium hexanoate; and amidoalkylbetaines which are disclosed in U.S. Pat. Nos. 3,950,417; 4,137,191; and 4,375,421; and British Patent GB No. 2,103,236; in another embodiment, the cation may be a sulfobetaine, which are disclosed in US Patent 4,687,602;

(c) Diester quaternary ammonium (DEQA) cations of the type:



wherein each R substituent is selected from hydrogen; C_1 - C_6 alkyl or hydroxyalkyl, preferably methyl, ethyl, propyl, or hydroxyethyl, and more preferably methyl; poly(C_1 - C_3 alkoxy), preferably polyethoxy; benzyl; or a mixture thereof; m is 2 or 3; each n is from 1 to about 4; each Y is -O-(O)C-, -C(O)-O-, -NR-C(O)-, or -C(O)-NR-; with the proviso that when Y is -O-(O)C- or -NR-C(O)-, the sum of carbons in each R^1 plus one is C_{12} - C_{22} , preferably C_{14} - C_{20} , with each R^1 being a hydrocarbyl, or substituted hydrocarbyl group; in one embodiment, the DEQA cation is an alkyl dimethyl hydroxyethyl quaternary ammonium as discussed in US 6,004,922; in another embodiment, the DEQA cation has the general formula:

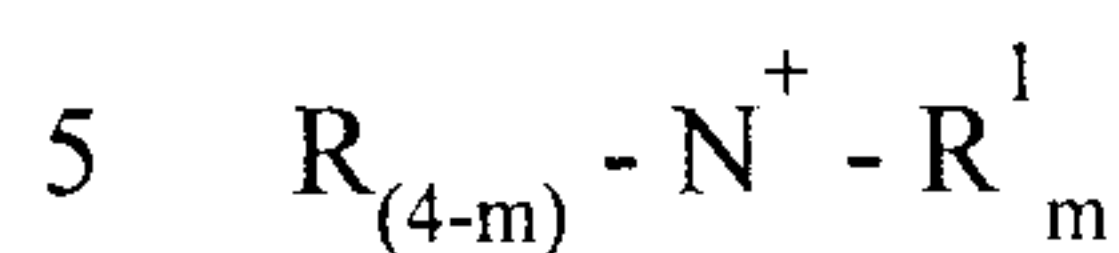


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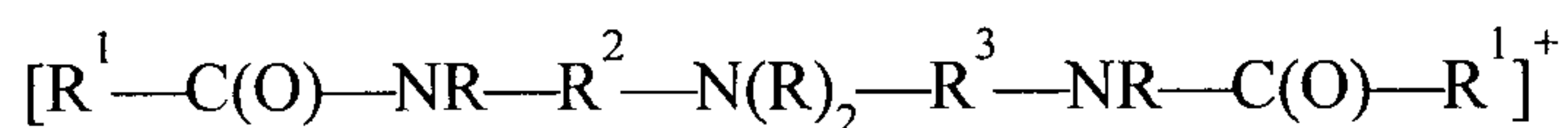
wherein each Y, R, R¹ have the same meanings as before; in yet another embodiment, the DEQA cation is [CH₃]₃ N⁽⁺⁾[CH₂CH(CH₂O(O)CR¹)O(O)CR¹] wherein each R¹ is in the range of C₁₅ to C₁₉;

(d) Alkylene quaternary ammonium cations having the formula:



wherein each m is 2 or 3; each R is independently an alkyl or hydroxyalkyl C₁-C₆ moiety, preferably methyl, ethyl, propyl or hydroxyethyl, and more preferably methyl; each R¹ is independently a linear or branched, saturated or unsaturated C₆-C₂₂ alkyl or alkoxy moiety, preferably C₁₄-C₂₀ moiety, but no more than one R¹ being less than about C₁₂ and then the other R¹ is at least about C₁₆; or hydrocarbyl or substituted hydrocarbyl moiety, preferably C₁₀-C₂₀ alkyl or alkenyl, most preferably C₁₂-C₁₈ alkyl or alkenyl; in one embodiment, the cation is dialkylenedimethyl ammonium, such as dioleyldimethyl ammonium available from Witco Corporation under the tradename Adogen[®] 472; in another embodiment, the cation monoalkenyltrimethyl ammonium, such as monooleytrimethyl ammonium, monocanolatrimethyl ammonium, and soyatrimethyl ammonium;

(e) Difatty amido quaternary ammonium cations such as:



wherein R and R¹ are as defined in cation (e) above, R² and R³ are C₁-C₆ alkylene moieties; for example, difatty amido quats are commercially available from Witco under the Varisoft[®] tradename;

(f) C₈₋₂₂ quaternary surfactants such as isostearyl ethyl imidonium available in its ethosulfate salt form as Schercoquat IIS[®] from Scher Chemicals, Inc., quaternium-52 obtainable as Dehyquart SP[®] from Cognis Corporation, and dicoco dimethyl ammonium available in its chloride salt form as Arquad 2C-75[®] from Akzo Nobel Surface Chemistry LLC;

25 (g) Cationic esters such as discussed in US 4,228,042, US 4,239,660, US 4,260,529 and US 6,022,844;

(h) 4,5-dichloro-2-n-octyl-3-isothiazolone, which is obtainable as Kathon[®] from Rohm and Haas;

(i) Quaternary amino polyoxyalkylene derivatives (choline and choline derivatives);

30 (j) Alkyl oxyalkylene cations;

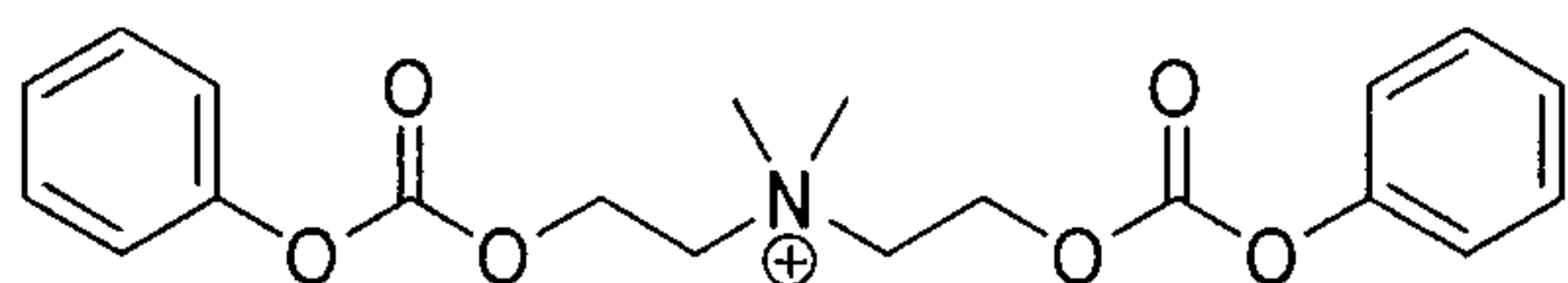
(k) Alkoxylate quaternary ammoniums (AQA) as discussed in US 6,136,769;

(l) Substituted and unsubstituted, , thiazolium, Guanidinium, and phosphonium;

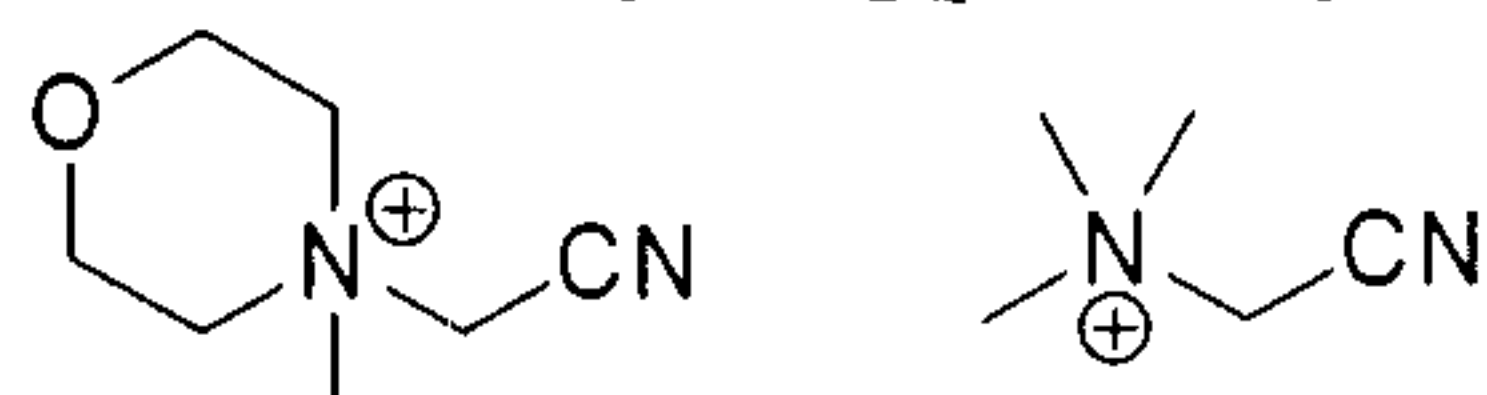
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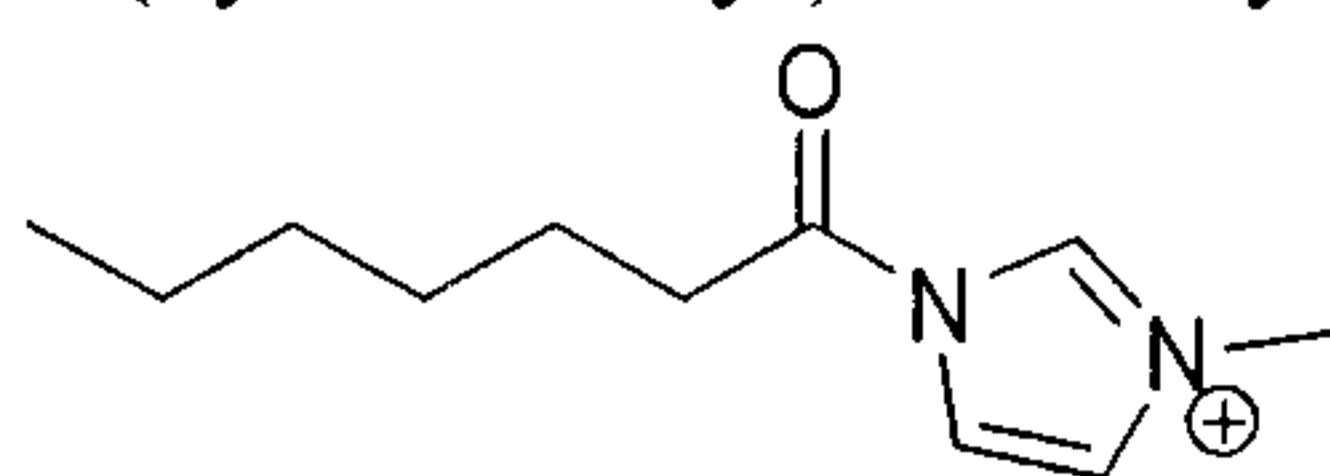
(m) Cationic bleach activators having a quaternary ammonium moiety including but not limited to



5 N,N-dimethyl-2-[(phenoxy carbonyl)oxy]-N-[2-[(phenoxy carbonyl)oxy]ethyl]ethanaminium



4-(cyanomethyl)-4-methylmorpholinium ; 1-cyano-N,N,N-trimethylmethanaminium

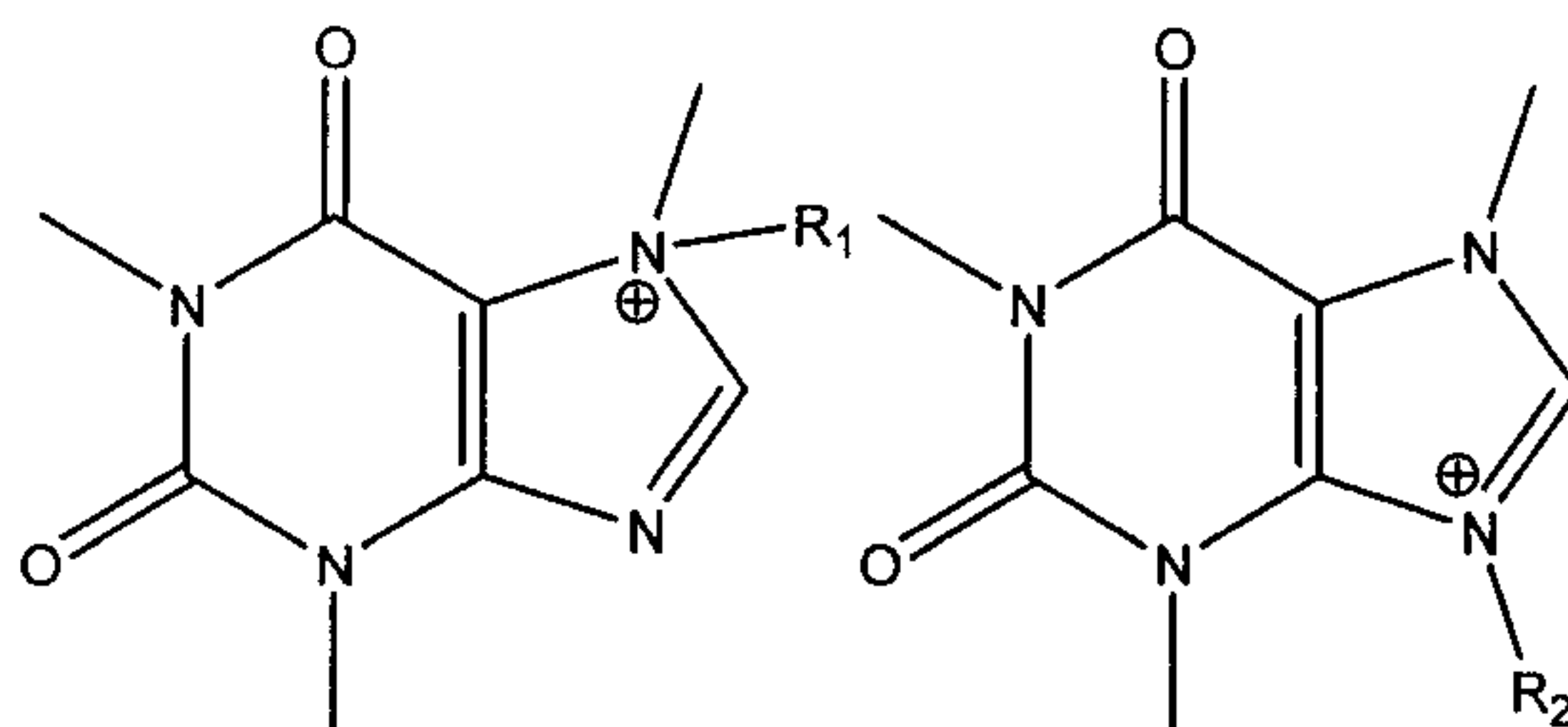


10 1-methyl-3-(1-oxoheptyl)-1H-imidazolium

these and other cationic bleach activators suitable for use herein as cations of the ionic liquids are disclosed in US 5,599,781, US 5,686,015, US 5,686,015, WO 95/29160, US 5,599,781, US 5,534,179, EP 1 253 190 A1, US 6,183,665, US 5,106,528, US 5,281,361, and Bulletin de la Societe Chimique de France (1973), (3)(Pt. 2), 1021-7;

15 (n) Cationic anti-microbial agents, such as cetyl pyridinium, chlorohexidine and domiphen.

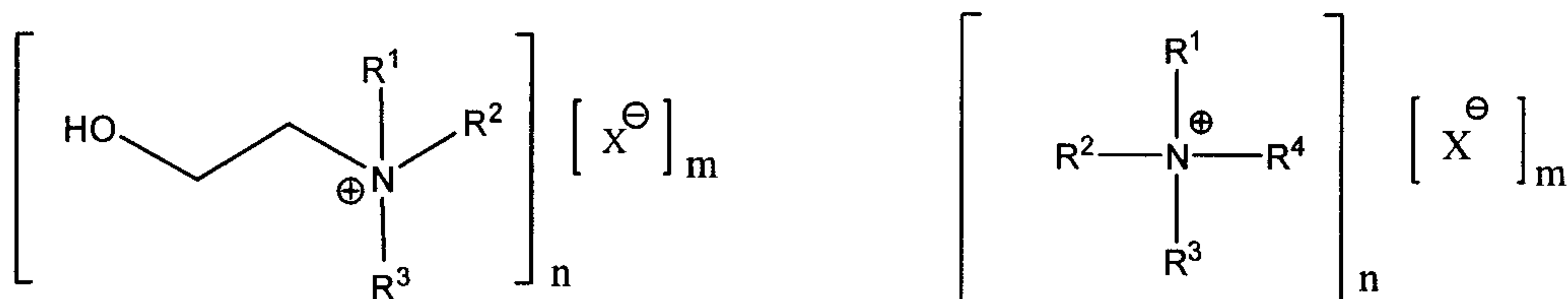
(o) Alkylated caffeine cations, such as



wherein R₁ and R₂ are C1 to C12 alkyl or alkylene groups.

In some embodiments, water immiscible ionic liquids comprise cations having the formulae:

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wherein R¹-R⁴ are selected from among the group consisting of linear or branched, substituted or unsubstituted, alkyl, aryl, alkoxyalkyl, alkylenearyl hydroxyalkyl, or haloalkyl; X is an anion such as those described hereinabove; m and n are chosen to provide electronic

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neutrality; further wherein the ionic liquids are water immiscible when at least one of R^1 - R^4 is C12 or higher; or at least two of R^1 - R^4 are C10 or higher; or at least three of R^1 - R^4 are C6 or higher.

In some embodiments, the water immiscible ionic liquids comprise a cation selected from the group consisting of trimethyloctyl ammonium cation, triisooctylmethyl ammonium cation, tetrahexyl ammonium cation, tetraoctyl ammonium cation, and mixtures thereof.

In some embodiments, the water immiscible ionic liquids comprise amine oxide cations and those anions described hereinabove.

In some embodiments, the water immiscible ionic liquids comprise betaine cations and those anions described hereinabove:

Dimethyl C12-14 amine oxide - Isalchem 123 alkyl sulfate (C12-13 branched alkyl sulfate)
 Dimethyl C12-14 amine oxide - TMN E3 alkyl sulfate (highly branched C12-13 ethoxy(3) alkyl sulfate)
 Tetrabutylammonium - Dioctylsulfosuccinate
 Tetrabutylammonium - C12-13 HSAS (methyl branched C12-13 alkyl sulfate)
 Tetrabutylammonium - C16-17 HSAS (methyl branched C16-17 alkyl sulfate)
 Tetrahexylammonium - C12-13 HSAS
 Tetraoctylammonium - C16-17 HSAS
 Tetraoctylammonium - Dioctylsulfosuccinate
 Tetraoctylammonium - Dodecyl sulfate (C12 alkyl sulfate)
 Tetraoctylammonium - C12-13 HSAS
 Trioctylmethylammonium - C12-13 HSAS

Mixtures of Ionic Liquids

As described above in formula I - VI, each ionic liquid may comprise an anionic IL component and a cationic IL component. When the ionic liquid is in its liquid form, these components are freely associating with one another (i.e., in a scramble). A “cocktail of ionic liquids”, as the term is used herein, comprises at least three different and charged IL components, wherein at least one IL component is cationic and at least one IL component is anionic. Thus, the pairing of the cationic and anionic IL components in a cocktail would result in at least two different ionic liquids.

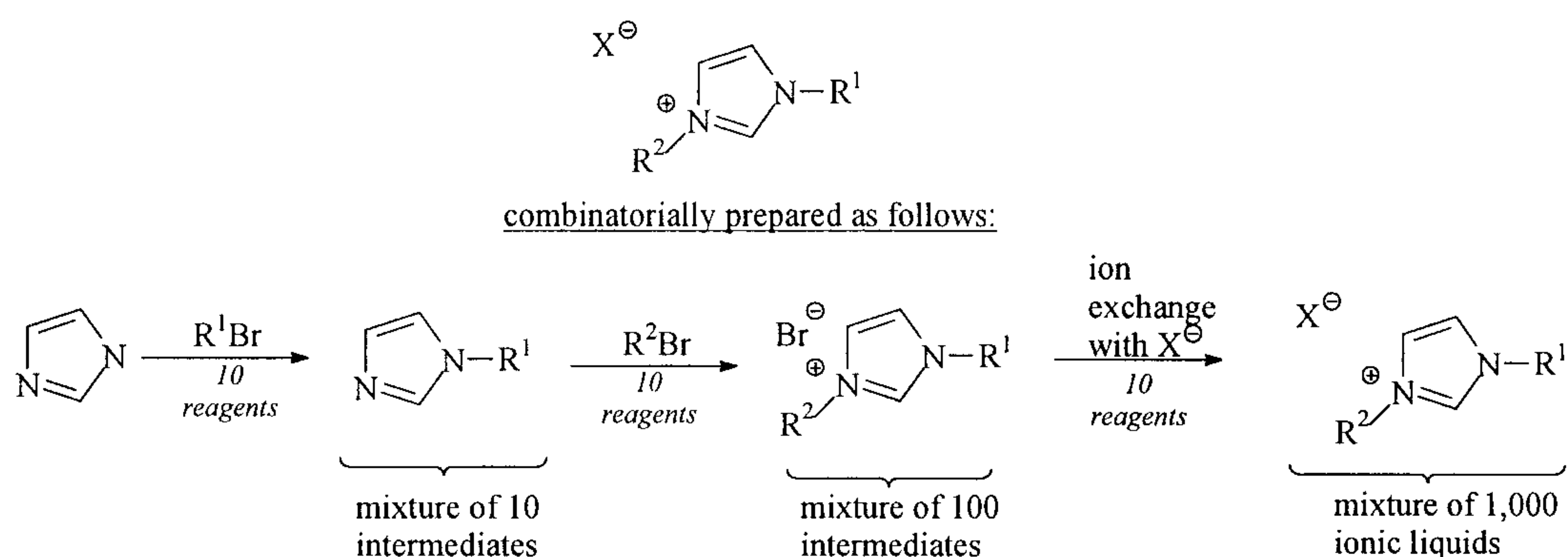
The cocktails of ionic liquids may be prepared either by mixing individual ionic liquids having different IL components, or by preparing them via combinatorial chemistry.

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It is noted that ionic liquids especially lend themselves to preparation via combinatorial chemistry. For example, the following imidazolium-based ionic liquid cocktail can be prepared, combinatorially, from three individual IL components (the alkylated imidazole, the alkyl halide, and the anionic charged counterion, such as a halide ion). The following illustrates how the

5 combinatorial chemistry results in a cocktail of ionic liquids.



15 Ionic liquid mixtures or cocktails are highly advantageous because the plurality of functional groups and counterions impart varying degrees of hydrophobicity or hydrophilicity, as well as varying degrees of other aspects of solvating power. Such mixture or cocktail would be more effective in its interactions with mixtures of, for example, color cosmetics that may be present on the human face that is being cleansed. For example, the facial substrate to be cleansed

20 may comprise a heterogeneous mixture of protein/starch/lipids, many of which may have become polymerized. Accordingly, the plurality of charged IL components in an ionic liquid cocktail is highly efficient in interacting and removing such cosmetics from the skin.

Compositions Containing Ionic Liquids

25 The ionic liquids can be present in various compositions suitable for use in applications disclosed above in any desired effective amount, depending on the nature of the intended

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application. Typically, the ionic liquids are present in an amount ranging from about 0.1% to about 99.9%, preferably from about 1% to about 85 %, and more preferably from about 5% to about 75%, by weight of the composition. In some embodiments, the ionic liquids comprise at least about 50% by weight of the composition.

5 Many ionic liquids are hygroscopic, thus, may contain appreciable amounts of water (referred to herein as the “innate water”) ranging from about 0.01% to about 50% by weight of the ionic liquid. It should be noted that “free water” may be added in making the composition of the present invention. A person of ordinary skill in the art would recognize that once the components (e.g., innate water and free water) are mixed in a composition, the components can
10 no longer be distinguished by their origin and will be reported in totality as percentage of the overall composition. Thus, the compositions of the present invention may comprise water, regardless of its origin, ranging from about 0.01% to about 50%, preferably from about 1% to about 40%, more preferably from about 5% to about 30% by weight of the composition.

The IL-containing compositions may be formulated in the form of liquid, gel, paste,
15 foam, or solid.

Low-Viscosity Ionic Liquids And Cocktails

Typically, ionic liquids have high viscosities (greater than about 1000 mPa ·s) at room temperature. The high viscosities can be problematic in formulating the composition and in
20 applicability. Therefore, the present invention is directed to ionic liquids or cocktails of ionic liquids (undiluted with adjuncts, co-solvents or free water) which have viscosities of less than about 750 mPa ·s, preferably less than about 500 mPa ·s, as measured at 20°C. In some embodiments, the viscosity of undiluted ionic liquids are in the range from about 0.1 to about 400 mPa ·s, preferably from about 0.5 to about 300 mPa ·s, and more preferably from about 1 to
25 about 250 mPa ·s.

The viscosities of the ionic fluids and compositions containing them can be measured on a Brookfield viscometer model number LVDVII+ at 20°C, with Spindle no. S31 at the appropriate speed to measure materials of different viscosities. Typically, the measurement is done at a speed of 12 rpm to measure products of viscosity greater than about 1000 mPa ·s; 30
30 rpm to measure products with viscosities between about 500 mPa ·s to about 1000 mPa ·s; 60 rpm to measure products with viscosities less than about 500 mPa ·s. The undiluted state is prepared by storing the ionic liquids or cocktails in a desiccators containing a desiccant (e.g.

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calcium chloride) at room temperature for at least about 48 hours prior to the viscosity measurement. This equilibration period unifies the amount of innate water in the undiluted samples.

5 New Uses for Ionic Liquids in Personal Care Compositions

Ionic liquids can be added to personal care compositions to enhance the benefits that they deliver. Without wishing to be bound by theory, it is believed that the fundamental chemical and/or physical properties on ionic liquids can be used advantageously in numerous personal care compositions. In one aspect, ionic liquids have a high solubilizing ability, due to their high polarity and charge density; thus, ionic liquids can be an effective solvent. In another aspect, the functional groups and counterions of the ionic liquids can be varied such that the resulting ionic liquids are “tuned” to the characteristics of the target benefit desired from the personal care product. For example, the functional groups can be selected such that the resulting ionic liquids have the desired degree of hydrophilicity or hydrophobicity to interact more strongly or preferentially. The mechanisms by which ionic liquids can effectively interact with substrates include, but are not limited to, charge transfer, ion exchange, van der Waals forces, and hydrogen bonding. In yet another aspect, the effective solvating property of the ionic liquids enables them to dissolve certain polymeric materials, which are soluble in few if any solvent media. Examples of such hard-to-dissolve polymers include, but are not limited to, biofilms, polymerized soils, and the like.

In still another aspect, the ionic liquids are non-volatile and nonflammable, and have high thermal stability; as such, they are especially suitable for use in personal care compositions, both for safety and aesthetic reasons. It is often undesirable to have chemical vapors or low flash points associated with compositions used in a consumer setting. It is also undesirable to have compositions that will leave unsightly streaks on keratinous surfaces treated by them. Other commonly used compositions may leave unsightly or streaky residue on the treated surfaces, thus, they need to be removed (e.g., by wiping, rinsing, and the like) from the surfaces after application. In contrast, ionic liquids have essentially no vapor pressure (i.e., no detectable vapor pressure at or near room temperature); compositions using ionic liquids as the solvents or the active ingredients would avoid the problems associated with chemical vapors, thus, are highly advantageous. Additionally, such compositions can be used as a leave-on product and produce aesthetically pleasing results on the treated keratinous tissue surfaces.

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Thus, the unique and customizable physical and chemical properties allow ionic liquids to overcome several problems that persist in prior art compositions.

The ionic liquid may be used in these applications or products as a pure solvent (i.e. as a pure, undiluted ionic liquid or ionic liquid composite); as a co-solvent in conjunction with water
5 or other organic solvents; or as an additive where the continuous phase is water or another solvent (e.g. linear or cyclic siloxanes, halocarbons). Various adjunct ingredients may be incorporated into such compositions.

The ionic liquids or compositions containing them may be delivered to the target surface as a liquid or liquid composition via delivery means such as pumps, sprays, and the like. The
10 ionic liquids or compositions containing them may also be delivered via a sheet substrate (such as a wipe made of woven or nonwoven material), a cellular substrate (such as a sponge or a foam), or like substrates. Additionally, the ionic liquids or compositions containing them may be incorporated/deposited into inert porous support materials, which can be made into the form of powders, tablets, and the like.

15 III. OPTIONAL COMPONENTS / INGREDIENTS

The compositions of the present invention can comprise one or more suitable desired optional components. For example, the composition can optionally include other active or inactive ingredients. Compositions comprising a combination of optional keratinous tissue
20 actives can be capable of providing additive and/or synergistic keratinous tissue (e.g., skin, hair, or nail) benefits.

For instance, such materials can be selected from the group consisting of sugar amines (e.g., N-acetylglucosamine), vitamin B3 compounds, sodium dehydroacetate, dehydroacetic acid and its salts, phytosterols, soy derivatives (e.g., equol and other isoflavones), niacinamide,
25 phytantriol, farnesol, bisabolol, salicylic acid compounds, hexamidines, dialkanoyl hydroxyproline compounds, flavonoids, N-acyl amino acid compounds, retinoids (e.g., retinyl propionate), water-soluble vitamins, ascorbates (e.g., vitamin C, ascorbic acid, ascorbyl glucoside, ascorbyl palmitate, magnesium ascorbyl phosphate, sodium ascorbyl phosphate), particulate materials, sunscreen actives, anti-cellulite agents, butylated hydroxytoluene, butylated
30 hydroxyanisole, their derivatives, and combinations thereof. Other examples of optional ingredients can include cationic polymers, conditioning agents (hydrocarbon oils, fatty esters, silicones), anti dandruff agents, antiseborrheic agents, antipsoriasis agents, suspending agents,

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viscosity modifiers, dyes, nonvolatile solvents or diluents (water soluble and insoluble), pearlescent aids, foam boosters, surfactants, nonionic cosurfactants, pediculocides, pH adjusting agents, perfumes, preservatives, chelants, chelating agents, proteins, UV absorbers, pigments, other amino acids, and other vitamins.

5 For instance, the compositions of the present invention may comprise one or more vitamins and/or amino acids such as: water soluble vitamins such as vitamin B1, B2, B6, B12, C, pantothenic acid, pantothenyl ethyl ether, panthenol, biotin, and their derivatives, water soluble amino acids such as asparagine, alanine, indole, glutamic acid and their salts, water insoluble vitamins such as vitamin A, D, E, and their derivatives, water insoluble amino acids such as
10 tyrosine, tryptamine, and their salts.

The compositions of the present invention may also contain one or more pigment materials such as inorganic, nitroso, monoazo, disazo, carotenoid, triphenyl methane, triaryl methane, xanthene, quinoline, oxazine, azine, anthraquinone, indigoid, thionindigoid, quinacridone, phthalocianine, botanical, natural colors, including: water soluble components such
15 as those having C. I. Names. The compositions of the present invention may also contain antimicrobial agents which are useful as cosmetic biocides and antidandruff agents including: water soluble components such as piroctone olamine, water insoluble components such as 3,4,4'-trichlorocarbanilide (trichlosan), triclocarban and zinc pyrithione.

Furthermore, the composition can comprise other peptides, such as those disclosed in
20 U.S. Patent No. 6,492,326, issued December 10, 2002, to Robinson et al. (e.g., pentapeptides such as lys-thr-thr-lys-ser, and derivatives thereof). Suitable pentapeptide derivatives include palmitoyl-lys-thr-thr-lys-ser, available from Sederma, France. Another optional dipeptide that can be used in the composition herein is carnosine.

Any other suitable optional component can also be included in the personal care
25 composition of the present invention, such as those ingredients that are conventionally used in given product types. The CTFA Cosmetic Ingredient Handbook, Tenth Edition (published by the Cosmetic, Toiletry, and Fragrance Association, Inc., Washington, D.C.) (2004) (hereinafter "CTFA"), describes a wide variety of nonlimiting materials that can be added to the composition herein. Examples of these ingredient classes include, but are not limited to: abrasives,
30 absorbents, aesthetic components such as fragrances, pigments, colorings/colorants, essential oils, skin sensates, astringents, etc. (e.g., clove oil, menthol, camphor, eucalyptus oil, eugenol, menthyl lactate, witch hazel distillate), anti-acne agents, anti-caking agents, antifoaming agents,

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antimicrobial agents (e.g., iodopropyl butylcarbamate), antibacterial agents, antifungal agents, antioxidants, binders, biological additives, buffering agents, bulking agents, chelating agents, chemical additives, colorants, cosmetic astringents, cosmetic biocides, denaturants, drug astringents, external analgesics, film formers or materials, e.g., polymers, for aiding the film-forming properties and substantivity of the composition (e.g., copolymer of eicosene and vinyl pyrrolidone), opacifying agents, pH adjusters, plant derivatives, plant extracts, plant tissue extracts, plant seed extracts, plant oils, botanicals, botanical extracts, preservatives, propellants, reducing agents, , sebum control agents, sequestrants, skin bleaching and lightening agents, (e.g. hydroquinone, kojic acid, ascorbic acid, magnesium ascorbyl phosphate, ascorbyl glucoside, pyridoxine), enzymes, coenzymes, skin-conditioning agents (e.g. humectants and occlusive agents) , skin soothing and/or healing agents and derivatives (e.g. panthenol, and derivatives such as ethyl panthenol, aloe vera, pantothenic acid and its derivatives, allantoin, bisabolol, and dipotassium glycyrrhizinate) , skin treating agents (e.g. vitamin D compounds, mono-, di-, and tri-terpenoids, beta-ionol, cedrol), thickeners, and vitamins and derivatives thereof.

IV. CARRIER

The compositions of the present invention can comprise an orally or a dermatologically acceptable carrier, or injectible liquid, depending upon the desired product form.

a. Dermatologically Acceptable Carrier

The topical compositions of the present invention can also comprise a dermatologically acceptable carrier for the composition. In one embodiment, the carrier is present at a level of from about 50% to about 99.99%, preferably from about 60% to about 99.9%, more preferably from about 70% to about 98%, and even more preferably from about 80% to about 95%, by weight of the composition.

The carrier can be in a wide variety of forms. Non-limiting examples include simple solutions (water or oil based), emulsions, and solid forms (gels, sticks). For example, emulsion carriers can include, but are not limited to, oil-in-water, water-in-oil, water-in-silicone, water-in-oil-in-water, and oil-in-water-in-silicone emulsions.

Depending upon the desired product form, preferred carriers can comprise an emulsion such as oil-in-water emulsions (e.g., silicone in water) and water-in-oil emulsions, (e.g., water-in-silicone emulsions). As will be understood by the skilled artisan, a given component will distribute primarily into either the water or oil phase, depending on the water

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solubility/dispensability of the component in the composition. In one embodiment, oil-in-water emulsions are especially preferred.

Emulsions according to the present invention can contain an aqueous phase and a lipid or oil. Lipids and oils may be derived from animals, plants, or petroleum and may be natural or synthetic (i.e., man-made). Preferred emulsions can also contain a humectant, such as glycerin. Emulsions can further comprise from about 0.1% to about 10%, more preferably from about 0.2% to about 5%, of an emulsifier, based on the weight of the composition. Emulsifiers may be nonionic, anionic or cationic. Suitable emulsifiers are disclosed in, for example, U.S. Patent 3,755,560, U.S. Patent 4,421,769, and McCutcheon's Detergents and Emulsifiers, North American Edition, pages 317-324 (1986). Suitable emulsions may have a wide range of viscosities, depending on the desired product form.

The compositions of the present invention can be in the form of pourable liquids (under ambient conditions). The compositions can therefore comprise an aqueous carrier, which is typically present at a level of from about 20% to about 95%, preferably from about 60% to about 85%. The aqueous carrier may comprise water, or a miscible mixture of water and organic solvent, but preferably comprises water with minimal or no significant concentrations of organic solvent, except as otherwise incidentally incorporated into the composition as minor ingredients of other essential or optional components.

b. Orally Acceptable Carrier

The compositions of the present invention can also comprise an orally acceptable carrier if they are to be ingested. Any suitable orally ingestible carrier or carrier form, as known in the art or otherwise, can be used. Non-limiting examples of oral personal care compositions can include, but are not limited to, tablets, pills, capsules, drinks, beverages, powders, vitamins, supplements, health bars, candies, chews, and drops.

c. Injectable Liquid

The compositions of the present invention can also comprise a liquid that is acceptable for injection in and/or under the skin if the composition is to be injected. Any suitable acceptable liquid as known in the art or otherwise can be used.

V. COMPOSITION PREPARATION

The compositions useful for the methods of the present invention are generally prepared by conventional methods such as are known in the art of making topical and oral compositions

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and compositions for injection. Such methods typically can involve mixing of the ingredients in one or more steps to a relatively uniform state, with or without heating, cooling, application of vacuum, and the like.

5 VI. METHODS FOR TREATING KERATINOUS TISSUE CONDITION

The compositions of the present invention can be useful for treating a number of mammalian keratinous tissue conditions. Such treatment of keratinous tissue conditions can include prophylactic and therapeutic regulation, including regulating the cosmetic appearance of the mammalian keratinous tissue. More specifically, such treatment methods can be directed to,
 10 but are not limited to, preventing, retarding, and/or treating uneven skin tone, reducing the size of pores in mammalian skin, regulating oily/shiny appearance of mammalian skin, thickening keratinous tissue (i.e., building the epidermis and/or dermis and/or subcutaneous layers of the skin and where applicable the keratinous layers of the nail and hair shaft), preventing, retarding, and/or treating uneven skin tone by acting as a lightening or pigmentation reduction cosmetic
 15 agent, preventing, retarding, and/or treating atrophy of mammalian skin, softening and/or smoothing lips, hair and nails of a mammal, preventing, retarding, and/or treating itch of mammalian skin, preventing, retarding, and/or treating the appearance of dark under-eye circles and/or puffy eyes, preventing, retarding, and/or treating sallowness of mammalian skin, preventing, retarding, and/or treating sagging (i.e., glycation) of mammalian skin, preventing
 20 and/or retarding tanning of mammalian skin, desquamating, exfoliating, and/or increasing turnover in mammalian skin, preventing, retarding, and/or treating hyperpigmentation such as post-inflammatory hyperpigmentation, preventing, retarding, and/or treating the appearance of spider vessels and/or red blotchiness on mammalian skin, preventing, retarding, and/or treating fine lines and wrinkles of mammalian skin, preventing, retarding, and/or treating skin dryness
 25 (i.e., roughness, scaling, flaking) and preventing, retarding, and/or treating the appearance of cellulite in mammalian skin. In a preferred embodiment, the composition is used to treat the signs of aging; in one aspect, the composition is used to regulate the signs of aging; in another aspect, the composition is used to reduce or decrease the signs of aging; in yet another aspect the composition is used to prevent the signs of aging in keratinous tissue (e.g., skin, hair, or nails).

30 For instance, the present invention can be useful for therapeutically regulating visible and/or tactile discontinuities in mammalian keratinous tissue, including discontinuities in skin texture and color. For example, the apparent diameter of pores can be decreased, the apparent

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height of tissue immediately proximate to pore openings can approach that of the interadnexal skin, the skin tone/color can become more uniform, and/or the length, depth, and/or other dimension of lines and/or wrinkles can be decreased.

Furthermore, compositions of the present invention can also be useful for cleansing (e.g., hair, body, facial), improving keratinous tissue feel (wet & dry) such as for hair (e.g., improving appearance/look, detangling, shine, gloss, decrease coefficient of friction, increase smoothness, color retention, decrease split ends, prevent hair breakage, prevent environmental damage such as sunlight damage, smoke damage, and damage from pollutants such as nitrogen oxides, sulfur oxides, ozone, and metals such as lead), odor control, oil control, conditioning, hair volume control, hair growth, and hair growth inhibition.

Regulating keratinous tissue conditions can involve topically applying to the keratinous tissue a safe and effective amount of a composition of the present invention. The amount of the composition that is applied, the frequency of application, and the period of use will vary widely depending upon the level of components of a given composition and the level of regulation desired, e.g., in view of the level of keratinous tissue damage present or expected to occur.

Furthermore, regulating keratinous tissue conditions can involve orally ingesting a safe and effective amount of a composition of the present invention. The amount of the composition that is ingested, the frequency of ingestion, and the period of use will vary widely depending upon the level of components of a given composition and the level of regulation desired, e.g., in view of the level of keratinous tissue damage present or expected to occur.

In one embodiment, the composition is chronically applied to the skin, e.g. topically. By "chronic application" is meant continued topical application of the composition over an extended period during the subject's lifetime, preferably for a period of at least about one week, more preferably for a period of at least about one month, even more preferably for at least about three months, even more preferably for at least about six months, and more preferably still for at least about one year. While benefits are obtainable after various maximum periods of use (e.g., five, ten or twenty years), it is preferred that chronic applications continue throughout the subject's lifetime. Typically applications would be on the order of about once per day over such extended periods, however, application rates can vary, and can include from about once per week up to about three times per day or more.

A wide range of quantities of the compositions of the present invention can be employed to provide a keratinous tissue appearance and/or feel benefit when applied topically. For

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example, quantities of the present compositions, which are typically applied per application are, in mg composition/cm² keratinous tissue, from about 0.1 mg/cm² to about 20 mg/cm². A particularly useful application amount is about 0.5 mg/cm² to about 10 mg/cm².

Treating keratinous tissue condition can be practiced, for example, by applying a composition in the form of a skin lotion, clear lotion, milky lotion, cream, gel, foam, ointment, paste, emulsion, spray, conditioner, tonic, cosmetic, lipstick, foundation, nail polish, after-shave, or the like which is intended to be left on the skin or other keratinous tissue for some aesthetic, prophylactic, therapeutic or other benefit (i.e., a "leave-on" composition). After applying the composition to the keratinous tissue (e.g., skin), it is preferably left on for a period of at least about 15 minutes, more preferably at least about 30 minutes, even more preferably at least about 1 hour, even more preferably for at least several hours, e.g., up to about 12 hours. Any part of the external portion of the face, hair, and/or nails can be treated, (e.g., face, lips, under-eye area, eyelids, scalp, neck, torso, arms, hands, legs, feet, fingernails, toenails, scalp hair, eyelashes, eyebrows, etc.) The application of the present compositions may be done using the palms of the hands and/or fingers or a device or implement (e.g., a cotton ball, swab, pad, applicator pen, spray applicator, etc.)

Another approach to ensure a continuous exposure of the keratinous tissue to at least a minimum level of the composition is to apply the compound by use of a patch applied, e.g., to the face. Such an approach is particularly useful for problem skin areas needing more intensive treatment (e.g., facial crows feet area, frown lines, under eye area, upper lip, and the like). The patch can be occlusive, semi-occlusive or non-occlusive, and can be adhesive or non-adhesive. The composition can be contained within the patch or be applied to the skin prior to application of the patch. The patch can also include additional actives such as chemical initiators for exothermic reactions such as those described in PCT application WO 9701313, and in U.S. Patents numbered 5,821,250, 5,981,547, and 5,972,957 to Wu, et al. The patch can also contain a source of electrical energy (e.g., a battery) to, for example, increase delivery of the composition and active agents (e.g., iontophoresis). The patch is preferably left on the keratinous tissue for a period of at least about 5 minutes, more preferably at least about 15 minutes, more preferably still at least about 30 minutes, even more preferably at least about 1 hour, even more preferably at night as a form of night therapy.

In another embodiment, a personal care regimen is used to regulate the condition of keratinous tissue. By "regimen" is meant the use of an oral composition in conjunction with a

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topical composition. In a particular embodiment, the oral composition and the topical composition are packaged together as a kit. In another embodiment, the oral composition and the topical composition are not packaged together as a kit, but potential users of the regimen are informed (e.g. through advertisements, product labeling) that the oral and the topical compositions may be used in conjunction with one another to regulate the condition of keratinous tissue. At least one of the compositions, either oral or topical, comprises a dipeptide of the present invention. Preferably, both the oral and the topical compositions comprise a dipeptide of the present invention.

EXAMPLES

The following are non-limiting examples of compositions of the present invention. The examples are given solely for the purpose of illustration and are not to be construed as limitations of the present invention, as many variations thereof are possible without departing from the spirit and scope of the invention, which would be recognized by one of ordinary skill in the art.

In the examples, all concentrations are listed as weight percent, unless otherwise specified and may exclude minor materials such as diluents, filler, and so forth. The listed formulations, therefore, comprise the listed components and any minor materials associated with such components. As is apparent to one of ordinary skill in the art, the selection of these minors will vary depending on the physical and chemical characteristics of the particular ingredients selected to make the present invention as described herein.

Example 1 – General Preparation of Ionic Liquids

In a 100-ml round bottom flask a 15-40 ml acetone (or aqueous ethanol) solution containing 15 mmoles of the cation is added into a 25-30 ml aqueous solution containing 15 mmoles of the anion. After stirring for 30 minutes at 25°C, a quantity of 25-100 ml of methylene chloride is added and the mixture is transferred into a separation funnel. The lower aqueous layer is disposed and the upper layer is dried over anhydrous sodium sulfate for 5 minutes, filtered and concentrated on a rotary evaporator. Any residual solvents are removed by exposing the material to high vacuum (less than 0.1 mmHg) for 3 hours.

Example 2 – Preparation of Ionic Liquid from Ditalow Dimethyl Ammonium Chloride and Dehydroacetate

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Into a 100-ml round-bottom flask the following materials are added:

1. 11.9 g Adogen 422 (supplied by Evonik as a 75% solution of ditallow dimethyl ammonium chloride in isopropanol/water).
2. 12.3 g ethanol
- 5 3. 24.8 g water

After mixing for 2 minutes using a magnetic stirrer, the pH is adjusted to 9.8-10.0, and a solution of 2.8 g sodium dehydroacetate (SDA) in 30 g water (adjusted to pH of 9.8-10.0) are added.

After stirring for 30 minutes at 25°C, a quantity of 100 ml of methylene chloride is added and the mixture is transferred into a separation funnel. The lower aqueous layer is disposed and the upper
10 layer is dried over anhydrous sodium sulfate for 5 minutes, filtered and concentrated on a rotary evaporator. Any residual solvents are removed by exposing the material to high vacuum (less than 0.1 mmHg) for 3 hours. Finally 10.0 g of the ionic liquid are collected.

Example 3 – Solution Preparation

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a. Ionic Liquid

Into a glass jar, a saturated solution of the ionic liquid from Example 2 in mineral oil is prepared.

b. Control

Into a glass jar, a saturated solution of sodium dehydroacetate (SDA) in mineral oil is prepared.

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Example 4 - Penetration Study

Human skin (dermatomed abdominal epidermis) is placed in a standard Franz diffusion apparatus in a horizontal position between a lower, capped diffusion cell and an upper open cell. A saline solution is added to the lower diffusion cell, abutting the subcutaneous side of the skin. The test
25 composition from Example 3 is added to the diffusion cell abutting the epidermal side of the skin. The cell assembly is kept at a constant temperature (25°C). At appropriate intervals (1 and 2 days) the diffusate from the receptor compartment is withdrawn through a sidearm. Levels of sodium dehydroacetate (SDA) in the difusate are measured using High Performance Liquid Chromatography. Each trial is run on a separate sample of skin. The quantity of SDA in the
30 diffusate is significantly higher in the case of the ionic liquid preparation than the SDA preparation.

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Example 5 – Partition into Sebum Study

- a. A quantity of 100 mg of sodium dehydroacetate is allowed to partition between 10 ml of artificial sebum and 100 ml of distilled water.
- b. A quantity of 100 mg of the ionic liquid from Example 2 is allowed to partition between
5 10 ml of artificial sebum and 10 ml of distilled water.

In both cases the aqueous layer is separated, evaporated and the residual organic material is quantified gravimetrically. The experiment reveals that the quantity of ionic liquid partition in water (from part b) is negligible as opposed to the quantity of sodium dehydroacetate partition in water (from part a). As a result of the incorporation of the ionic liquid, the melting point of the
10 sebum is lowered and it is more fluid and easier to remove from skin and hair.

Example 6 – Preparation of Ionic Liquid Solution in Isopropanol

A quantity of 0.2 g of the ionic liquid prepared as described in Example 2 by the combination of dimethyl C12-14 amine oxide and C12-13 branched alkyl sulfate is dissolved in 100 g of
15 isopropanol.

Example 7 – Treatment of Bleached Hair with Ionic Liquid Solution

For this experiment bleached hair switches (25 cm long, each weighing 15 g) are used. Each hair switch is uniformly sprayed with 7.5 ml of the solution from Example 6. After the spraying, the
20 switch is allowed to dry and equilibrated at a chamber at 73°F temperature and 45% relative humidity for at least 24 hours. Then, coefficient of friction measurement of the treated hair switches is found to be lower than bleached hair conditioned using a typical hair conditioner.

Example 8 - Wipes

25 Any of the aforementioned compositions may be impregnated onto one or both sides of an absorbent substrate to afford a “wipe” for use in certain applications. Said absorbent substrate may be formed from any woven or nonwoven fibrous webs, or foam webs. Said absorbent substrate should have sufficient wet strength to hold an effective amount of the ionic liquid containing composition.

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The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such

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dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as “40 mm” is intended to mean “about 40 mm.”

5 Every document cited herein, including any cross referenced or related patent or application, is hereby incorporated herein by reference in its entirety unless expressly excluded or otherwise limited. The citation of any document is not an admission that it is prior art with respect to any invention disclosed or claimed herein or that it alone, or in any combination with any other reference or references, teaches, suggests or discloses any such invention. Further, to
10 the extent that any meaning or definition of a term in this document conflicts with any meaning or definition of the same term in a document incorporated by reference, the meaning or definition assigned to that term in this document shall govern.

 While particular embodiments of the present invention have been illustrated and
15 described, it would be apparent to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

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CLAIMS

What is claimed is:

1. A personal care composition comprising:

an ionic active compound that provides a benefit to keratinous materials; and
an oppositely charged counter ion that forms an ionic liquid with the ionic active compound;
wherein the ionic liquid has a melting point of less than 100 °C, preferably less than 60 °C, and more preferably less than 35 °C.
2. The composition of claim 1, wherein the ionic active compound retains activity in ionic liquid form.
3. The composition of claim 1, wherein the ionic liquid is lipophilic.
4. The composition of claim 1, wherein the ionic liquid is substantially immiscible with water.
5. The composition of claim 1, wherein the ionic liquid has a clogP value within the range of from -6 to 22, preferably from 2 to 22.
6. The composition of claim 1, wherein the ionic liquid remains 95 percent to 100 percent, preferably 99 percent to 100 percent, non-dissociated in water.
7. The composition of claim 1, wherein the ionic liquid comprises a soft acid and a soft base.
8. The composition of claim 1, wherein the ionic liquid comprises a hard acid and a hard base.
9. The composition of claim 1, wherein the ionic liquid comprises a hard acid and a soft base.

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10. The composition of claim 1, wherein the ionic liquid comprises a soft acid and a hard base.
11. The composition of claim 1, wherein the ionic active compound in ionic liquid form exhibits enhanced penetration into skin.
12. The composition of claim 1, wherein the ionic active compound in ionic liquid form exhibits increased partition into sebum.
13. The composition of claim 1, wherein the ionic active compound in ionic liquid form exhibits enhanced deposition onto hair.
14. The composition of claim 1, wherein the ionic active compound in ionic liquid form exhibits low hair fiber friction
15. The composition of claim 1, wherein the ionic active compound comprises cetyl pyridinium.
16. The composition of claim 1, wherein the ionic active compound comprises a hexamidine.
17. The composition of claim 1, wherein the ionic active compound comprises difluoromethylornithine.
18. The composition of claim 1, wherein the ionic active compound comprises dehydroacetate.
19. The composition of claim 1, wherein the ionic active compound comprises sodium dehydroacetate with quaternary ammonium, amine oxide, or phosphine salt selected from the group consisting of sodium dehydroacetate and ammonium salt (such as ditallow dimethyl ammonium, C12 trimethyl ammonium, tetraoctyl ammonium); Alkyl sulfate anion with cationic salts such as tetraalkyl ammonium (i.e. tetrabutyl), tetraalkyl phosphine (i.e. tetrabutyl), trialkyl ammonium oxide(i.e C12, dimethyl); Dicanola ethyl ester dimethyl amine – dihexyl sulfosuccinate; Dicanola ethyl ester dimethyl ammonium docusate; Ditallow ethyl ester dimethyl ammonium docusate; Dimethyl C12-C14 amine oxide – C12 branched alkyl sulphate; Dimethyl C12-C14 amine oxide – branched C12-13 ethoxy(3) alkyl sulphate; Tetrabutylammonium – dioctylsulfosuccinate

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Tetrabutylammonium – branched C12-C13 alkyl sulphate; Tetrabutylammonium – branched C16-17 alkyl sulphate; Tetrahexylammonium – C12-13 branched alkyl sulphate, Tetraoctylammonium – C16-17 branched alkyl sulphate; Tetraoctylammonium – dioctylsulfosuccinate; Tetraoctylammonium – dodecyl sulphate; Tetraoctylammonium – C12-13 branched alkyl sulphate; Trioctylmethyammonium – C12-13 brached alkyl sulphate, and mixtures thereof.

20. The composition of claim 1, wherein the ionic active compound provides an antibacterial benefit.
21. The composition of claim 1, wherein the ionic active compound provides an anti-odor benefit.
22. The composition of claim 1, wherein the ionic active compound provides an improvement in skin texture, skin tone, skin hydration, hair hydration, skin or hair conditioning, skin or hair friction reduction, skin or hair cleaning, hair growth regulation, foam reduction, film formation, conductivity improvement, improved formula compatibility, phase stability, viscosity control, or any combination thereof.
23. A method of treating keratinous materials comprising:
 - applying to a keratinous material a composition comprising:
 - an ionic active compound that provides a benefit to the keratinous material; and
 - an oppositely charged counter ion that forms an ionic liquid with the ionic active compound;
 - wherein the ionic liquid has a melting point of less than 100 °C.
24. The method of claim 23, wherein the ionic active compound and the oppositely charged counter ion are combined in situ to form the ionic liquid when applied to the keratinous material.
25. The method of claim 23, wherein the ionic active compound and the oppositely charged counter ion are pre-combined to form the ionic liquid before application to the keratinous material.

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26. The method of claim 23, wherein extraneous counter ions to the ionic active compound and to the oppositely charged counter ion are substantially removed before application of the composition to the keratinous material.
27. The method of claim 23, wherein the ionic active compound retains a biological activity in ionic liquid form.
28. The method of claim 23, wherein the ionic liquid is lipophilic.
29. The method of claim 23, wherein the ionic liquid is substantially immiscible with water.
30. The method of claim 23, wherein the ionic liquid has a clogP value within the range of from -5 to 22, preferably 1 to 22.
31. The method of claim 23, wherein the ionic liquid remains 85 percent to 100 percent, preferably 90 percent to 100 percent, non-dissociated in water.
32. The method of claim 23, wherein the ionic liquid comprises a soft acid and a soft base.
33. The method of claim 23, wherein the ionic liquid comprises a hard acid and a hard base.
34. The method of claim 23, wherein the ionic liquid comprises a hard acid and a soft base.
35. The method of claim 23, wherein the ionic liquid comprises a soft acid and a hard base.
36. The method of claim 23, wherein the ionic active compound in ionic liquid form exhibits enhanced penetration into skin.
37. The method of claim 23, wherein the ionic active compound in ionic liquid form exhibits increased partition into sebum.
38. The method of claim 23, wherein the ionic active compound in ionic liquid form exhibits enhanced deposition onto hair.
39. The method of claim 23, wherein the ionic active compound comprises cetyl pyridinium.
40. The method of claim 23, wherein the ionic active compound comprises difluoromethylornithine.

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41. The method of claim 23, wherein the ionic active compound comprises a hexamidine.
42. The method of claim 23, wherein the ionic active compound comprises dehydroacetate.
43. The method of claim 23, wherein the ionic active compound provides an antibacterial benefit.
44. The method of claim 23, wherein the ionic active compound provides an anti-odor benefit.
45. A personal care composition comprising:
 - an ionic liquid comprising a soft acid and a soft base, the ionic liquid having a melting point of less than 100 °C and a clogP value within the range of -5 to 22; and
 - a benefit agent that preferentially associates with the ionic liquid relative to water,wherein the benefit agent provides a benefit to keratinous materials.
46. The composition of claim 45, wherein the ionic liquid is substantially immiscible with water.
47. The composition of claim 45, wherein the ionic liquid is substantially non-dissociated in water.
48. The composition of claim 45, wherein the benefit agent preferentially dissolves in the ionic liquid relative to water.
49. The composition of claim 45, wherein the benefit agent preferentially disperses in the ionic liquid relative to water.
50. The composition of claim 45, wherein the ionic liquid coats the benefit agent.
51. The composition of claim 45, wherein the ionic liquid encapsulates the benefit agent.
52. The composition of claim 45, further comprising water.
53. The composition of claim 52, wherein the benefit agent is water labile and the ionic liquid isolates the benefit agent from the water.

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54. The composition of claim 52, wherein the ionic liquid functions as a carrier compound that incorporates the benefit agent into an aqueous medium.
55. A benefit agent delivery system comprising:

a benefit agent that provides a benefit to keratinous materials; and
an ionic liquid having a melting point of less than 100 °C and a clogP value within the range of -5 to 22,
wherein the benefit agent is releasably associated with the ionic liquid.
56. The delivery system of claim 55, wherein the ionic liquid is substantially immiscible with water.
57. The delivery system of claim 55, wherein the benefit agent is water labile and protected from water by the ionic liquid.
58. The delivery system of claim 55, wherein the benefit agent is stabilized by the ionic liquid.
59. The delivery system of claim 55, wherein the ionic liquid is coated on the benefit agent.
60. The delivery system of claim 53, wherein the ionic liquid encapsulates the benefit agent.
61. The delivery system of claim 55, wherein the benefit agent is dispersed in the ionic liquid.
62. The delivery system of claim 55, wherein the benefit agent is dissolved in the ionic liquid.
63. A method for delivering a benefit agent to a keratinous material comprising the steps of:

applying to the keratinous material a composition comprising:
an ionic liquid comprising a soft acid and a soft base, the ionic liquid having a melting point of less than 100 °C and a clogP value within the range of -5 to 22; and a benefit agent that preferentially associates with the ionic liquid relative to water.
64. The method of claim 63, wherein the ionic liquid enhances penetration of the benefit agent into skin.

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65. The method of claim 63, wherein the ionic liquid increases partition of the benefit agent into sebum.
66. The method of claim 63, wherein the ionic liquid enhances deposition of the benefit agent onto hair.
67. A personal care composition comprising:
- an ionic liquid having a melting point of less than 100 °C; and a solvent, wherein the ionic liquid at least partially dissociates into constituent ions in the solvent and re-associates to form an ionic liquid structure upon evaporation of the solvent from the composition.
68. The composition of claim 67, wherein the solvent comprises water.
69. The composition of claim 67, wherein the ionic liquid has a clogP value within the range of -5 to 22.
70. The composition of claim 67, wherein the ionic liquid comprises a hard acid and a hard base.
71. The composition of claim 67, wherein the ionic liquid comprises a hard acid and a soft base.
72. The composition of claim 67, wherein the ionic liquid comprises a soft acid and a hard base.
73. A method for delivering a beneficial ionic liquid to a keratinous material comprising the steps of:
- providing a composition comprising a solvent and an ionic liquid dissociated in the solvent into constituent ions, wherein the ionic liquid provides a benefit to the keratinous material in associated ionic liquid form;
- applying the composition to the keratinous material; and
- evaporating the solvent, wherein upon evaporation the constituent ions re-associate to form an ionic liquid structure thereby delivering the beneficial ionic liquid to the keratinous material.

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74. The method of claim 73, wherein the solvent comprises water.
75. A method for treating keratinous materials comprising:

applying to a keratinous material a composition comprising:
an ionic liquid having a melting point of less than 100 °C and a clogP value within the range of -5 to 22, wherein the ionic liquid has preferential solubility for sebum relative to skin ceramides.
76. The method of claim 75, wherein the composition is formed in situ by separately applying constituent ions to the keratinous material to thereby form the ionic liquid.
77. The method of claim 75, wherein the composition increases the removability of sebum biofilms.
78. The method of claim 75, wherein the composition further comprises an active compound that provides a benefit to keratinous materials.
79. The method of claim 75, wherein delivery of the active compound to sebum biofilms on skin is enhanced by the ionic liquid.
80. The method of claim 75, wherein the ionic liquid preferentially delivers the active compound to hair follicles containing sebum relative to penetration into stratum corneum.
81. The method of claim 75, wherein the composition is applied to hair.
82. The method of claim 75, wherein the ionic liquid deposits onto hair fibers and reduces the coefficient of friction of the hair fibers.
83. A personal care composition comprising:

a first active compound releasably associated with a first ionic liquid; and
a second active compound releasably associated with a second ionic liquid,
wherein the first ionic liquid and the second ionic liquid are immiscible in a first chemical state but are miscible in a second chemical state.

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84. The personal care composition of claim 83, wherein the first active compound is reactive with the second active compound to provide a benefit when concurrently applied to a keratinous material.
85. The personal care composition of claim 83, wherein the first active compound is physically isolated from the second active compound in the first chemical state and the first active compound and the second active compound are placed in physical contact in the second chemical state.
86. The personal care composition of claim 83, wherein the first chemical state comprises maintaining the composition in a substantially solvent-free state and the second chemical state comprises placing the composition in contact with a solvent.
87. The personal care composition of claim 86, wherein the solvent dissolves the first ionic liquid and the second ionic liquid into constituent ions.
88. The personal care composition of claim 86, wherein the first active compound and the second active compound are miscible in the solvent.
89. The personal care composition of claim 86, wherein the solvent is water.