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(54) Title: IONIC LIQUID SYSTEMS

(57) Abstract: The present invention relates to an ionic liquid system comprising for enhanced delivery and/or deposition of a per-
fume raw material onto a substrate, particularly fabric, hard surfaces, soft surfaces, skin, or hair. The invention also relates to con-
sumer products comprising the ionic liquid systems, and processes for making and methods of using such ionic liquid systems and
consumer products.



IONIC LIQUID SYSTEMS

FIELD OF THE INVENTION

The present invention relates to ionic liquid systems and consumer products comprising
5 such ionic liquid systems, as well as processes for making and using thereof.

BACKGROUND OF THE INVENTION

Consumer products may comprise one or more perfume systems that can deposit a
desired fragrance upon a substrate that is contacted with such a product. Current perfume
10 systems, such as for example perfume micro-capsule ("PMC") technology, encapsulates perfume
raw materials ("PRMs"). The PMC comprises a shell wall material and a core material of PRMs
that is encapsulated within the shell wall material. The PMC can enable deposition on substrate
and release over-time of the PRMs contained therein, for example by breakage of the micro-
capsules (from mechanical stress such as friction, *i.e.*, friable) or leakage of the PRMs out of the
15 PMC and onto the substrate. However, it has been noticed that several PRMs having low clogP
values, preferably below 3, tend to be hydrophilic and pre-maturely leak out of the PMC during
storage. As a result, these PRMs are lost before they have an opportunity to be delivered and/or
deposited onto the situs to provide the desired scent. Furthermore, malodour removal/control is
an important consumer benefit. Consumer products commonly incorporate PRMs in their
20 formulation to aid in masking malodour. If certain PRMs are pre-maturely lost then they will not
have an opportunity to provide their anti-malodour benefits as well.

Recently, ionic liquids ("ILs") have been used in the fragrance industry for dealing with
solvent applications of the synthesis of fragrance materials or with the extractions of naturally
derived PRMs (Sullivan, N., *Innovations in Pharma. Tech.* 2006, 20:75-77). For example,
25 Forsyth *et al.* investigated the utilisation of ionic liquid solvents for the synthesis of lily-of-the-
valley fragrance and fragrance intermediate Lilial (Forsyth *et al.*, *J. Mol. Cat. A.* 2005, 231:61-
66). Additionally, the utilisation of ionic liquids to suppress evaporation of fragrances in
consumer products has also been gaining attention (Davey P., *Perfumer Flavorist* 2008,
33(4):34-35). For instance, ionic liquids have been used as "fixatives" with fragrance
30 compositions to delay the rate of evaporation of the perfume component to impart increased

stability/longevity of the fragrance (Petrat *et al.*, US2006/0166856). Ionic liquids have also been used as pro-fragrances where PRM is appended covalently to either the cation or the anion (Rogers *et al.*, US2012/046244; Blesic *et al.*, *RSC Advances*, 2013, 3:329-333; Gunaratne *et al.*, *Chem Commun.*, 2015, 51, 4455).

Accordingly, as discussed above, the prior art efforts have focused on the incorporation of ionic liquids into an existing fragrance composition whereby the ionic liquids associated with the PRMs via various mechanisms, such as for example electrostatic interactions/H-bonding non-covalent forces. The prior art does not appear to focus on cations and/or anions derived from perfume materials that form the ionic liquids. The prior art also does not appear to focus on using ionic liquids for improving the deposition of fragrances onto substrates and/or delivering other benefits (*e.g.*, freshness delivery, biofilm removal, or anti-malodour). Applicants have surprisingly discovered that certain PRMs can be protonated to give a cation, having a *pKa* between 0 and 14, which can act as the cationic pair in the ionic liquids and release the PRMs upon drying-out after deposition onto a substrate.

Therefore, there remains a need for an ionic liquid system that comprises ionic liquids to deliver and/or deposit fragrances onto a substrate, preferably leveraging low clogP PRMs. It is also advantageous that the ionic liquids in the ionic liquid system aid in freshness delivery, biofilm removal and/or malodour control. It is also a further advantage of the invention to maximize cost/efficiency benefits by using a cation, and its conjugate acid, with dual functions.

SUMMARY OF THE INVENTION

In a first aspect, the present invention is directed to an ionic liquid system comprising one or more ionic liquids, each comprising of a cation and an anion, wherein at least one of the cations is the conjugate acid of a perfume raw material, which has a *pKa* from 0 to about 14, preferably from about 7 to about 14, or more preferably from about 8 to about 14.

In another aspect of the present invention, a consumer product comprising from about 0.0001% w/w to about 100% w/w, based on total consumer product weight, of an ionic liquid system as disclosed herein.

In still another aspect of the present invention, a method of delivering and/or depositing fragrance onto a fabric comprising the steps of optionally washing and/or rinsing the fabric,

contacting the fabric with a detergent composition as disclosed herein, then optionally washing and/or rinsing the fabric.

These, and other features of the present invention, will become apparent to one skilled in the art upon review of the following detailed description when taken in conjunction with the appended claims.

DETAILED DESCRIPTION OF THE INVENTION

Definitions

As used herein, articles such as "a" and "an" when used in a claim, are understood to mean one or more of what is claimed or described.

As used herein, the terms "include", "includes" and "including" are meant to be non-limiting.

As used herein, the term "composition" or "consumer product" are used interchangeably, those compositions intended for the treatment of hard surfaces (*e.g.*, floors, countertops, sinks, windows, toilets, dishware), soft surfaces (*e.g.*, carpets, fabric), air (*e.g.*, air fresheners, fabric refresheners), skin and hair (*e.g.*, shampoos, body wash, shave care) including products, packaging or devices generally intended to be used or consumed in the form in which it is sold. Such products include but are not limited to products for and/or methods relating to treating fabrics, dishes, air care including air freshners and scent delivery systems, car care, dishwashing, fabric conditioning (including softening and/or freshening), laundry detergency, laundry and rinse additives and/or care, hard surface cleaning and/or treatment including floor and toilet bowl cleaners, and other cleaning for consumer or institutional use.

As used herein, the term "detergent composition" is a subset of consumer products that includes, unless otherwise indicated, include a surfactant. Non-limiting examples of detergent compositions include: detergents, laundry detergents, fabric softeners, and laundry additives. The detergent composition of the present invention may be used for handwashing, administered to an automated laundry washing machine as well as for soaking and/or pre-treating fabrics. The detergent composition may be in the form of a powder/granule, a bar, a pastille, foam, flakes, a liquid, a dispersible substrate, or as a coating on a dryer added fabric softener sheet. The detergent composition may be administered to the washing machine as a unit dose or dispensed

from a container (*e.g.*, dispensing cap) containing multiple doses. An example of a unit dose is a composition encased in a water soluble polyvinylalcohol film. All of such products which are applicable may be in standard, concentrated or even highly concentrated form even to the extent that such products may in certain aspect be non-aqueous.

5 As used herein, the term "fragrance profile" means the description of how the fragrance is perceived by the typical human nose after it has been applied to a substrate. It is a result of the combination of the PRMs, if present, of a consumer product. A fragrance profile is composed of 2 characteristics: 'intensity' and 'character'. The 'intensity' relates to the perceived strength whilst 'character' refers to the odour impression or quality of the perfume, *i.e.*, fruity, floral, woody, *etc.*

10 As used herein, the term "perfume raw material" ("PRM") and "perfume raw materials" ("PRMs") relates to a perfume raw material, or a mixture of perfume raw materials, that are used to deliver and/or deposit an overall pleasant odour or fragrance profile to a consumer product or a substrate upon which the consumer product is applied. "Perfume raw materials" can encompass any suitable perfume raw materials for fragrance uses, including materials such as, 15 for example, alcohols, aldehydes, ketones, esters, ethers, acetates, nitriles, terpene hydrocarbons, nitrogen-containing or sulfur-containing heterocyclic compounds and essential oils. However, naturally occurring plant and animal oils and exudates comprising complex mixtures of various chemical components are also known for use as PRMs. The individual PRMs which comprise a known natural oil can be found by reference to Journals commonly used by those skilled in the 20 art such as "*Perfume and Flavourist*" or "*Journal of Essential Oil Research*", or listed in reference texts such as the book by S. Arctander, *Perfume and Flavor Chemicals*, 1969, Montclair, New Jersey, USA and more recently re-published by Allured Publishing Corporation Illinois (1994). Additionally, some PRMs are supplied by the fragrance houses (*e.g.*, Firmenich, International Flavors & Fragrances, Givaudan, Symrise) as mixtures in the form of proprietary 25 speciality accords. Non-limiting examples of the PRMs useful herein include pro-fragrances such as acetal pro-fragrances, ketal pro-fragrances, ester pro-fragrances, hydrolysable inorganic-organic pro-fragrances, and mixtures thereof. The PRMs may be released from the pro-fragrances in a number of ways. For example, the fragrance may be released as a result of simple hydrolysis, or by a shift in an equilibrium reaction, or by a pH-change, or by enzymatic 30 release or by thermal change or by photo-chemical release.

As used herein, the term "perfume system" or "perfume composition" can be used interchangeably and refers to the component in the consumer product composition or ionic liquid system that is formed of PRMs, *i.e.*, ingredients capable of imparting or modifying the odour of the consumer product itself or the substrate to which it is applied.

5 As used herein, the term "substrate" includes for non-limiting example, fabrics, garments, hard surfaces, soft surfaces, dishware, hair and body, etc.

Unless otherwise noted, all component or composition levels are in reference to the active level of that component or composition, and are exclusive of impurities, for example, residual solvents or by-products, which may be present in commercially available sources. All percentages and ratios are calculated by weight unless otherwise indicated. All percentages and ratios are calculated based on the total weight of the consumer product, which includes the product and product matrix composition unless otherwise indicated.

10

In all embodiments of the present invention, all percentages are by weight of the total fragrance composition, as evident by the context, unless specifically stated otherwise. All ratios are weight ratios, unless specifically stated otherwise, and all measurements are made at 25 °C, unless otherwise designated.

15

Certain chemical functional groups named here are preceded by a shorthand notation indicating the total number of carbon atoms that are to be found in the indicated chemical group. For example: C₁-C₂₀ alkyl describes an alkyl group having a total of 1 to 20 carbon atoms (*e.g.* C₁₀ implies C₁₀H₂₁). The total number of carbons in the shorthand notation does not include carbons that may exist in substituents of the group described. Unless specified to the contrary, the following terms have the following meaning:

20

"Alkyl" refers to a group containing a straight or branched hydrocarbon chain consisting solely of carbon and hydrogen atoms, containing no unsaturation, having from 1 to 20 carbon atoms, preferably 1 to 12 carbon atoms, preferably 1 to 8, or preferably 1 to 6 carbon atoms, and which is attached to the rest of the molecule by a single bond, *e.g.*, methyl, ethyl, propyl, 1-methylethyl (*iso*-propyl), butyl, pentyl, and the like. An alkyl may be optionally substituted.

25

"Alkenyl" refers to a group containing straight or branched hydrocarbon chain consisting solely of carbon and hydrogen atoms, containing at least one carbon-carbon double bond, having

30

from 2 to 20 carbon atoms, preferably 2 to 12 carbon atoms, or preferably 1 to 8 carbon atoms, *e.g.*, ethenyl, prop-2-enyl, but-1-enyl, pent-1-enyl, penta-1,4-dienyl, and the like. An alkenyl may be optionally substituted.

5 "Alkynyl" refers to a group containing straight or branched hydrocarbon chain consisting solely of carbon and hydrogen atoms, containing at least one carbon-carbon triple bond, having from 2 to 20 carbon atoms, preferably 2 to 12 carbon atoms, or preferably 1 to 8 carbon atoms, *e.g.*, ethynyl, propynyl, butynyl, pentynyl, hexynyl, and the like. An alkynyl may be optionally substituted.

10 "Alkylene" or "alkylene chain" refers to a group containing straight or branched hydrocarbon chain linking the rest of the molecule to a group, consisting solely of carbon and hydrogen, containing no unsaturation and having from 1 to 12 carbon atoms, *e.g.*, methylene, ethylene, propylene, butylene, and the like. An alkylene may be optionally substituted.

15 "Alkenylene" or "alkenylene chain" refers to a straight or branched hydrocarbon chain linking the rest of the molecule to a group, consisting solely of carbon and hydrogen, containing at least one carbon-carbon double bond and having from 2 to 20 carbon atoms, preferably 2 to 12 carbon atoms, *e.g.*, ethenylene, propenylene, butenylene, and the like. An alkenylene may be optionally substituted.

20 "Alkynylene" or "alkynylene chain" refers to a straight or branched hydrocarbon chain linking the rest of the molecule to a group, consisting solely of carbon and hydrogen, containing at least one carbon-carbon triple bond and having from 2 to 20 carbon atoms, *e.g.*, propynylene, butynylene, and the like. An alkynylene may be optionally substituted.

"Alkoxy" refers to a functional group of the formula $-OR_a$ where R_a is an alkyl chain as defined above containing 1 to 20 carbon atoms, preferably 1 to 12 carbon atoms. An alkoxy may be optionally substituted.

25 "Alkoxyalkyl" refers to a functional group of the formula $-R_{a1}-O-R_{a2}$ where R_{a1} is an alkylene as defined above and R_{a2} is an alkyl chain as defined above containing 1 to 20 carbon atoms, preferably 1 to 12 carbon atoms. An alkoxyalkyl may be optionally substituted.

30 "Aryl" refers to aromatic monocyclic or multicyclic hydrocarbon ring system consisting only of hydrogen and carbon, and preferably containing from 6 to 18 carbon atoms, preferably 6 to 10 carbon atoms, where the ring system is aromatic (by the Hückel definition). Aryl groups

include but are not limited to groups such as phenyl, naphthyl, anthracenyl. The term "aryl" or the prefix "ar" (such as in "aralkyl") is meant to include aryls that may be optionally substituted.

"Cycloalkyl" refers to a stable saturated mono-cyclic or polycyclic hydrocarbon group consisting solely of carbon and hydrogen atoms, which may include fused or bridged ring systems, having from 3 to 15 carbon atoms, preferably having from 3 to 10 carbon atoms or preferably from 3 to 7 carbon atoms. A cycloalkyl may be optionally substituted.

"Cycloalkylalkyl" refers to a functional group of the formula $-R_aR_d$, where R_a is an alkylene as defined above and R_d is a cycloalkyl as defined above.

"Heterocyclyl" refers to a stable 3- to 24-membered saturated ring which consists of 2 to 20 carbon atoms and from 1 to 6 heteroatoms selected from atoms consisting of nitrogen, oxygen, or sulfur. Unless stated otherwise specifically in the specification, the heterocyclyl may be a monocyclic, bicyclic, tricyclic or tetracyclic ring system, which may include fused or bridged ring systems; and the nitrogen, carbon or sulfur atoms in the heterocyclyl may be optionally oxidised; the nitrogen atom may be optionally quaternised. A heterocyclyl may be optionally substituted.

"Heterocyclylalkyl" refers to a functional group of the formula $-R_aR_e$ where R_a is an alkylene as defined above and R_e is a heterocyclyl as defined above, and if the heterocyclyl is a nitrogen-containing heterocyclyl, the heterocyclyl may be attached to the alkylene at the nitrogen atom. A heterocyclylalkyl may be optionally substituted.

"Heteroaryl" refers to a 5- to 20-membered aromatic ring which consists of 1 to 17 carbon atoms and from 1 to 3 heteroatoms selected from atoms consisting of nitrogen, oxygen and sulfur. The heteroaryl may be a monocyclic, bicyclic, tricyclic or tetracyclic ring system, which may include fused or bridged ring systems. A heteroaryl may be optionally substituted.

"Heteroarylalkyl" refers to a functional group of the formula $-R_aR_f$ where R_a is an alkylene as defined above and R_f is a heteroaryl as defined above. A heteroarylalkyl may be optionally substituted.

"Optionally substituted" means that the subsequently described event of circumstances may or may not occur and that the description includes instances where the event or circumstance occurs and instances in which it does not. For example, unless specified otherwise,

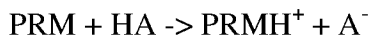
"optionally substituted" means that the chemical moiety may or may not be substituted by one or

more of the following groups: alkyl, alkenyl, halo, haloalkenyl, cyano, nitro, aryl, cycloalkyl, heterocyclyl, heteroaryl, oxo, $-OR^{10}$, $-OC(O)-R^{10}$, $-N(R^{10})_2$, $-C(O)R^{10}$, $-C(O)OR^{10}$, $-C(O)N(R^{10})_2$, $-N(R^{10})C(O)OR^{12}$, $-N(R^{10})C(O)R^{12}$, $-N(R^{10})S(O)_tR^{12}$ (where t is 1 to 2), $-S(O)_tOR^{12}$ (where t is 1 to 2), $-S(O)_xR^{12}$ (where x is 0 to 2) and $-S(O)_tN(R^{10})_2$ (where t is 1 to 2) where each R^{10} is independently hydrogen, alkyl, haloalkyl, cycloalkyl, cycloalkylalkyl, aryl (optionally substituted with one or more halogen groups), aralkyl, heterocyclyl, heterocyclalkyl, heteroaryl or heteroarylalkyl; and each R^{12} is alkyl, haloalkyl, cycloalkyl, cycloalkylalkyl, aryl, aralkyl, heterocyclyl, heterocyclalkyl, heteroaryl or heteroarylalkyl, and where each of the above substituents is unsubstituted unless otherwise indicated.

It is understood that the test methods that are disclosed in the Test Methods section of the present application must be used to determine the respective values of the parameters of the present invention as described and claimed herein.

Ionic Liquid Systems

Applicants have discovered that ionic liquids can be formulated into consumer products to deliver and/or deposit fragrance benefit onto a substrate. It has also been discovered that ionic liquid systems comprising at least one ionic liquid can also aid in biofilm removal, freshness delivery, and/or malodour control and/or elimination. In particular, the applicants have discovered that certain types of perfume raw materials can be protonated to form cations, which have a dual function as the cation of the ionic liquid and the perfume material that is being delivered and/or deposited onto the substrate.

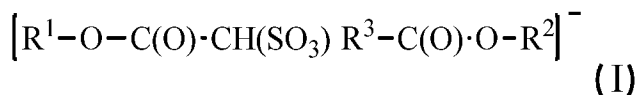


For example, with a consumer product that involves machine-washing (*e.g.*, detergents), the ionic liquids can aid in the deposition of the PRMs onto fabric. This occurs because the cation once deposited on the substrate, upon drying-out, releases the PRMs. Without wishing to be bound by theory, it is believed that the ionic liquids will form a coacervate with other ingredients in the formula. Only after deposition on the substrate (*e.g.*, fabric, carpet, skin, hair, etc.) they will dissociate and therefore are not readily lost during the washing process.

With conventional ionic liquids, there is a cation and an anion which are synthesized and then added to an existing composition that contains a fragrance component. The ionic liquids interact (attract/repel) with the PRMs according to electrostatic/H-bonding non-covalent forces. However, PRMs having low clogP, preferably below 3, tend to be very hydrophilic and can be difficult to deposit on surfaces, preferably soft surfaces (*e.g.*, fabric, carpet, skin, hair, etc.), as they are typically lost in the thru-the-wash process. One solution has been to encapsulate the PRMs in PMC to improve delivery/deposition. Unfortunately, these hydrophilic PRMs tend to be very hard to encapsulate with PMC and even if successful with the encapsulation they tend to leak out of the PMC during storage resulting in, potentially significant, losses over-time.

Accordingly, the ionic liquid system according to the present invention comprises one or more ionic liquids, each comprising of a cation and an anion, wherein at least one of the cations is the conjugate acid of a perfume raw material and wherein the cation has a pKa from 0 to about 14, preferably from about 7 to about 14, or more preferably from about 8 to about 14.

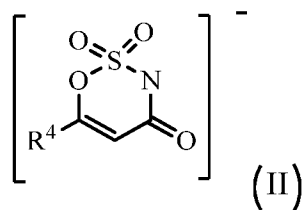
In an embodiment of the present invention, wherein each ionic liquid comprises an anion independently selected from the group consisting of:



(i)

wherein:

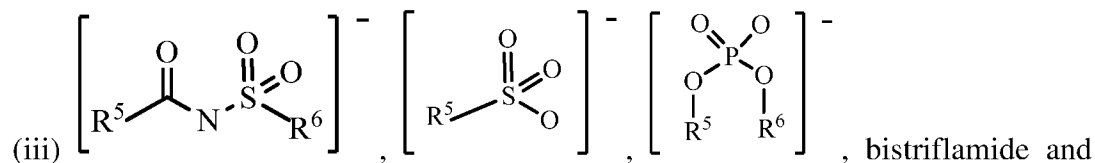
R^1 and R^2 are independently selected from the group consisting of alkyl and alkenyl, provided that the alkyl is not substituted with nitro, azido or halide; and R^3 is alkylene, heteroarylene, arylene, or cycloalkylene;



(ii)

wherein:

R^4 is selected from the group consisting of hydrogen, cyano, alkyl, alkoxy and alkoxyalkyl;



combinations thereof;

wherein:

each R^5 and R^6 are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, alkoxyalkyl, cycloalkyl, cycloalkylalkyl, aryl, aralkyl, heterocyclyl, heterocyclalkyl, heteroaryl and heteroarylalkyl; and

(iv) combinations thereof.

Of this embodiment of the invention, wherein the anion is selected from the group consisting of: 1,4-bis(2-ethylhexoxy)-1,4-dioxobutane-2-sulfonate (*i.e.*, dioctyl sulfosuccinate); 6-methyl-3,4-dihydro-1,2,3-oxathiazin-4-one 2,2-dioxide; and combinations thereof.

The anions of the present invention are prepared according to well-known methods to those skilled in the art.

In an embodiment of the present invention, wherein at least one of the cations is the conjugate acid of a perfume raw material having a clogP value between 0 and about 7, preferably between 0 and about 3.

In an embodiment of the present invention, wherein at least one of the cations is the conjugate acid of a perfume raw material selected from materials listed in Table 1 hereinafter.

Table 1: Perfume Raw Materials, and their pKa

No.	CAS Number	IUPAC Name	pKa
1	121-32-4	3-ethoxy-4-hydroxybenzaldehyde	7.3
2	121-33-5	4-hydroxy-3-methoxybenzaldehyde	7.3
3	93-35-6	7-Hydroxy-2H-1-benzopyran-2-one	7.8
4	1009-11-6	1-(4-Hydroxyphenyl) butan-1-one	8.1
5	121-34-6	4-hydroxy-3-methoxybenzoic acid	8.5
6	4940-11-8	4H-Pyran-4-one, 2-ethyl-3-hydroxy-	8.7
7	118-71-8	3-hydroxy-2-methyl-4-pyrone	8.7

8	458-36-6	3-(4-hydroxy-3-methoxyphenyl)prop-2-enal	9.5
9	3209-13-0	3-methoxy-5-methylphenol	9.6
10	88-04-0	4-chloro-3,5-dimethylphenol	9.6
11	38462-22-5	5-methyl-2-(2-sulfanylpropan-2-yl)cyclohexan-1-one	9.6
12	5471-51-2	4-(4-hydroxyphenyl)butan-2-one	9.7
13	122-48-5	4-(4-hydroxy-3-methoxyphenyl)butan-2-one	9.7
14	131-57-7	(2-hydroxy-4-methoxyphenyl)-phenylmethanone	9.7
15	2050-08-0	pentyl 2-hydroxybenzoate	9.8
16	2052-14-4	Butyl 2-hydroxybenzoate	9.8
17	65405-77-8	[(Z)-hex-3-enyl] 2-hydroxybenzoate	9.8
18	25485-88-5	cyclohexyl 2-hydroxybenzoate	9.8
19	118-61-6	Ethyl 2-hydroxybenzoate	9.8
20	87-20-7	3-methylbutyl 2-hydroxybenzoate	9.8
21	87-19-4	2-methylpropyl 2-hydroxybenzoate	9.8
22	119-36-8	methyl 2-hydroxybenzoate	9.8
23	6259-76-3	hexyl 2-hydroxybenzoate	9.8
24	68555-58-8	3-methylbut-2-enyl 2-hydroxybenzoate	9.8
25	118-58-1	benzyl 2-hydroxybenzoate	9.8
26	77-93-0	triethyl 2-hydroxypropane-1,2,3-tricarboxylate	9.9
27	105-67-9	2,4-dimethylphenol	10
28	2785-89-9	4-ethyl-2-methoxyphenol	10
29	2628-17-3	4-ethenylphenol	10
30	499-75-2	2-methyl-5-propan-2-ylphenol	10
31	97-54-1	2-methoxy-4-[(Z)-prop-1-enyl]phenol	10
32	93-51-6	2-methoxy-4-methylphenol	10
33	2785-87-7	2-methoxy-4-propylphenol	10
34	97-53-0	2-methoxy-4-prop-2-enylphenol	10

35	90-05-1	2-methoxyphenol	10
36	108-95-2	Phenol	10
37	97-54-1	2-methoxy-4-prop-1-en-2-ylphenol	10
38	620-17-7	3-ethylphenol	10
39	95-48-7	2-methylphenol	10
40	106-44-5	4-methylphenol	10
41	123-07-9	4-ethylphenol	10
42	98-54-4	4-tert-butylphenol	10
43	5932-68-3	2-methoxy-4-[(<i>E</i>)-prop-1-enyl]phenol	10
44	2563-07-7	2-ethoxy-4-methylphenol	10
45	94-86-0	2-ethoxy-5-prop-1-enylphenol	10
46	5595-79-9	2-ethoxy-4-(methoxymethyl)phenol	10.1
47	09-03-33	2-methoxy-4-(methoxymethyl)phenol	10.1
48	4707-47-5	methyl 2,4-dihydroxy-3,6-dimethylbenzoate	10.2
49	89-83-8	5-methyl-2-propan-2-ylphenol	10.8
50	128-37-0	2,6-ditert-butyl-4-methylphenol	12.1
51	119-53-9	2-hydroxy-1,2-diphenylethanone	12.3
52	75147-23-8	<i>N</i> -(1,5-dimethyl-8-bicyclo[3.2.1]octanylidene)hydroxylamine	12.5
53	22457-23-4	<i>N</i> -(5-methylheptan-3-ylidene)hydroxylamine	12.5

* pKa were calculated utilizing the ACD Software V.14.02, as described in the Test Methods Section.

** Origin: The PRMs may be obtained from one or more of the following companies: Firmenich (Geneva, Switzerland), Symrise AG (Holzminden, Germany), Givaudan (Argenteuil, France), IFF (Hazlet, New Jersey), Bedoukian (Danbury, Connecticut), Sigma Aldrich (St. Louis, Missouri), Millennium Speciality Chemicals (Olympia Fields, Illinois), Polarone International (Jersey City, New Jersey), and Aroma & Flavor Specialities (Danbury, Connecticut).

Preferred protonable perfume raw materials whose cations can be used as cations in ionic liquids are listed in Table 1. Preferably, the protonable perfume raw materials are selected from the group consisting of amino-based perfume raw materials, and combinations thereof. However, it is understood by one skilled in the art that other protonable perfume raw materials, which originate cations, and are not recited in Table 1, would also fall within the scope of the present invention, so long as their corresponding cations (protonated form of the PRMs) have a pK_a of from 0 to about 14, preferably from about 7 to about 14, or more preferably from about 8 to about 14.

Preferably, the ionic liquids useful in the present invention exhibit no measurable vapour pressure between 25 °C and 100 °C. Thus, it is understood that the ionic liquids themselves make no contribution to the vapour pressure of any mixture in which they are incorporated.

As used herein, the term "ionic liquid" refers to a liquid which consists exclusively of ions and is preferably present in a liquid form at temperatures lower than 100 °C, preferably at ambient or room temperature (*i.e.*, from 15 °C to 30 °C). Particularly preferred ionic liquids are suitable for use in consumer products and have to be chosen so as to avoid adverse effect in terms of health and/or the environment.

Ionic liquids have no effective vapour pressure (essentially zero) and may be easy to handle. Their solvent properties can be readily adjusted so as to be suitable to a wide range of PRMs. Solvent properties can be readily adjusted by adjusting the structural features of both cations and anions of the ionic liquids.

Typically, ionic liquids may have high viscosities (*i.e.*, greater than about 1,000 mPa•s) at room temperature. High viscosities can be problematic in formulating the compositions of the present invention. Therefore, in an embodiment, the present invention is preferably directed to ionic liquids (undiluted with adjuncts, co-solvents or free water) which have viscosities of less than about 1000 mPa•s, preferably less than about 750 mPa•s, preferably less than about 500 mPa•s, as measured at 20 °C. In some embodiments, the viscosity of the undiluted ionic liquids are in the range from about 1 mPa•s to about 400 mPa•s, preferably from 1 mPa•s to about 300 mPa•s, and more preferably from about 1 mPa•s to about 250 mPa•s.

The viscosities of the ionic liquids and compositions containing therein can be measured on a Brookfield viscometer model number LVDVII+ at 20 °C, with Spindle S31 at the

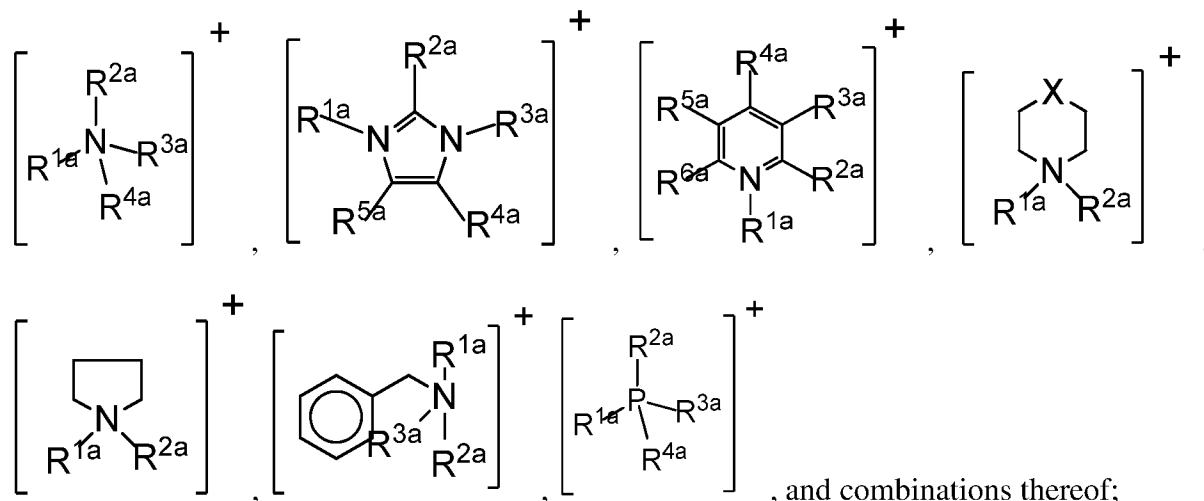
appropriate speed to measure materials of differing viscosities. Typically, the measurement is performed at speed from 12 rpm to 60 rpm. The undiluted state is prepared by storing the ionic liquids in a desiccator containing a desiccant (*e.g.* anhydrous calcium chloride) at room temperature for at least 48 hours prior to the viscosity measurement. This equilibration period
5 unifies the amount of innate water in the undiluted samples.

The ionic liquids may be used in the compositions and/or consumer products of the present invention as pure solvents (*i.e.*, as a pure, undiluted ionic liquid); as a co-solvent in conjunction with water or other organic solvents; or as an active where the continuous phase is water or another solvent. Various adjunct ingredients known in the art may be incorporated into
10 such compositions. In certain embodiments, water and/or solvent may be present in the composition at least about 0.01 wt% or at least about 1 wt% or at least about 10 wt%, and less than about 50 wt% or less than about 30 wt% or less than about 20 wt% by weight of the composition. The ionic liquid compositions may be formulated in the form of liquid, gel, paste, or foam.

15 It should be understood that the terms "ionic liquid system" refers to a system comprising one or more ionic liquids. In an embodiment, the ionic liquid system comprises two, three, four, five or more ionic liquids. The ionic liquid system may be formed from a homogeneous combination comprising one species of anion and one species of cation, or it can be composed of more than one species of cation and/or anion. Thus, an ionic liquid may be composed of more
20 than one species of cation and one species of anion. An ionic liquid may further be composed of one species of cation and more than one species of anion. Finally, an ionic liquid may further be composed of more than one species of cation and more than one species of anion.

In another embodiment of the present invention, the ionic liquids, preferably the cation component may be selectively made to be hydrophobic.

25 In yet another embodiment of the present invention, wherein at least one of the ionic liquid comprises cations which are not conjugate acids of perfume raw materials, and are independently selected from the group consisting of:



X is CH₂ or O;

each R^{1a}, R^{3a}, and R^{4a} are independently selected from hydrogen, C₁-C₂₀ alkyl, C₁-C₂₀ alkenyl, C₁-C₂₀ alkynyl, C₁-C₂₀ alkoxy, C₁-C₂₀ alkoxyC₁-C₂₀alkyl, C₃-C₇ cycloalkyl, C₃-C₇ cycloalkylC₁-C₄alkyl, C₂-C₂₀ heterocyclyl, C₆-C₁₀ aryl, C₆-C₁₀ arylC₁-C₁₀alkyl, C₁-C₁₀ heteroaryl, halo, haloC₁-C₂₀alkyl, hydroxyl, hydroxyC₁-C₂₀alkyl, or -N(R^{6a})₂;

each R^{2a} is independently selected from hydrogen, C₁-C₂₀ alkyl, C₁-C₂₀ alkenyl, or C₁-C₂₀ alkynyl;

each R^{5a} is independently selected from hydrogen, C₁-C₂₀ alkyl, C₁-C₂₀ alkenyl, C₁-C₂₀ alkynyl, -R^{7a}-OR^{8a}, or -R^{7a}-OR^{7a}-OR^{8a};

each R^{6a} is independently selected from hydrogen, alkyl, alkenyl, alkynyl, haloalkyl, alkoxyalkyl, cycloalkyl, cycloalkylalkyl, aryl, aralkyl, heterocyclyl, heterocyclalkyl, heteroaryl, or heteroarylalkyl;

each R^{7a} is independently selected from a direct bond, alkylene chain, alkenylene chain, or alkynylene chain; and

each R^{8a} is independently selected from a hydrogen, alkylene chain, alkenylene chain, or alkynylene chain.

Of this embodiment, wherein the cations which are not conjugate acids of perfume raw materials are independently selected from the group consisting of: 1-butyl-3-methylimidazolium; (N-ethyl-2-(2-methoxyethoxy)-N,N-dimethylethanaminium); 2-(2-ethoxyethoxy)-N-ethyl-N,N-

dimethylethanaminium; *N*-benzyl-*N,N*-dimethyloctan-1-aminium; *N*-benzyl-*N,N*-dimethylnonan-1-aminium; and combinations thereof.

The methods for preparing the cations and the conjugate acids of the present invention are provided in the Examples section. The preparations are not intended to limit the scope of the present invention.

In another embodiment of the present invention, wherein the ionic liquid system further comprises a perfume microcapsule comprising from about 1% w/w to about 90% w/w, based on the total perfume microcapsule weight, of one or more perfume raw materials. Of this embodiment, wherein the perfume raw materials comprise materials selected from the group consisting of:

- a) a perfume composition having a clog P of less than 4.5;
- b) a perfume composition comprising, based on total perfume composition weight, 60% perfume materials having a clog P of less than 4.0;
- c) a perfume composition comprising, based on total perfume composition weight, 35% perfume materials having a clog P of less than 3.5;
- d) a perfume composition comprising, based on total perfume composition weight, 40% perfume materials having a clog P of less than 4.0 and at least 1% perfume materials having a clog P of less than 2.0;
- e) a perfume composition comprising, based on total perfume composition weight, 40% perfume materials having a clog P of less than 4.0 and at least 15% perfume materials having a clog P of less than 3.0;
- f) a perfume composition comprising, based on total perfume composition weight, at least 1% butanoate esters and at least 1% of pentanoate esters;
- g) a perfume composition comprising, based on total perfume composition weight, at least 2% of an ester comprising an allyl moiety and at least 10% of another perfume comprising an ester moiety;
- h) a perfume composition comprising, based on total perfume composition weight, at least 1% of an aldehyde comprising an alkyl chain moiety;
- i) a perfume composition comprising, based on total perfume composition weight, at least 2% of a butanoate ester;

- j) a perfume composition comprising, based on total perfume composition weight, at least 1% of a pentanoate ester;
- k) a perfume composition comprising, based on total perfume composition weight, at least 3% of an ester comprising an allyl moiety and 1% of an aldehyde comprising an alkyl chain moiety;
- l) a perfume composition comprising, based on total perfume composition weight, at least 25% of a perfume comprising an ester moiety and 1% of an aldehyde comprising an alkyl chain moiety;
- m) a perfume composition comprising, based on total perfume composition weight, at least 2% of a material selected from the group consisting of 4-(2,6,6-trimethyl-1-cyclohexenyl)-3-buten-2-one; 4-(2,6,6-trimethyl-2-cyclohexenyl)-3-buten-2-one; 3-buten-2-one,3-methyl-4-(2,6,6-trimethyl-1-cyclohexen-2-yl)-; and mixtures thereof;
- n) a perfume composition comprising, based on total perfume composition weight, at least 0.1% of tridec-2-enonitrile; mandarin; or mixtures thereof;
- o) a perfume composition comprising, based on total perfume composition weight, at least 2% of a material selected from 3,7-dimethyl-6-octenenitrile; 2-cyclohexylidene-2-phenylacetonitrile; or mixtures thereof;
- p) a perfume composition comprising, based on total perfume composition weight, at least 80% of one or more perfumes comprising a moiety selected from the group consisting of esters, aldehydes, ionones, nitriles, ketones and combinations thereof;
- q) a perfume composition comprising, based on total perfume composition weight, at least 3% of an ester comprising an allyl moiety; a perfume composition comprising, based on total perfume composition weight, at least 20% of a material selected from the group consisting of: 1-methylethyl-2-methylbutanoate; ethyl-2-methyl pentanoate; 1,5-dimethyl-1-ethenylhexyl-4-enyl acetate; p-meth-1-en-8-yl acetate; 4-(2,6,6-trimethyl-2-cyclohexenyl)-3-buten-2-one; 4-acetoxy-3-methoxy-1-propenylbenzene; 2-propenyl cyclohexanepropionate; bicyclo[2.2.1]hept-5-ene-2-carboxylic acid,3-(1-methylethyl)-ethyl ester; bicyclo[2.2.1]heptan-2-ol, 1,7,7-trimethyl-, acetate; 1,5-dimethyl-1-ethenylhex-4-enylacetate; hexyl 2-methyl propanoate; ethyl-2-methylbutanoate; 4-undecanone; 5-heptyldihydro-2(3h)-furanone ;1,6-nonadien-3-ol,3,7dimethyl-; 3,7-

- dimethylocta-1,6-dien-3-o ; 3-cyclohexene-1-carboxaldehyde,dimethyl-; 3,7-dimethyl-6-octene nitrile; 4-(2,6,6-trimethyl-1-cyclohexenyl)-3-buten-2-one; tridec-2-enonitrile; patchouli oil; ethyl tricycle [5.2.1.0]decan-2-carboxylate; 2,2-dimethyl-cyclohexanepropanol; hexyl ethanoate, 7-acetyl,1,2,3,4,5,6,7,8-octahydro-1,1,6,7-tetramethyl naphthalene ; allyl-cyclohexyloxy acetate; methyl nonyl acetic aldehyde; 1-spiro[4,5]dec-7-en-7-yl-4-penten-1-one; 7-octen-2-ol,2-methyl-6-methylene-,dihydro; cyclohexanol,2-(1,1-dimethylethyl)-, acetate; hexahydro-4,7-methanoinden-5(6)-yl propionatehexahydro-4,7-methanoinden-5(6)-yl propionate; 2-methoxynaphthalene; 1-(2,6,6-trimethyl-3-cyclohexenyl)-2-buten-1-one; 1-(2,6,6-trimethyl-2-cyclohexenyl)-2-buten-1-one; 3,7-dimethyloctan-3-ol; 3-buten-2-one,3- methyl-4-(2,6,6-trimethyl-1-cyclohexen-2-yl)-; hexanoic acid, 2-propenyl ester; (Z)-non-6-en-1-al ;1-decyl aldehyde; 1-octanal; 4-t-butyl- α -methylhydrocinnamaldehyde; α -hexylcinnamaldehyde; ethyl-2,4-hexadienoate; 2-propenyl 3-cyclohexanepropanoate; and mixtures thereof;
- r) a perfume composition comprising, based on total perfume composition weight, at least 20% of a material selected from the group consisting of: 1-methylethyl-2-methylbutanoate; ethyl-2-methyl pentanoate; 1,5-dimethyl-1-ethenylhex-4-enyl acetate; p-menth-1-en-8-yl acetate; 4-(2,6,6-trimethyl-2-cyclohexenyl)-3-buten-2-one; 4-acetoxy-3-methoxy-1-propenylbenzene; 2-propenyl cyclohexanepropionate; bicyclo[2.2.1]hept-5-ene-2-carboxylic acid,3-(1-methylethyl)-ethyl ester; bicyclo [2.2.1]heptan-2-ol, 1,7,7-trimethyl-, acetate; 1,5-dimethyl-1-ethenylhex-4-enyl acetate; hexyl 2-methyl propanoate; ethyl-2-methylbutanoate ,4-undecanolide; 5-heptyldihydro-2(3h)-furanone; 5-hydroxydodecanoic acid; decalactones; undecalactones, 1,6-nonadien-3-ol,3,7dimethyl-; 3,7-dimethylocta-1,6-dien-3-ol; 3-cyclohexene-1-carboxaldehyde,dimethyl-; 3,7-dimethyl-6-octene nitrile; 4-(2,6,6-trimethyl-1-cyclohexenyl)-3-buten-2-one; tridec-2-enonitrile; patchouli oil; ethyl tricycle [5.2.1.0]decan-2-carboxylate; 2,2-dimethyl-cyclohexanepropanol; allyl-cyclohexyloxy acetate; methyl nonyl acetic aldehyde; 1-spiro[4,5]dec-7-en-7-yl-4-penten-1-one; 7-octen-2-ol,2-methyl-6-methylene-,dihydro, cyclohexanol,2-(1,1-dimethylethyl)-, acetate; hexahydro-4,7-methanoinden-5(6)-yl propionatehexahydro-4,7-methanoinden-5(6)-yl propionate; 2-methoxynaphthalene; 1-

(2,6,6-trimethyl-3-cyclohexenyl)-2-buten-1-one; 1-(2,6,6-trimethyl-2-cyclohexenyl)-2-buten-1-one; 3,7-dimethyloctan-3-ol; 3-buten-2-one, 3-methyl-4-(2,6,6-trimethyl-1-cyclohexen-2-yl)-; hexanoic acid, 2-propenyl ester; (Z)-non-6-en-1-al; 1-decyl aldehyde; 1-octanal; 4-*t*-butyl- α -methylhydrocinnamaldehyde; ethyl-2,4-hexadienoate; 2-propenyl
 5 3-cyclohexanepropanoate; and mixtures thereof;

s) a perfume composition comprising, based on total perfume composition weight, at least 5% of a material selected from the group consisting of 3-cyclohexene-1-carboxaldehyde, dimethyl-; 3-buten-2-one, 3-methyl-4-(2,6,6-trimethyl-1-cyclohexen-2-yl)-; patchouli oil; Hexanoic acid, 2-propenyl ester; 1-Octanal; 1-decyl aldehyde; (Z)-
 10 non-6-en-1-al; methyl nonyl acetic aldehyde; ethyl-2-methylbutanoate; 1-methylethyl-2-methylbutanoate; ethyl-2-methyl pentanoate; 4-hydroxy-3-ethoxybenzaldehyde; 4-hydroxy-3-methoxybenzaldehyde; 3-hydroxy-2-methyl-4-pyrone; 3-hydroxy-2-ethyl-4-pyrone; and mixtures thereof;

t) a perfume composition comprising, based on total perfume composition weight, less than
 15 10% perfume materials having a clog P greater than 5.0;

u) a perfume composition comprising geranyl palmitate;

v) a perfume composition comprising a first and an optional second material, the first material having:

(i) a clog P of at least 2; and

(ii) a boiling point of less than about 280 °C;

wherein, the optional second material, if present, having a clog P of less than 2.5; and

w) combinations thereof.

In yet another embodiment of the present invention, the ionic liquids (*i.e.*, cation and
 25 anion) are essentially free of any of the following chemical moieties: antimony, barium, beryllium, bromine, cobalt, chromium, iodine, lead, nickel, selenium, or thallium. By "essentially free" it is meant that no cation or anion containing any of the foregoing chemical moieties are intentionally added to form the ionic liquids of the present invention. The term "essentially free" also means that no or negligible levels of impurities or intermediates containing
 30 any of the foregoing chemical moieties are formed during the synthesis of the ionic liquids.

It may be advantageous if the composition of the present invention has an ionic liquid which has one or more of the abovementioned salts. It is understood that the ionic liquids can comprise either a single anionic species and a single cationic species or a plurality of different anionic and cationic species. By using different cationic species, the properties of the ionic liquids can be matched in an optimal way to include the desired PRMs and/or other components of the fragrance composition. In an embodiment of the invention, the ionic liquids consist of more than one cationic species.

Ionic liquids are formed by combining simply salts of a cation and an anion (*e.g.* sodium salt of the anion and chloride salt of the cation). Ionic liquids lend themselves to preparation *via* combinatorial chemistry. Some methods for preparing the ionic liquids of the present invention are provided in the Examples section. The preparations are not intended to limit the scope of the present invention.

The present invention also provides an ionic liquid system comprising $\Sigma(I_N)$, wherein "I" represents an ionic liquid and "N" represents an integer from one to fifty, preferably two, three, four, five, or more, wherein the ionic liquid system comprises from about 0.1% w/w to 100% w/w, based on the total system weight, of at least one ionic liquid comprising a cation and an anion, wherein the cation is the conjugate acid of a perfume raw material, which has a pKa from 0 to about 14, preferably from about 7 to about 14, or more preferably from about 8 to about 14; and wherein the ionic liquid system comprises from 0% w/w to about 99.9% w/w, based on the total system weight, of at least one ionic liquid comprising cations which are not conjugate acids of perfume raw materials.

Consumer Product

Applicants have surprisingly found that ionic liquids can be incorporated into consumer products to enhance the delivery and/or deposition of a desired scent to such substrate that is contacted with such a product and/or mask an undesirable odour. While current perfume systems (*e.g.*, PMC) provide suitable deposition of desirable odours, they are limited when it comes to scents comprising certain PRMs, preferably with a clogP below 3, and which tend to be hydrophilic in nature. Accordingly, the pool of perfumes available for use in current perfume

systems is still limited to meet different scent desires. Thus, the current invention allows formulators a larger pool of perfumes from which to choose from.

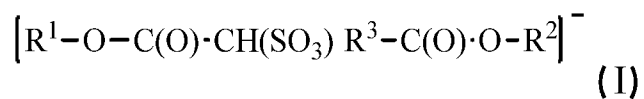
The precise level of the ionic liquids and/or ionic liquid system that is employed depends on the type and end use of the consumer product comprising such materials. Specifically, in one aspect, the present invention provides for a consumer product comprising, from about 0.0001% w/w to about 100% w/w, preferably from about 0.01% w/w to about 10% w/w, or more preferably 0.1% w/w to about 5% w/w, based on the total consumer product weight, of an ionic liquid system according to the present invention.

In another embodiment, the consumer product of the present invention wherein the consumer product being a composition intended for the treatment of hard surfaces, soft surfaces, skin or hair.

In another embodiment, the consumer product of the present invention, wherein a 10% solution in water of the consumer product has a pH of from about 1 to about 14, preferably a pH of 7 or higher. Techniques for controlling pH include the use of buffers, alkalis, acids, etc., and are well known to those skilled in the art.

Aspects of the invention include the use of the ionic liquid system of the present invention in a detergent composition. In particular, the present invention provides a detergent composition comprising:

- (a) from about 0.001% w/w to about 10% w/w, based on the total weight of the detergent composition, of an ionic liquid system made of at least one ionic liquid comprising:
 - (i) a cation, wherein the cation is the conjugate acid of a perfume raw material, which has a pKa from 0 to about 14, preferably from about 7 to about 14, or more preferably from about 8 to about 14;
 - (ii) an anion selected from the group consisting of:

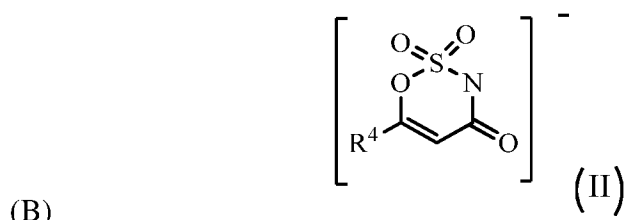


(A)

wherein:

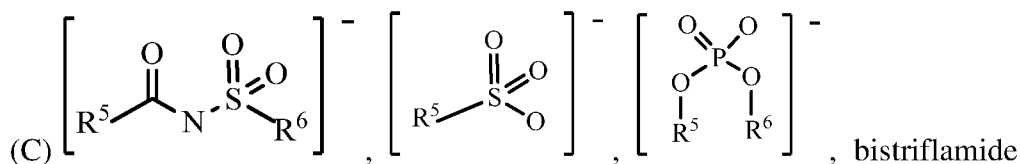
R^1 and R^2 are independently selected from the group consisting of alkyl and alkenyl, provided that the alkyl is not substituted with nitro, azido or halide; and

R^3 is alkylene, heteroarylene, arylene, or cycloalkylene;



wherein:

R^4 is selected from the group consisting of hydrogen, cyano, alkyl, alkoxy and alkoxyalkyl;



and combinations thereof;

wherein:

each R^5 and R^6 are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, alkoxyalkyl, cycloalkyl, cycloalkylalkyl, aryl, aralkyl, heterocyclyl, heterocyclalkyl, heteroaryl and heteroarylalkyl; and

(D) combinations thereof.

5 Of this embodiment, the detergent composition further comprising: (b) from about 1% w/w to about 50% w/w, based on the total weight of the detergent composition, of a deterative surfactant.

Of this embodiment, wherein the ionic liquid system is encapsulated in a perfume microcapsule, which optionally further comprises one or more perfume raw materials.

10 In one aspect, the microcapsule wall material may comprise: melamine, polyacrylamide, silicones, silica, polystyrene, polyurea, polyurethanes, polyacrylate based materials, polyacrylate esters based materials, gelatin, styrene malic anhydride, polyamides, aromatic alcohols, polyvinyl alcohol and mixtures thereof. In one aspect, said melamine wall material may comprise melamine crosslinked with formaldehyde, melamine-dimethoxyethanol crosslinked
15 with formaldehyde, and mixtures thereof. In one aspect, said polystyrene wall material may

comprise polystyrene cross-linked with divinylbenzene. In one aspect, said polyurea wall material may comprise urea crosslinked with formaldehyde, urea crosslinked with glutaraldehyde, and mixtures thereof. In one aspect, said polyacrylate based wall materials may comprise polyacrylate formed from methylmethacrylate/dimethylaminomethyl methacrylate, polyacrylate formed from amine acrylate and/or methacrylate and strong acid, polyacrylate formed from carboxylic acid acrylate and/or methacrylate monomer and strong base, polyacrylate formed from an amine acrylate and/or methacrylate monomer and a carboxylic acid acrylate and/or carboxylic acid methacrylate monomer, and mixtures thereof.

In one aspect, said polyacrylate ester based wall materials may comprise polyacrylate esters formed by alkyl and/or glycidyl esters of acrylic acid and/or methacrylic acid, acrylic acid esters and/or methacrylic acid esters which carry hydroxyl and/or carboxy groups, and allylgluconamide, and mixtures thereof.

In one aspect, said aromatic alcohol based wall material may comprise aryloxyalkanols, arylalkanols and oligoalkanolarylethers. It may also comprise aromatic compounds with at least one free hydroxyl-group, especially preferred at least two free hydroxy groups that are directly aromatically coupled, wherein it is especially preferred if at least two free hydroxy-groups are coupled directly to an aromatic ring, and more especially preferred, positioned relative to each other in meta position. It is preferred that the aromatic alcohols are selected from phenols, cresols (o-, m-, and p-cresol), naphthols (alpha and beta -naphthol) and thymol, as well as ethylphenols, propylphenols, fluorophenols and methoxyphenols.

In one aspect, said polyurea based wall material may comprise a polyisocyanate. In some embodiments, the polyisocyanate is an aromatic polyisocyanate containing a phenyl, a toluoyl, a xylyl, a naphthyl or a diphenyl moiety (*e.g.*, a polyisocyanurate of toluene diisocyanate, a trimethylol propane-adduct of toluene diisocyanate or a trimethylol propane-adduct of xylylene diisocyanate), an aliphatic polyisocyanate (*e.g.*, a trimer of hexamethylene diisocyanate, a trimer of isophorone diisocyanate and a biuret of hexamethylene diisocyanate), or a mixture thereof (*e.g.*, a mixture of a biuret of hexamethylene diisocyanate and a trimethylol propane-adduct of xylylene diisocyanate). In still other embodiments, the polyisocyanate may be cross-linked, the cross-linking agent being a polyamine (*e.g.*, diethylenetriamine, bis(3-aminopropyl)amine, bis(hexamethylene)triamine, tris(2-aminoethyl)amine, triethylenetetramine, *N,N'*-bis(3-

aminopropyl)-1,3-propanediamine, tetraethylenepentamine, pentaethylenehexamine, branched polyethylenimine, chitosan, nisin, gelatin, 1,3-diaminoguanidine monohydrochloride, 1,1-dimethylbiguanide hydrochloride, or guanidine carbonate).

In one aspect, said polyvinyl alcohol based wall material may comprise a crosslinked, hydrophobically modified polyvinyl alcohol, which comprises a crosslinking agent comprising i) a first dextran aldehyde having a molecular weight of from 2,000 to 50,000 Da; and ii) a second dextran aldehyde having a molecular weight of from greater than 50,000 to 2,000,000 Da.

In one aspect, the perfume microcapsule may be coated with a deposition aid, a cationic polymer, a non-ionic polymer, an anionic polymer, or mixtures thereof. Suitable polymers may be selected from the group consisting of: polyvinylformaldehyde, partially hydroxylated polyvinylformaldehyde, polyvinylamine, polyethyleneimine, ethoxylated polyethyleneimine, polyvinylalcohol, polyacrylates, and combinations thereof. Suitable deposition aids are described herein or well-known to those skilled in the art. In one aspect, the microcapsule may be a perfume microcapsule. In one aspect, one or more types of microcapsules, for examples two microcapsules types, wherein one of the first or second microcapsules (a) has a wall made of a different wall material than the other; (b) has a wall that includes a different amount of wall material or monomer than the other; or (c) contains a different amount perfume oil ingredient than the other; or (d) contains a different perfume oil, may be used.

In another embodiment, wherein the detergent composition is substantially free of anti-microbes and anti-effectives and retards bacterial growth upon soaking in a wash liquor thereof with a fabric contaminated with bacteria for 5, 8, 10, 12 or 24 hours at 25 °C versus a control composition lacking an ionic liquid.

Consumer Product Adjunct Materials

For the purposes of the present invention, the non-limiting list of adjuncts illustrated hereinafter are suitable for use in the instant compositions and may be desirably incorporated in certain embodiments of the invention, for example to assist or enhance performance, for treatment of the substrate to be cleaned or to modify the aesthetics of the composition as is the case with perfumes, colorants, dyes or the like. It is understood that such adjuncts are in addition to the components that are supplied via Applicants' perfume systems. The precise nature of these

additional components, and levels of incorporation thereof will depend on the physical form of the composition and the nature of the operation for which it is to be used. Suitable adjunct materials include, but are not limited to, surfactants, builders, chelating agents, dye transfer inhibiting agents, dispersants, enzymes, and enzyme stabilizers, catalytic materials, bleach
5 activators, polymeric dispersing agents, clay soil remove/anti-redeposition agents, brighteners, suds suppressors, dyes, additional perfume and perfume delivery systems, structure elasticizing agents, fabric softeners, carriers, hydrotropes, processing aids and/or pigments. In addition to the disclosure below, suitable examples of such other adjuncts and levels of use are found in U.S. Patent Nos. 5,576,282; 6,306,812B1 and 6,326,348B1 that are incorporated by reference.

10 Each adjunct ingredients is not essential to Applicants' compositions. Thus, certain embodiments of Applicants' compositions do not contain one or more of the adjunct ingredients.

Surfactants – The compositions according to the present invention can comprise a surfactant or surfactant system wherein the surfactant can be selected from nonionic and/or anionic and/or cationic surfactants and/or ampholytic and/or zwitterionic and/or semi-polar
15 nonionic surfactants. Anionic and nonionic surfactants are typically employed if the fabric care product is a laundry detergent. On the other hand, cationic surfactants are typically employed if the fabric care product is a fabric softener. In one embodiment, the non-ionic surfactant may comprise an ethoxylated non-ionic surfactant. Suitable for use herein are the ethoxylated alcohols and ethoxylated alkyl phenols of the formula $R(OC_2H_4)_n OH$, wherein R is selected
20 from the group consisting of aliphatic hydrocarbon radicals containing from about 8 to about 20 carbon atoms and alkyl phenyl radicals in which the alkyl groups contain from about 8 to about 12 carbon atoms, and the average value of n is from about 5 to about 15. The surfactant is typically present at a level of from about 0.1 wt%, from about 1 wt%, or even from about 5 wt%, to about 99.9 wt%, to about 80 wt%, to about 35 wt%, or even to about 30 wt%, based on the
25 total weight of the composition.

Builders – The compositions may also contain from about 0.1% to 80% by weight of a builder. Compositions in liquid form generally contain from about 1% to 10% by weight of the builder component. Compositions in granular form generally contain from about 1% to 50% by weight of the builder component. Detergent builders are well known in the art and can contain,
30 for example, phosphate salts as well as various organic and inorganic nonphosphorus builders.

Water-soluble, nonphosphorus organic builders useful herein include the various alkali metal, ammonium and substituted ammonium polyacetates, carboxylates, polycarboxylates and polyhydroxy sulfonates. Examples of polyacetate and polycarboxylate builders are the sodium, potassium, lithium, ammonium and substituted ammonium salts of ethylene diamine tetraacetic acid, nitrilotriacetic acid, oxydisuccinic acid, mellitic acid, benzene polycarboxylic acids, and citric acid. Other polycarboxylate builders are the oxydisuccinates and the ether carboxylate builder compositions comprising a combination of tartrate monosuccinate and tartrate disuccinate. Builders for use in liquid detergents include citric acid. Suitable nonphosphorus, inorganic builders include the silicates, aluminosilicates, borates and carbonates, such as sodium and potassium carbonate, bicarbonate, sesquicarbonate, tetraborate decahydrate, and silicates having a weight ratio of SiO_2 to alkali metal oxide of from about 0.5 to about 4.0, or from about 1.0 to about 2.4. Also useful are aluminosilicates including zeolites.

Chelating Agents – The compositions herein may also optionally contain one or more copper, iron and/or manganese chelating agents. If utilized, chelating agents will generally comprise from about 0.1 wt% by weight of the compositions herein to about 15 wt%, or even from about 3 wt% to about 15 wt% by weight of the compositions herein.

Dye Transfer Inhibiting Agents – The compositions of the present invention may also include one or more dye transfer inhibiting agents. Suitable polymeric dye transfer inhibiting agents include, but are not limited to, polyvinylpyrrolidone polymers, polyamine N-oxide polymers, copolymers of N-vinylpyrrolidone and N-vinylimidazole, polyvinylloxazolidones and polyvinylimidazoles or mixtures thereof. When present in the compositions herein, the dye transfer inhibiting agents are present at levels from about 0.000 wt%, from about 0.01 wt%, from about 0.05 wt% by weight of the compositions to about 10 wt%, about 2 wt%, or even about 1 wt% by weight of the compositions.

Dispersants – The compositions of the present invention can also contain dispersants. Suitable water-soluble organic materials are the homo- or co-polymeric acids or their salts, in which the polycarboxylic acid may comprise at least two carboxyl radicals separated from each other by not more than two carbon atoms.

Enzymes – The compositions may contain one or more detergent enzymes which provide cleaning performance and/or fabric care benefits. Examples of suitable enzymes include

hemicellulases, peroxidases, proteases, cellulases, xylanases, lipases, phospholipases, esterases, cutinases, pectinases, keratanases, reductases, oxidases, phenoloxidas, lipoxigenases, ligninases, pullulanases, tannases, pentosanases, malanases, β -glucanases, arabinosidases, hyaluronidase, chondroitinase, laccase, and amylases, or mixtures thereof. A typical
5 combination may be a cocktail of conventional applicable enzymes like protease, lipase, cutinase and/or cellulase in conjunction with amylase. Enzymes can be used at their art-taught levels, for example at levels recommended by suppliers such as Novozymes and Genencor. Typical levels in the compositions are from about 0.0001% to about 5%. When enzymes are present, they can be used at very low levels, *e.g.*, from about 0.001% or lower; or they can be used in heavier-duty
10 laundry detergent formulations at higher levels, *e.g.*, about 0.1% and higher. In accordance with a preference of some consumers for "non-biological" detergents, the compositions may be either or both enzyme-containing and enzyme-free.

Enzyme Stabilizers - Enzymes for use in compositions, for example, detergents can be stabilized by various techniques. The enzymes employed herein can be stabilized by the presence
15 of water-soluble sources of calcium and/or magnesium ions in the finished compositions that provide such ions to the enzymes.

Catalytic Metal Complexes - Applicants' compositions may include catalytic metal complexes. One type of metal-containing bleach catalyst is a catalyst system comprising a transition metal cation of defined bleach catalytic activity, such as copper, iron, titanium,
20 ruthenium, tungsten, molybdenum, or manganese cations, an auxiliary metal cation having little or no bleach catalytic activity, such as zinc or aluminum cations, and a sequester having defined stability constants for the catalytic and auxiliary metal cations, particularly ethylenediaminetetraacetic acid, ethylenediaminetetra (methyl-enephosphonic acid) and watersoluble salts thereof. Such catalysts are disclosed in U.S. patent 4,430,243.

25 Additional Perfume: The additional perfume component may comprise a component selected from the group consisting of

(1) a perfume microcapsule, or a moisture-activated perfume microcapsule, comprising a perfume carrier and an encapsulated perfume composition, wherein said perfume carrier may be selected from the group consisting of cyclodextrins, starch
30 microcapsules, porous carrier microcapsules, and mixtures thereof; and wherein said

encapsulated perfume composition may comprise low volatile perfume ingredients, high volatile perfume ingredients, and mixtures thereof;

(2) a pro-perfume;

(3) a low odour detection threshold perfume ingredients, wherein said low odour detection threshold perfume ingredients may comprise less than about 25%, by weight of the total neat perfume composition; and

(4) mixtures thereof.

Porous Carrier Microcapsule - A portion of the additional perfume can also be absorbed onto and/or into a porous carrier, such as zeolites or clays, to form perfume porous carrier microcapsules in order to reduce the amount of free perfume in the multiple use fabric conditioning composition.

Pro-perfume - The additional perfume may additionally include a pro-perfume. Pro-perfumes may comprise nonvolatile materials that release or convert to a perfume material as a result of, e.g., simple hydrolysis, or may be pH-change-triggered pro-perfumes (e.g. triggered by a pH drop) or may be enzymatically releasable pro-perfumes, or light-triggered pro-perfumes. The pro-perfumes may exhibit varying release rates depending upon the pro-perfume chosen.

The compositions of the present invention can be formulated into any suitable form and prepared by any process well known to those skilled in the art.

Process of Making Consumer Product

In one aspect, the compositions containing the ionic liquid system disclosed herein can be made by the following process whereby: (i) form the cation by protonation of the perfume raw material; (ii) combine the cation and anion as disclosed herein to form the ionic liquid, and (iii) add the ionic liquid to the consumer product adjunct materials to form the consumer product. In another aspect, after forming the cation per point (i), the cation and anion can be combined directly with the consumer product adjunct materials to form the consumer product.

The ionic liquid may be combined with such one or more consumer product adjunct materials in one or more forms, including a slurry form, neat particle form and spray dried particle form. The ionic liquid may be combined with such consumer product adjunct materials by methods commonly known to those skilled in the art including mixing and/or spraying.

The compositions of the present invention can be formulated into any suitable form and prepared by any process chosen by the formulator, suitable non-limiting examples of which are described in U.S. Patent No. 5,879,584.

Suitable equipment for use in the processes disclosed herein may include continuous stirred tank reactors, homogenizers, turbine agitators, recirculating pumps, paddle mixers, plough shear mixers, ribbon blenders, vertical axis granulators and drum mixers, both in batch and, where available, in continuous process configurations, spray dryers, and extruders. Such equipment can be obtained from Lödige GmbH (Paderborn, Germany), Littleford Day, Inc. (Florence, Kentucky, U.S.A.), Forberg AS (Larvik, Norway), Glatt Ingenieurtechnik GmbH (Weimar, Germany), Niro (Søborg, Denmark), Hosokawa Bepex Corp. (Minneapolis, Minnesota, U.S.A.), Arde Barinco (New Jersey, U.S.A.).

Method of Use

Compositions containing the ionic liquid system disclosed herein can be used to deliver and/or deposit scents to a substrate. Typically, at least a portion of the substrate is contacted with an embodiment of the Applicants' composition, in neat form or diluted in a liquor, for example, a wash liquor and then the situs may be optionally washed and/or rinsed. In one aspect, a substrate is optionally washed and/or rinsed, contacted with a composition comprising the ionic liquid system according to the present invention and then optionally washed and/or rinsed.

In another aspect, a method of providing enhanced fragrance onto a fabric comprising the steps of optionally washing and/or rinsing the fabric, contacting the fabric with a detergent composition according to the present invention, then optionally washing and/or rinsing the fabric. For purposes of the present invention, washing includes but is not limited to, scrubbing and mechanical agitation.

The fabric may comprise most any fabric capable of being laundered or treated in normal consumer use conditions. Liquors that may comprise the disclosed compositions may have a pH of from about 3 to about 11.5. Such compositions are typically employed at concentrations of from about 500 ppm to about 15,000 ppm in solution. When the wash solvent is water, the water temperature typically ranges from about 5 °C to about 90 °C and, when the situs comprises a fabric, the water to fabric ratio is typically from about 1:1 to about 30:1.

Accordingly, the present invention also relates to methods of using the compositions and consumer products for biofilm removal, freshness delivery and/or malodour control.

In other aspect, the present invention also relates to a method of controlling malodour comprising contacting a substrate comprising a malodour with a composition selected from the group consisting of the composition of the consumer product as disclosed herein above, the detergent composition as disclosed herein above, and mixtures thereof.

In other aspect, the compositions of the present invention can be applied to the substrate as a liquid spray, as an aerosol spray or as a pour-on liquid, which can be poured onto the substrate directly or indirectly via a substrate such as a fibrous web substrate (made by woven, non-woven or knitted technologies), a pulp-based substrate (made by air-felt or wet-laid technologies, including paper towels and tissues), a sponge or a foam substrate. Another mode of use would be to incorporate the compositions comprising the IL into or onto those substrates (e.g., impregnated in a wipe or a mitten), which would alleviate residue problems in those applications where complete dry down is needed.

TEST METHODS

It is understood that the test methods that are disclosed in the Test Methods Section of the present application should be used to determine the respective values of the parameters of Applicants' invention as such invention is described and claimed herein.

Test Method 1: clogP

The logP values of many perfume ingredients have been reported; for example, the Pomona92 database, available from Daylight Chemical Information Systems, Inc. (Daylight CIS, Irvine, California), contains many, along with citations to the original literature. However, the logP values are most conveniently calculated by the "CLOGP" program, also available from Daylight CIS. This program also lists experimental logP values when they are available in the Pomona92 database. The "calculated logP" (clogP) is determined by the fragment approach of Hansch and Leo (cf., A. Leo, in *Comprehensive Medicinal Chemistry*, Vol. 4, C. Hansch, P. G. Sammens, J. B. Taylor and C. A. Ramsden, Eds., p. 295, Pergamon Press, 1990, incorporated herein by reference). The fragment approach is based on the chemical structure of each perfume

ingredient, and takes into account the numbers and types of atoms, the atom connectivity, and chemical bonding. The clogP values, which are the most reliable and widely used estimates for this physicochemical property, are preferably used instead of the experimental logP values in the selection of perfume ingredients which are useful in the present invention.

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Test Method 2: Calculated pKa

The apparent acid dissociation constant (*i.e.*, pKa) for the perfume raw materials is calculated using the pKa calculation module of Advanced Chemistry Development (ACD/Labs) Software V14.02 (© 1994-2014 ACD/Labs)). The Ka is defined the equilibrium constant for a dissociation of an acid (HA) to its conjugate base and a hydrogen ion.

10

Test Method 3: Olfactory Test

In order to show the effect of the ionic liquids on the delivery and/or deposition of the PRMs in a composition of the present invention, test compositions are made, as described in the Example section, and given to panelists to sample. Different product forms comprising of liquid fabric enhancer ("LFE"), unit dose detergent ("SUD"), and/or heavy duty liquid ("HDL") are made and tested in the wash condition described below. After washing, the headspace measurement for the wet fabric ("WFO") and dry fabric ("DFO") are recorded, whereby an increase in headspace vs. a control reference indicates a higher deposition and consequent release of the PRMs.

20

1. Product Making:

LFE and SUD products are made containing 3 wt% of ionic liquid system added.

2. Load Composition:

Perfume ballast load is 3 Kg and contains:

25

- (i) 600 g polyester;
- (ii) 600 g polycotton;
- (iii) 600 g muslin (flat) cotton;
- (iv) 600 g knitted cotton; and
- (v) 600 g terry towels.

Ballast loads are pre-conditioned: 2 X 70 g Ariel[®] Sensitive Detergent, 95 °C wash + 2 X nil powder, short cotton wash @ 95 °C.

After each wash test ballast load is re-washed: 2 X 70 g Ariel[®] Sensitive Detergent, 95 °C wash + 2 X nil powder, short cotton wash @ 95 °C.

5 For each wash test we add 6 terry tracers (Maes Textile).

Tracers are pre-conditioned: 2 x 70 g Ariel[®] Sensitive Detergent, 95 °C wash + 2 X nil powder, short cotton wash @ 95 °C. Tracers are not re-used.

3. Wash Conditions:

Before test, washing machine is boiled washed (short cotton wash @ 95 °C).

10 Test conditions:

- (i) Miele Novotronic W526;
- (ii) Short cotton cycle wash at 60 °C, 1200 rpm spin speed with either Ariel[®] Sensitive Detergent powder or SUD;
- (iii) Put load in washing machine and add powder in the dispenser or the SUD in the
15 washing chamber;
- (iv) Optionally, add a dosage of 35 mL LFE in the dispenser;
- (v) Run wash cycle; and
- (vi) Evaluate WFO and/or after 1 day line dry for the DFO.

4. Performance Evaluation:

20 Terry tracers are evaluated by panelists and scored on the Primavera Grade (0-100 scale for intensity, where a 10 point difference is consumer noticeable). Panelists are selected from individuals who are either trained to evaluate fragrances according to the scales below or who have considerable experience of fragrance evaluation in the industry (*i.e.*, experts).

25 Test Method 4: Anti-Malodour Performance Test

1. Selection and Training of Assessors

A. The assessors must be able to differentiate the sweat odour from an odourless solvent (*e.g.*, dipropylene glycol = DPG). To do this, several cardboard smelling strips are immersed in a highly dilute solution (0.1% in DPG) of the 3-mercapto-3-methyl-
30 hexan-1-ol. In addition, several smelling strips are immersed in DPG. Only those

assessors who can perfectly differentiate the smelling strips in a test with 3-mercapto-3-methyl-hexan-1-ol -- 3-mercapto-3-methyl-hexan-1-ol -- DPG and DPG -- DPG -- 3-mercapto-3-methyl-hexan-1-ol take part in further testing.

- 5 B. Several concentrations of 3-mercapto-3-methyl-hexan-1-ol are then placed in a container with a volume of 7 L filled with air. The samples are sorted by the assessors according to intensity, *i.e.* odour strength. The series of concentrations must be correctly recognised and evaluated by the assessors. Assessors who have passed both tests can take part in the raw material test described in the following section.

2. Material Test Against Sweat Odour

- 10 A. The test materials examined are either individual perfume raw materials (PRMs) or perfume oils. The test materials are evaluated by the selected assessors in a predefined gaseous sample with regard to intensity and residual odour strength of the 3-mercapto-3-methyl-hexan-1-ol, a target malodour compound.

- 15 B. 1 μ L of the test material and 5 μ L of the dilute 3-mercapto-3-methyl-hexan-1-ol (0.1% in DPG) respectively are placed in a container with a volume of 7 L filled with air. The samples are kept at room temperature (*e.g.*, 20 °C) for 15 hrs before evaluation. The individual samples are each evaluated by at least 8 assessors by smelling in comparison with a sample just with 3-mercapto-3-methyl-hexan-1-ol-solution. The mean value is then formed from the at least 8 values obtained for the
20 respective raw material. The intensity of a test material describes the intensity of the test material perceived by odour by trained assessors, irrespective of the quality of the odour as a bad odour or pleasant odour. The stronger a test material smells the higher is the level of the intensity. The intensity is evaluated on a scale of 1 to 9. Level 1 means odourless, 9 means very strong odour detected. The term malodour reduction
25 value describes in the present case the difference in intensity, *i.e.* the difference between the bad odour (malodour) of the malodour standard mixture and the test mixture.

- C. The malodour standard mixture without test material, *i.e.*, 3-mercapto-3-methyl-hexan-1-ol, receives intensity 6. The assessors are selected on the basis of their ability

to reproducibly evaluate the strengths of odours. The assessors are trained before the series of tests to recognise the odour of 3-mercapto-3-methyl-hexan-1-ol.

EXAMPLES

The following examples are provided to further illustrate the present invention and are not to be construed as limitations of the present invention, as many variations of the present invention are possible without departing from its spirit or scope.

The structures of the ionic liquids of the present invention can be characterized by various techniques well-known to the skilled person, including for example: ^1H NMR (nuclear magnetic resonance), ^{13}C NMR, Halogen analysis and Elemental analysis.

Nuclear magnetic resonance spectroscopy ("NMR") is spectroscopic technique well-known to the skilled person and used herein to characterize the ionic liquids prepared herein.

Mass Spectrometry ("MS") is a spectroscopic technique used herein to quantify the mass to charge ratio of particles or molecules. Two different methods of MS are used: Electron Spray MS ("ES-MS") and Electron Ionisation MS ("EI-MS"). ES-MS is used for non-volatile materials such as the ionic liquids. EI-MS is used for volatile materials such as the precursor materials.

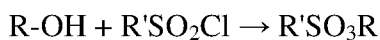
Example 1 – Synthesis of Ionic Liquids

The general method for synthesizing ionic liquids of the present invention consists of: (i) synthesis of chloride or sulfonate ester precursor; (ii) quaternisation of an amine using a chloroalkane or sulfonyl ester in order to obtain ionic liquid with chloride or sulfonate anion; and (iii) metathesis (*i.e.*, anion exchange) reaction in order to create the target ionic liquid. This is illustrated in Reaction Scheme 1.

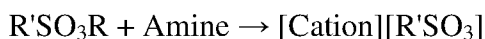
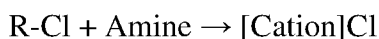
Reaction Scheme 1

General Synthesis of Ionic Liquids

(i) Precursor synthesis step:



(ii) Quaternisation step:

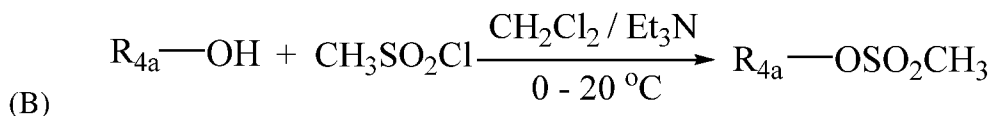
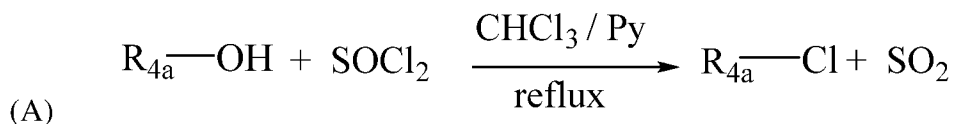


(iii) Metathesis Step: $[\text{Cation}]\text{Cl} + \text{Na} / \text{K} [\text{Anion}] \rightarrow [\text{Cation}][\text{Anion}] + \text{Na} / \text{KCl}$

Ionic liquids are formed by combining salts of a cation and an anion (*e.g.*, sodium or potassium salt of the anion and chloride salt of the cation). Different ionic liquids can be synthesised such that the interactions between the ionic liquids and the solutes (*i.e.*, PRMs) are optimised. Ionic liquids lend themselves to preparation *via* combinatorial chemistry. The steps shown in the Reaction Scheme 1 are described below in more details.

Reaction Scheme 2

Step (i): Synthesis of Chloride or Sulfonate Ester Precursor



(A) Chloride Precursor Synthesis:

Equimolar amounts of 2-(2-methoxyethoxy)ethanol (1A) or 2-(2-ethoxyethoxy)ethanol (1B) and pyridine are added to a three-neck round bottom flask under N₂. Trichloromethane is used as a solvent for the reaction. Thionyl chloride (1.2 mol eq) is added drop-wise to the stirred mixture *via* a pressure equalising funnel. Once the addition is completed, the reaction mixture is then heated at 60°C under reflux for 24 h. The reaction mixture is then washed with water (4x), saturated aqueous sodium hydrogencarbonate (3x), dried over anhydrous magnesium sulfate and filtered. The solvent is removed under reduced pressure and the resulting crude product is then distilled yielding the pure product.

(B) Sulfonate Ester Precursor Synthesis:

Equimolar amounts of 2-(2-methoxyethoxy)ethanol (1A) and triethylamine in dichloromethane are added to a round bottom flask in an ice bath under N₂. The mixture is stirred

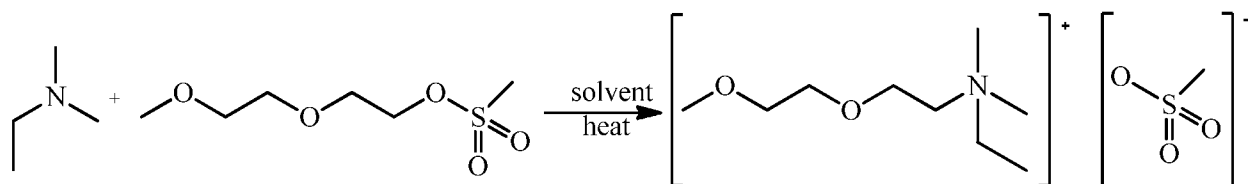
at 0°C for 20 min before sulfonyl chloride is added dropwise, in slight excess, *via* a pressure equalizing funnel. Once the addition is completed, the reaction mixture is warmed to room temperature overnight. The reaction mixture is then washed with water (6x), saturated sodium chloride solution (3x), dried over anhydrous magnesium sulfate, filtered and concentrated to yield the sulfonate ester precursor. Sulfonate ester precursor is obtained as a colorless liquid by fractional distillation of the crude product.

Table 3: Structures of 1A and 1B

	Chemical Name	Chemical Structure
1A	2-(2-methoxyethoxy)ethanol	
1B	2-(2-ethoxyethoxy)ethanol	

Reaction Scheme 3

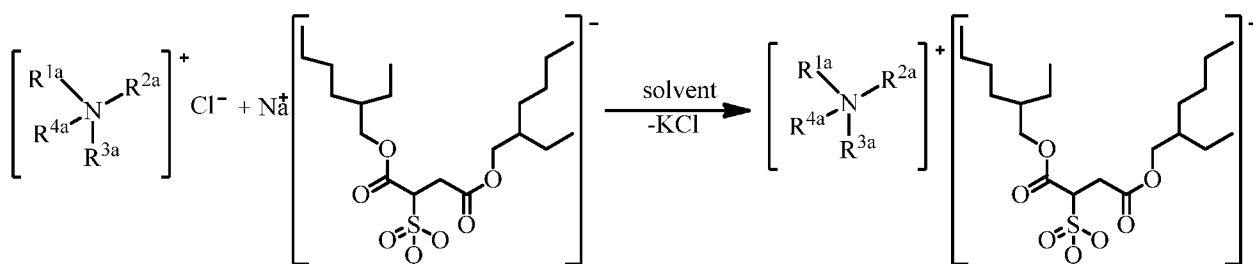
Step (ii): Quaternisation of an Amine using Chloroalkane or Sulfonyl Ester Precursors



Equimolar amounts of chloride precursor or sulfonyl ester precursor and amine (dimethylethylamine or dimethyloctylamine) are added to a tetrahydrofuran in a sealable reactor. The sealed reaction mixture is stirred and heated at 60 °C until the reaction is completed. The progress of reaction is monitored by NMR spectroscopy. Solvent and unreacted amine are removed under reduced pressure. The product is washed with ethyl ethanoate (6x) and cyclohexane (2x). The residual solvent is removed *via* rotary evaporator and the product is dried under high vacuum at 40-80 °C for 1-3 days. Exemplary ionic liquids in Table 4 are synthesized according to this method.

Reaction Scheme 4

Step (iii): Metathesis Synthesis Reaction of Docusate Ionic Liquids



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Sodium docusate

To a chloride ionic liquid in dichloromethane, sodium docusate are added in equimolar quantities, followed by sonication and stirring for 6 h. The byproduct, sodium chloride, is removed by centrifugation at 4,400 rpm, followed by filtration. The solvent is removed *via* rotary evaporation. The resulting product is dried by heating at 40-80 °C for 1-3 days, under high vacuum.

10

Table 4: Exemplary Ionic Liquids of the Present Invention

Example	IL Components	Chemical Structure	
		Cation	Anion
Ionic Liquid	Protonated Thymol dioctylsuccinate		
Ionic Liquid	Protonated Acetanilide dioctylsuccinate		

15

EXAMPLE 2 – Detergent Compositions

The following are non-limiting examples of granular detergent compositions containing ionic liquids of the present invention. They are prepared by admixture of the components described in Table 5, in the proportions indicated.

Table 5 – Granular Detergent Compositions

Ingredients	Dry Laundry Compositions (wt% ¹)				
	Ex. 1	Ex. 2	Ex. 3	Ex. 4	Ex. 5
Linear alkylbenzenesulfonate	20	22	20	15	19.5
C ₁₂₋₁₄ Dimethylhydroxy ethylammonium chloride	0.7	0.2	1	0.6	0.0
AE3S	0.9	1	0.9	0.0	0.4
AE7	0.0	0.0	0.0	1	0.1
Sodium tripolyphosphate	5	0.0	4	9	2
Zeolite A	0.0	1	0.0	1	4
1.6R Silicate (SiO ₂ :Na ₂ O at ratio 1.6:1)	7	5	2	3	3
Sodium carbonate	25	20	25	17	18
Polyacrylate MW 4500	1	0.6	1	1	1.5
Random graft copolymer ²	0.1	0.2	0.0	0.0	0.05
Carboxymethyl cellulose	1	0.3	1	1	1
Stainzyme® (20 mg active/g)	0.1	0.2	0.1	0.2	0.1
Protease (Savinase®, 32.89 mg active/g)	0.1	0.1	0.1	0.1	0.1
Amylase - Natalase® (8.65 mg active /g)	0.1	0.0	0.1	0.0	0.1
Lipase - Lipex® (18 mg active /g)	0.03	0.07	0.3	0.1	0.07
Fluorescent Brightener 1	0.06	0.0	0.06	0.18	0.06
Fluorescent Brightener 2	0.1	0.06	0.1	0.0	0.1
DTPA	0.6	0.8	0.6	0.25	0.6
MgSO ₄	1	1	1	0.5	1
Sodium Percarbonate	0.0	5.2	0.1	0.0	0.0
Sodium Perborate Monohydrate	4.4	0.0	3.85	2.09	0.78
NOBS	1.9	0.0	1.66	0.0	0.33
TAED	0.58	1.2	0.51	0.0	0.015
Sulphonated zinc phthalocyanine	0.0030	0.0	0.0012	0.0030	0.0021
S-ACMC	0.1	0.0	0.0	0.0	0.06
Direct Violet Dye (DV9 or DV99 or DV66)	0.0	0.0	0.0003	0.0001	0.0001
Neat Perfume ²	0.5	0.5	0.5	0.5	0.5
Ionic liquid from Examples 1 to 2	3	2	1	0.5	1

Total	100	100	100	100	100
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¹ wt% relative to the total weight of the composition.

² Optional.

The following are non-limiting examples of liquid detergent compositions containing ionic liquids of the present invention. They are prepared by admixture of the components described in Table 6, in the proportions indicated.

Table 6 – Liquid Detergent Compositions

Ingredients	Liquid Detergent Compositions (wt% ¹)				
	Ex. 6	Ex. 7	Ex. 8	Ex. 9	Ex. 10
AES C ₁₂₋₁₅ alkyl ethoxy (1.8) sulfate	11	10	4	6.32	0
AE3S	0	0	0	0	2.4
Linear alkyl benzene sulfonate/sulfonic acid	1.4	4	8	3.3	5
HSAS	3	5.1	3	0	0
Sodium formate	1.6	0.09	1.2	0.04	1.6
Sodium hydroxide	2.3	3.8	1.7	1.9	1.7
Monoethanolamine	1.4	1.49	1.0	0.7	0
Diethylene glycol	5.5	0.0	4.1	0.0	0
AE9	0.4	0.6	0.3	0.3	0
AE8	0	0	0	0	0
AE7	0	0	0	0	2.4
Chelant (HEDP)	0.15	0.15	0.11	0.07	0.5
Citric Acid	2.5	3.96	1.88	1.98	0.9
C ₁₂₋₁₄ dimethyl Amine Oxide	0.3	0.73	0.23	0.37	0
C ₁₂₋₁₈ Fatty Acid	0.8	1.9	0.6	0.99	1.2
4-formyl-phenylboronic acid	0	0	0	0	0.05
Borax	1.43	1.5	1.1	0.75	0
Ethanol	1.54	1.77	1.15	0.89	0
A compound having the following general structure: bis((C ₂ H ₅ O)(C ₂ H ₄ O) _n)(CH ₃)-N ⁺ -C _x H _{2x} -N ⁺ -(CH ₃)-	0.1	0	0	0	0

bis((C ₂ H ₅ O)(C ₂ H ₄ O) _n), wherein n = from 20 to 30, and x = from 3 to 8, or sulphated or sulphonated variants thereof					
Ethoxylated (EO ₁₅) tetraethylene pentamine	0.3	0.33	0.23	0.17	0.0
Ethoxylated Polyethylenimine	0	0	0	0	0
Ethoxylated hexamethylene diamine	0.8	0.81	0.6	0.4	1
1,2-Propanediol	0.0	6.6	0.0	3.3	0.5
Fluorescent Brightener	0.2	0.1	0.05	0.3	0.15
Hydrogenated castor oil derivative structurant	0.1	0	0	0	0
Perfume	1.6	1.1	1.0	0.8	0.9
Protease (40.6 mg active/g)	0.8	0.6	0.7	0.9	0.7
Mannanase: Mannaway [®] (25 mg active/g)	0.07	0.05	0.045	0.06	0.04
Amylase: Stainzyme [®] (15 mg active/g)	0.3	0	0.3	0.1	0
Amylase: Natalase [®] (29 mg active/g)	0	0.2	0.1	0.15	0.07
Xyloglucanase (Whitezyme [®] , 20mg active/g)	0.2	0.1	0	0	0.05
Lipex [®] (18 mg active/g)	0.4	0.2	0.3	0.1	0.2
Neat Perfume ²	0.5	0.5	0.5	0.5	0.5
Ionic liquid from Examples 1 to 2	3	2	1	0.5	1
*Water, dyes & minors	Balance				

¹ wt% relative to the total weight of the composition.

² Optional.

Raw Materials and Notes For Detergent Composition Examples

1. "LAS" is linear alkylbenzenesulfonate having an average aliphatic carbon chain length C₉-C₁₅, supplier: Stepan, Northfield, Illinois, USA or Huntsman Corp. (HLAS is acid form).

2. C₁₂₋₁₄ Dimethylhydroxyethyl ammonium chloride, supplier: Clariant GmbH, Germany.
3. AE3S is C₁₂₋₁₅ alkyl ethoxy (3) sulfate, supplier: Stepan, Northfield, Illinois, USA.
4. AE7 is C₁₂₋₁₅ alcohol ethoxylate, with an average degree of ethoxylation of 7, supplier: Huntsman, Salt Lake City, Utah, USA
- 5 5. AES is C₁₀₋₁₈ alkyl ethoxy sulfate, supplier: Shell Chemicals.
6. AE9 is C₁₂₋₁₃ alcohol ethoxylate, with an average degree of ethoxylation of 9, supplier: Huntsman, Salt Lake City, Utah, USA.
7. HSAS or HC1617HSAS is a mid-branched primary alkyl sulfate with average carbon chain length of about 16-17.
- 10 8. Sodium tripolyphosphate, supplier: Rhodia, Paris, France.
9. Zeolite A, supplier: Industrial Zeolite (U.K) Ltd, Grays, Essex, U.K.
10. 1.6R Silicate, supplier: Koma, Nestemica, Czech Republic.
11. Sodium Carbonate, supplier: Solvay, Houston, Texas, USA.
12. Polyacrylate MW 4500, supplier: BASF, Ludwigshafen, Germany.
- 15 13. Carboxymethyl cellulose is Finifix[®] V, supplier: CP Kelco, Arnhem, Netherlands.
14. Suitable chelants are, for example, diethylenetetraamine pentaacetic acid (DTPA), supplier: Dow Chemical, Midland, Michigan, USA or Hydroxyethane di phosphonate (HEDP), supplier: Solutia, St Louis, Missouri, USA Bagsvaerd, Denmark.
15. Savinase[®], Natalase[®], Stainzyme[®], Lipex[®], Celluclean[™], Mannaway[®] and Whitezyme[®],
20 supplier: Novozymes, Bagsvaerd, Denmark.
16. Proteases, supplier: Genencor International, Palo Alto, California, USA (*e.g.* Purafect Prime[®]) or by Novozymes, Bagsvaerd, Denmark (*e.g.* Liquanase[®], Coronase[®]).
17. Fluorescent Brightener 1 is Tinopal[®] AMS, Fluorescent Brightener 2 is Tinopal[®] CBS-X, Sulphonated zinc phthalocyanine and Direct Violet 9 is Pergasol[®] Violet BN-Z, supplier:
25 Ciba Specialty Chemicals, Basel, Switzerland.
18. Sodium percarbonate, supplier: Solvay, Houston, Texas, USA.
19. Sodium perborate, supplier: Degussa, Hanau, Germany.
20. "NOBS" is sodium nonanoyloxybenzenesulfonate, supplier: Future Fuels, Batesville, USA.
21. "TAED" is tetraacetythylenediamine (Peractive[®]), supplier: Clariant GmbH, Sulzbach,
30 Germany.

22. "S-ACMC" is carboxymethylcellulose conjugated with C.I. Reactive Blue 19 (AZO-CM-CELLULOSE, product code S-ACMC), supplier: Megazyme, Wicklow, Ireland.
23. Soil release agent is Repel-o-tex[®] PF, supplier: Rhodia, Paris, France.
24. Acrylic Acid/Maleic Acid Copolymer is molecular weight 70,000 and acrylate:maleate ratio
5 70:30, supplier: BASF, Ludwigshafen, Germany.
25. Na salt of Ethylenediamine-N,N'-disuccinic acid, (S,S) isomer (EDDS), supplier: Octel, Ellesmere Port, U.K.
26. Hydroxyethane di phosphonate (HEDP), supplier: Dow Chemical, Midland, Michigan, USA.
27. Suds suppressor agglomerate, supplier: Dow Corning, Midland, Michigan, USA.
- 10 28. HSAS is mid-branched alkyl sulfate as disclosed in U.S. Patent Nos. 6,020,303 and 6,060,443.
29. C₁₂₋₁₄ dimethyl Amine Oxide, supplier: Procter & Gamble Chemicals, Cincinnati, USA.
30. Random graft copolymer is a polyvinyl acetate grafted polyethylene oxide copolymer having a polyethylene oxide backbone and multiple polyvinyl acetate side chains. The molecular
15 weight of the polyethylene oxide backbone is about 6000 and the weight ratio of the polyethylene oxide to polyvinyl acetate is about 40:60 and no more than 1 grafting point per 50 ethylene oxide units.
31. Ethoxylated polyethyleneimine is polyethyleneimine (MW = 600) with 20 ethoxylate groups per -NH.
- 20 32. Cationic cellulose polymer is LK400, LR400 and/or JR30M, supplier: Amerchol Corporation, Edgewater N.J.
33. Note: all enzyme levels are expressed as % enzyme raw material.

EXAMPLE 4 – Hair Care Compositions

- 25 The following are non-limiting examples of hair care compositions containing ionic liquids of the present invention. They are prepared by admixture of the components described in Tables below, in the proportions indicated.

Table 7 – Leave-on Conditioner Composition

Ingredients	Leave-on Conditioner Compositions (wt%)
-------------	---

	Ex. 11
Premix	--
Aminosilicone	--
PDMS	1.0 – 1.5
Gel matrix carrier	--
Behenyl trimethyl ammonium chloride	--
Stearamidopropyldimethylamine (SAPDMA), C18	0.60 – 0.8
DTDMAC, C18(Quaternium-18)	0.45 – 0.6
Citric Acid (anhydrous)	0.10 – 0.25
Cetyl alcohol	0.80 – 1.0
Stearyl alcohol	0.54 – 1.0
Deionized Water	Balance
Polymers	--
Hydroxyethylcellulose (HEC)	0.15 – 0.50
PEG-2M (Polyox WAR N-10)	0.30 – 0.60
Others	--
Ionic liquid from Examples 1 to 2	0.10 – 1.20
Preservatives	0.40 – 0.60

Table 8 – Shampoo Compositions

Ingredients	Shampoo Compositions (wt%)		
	Ex. 12	Ex. 13	Ex. 14
Water	q.s.	q.s.	q.s.
Polyquaternium 76 ¹	2.50	--	-
Guar, Hydroxylpropyl Trimonium Chloride ²	--	0.25	--
Polyquaterium 6 ³	-	-	0.79
Sodium Laureth Sulfate (SLE3S) ⁴	21.43	21.43	21.43
Sodium Lauryl Sulfate (SLS) ⁵	20.69	20.69	20.69

Silicone ⁶	0.75	1.00	0.5
Cocoamidopropyl Betaine ⁷	3.33	3.33	3.33
Cocoamide MEA ⁸	1.0	1.0	1.0
Ethylene Glycol Distearate ⁹	1.50	1.50	1.50
Sodium Chloride ¹⁰	0.25	0.25	0.25
Free Perfume Oil	0.70	0.70	0.70
Ionic liquid from Examples 1 to 2	1.2	1.2	1.2
Preservatives, pH adjusters	Up to 1%	Up to 1%	Up to 1%

¹ Mirapol AT-1, Copolymer of Acrylamide(AM) and TRIQUAT, MW=1,000,000; CD= 1.6 meq./gram; 10% active, supplier: Rhodia.

² Jaguar C500, MW – 500,000, CD=0.7, supplier: Rhodia.

5 ³ Mirapol 100S, 31.5% active, supplier: Rhodia.

⁴ Sodium Laureth Sulfate (SLS), 28% active, supplier: Procter & Gamble.

⁵ Sodium Lauryl Sulfate, 29% active, supplier: Procter & Gamble.

⁶ Glycidol Silicone VC2231-193C.

⁷ Tegobetaine F-B, 30% active, supplier: Goldschmidt Chemicals.

10 ⁸ Monamid CMA, 85% active, supplier: Goldschmidt Chemicals.

⁹ Ethylene Glycol Distearate, EGDS Pure, supplier: Goldschmidt Chemicals.

¹⁰ Sodium Chloride USP (food grade), supplier: Morton. (Note that salt is an adjustable ingredient, higher or lower levels may be added to achieve target viscosity.)

15 Table 9 – Shampoo Compositions (Cont.)

Ingredients	Shampoo Compositions (wt %)		
	Ex. 15	Ex. 16	Ex. 17
Water	q.s.	q.s.	q.s.
Silicone A ¹	1.0	--	--
Silicone B ²	--	0.5	--
Silicone C ³	--	--	0.5
Cyclopentasiloxane ⁴	--	0.61	1.5
Behenyl trimethyl ammonium chloride ⁵	2.25	2.25	2.25
Isopropyl alcohol	0.60	0.60	0.60

Cetyl alcohol ⁶	1.86	1.86	1.86
Stearyl alcohol ⁷	4.64	4.64	4.64
Disodium EDTA	0.13	0.13	0.13
NaOH	0.01	0.01	0.01
Benzyl alcohol	0.40	0.40	0.40
Methylchloroisothiazolinone/ Methylisothiazolinone ⁸	0.0005	0.0005	0.0005
Panthenol ⁹	0.10	0.10	0.10
Panthenyl ethyl ether ¹⁰	0.05	0.05	0.05
Free Perfume Oil	0.35	0.35	0.35
Ionic liquid from Examples 1 to 2	1.2	1.2	1.2

¹ Glycidol Silicone VC2231-193.

² Glycidol Silicone VC2231-193F.

³ Glycidol Silicone VC2231-193A.

5 ⁴ Cyclopentasiloxane: SF1202, supplier: Momentive Performance Chemicals.

⁵ Behenyl trimethyl ammonium chloride/Isopropyl alcohol: Genamin™ KMP, supplier: Clariant.

⁶ Cetyl alcohol: Konol™ series, supplier: Shin Nihon Rika.

⁷ Stearyl alcohol: Konol™ series, supplier: Shin Nihon Rika.

⁸ Methylchloroisothiazolinone/Methylisothiazolinone: Kathon™ CG, supplier: Rohm & Haas.

10 ⁹ Panthenol, supplier: Roche.

¹⁰ Panthenyl ethyl ether, supplier: Roche.

Table 10 – Shampoo Compositions (Cont.)

Ingredients	Shampoo Compositions (wt %)	
	Ex. 18	Ex. 19
Sodium Laureth Sulfate	10.00	10.00
Sodium Lauryl Sulfate	1.50	1.50
Cocamidopropyl betaine	2.00	2.00
Guar Hydroxypropyl trimonium chloride ¹	0.40	--
Guar Hydroxypropyl trimonium chloride ²	--	0.40
Dimethicone ³	2.00	2.00

Gel Network ⁴	--	27.27
Ethylene Glycol Distearate	1.50	1.50
5-Chloro-2-methyl-4-isothiazolin-3-one, Kathon CG	0.0005	0.0005
Sodium Benzoate	0.25	0.25
Disodium EDTA	0.13	0.13
Free Perfume Oil	0.70	0.70
Ionic liquid from Examples 1 to 2	1.0	1.0
Citric Acid/ Sodium Citrate Dihydrate	pH q.s.	pH q.s.
Sodium Chloride/ Ammonium Xylene Sulfonate	visc. q.s.	visc. q.s.
Water	q.s.	q.s.

¹ Jaguar C17, supplier: Rhodia.

² N-Hance 3269 (with Mol. W. of ~500,000 and 0.8meq/g), supplier: Aqualon/Hercules.

³ Viscasil 330M, supplier: General Electric Silicones.

- 5 ⁴ Gel Networks; See Composition below. The water is heated to about 74°C and the Cetyl Alcohol, Stearyl Alcohol, and the SLES Surfactant are added to it. After incorporation, this mixture is passed through a heat exchanger where it is cooled to about 35°C. As a result of this cooling step, the Fatty Alcohols and surfactant crystallized to form a crystalline gel network.

Ingredients	Wt. %
Water	86.14%
Cetyl Alcohol	3.46%
Stearyl Alcohol	6.44%
Sodium laureth-3 sulfate (28% Active)	3.93%
5-Chloro-2-methyl-4-isothiazolin-3-one, Kathon CG	0.03%

10

EXAMPLE 5 – Lotion Compositions

The following are non-limiting examples of microcapsules in lotion compositions containing ionic liquids of the present invention. For the examples described in Table 11, in a suitable container, combine the ingredients of Phase A. In a separate suitable container, combine the ingredients of Phase B. Heat each phase to 73-78 °C while mixing each phase using a

15

suitable mixer (*e.g.*, Anchor blade, propeller blade, or IKA T25) until each reaches a substantially constant desired temperature and is homogenous. Slowly add Phase B to Phase A while continuing to mix Phase A. Continue mixing until batch is uniform. Pour product into suitable containers at 73-78 °C and store at room temperature. Alternatively, continuing to stir the mixture as temperature decreases results in lower observed hardness values at 21 °C & 33 °C.

Table 11 – Lotion Compositions

Ingredients	Lotion Compositions (wt %)		
	Ex. 20	Ex. 21	Ex. 22
PHASE A			
DC-9040 ¹	8.60	3.00	5.00
Dimethicone	4.09	4.00	4.00
Polymethylsilsesquioxane ²	4.09	4.00	4.00
Cyclomethicone	11.43	0.50	11.33
KSG-210 ³	5.37	5.25	5.40
Polyethylene wax ⁴	3.54	--	2.05
DC-2503 Cosmetic Wax ⁵	7.08	10.00	3.77
Hydrophobic TiO ₂	--	--	0.50
Iron oxide coated Mica	--	--	0.65
TiO ₂ Coated Mica	1.00	1.00	--
Ionic liquid from Examples 1 to 2	1.00	1.00	1.00
PHASE B			
Glycerin	10.00	10.00	10.00
Dexpanthenol	0.50	0.50	0.50
Pentylene Glycol	3.00	3.00	3.00
Hexamidine Diisethionate ⁶	0.10	0.10	0.10
Niacinamide ⁷	5.00	5.00	5.00
Methylparaben	0.20	0.20	0.20
Ethylparaben	0.05	0.05	0.05
Sodium Citrate	0.20	0.20	0.20
Citric Acid	0.03	0.03	0.03
Sodium Benzoate	0.05	0.05	0.05
Sodium Chloride	0.50	0.50	0.50

FD&C Red #40 (1%)	0.05	0.05	0.05
Water	q.s.	q.s.	q.s.
Hardness at 21 °C (g)	33.3	15.4	14.2
Hardness at 33 °C (g)	6.4	0.7	4.0

¹ 12.5% Dimethicone Crosspolymer in Cyclopentasiloxane, supplier: Dow Corning.

² Tospearl™ 145A or Tospearl 2000, supplier: GE Toshiba Silicone.

³ 25% Dimethicone PEG-10/15 Crosspolymer in Dimethicone, supplier: Shin-Etsu.

5 ⁴ Jeenate™ 3H polyethylene wax, supplier: Jeen.

⁵ Stearyl Dimethicone, supplier: Dow Corning.

⁶ Hexamidine diisethionate, available from Laboratoires Serobiologiques.

⁷ Additionally or alternatively, the composition may comprise one or more other skin care actives, their salts and derivatives, as disclosed herein, in amounts also disclosed herein as
10 would be deemed suitable by one of skill in the art.

EXAMPLE 6 – Antiperspirant/Deodorant Compositions

The following are non-limiting examples of antiperspirant/deodorant compositions containing ionic liquids of the present invention. The below examples in Table 12 can be made
15 via the following general process, which one skilled in the art will be able to alter to incorporate available equipment. The ingredients of Part I and Part II are mixed in separate suitable containers. Part II is then added slowly to Part I under agitation to assure the making of a water-in-silicone emulsion. The emulsion is then milled with suitable mill, for example a Greco 1L03 from Greco Corp, to create a homogenous emulsion. Part III is mixed and heated to 88 °C until
20 the all solids are completely melted. The emulsion is then also heated to 88 °C and then added to the Part III ingredients. The final mixture is then poured into an appropriate container, and allowed to solidify and cool to ambient temperature.

Table 12 – Antiperspirant/Deodorant Compositions

Ingredients	Antiperspirant/Deodorant Compositions (wt %)				
	Ex. 23	Ex. 24	Ex. 25	Ex. 26	Ex. 27

Part I: Partial Continuous Phase					
Hexamethyldisiloxane ¹	22.65	21.25	21.25	21.25	21.25
DC5200 ²	1.20	1.20	1.20	1.20	
Fragrance	0.35	1.25	1.25	1.25	1.25
Ionic liquid - Examples 1 to 8	1.00	1.00	1.00	1.00	1.00
Shin Etsu KF 6038 ³	--	--	--	--	1.20
Part II: Disperse Phase					
ACH (40% solution) ⁴	40.00	55.0	--	--	--
IACH (34% solution) ⁵	--	2.30	49.00	--	--
ZAG (30% solution) ⁶	--	--	--	52.30	52.30
propylene glycol	5.00	--	5.00	5.00	5.00
Water	12.30	--	3.30	--	--
Part III: Structurant Plus Remainder of Continuous Phase					
FinSolve TN	6.50	6.00	6.50	6.00	6.50
Ozocrite Wax	--	--	--		12.00
Performalene PL ⁷	11.00	11.00	12.00	12.00	
Aqueous Phase Conductivity (mS/cm)	37.7	79.5	40.5	60.3	60.3

¹ DC 246 fluid, supplier: Dow Corning.

² Supplier: Dow Corning.

³ Supplier: Shinetsu.

5 ⁴ Standard aluminum chlorohydrate solution.

⁵ IACH solution stabilized with calcium.

⁶ IZAG solution stabilized with calcium.

⁷ Supplier: New Phase Technologies.

10 Examples 28-31 in Table 13 can be made as follows whereby all ingredients except the fragrance, linalool, and dihydromyrcenol are combined in a suitable container and heated to about 85 °C to form a homogenous liquid. The solution is then cooled to about 62 °C and then the fragrance, linalool, and dihydromyrcenol are added. The mixture is then poured into an appropriate container and allowed to solidify up cooling to ambient temperature.

15 Example 32 in Table 13 can be made as follows whereby all the ingredients except the propellant are combined in an appropriate aerosol container. The container is then sealed with an appropriate aerosol delivery valve. Next air in the container is removed by applying a vacuum

to the valve and then propellant is added to container through the valve. Finally an appropriate actuator is connected to the valve to allow dispensing of the product.

Table 13 – Anti-Perspirant/Deodorant Compositions (Cont.)

Ingredients	Anti-Perspirant/Deodorant Compositions (wt %)				
	Ex. 28	Ex. 29	Ex. 30	Ex. 31	Ex. 32
Product Form	Solid	Solid	Solid	Solid	Solid or Spray
Dipropylene glycol	45	22	20	30	20
Propylene glycol	22	45	22	--	--
Tripropylene glycol	--	--	25	--	--
Glycerine	--	--	--	10	--
PEG-8	--	--	--	20	--
Ethanol	--	--	--	--	q.s.
Water	q.s.	q.s.	q.s.	q.s.	--
Sodium stearate	5.5	5.5	5.5	5.5	--
Tetra sodium EDTA	0.05	0.05	0.05	0.05	--
Sodium hydroxide	0.04	0.04	0.04	0.04	--
Triclosan	0.3	0.3	0.3	0.3	--
Fragrance	0.5	0.5	0.5	0.5	0.5
Ionic liquid - Examples 1 to 2	1.0	1.0	1.0	1.0	0.5
Dihydromyrcenol	0.3	0.1	0.3	0.5	0.1
Linalool	0.2	0.15	0.2	0.25	0.15
Propellant (1,1 difluoroethane)	--	--	--	--	40

5

EXAMPLE 7 – Rinse-Off Conditioner Compositions

The following are non-limiting examples of rinse-off conditioner compositions containing ionic liquids of the present invention. Examples 33 and 35-38 in Table 14 are prepared as follows: cationic surfactants, high melting point fatty compounds are added to water with agitation, and heated to about 80 °C. The mixture is cooled down to about 50 °C to form a gel matrix carrier. Separately, slurries of perfume microcapsules and silicones are mixed with agitation at room temperature to form a premix. The pre-mix is added to the gel matrix carrier with agitation. If included, other ingredients such as preservatives are added with agitation. Then the compositions are cooled down to room temperature.

10

Example 34 in Table 14 is prepared as follows: cationic surfactants, high melting point fatty compounds are added to water with agitation, and heated to about 80 °C. The mixture is cooled down to about 50 °C to form a gel matrix carrier. Then, silicones are added with agitation. Separately, slurries of perfume microcapsules, and if included, other ingredients such as preservatives are added with agitation. Then the compositions are cooled down to room temperature.

Table 14 – Rinse-Off Conditioner Compositions

Ingredients	Rinse-Off Conditioner Compositions (wt%)					
	Ex. 33	Ex. 34	Ex. 35	Ex. 36	Ex. 37	Ex. 38
Pre-Mix						
Aminosilicone-1 ¹	0.50	0.50	--	--	--	--
Aminosilicone-2 ²	--	--	0.50	0.50	0.50	--
PDMS	--	--	--	--	--	0.50
Ionic liquid - Examples 1 to 2	--	1.0	1.0	1.0	1.0	1.0
Gel Matrix Carrier						
Behenyl trimethyl ammonium chloride	2.30	2.30	2.30	2.30	2.30	2.30
Cetyl alcohol	1.5	1.5	1.5	1.5	1.5	1.5
Stearyl alcohol	3.8	3.8	3.8	3.8	3.8	3.8
Deionized Water	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
Preservatives	0.4	0.4	0.4	0.4	0.4	0.4
Panthenol	--	--	0.03	--	--	--
Panthenyl ethyl ether	--	--	0.03	--	--	--

¹ Aminosilicone-1 (AMD): having an amine content of 0.12-0.15 mmol/g and a viscosity of 3,000-8,000 mPa·s, which is water insoluble.

² Aminosilicone-2 (TAS): having an amine content of 0.04-0.06 mmol/g and a viscosity of 10,000-16,000 mPa·s, which is water insoluble.

EXAMPLE 8 – Body Cleansing Compositions

The following are non-limiting examples of body cleansing compositions containing ionic liquids of the present invention. They are prepared by admixture of the components described in Table 15, in the proportions indicated.

5 **Table 15 – Lotion Compositions**

Ingredients	Lotion Compositions (wt%)		
	Ex. 39	Ex. 40	Ex. 41
Part I: Cleansing Phase Composition			
Sodium Trideceth Sulfate (sulfated from Iconol TDA-3 to > 95% sulfate) ¹	5.9	5.9	5.9
Sodium Lauryl Sulfate ²	5.9	5.9	5.9
Sodium Lauroamphoacetate ³	3.6	3.6	3.6
Guar Hydroxypropyltrimonium Chloride ⁴	--	0.3	0.7
Guar Hydroxypropyltrimonium Chloride ⁵	0.6	--	--
Stabylen 30 ⁶	0.33	0.33	0.33
Sodium Chloride	3.75	3.75	3.75
Trideceth-3 ⁷	1.75	1.75	1.75
Methyl chloro isothiazolinone and methyl isothiazolinone ⁸	0.033	0.033	0.033
EDTA ⁹	0.15	0.15	0.15
Sodium Benzoate	0.20	0.20	0.20
Citric Acid, titrate	pH 5.7 ± 0.2	pH 5.7 ± 0.2	pH 5.7 ± 0.2
Perfume	1.11%	1.11%	1.11%
Water and Minors (NaOH)	q.s.	q.s.	q.s.
Part II: Benefit Phase Composition			
Petrolatum ¹⁰	60	60	60
Mineral oil ¹¹	20	20	20
Ionic liquid - Examples 1 to 2	10	10	10

¹ Supplier: BASF.

² Supplier: Procter & Gamble.

³ Supplier: Cognis Chemical Corp.

10 ⁴ N-Hance 3196, supplier: Aqualon.

⁵ Jaguar C-17, supplier: Rhodia.

⁶ Acrylates/Vinyl Isodecanoate, 3V.

⁷ Iconal TDA-3, supplier: BASF.

⁸ Kathon CG, supplier: Rohm & Haas.

5 ⁹ Dissolvine NA 2x.

¹⁰ G2218, supplier: Sonnerbonn.

¹¹ Hydrobrite 1000, supplier: Sonnerbonn.

10 It should be understood that every maximum numerical limitation given throughout this specification includes every lower numerical limitation, as if such lower numerical limitations were expressly written herein. Every minimum numerical limitation given throughout this specification will include every higher numerical limitation, as if such higher numerical limitations were expressly written herein. Every numerical range given throughout this specification will include every narrower numerical range that falls within such broader
15 numerical range, as if such narrower numerical.

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 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
20 "about 40 mm."

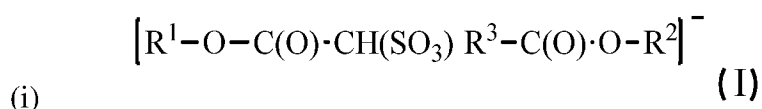
Every document cited herein, including any cross referenced or related patent or application and any patent application or patent to which this application claims priority or benefit thereof, is hereby incorporated herein by reference in its entirety unless expressly excluded or otherwise limited. The citation of any document is not an admission that it is prior
25 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 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 described, it would be obvious 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
5 within the scope of this invention.

CLAIMS

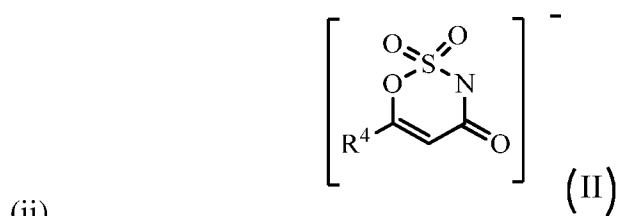
What is claimed is:

1. An ionic liquid system comprising one or more ionic liquids, each comprising of a cation and an anion, wherein at least one of the cations is the conjugate acid of a perfume raw material which has a pKa from 0 to about 14, preferably from about 7 to about 14, or more preferably from about 8 to about 14.
2. The ionic liquid system according to claim 1, wherein each ionic liquid comprises an anion independently selected from the group consisting of:



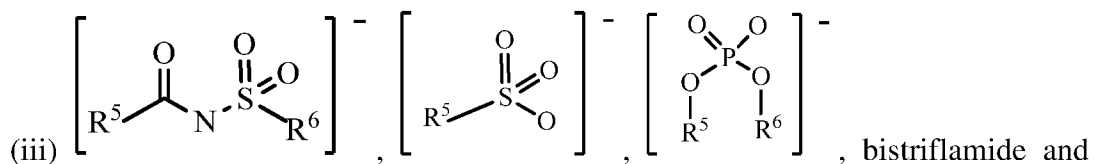
wherein:

R^1 and R^2 are independently selected from the group consisting of alkyl and alkenyl, provided that the alkyl is not substituted with nitro, azido or halide; and R^3 is alkylene, heteroarylene, arylene, or cycloalkylene;



wherein:

R^4 is selected from the group consisting of hydrogen, cyano, alkyl, alkoxy and alkoxyalkyl;

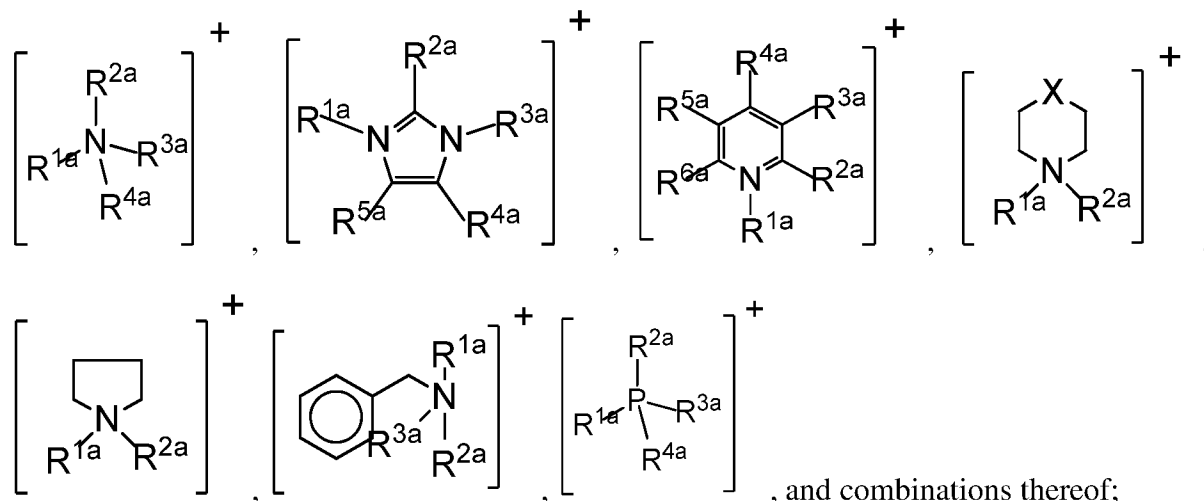


wherein:

each R⁵ and R⁶ are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, alkoxyalkyl, cycloalkyl, cycloalkylalkyl, aryl, aralkyl, heterocyclyl, heterocyclalkyl, heteroaryl and heteroarylalkyl; and

(iv) combinations thereof.

3. The ionic liquid system according to claim 2, wherein the anion is selected from the group consisting of: 1,4-bis(2-ethylhexoxy)-1,4-dioxobutane-2-sulfonate; 6-methyl-3,4-dihydro-1,2,3-oxathiazin-4-one 2,2-dioxide; and combinations thereof.
4. The ionic liquid according to any one of the preceding claims, wherein at least one of the cations is the conjugate acid of a perfume raw material having a clogP value between 0 and about 7, preferably between 0 and about 3.
5. The ionic liquid system according to claim 4, wherein at least one of the cations is the conjugate acid of a perfume raw material selected from the group consisting of the materials in Table 1.
6. The ionic liquid system according to any one of the preceding claims, wherein the system comprises two, three, four, five or more ionic liquids.
7. The ionic liquid system according to claim 6, wherein at least one of the ionic liquids comprises cations which are not conjugate acids of perfume raw materials, and are independently selected from the group consisting of:



X is CH₂ or O;

each R^{1a}, R^{3a}, and R^{4a} are independently selected from hydrogen, C₁-C₂₀ alkyl, C₁-C₂₀ alkenyl, C₁-C₂₀ alkynyl, C₁-C₂₀ alkoxy, C₁-C₂₀ alkoxyC₁-C₂₀alkyl, C₃-C₇ cycloalkyl, C₃-C₇ cycloalkylC₁-C₄alkyl, C₂-C₂₀ heterocyclyl, C₆-C₁₀ aryl, C₆-C₁₀ arylC₁-C₁₀alkyl, C₁-C₁₀ heteroaryl, halo, haloC₁-C₂₀alkyl, hydroxyl, hydroxyC₁-C₂₀alkyl, or -N(R^{6a})₂;

each R^{2a} is independently selected from hydrogen, C₁-C₂₀ alkyl, C₁-C₂₀ alkenyl, or C₁-C₂₀ alkynyl;

each R^{5a} is independently selected from hydrogen, C₁-C₂₀ alkyl, C₁-C₂₀ alkenyl, C₁-C₂₀ alkynyl, -R^{7a}-OR^{8a}, or -R^{7a}-OR^{7a}-OR^{8a};

each R^{6a} is independently selected from hydrogen, alkyl, alkenyl, alkynyl, haloalkyl, alkoxyalkyl, cycloalkyl, cycloalkylalkyl, aryl, aralkyl, heterocyclyl, heterocyclalkyl, heteroaryl, or heteroarylalkyl;

each R^{7a} is independently selected from a direct bond, alkylene chain, alkenylene chain, or alkynylene chain; and

each R^{8a} is independently selected from a hydrogen, alkylene chain, alkenylene chain, or alkynylene chain.

8. The ionic liquid system according to claim 7, wherein the cations which are not conjugate acids of perfume raw materials are independently selected from the group consisting of: 1-butyl-3-methylimidazolium; (*N*-ethyl-2-(2-methoxyethoxy)-*N,N*-dimethylethanaminium); 2-

(2-ethoxyethoxy)-*N*-ethyl-*N,N*-dimethylethanaminium; *N*-benzyl-*N,N*-dimethyloctan-1-aminium; *N*-benzyl-*N,N*-dimethylnonan-1-aminium; and combinations thereof.

9. The ionic liquid system according to any one of the preceding claims, wherein the ionic liquid system further comprises a perfume microcapsule comprising from about 1% w/w to about 90% w/w, based on the total perfume microcapsule weight, of one or more encapsulated perfume raw materials.
10. The ionic liquid system according to claim 9, wherein the encapsulated perfume raw materials comprise materials selected from the group consisting of:
 - (a) a perfume composition having a clogP of less than 4.5;
 - (b) a perfume composition comprising, based on total perfume composition weight, 60% perfume materials having a clogP of less than 4.0;
 - (c) a perfume composition comprising, based on total perfume composition weight, 35% perfume materials having a clog P of less than 3.5;
 - (d) a perfume composition comprising, based on total perfume composition weight, 40% perfume materials having a clog P of less than 4.0 and at least 1% perfume materials having a clog P of less than 2.0;
 - (e) a perfume composition comprising, based on total perfume composition weight, 40% perfume materials having a clog P of less than 4.0 and at least 15% perfume materials having a clog P of less than 3.0;
 - (f) a perfume composition comprising, based on total perfume composition weight, at least 1% butanoate esters and at least 1% of pentanoate esters;
 - (g) a perfume composition comprising, based on total perfume composition weight, at least 2% of an ester comprising an allyl moiety and at least 10% of another perfume comprising an ester moiety;
 - (h) a perfume composition comprising, based on total perfume composition weight, at least 1% of an aldehyde comprising an alkyl chain moiety;
 - (i) a perfume composition comprising, based on total perfume composition weight, at least 2% of a butanoate ester;

- (j) a perfume composition comprising, based on total perfume composition weight, at least 1% of a pentanoate ester;
- (k) a perfume composition comprising, based on total perfume composition weight, at least 3% of an ester comprising an allyl moiety and 1% of an aldehyde comprising an alkyl chain moiety;
- (l) a perfume composition comprising, based on total perfume composition weight, at least 25% of a perfume comprising an ester moiety and 1% of an aldehyde comprising an alkyl chain moiety;
- (m) a perfume composition comprising, based on total perfume composition weight, at least 2% of a material selected from the group consisting of 4-(2,6,6-trimethyl-1-cyclohexenyl)-3-buten-2-one; 4-(2,6,6-trimethyl-2-cyclohexenyl)-3-buten-2-one; 3-buten-2-one,3-methyl-4-(2,6,6-trimethyl-1-cyclohexen-2-yl)-; and mixtures thereof;
- (n) a perfume composition comprising, based on total perfume composition weight, at least 0.1% of tridec-2-enonitrile; mandarin; or mixtures thereof;
- (o) a perfume composition comprising, based on total perfume composition weight, at least 2% of a material selected from 3,7-dimethyl-6-octenenitrile; 2-cyclohexylidene-2-phenylacetonitrile; or mixtures thereof;
- (p) a perfume composition comprising, based on total perfume composition weight, at least 80% of one or more perfumes comprising a moiety selected from the group consisting of esters, aldehydes, ionones, nitriles, ketones and combinations thereof;
- (q) a perfume composition comprising, based on total perfume composition weight, at least 3% of an ester comprising an allyl moiety; a perfume composition comprising, based on total perfume composition weight, at least 20% of a material selected from the group consisting of: 1-methylethyl-2-methylbutanoate; ethyl-2-methyl pentanoate; 1,5-dimethyl-1-ethenylhexyl-4-enyl acetate; p-meth-1-en-8-yl acetate; 4-(2,6,6-trimethyl-2-cyclohexenyl)-3-buten-2-one; 4-acetoxy-3-methoxy-1-propenylbenzene; 2-propenyl cyclohexanepropionate; bicyclo[2.2.1]hept-5-ene-2-carboxylic acid, 3-(1-methylethyl)-ethyl ester; bicyclo[2.2.1]heptan-2-ol, 1,7,7-trimethyl-, acetate; 1,5-dimethyl-1-ethenylhex-4-enylacetate; hexyl 2-methyl propanoate; ethyl-2-methylbutanoate; 4-undecanone; 5-heptyldihydro-2(3h)-furanone ;1,6-nonadien-3-ol,3,7dimethyl-; 3,7-

dimethylocta-1,6-dien-3-ol; 3-cyclohexene-1-carboxaldehyde, dimethyl-; 3,7-dimethyl-6-octene nitrile; 4-(2,6,6-trimethyl-1-cyclohexenyl)-3-buten-2-one; tridec-2-enonitrile; patchouli oil; ethyl tricyclo [5.2.1.0]decan-2-carboxylate; 2,2-dimethylcyclohexanepropanol; hexyl ethanoate, 7-acetyl, 1,2,3,4,5,6,7,8-octahydro-1,1,6,7-tetramethyl naphthalene; allyl-cyclohexyloxy acetate; methyl nonyl acetic aldehyde; 1-spiro[4,5]dec-7-en-7-yl-4-penten-1-one; 7-octen-2-ol, 2-methyl-6-methylene-, dihydro; cyclohexanol, 2-(1,1-dimethylethyl)-, acetate; hexahydro-4,7-methanoinden-5(6)-yl propionate hexahydro-4,7-methanoinden-5(6)-yl propionate; 2-methoxynaphthalene; 1-(2,6,6-trimethyl-3-cyclohexenyl)-2-buten-1-one; 1-(2,6,6-trimethyl-2-cyclohexenyl)-2-buten-1-one; 3,7-dimethyloctan-3-ol; 3-buten-2-one, 3-methyl-4-(2,6,6-trimethyl-1-cyclohexen-2-yl)-; hexanoic acid, 2-propenyl ester; (Z)-non-6-en-1-al; 1-decyl aldehyde; 1-octanal; 4-tert-butyl- α -methylhydrocinnamaldehyde; α -hexylcinnamaldehyde; ethyl-2,4-hexadienoate; 2-propenyl 3-cyclohexanepropanoate; and mixtures thereof;

- (r) a perfume composition comprising, based on total perfume composition weight, at least 20% of a material selected from the group consisting of: 1-methylethyl-2-methylbutanoate; ethyl-2-methyl pentanoate; 1,5-dimethyl-1-ethenylhex-4-enyl acetate; p-menth-1-en-8-yl acetate; 4-(2,6,6-trimethyl-2-cyclohexenyl)-3-buten-2-one; 4-acetoxy-3-methoxy-1-propenylbenzene; 2-propenyl cyclohexanepropanoate; bicyclo[2.2.1]hept-5-ene-2-carboxylic acid, 3-(1-methylethyl)-ethyl ester; bicyclo [2.2.1]heptan-2-ol, 1,7,7-trimethyl-, acetate; 1,5-dimethyl-1-ethenylhex-4-enyl acetate; hexyl 2-methyl propanoate; ethyl-2-methylbutanoate, 4-undecanolide; 5-heptyldihydro-2(3H)-furanone; 5-hydroxydodecanoic acid; decalactones; undecalactones, 1,6-nonadien-3-ol, 3,7-dimethyl-; 3,7-dimethylocta-1,6-dien-3-ol; 3-cyclohexene-1-carboxaldehyde, dimethyl-; 3,7-dimethyl-6-octene nitrile; 4-(2,6,6-trimethyl-1-cyclohexenyl)-3-buten-2-one; tridec-2-enonitrile; patchouli oil; ethyl tricyclo [5.2.1.0]decan-2-carboxylate; 2,2-dimethylcyclohexanepropanol; allyl-cyclohexyloxy acetate; methyl nonyl acetic aldehyde; 1-spiro[4,5]dec-7-en-7-yl-4-penten-1-one; 7-octen-2-ol, 2-methyl-6-methylene-, dihydro, cyclohexanol, 2-(1,1-dimethylethyl)-, acetate; hexahydro-4,7-methanoinden-5(6)-yl propionate hexahydro-4,7-methanoinden-5(6)-yl propionate; 2-methoxynaphthalene; 1-

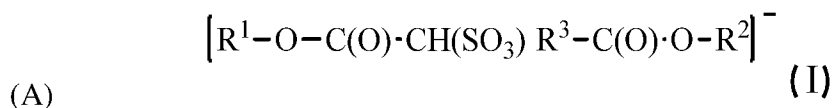
(2,6,6-trimethyl-3-cyclohexenyl)-2-buten-1-one; 1-(2,6,6-trimethyl-2-cyclohexenyl)-2-buten-1-one; 3,7-dimethyloctan-3-ol; 3-buten-2-one, 3-methyl-4-(2,6,6-trimethyl-1-cyclohexen-2-yl)-; hexanoic acid, 2-propenyl ester; (Z)-non-6-en-1-al; 1-decyl aldehyde; 1-octanal; 4-*t*-butyl- α -methylhydrocinnamaldehyde; ethyl-2,4-hexadienoate; 2-propenyl 3-cyclohexanepropanoate; and mixtures thereof;

- (s) a perfume composition comprising, based on total perfume composition weight, at least 5% of a material selected from the group consisting of 3-cyclohexene-1-carboxaldehyde, dimethyl-; 3-buten-2-one, 3-methyl-4-(2,6,6-trimethyl-1-cyclohexen-2-yl)-; patchouli oil; Hexanoic acid, 2-propenyl ester; 1-Octanal; 1-decyl aldehyde; (Z)-non-6-en-1-al; methyl nonyl acetic aldehyde; ethyl-2-methylbutanoate; 1-methylethyl-2-methylbutanoate; ethyl-2-methyl pentanoate; 4-hydroxy-3-ethoxybenzaldehyde; 4-hydroxy-3-methoxybenzaldehyde; 3-hydroxy-2-methyl-4-pyrone; 3-hydroxy-2-ethyl-4-pyrone; and mixtures thereof;
- (t) a perfume composition comprising, based on total perfume composition weight, less than 10% perfume materials having a clog P greater than 5.0;
- (u) a perfume composition comprising geranyl palmitate;
- (v) a perfume composition comprising a first and an optional second material, the first material having:
 - (i) a clog P of at least 2; and
 - (ii) a boiling point of less than about 280°C;
 wherein, the optional second material, if present, having a clog P of less than 2.5; and
- (w) combinations thereof.

11. An ionic liquid system comprising $\Sigma(I_N)$, wherein "I" represents an ionic liquid and "N" represents an integer from one to fifty, preferably two, three, four, five, or more, wherein the ionic liquid system comprises from about 0.1% w/w to 100% w/w, based on the total system weight, of at least one ionic liquid comprising a cation and an anion, wherein the cation is the conjugate acid of a perfume raw material, which has a pKa from 0 to about 14, preferably from about 7 to about 14, or more preferably from about 8 to about 14; and wherein the ionic

liquid system comprises from 0% w/w to about 99.9% w/w, based on the total system weight, of at least one ionic liquid comprising cations which are not conjugate acids of perfume raw materials.

12. A consumer product comprising from about 0.0001% w/w to 100% w/w, based on total consumer product weight of an ionic liquid system according to any one of the preceding claims.
13. The consumer product according to claim 12, wherein the consumer product is a composition intended for the treatment of hard surfaces, soft surfaces, skin or hair.
14. The consumer product according to claim 12, wherein a 10% solution in water of the consumer product has a pH of 7 or higher.
15. A detergent composition comprising:
 - (a) from about 0.001% w/w to about 10% w/w, based on the total weight of the detergent composition, of an ionic liquid system made of at least one ionic liquid comprising:
 - (i) a cation, wherein the cation is the conjugate acid of a perfume raw material, which has a pK_a from 0 to about 14, preferably from about 7 to about 14, or more preferably from about 8 to about 14;
 - (ii) an anion selected from the group consisting of:

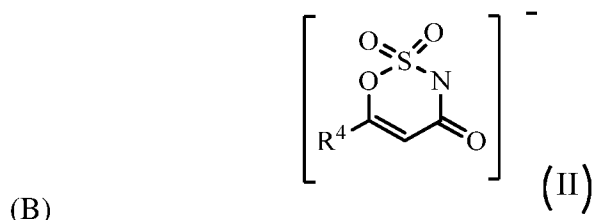


wherein:

R^1 and R^2 are independently selected from the group consisting of alkyl and alkenyl, provided that the alkyl is not substituted with nitro, azido or halide; and

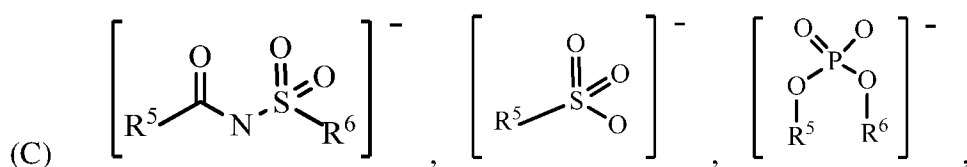
R^3 is alkylene, heteroarylene, arylene, or cycloalkylene;

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wherein:

R^4 is selected from the group consisting of hydrogen, cyano, alkyl, alkoxy and alkoxyalkyl;



bistriflamide and combinations thereof;

wherein:

each R^5 and R^6 are independently selected from the group consisting of hydrogen, alkyl, alkenyl, alkynyl, alkoxyalkyl, cycloalkyl, cycloalkylalkyl, aryl, aralkyl, heterocyclyl, heterocyclalkyl, heteroaryl and heteroarylalkyl; and

(D) combinations thereof.

16. The detergent composition according to claim 15, further comprising: (b) from about 1% w/w to about 50% w/w, based on the total weight of the detergent composition, of a deterative surfactant.

17. The detergent composition according to claim 15, wherein the ionic liquid system is encapsulated in a perfume microcapsule, which optionally further comprises one or more encapsulated perfume raw materials.

18. A method of delivering and/or depositing fragrance onto a fabric comprising the steps of optionally washing and/or rinsing the fabric, contacting the fabric with a detergent composition according to claim 15, then optionally washing and/or rinsing the fabric.

19. A method of controlling malodour comprising contacting a substrate comprising a malodour with a composition selected from the group consisting of the composition of the consumer product of claim 12, the detergent composition of claim 15 and mixtures thereof.

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2016/038930

A. CLASSIFICATION OF SUBJECT MATTER

INV. C11D3/50 A61Q13/00
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C11D A61Q C11B

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE WPI Week 201542 Thomson Scientific, London, GB; AN 2015-28910T XP002761780, & CN 104 437 003 A (UNIV HENAN NORMAL) 25 March 2015 (2015-03-25) abstract	1,4
A	----- US 2006/166856 A1 (PETRAT FRANK-MARTIN [DE] ET AL) 27 July 2006 (2006-07-27) cited in the application claims 1, 17	1-19
A	----- WO 2006/050298 A2 (PROCTER & GAMBLE [US]; PRICE KENNETH NATHAN [US]; HECHT STACIE ELLEN []) 11 May 2006 (2006-05-11) abstract -----	1-19



Further documents are listed in the continuation of Box C.



See patent family annex.

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

14 September 2016

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2016/038930

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