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(54) Title: DEODORIZING SYSTEM

(57) Abstract: A deodorizing system capable of reducing malodors in confined spaces such as bathrooms, kitchens, cars and cellars. More specifically, it is provided a deodorizing system comprising a chlorine dioxide generating sachet and a perfume composition.



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DEODORIZING SYSTEM

TECHNICAL FIELD

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The present invention relates to a deodorizing system capable of reducing malodors in confined spaces such as bathrooms, kitchens, cars and cellars. More specifically, the present invention is directed to a deodorizing system comprising a chlorine dioxide generating sachet and a perfume composition.

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BACKGROUND OF THE INVENTION

Air freshener or deodorizing systems have long been sought by consumers, in both residential and commercial environments. In an attempt to meet the demand for air fresheners or deodorizers, numerous products have been developed and are presently available in the marketplace. In general, these prior art products are sold as solids, liquids, or aerosol sprays to provide the desired effect. Typically, these prior art products are used to eliminate, chemically change, or mask an existing odor. Products known in the art typically work by absorbing odorous molecules, dissolving or emulsifying such molecules, or killing bacteria that cause the offensive odor.

Chlorine dioxide has long been recognized as a disinfecting and sterilizing agent. Also, gaseous chlorine dioxide in low concentrations is known to be useful for deodorizing a variety of malodours. Chlorine dioxide, which is gaseous at room temperature and atmospheric pressure, is known to be toxic to humans at relatively high concentrations and may be explosive at concentrations above 0.1 atmosphere. However, gaseous chlorine dioxide is generally considered safe for human contact at the low concentrations that are effective for deodorization.

Another problem associated with the use of gaseous chlorine dioxide, is that it is offending to the olfactory senses and it may even be perceived by consumers as unacceptable because of its unpleasant odor.

These problems have therefore considerably limited the use of chlorine dioxide to large commercial applications. Chlorine dioxide has, in particular, not achieved widespread use in household applications which involve contact with human. Partial solutions to these drawbacks have been provided with for example in US-B1-6,294,108, which discloses a solid composition
5 for generating chlorine dioxide gas in presence of water vapor. Another solution is described in US-A1-2004/0183050 which discloses a composition for the production of chlorine dioxide which is claimed to find use as deodorizer.

The problem of providing long-term deodorizing or air freshening is particularly critical when
10 trying to establish a pleasant odor in areas or environments in which offensive odors continuously exist, such as in bathrooms, kitchens, cars, and cellars.

It is therefore an objective of the present invention to provide a deodorizing system capable of reducing the formation of a broad variety of malodors in confined spaces, while securely
15 delivering a desired fragrance, and wherein said deodorizing system does not generate unwanted side malodors.

Advantageously, the kit according to the present invention is capable of providing long-term and sustained delivery of deodorizing or air freshening. Also the kit of the present invention is able
20 to release deodorizing or air freshening material in a highly controlled manner without any intervention of the user required. A further advantage associated with the kit according to the present invention is that it is of very simple and inexpensive construction, and may be easily employed and positioned in both residential and commercial establishments for providing deodorizing or air-freshening in a wide variety of locations. It is still a further advantage that the
25 kit of the present invention is completely safe for use in human-occupied spaces.

Other advantages and more specific properties of the kit according to the present invention will be clear after reading the following description of the invention.

The present invention relates to a kit comprising a moisture-permeable, water-impervious sachet and a perfume composition, wherein said sachet comprises a dry chlorine dioxide precursor and a dry chlorine dioxide activator.

- 5 In another embodiment, the present invention is directed to a process of reducing the formation of malodors in confined spaces comprising the step of positioning a kit as above described in said confined space.

The present invention further encompasses the use of a kit as above-described for reducing the
10 formation of malodors in confined spaces.

DETAILED DESCRIPTION OF THE INVENTION

SACHET

15 The kit according to the present invention comprises a moisture-permeable, water-impervious sachet. The sachet for use herein may be formed from any material well known in the art of functional sachets for being moisture-permeable and water-impervious. Typically, the sachet for use herein may be defined as being formed from a microporous membrane comprising one or more selected from the group consisting of woven or non-woven, synthetic or natural fibers
20 integrally joined together, wood pulp, and plastic films or sheets. Preferably, the sachet for use in the present invention is formed from a polymeric plastic sheet comprising one selected from the group consisting of polyurethanes, polyethers, polyesters, polypropylenes, polystyrenes, and combinations thereof.

25 In an even more preferred embodiment, the sachet for use herein is made from materials commercially available under the tradenames TYVEK® and GORTEX®, most preferably from TYVEK®. Such particular materials enable water vapor to enter into the sachet and the resulting chlorine dioxide gas to be released from the sachet and enter the surrounding atmosphere, while said material being substantially impervious to water.

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Suitable sachet may have any suitable configuration, form or dimension for accommodating the dry chlorine dioxide activator and the dry chlorine dioxide precursor. Suitable sachet for use in the present invention will easily be recognized by those skilled in the art. As a way of example,

suitable sachets for use herein are described e.g. US-B1-6,294,108 on column 9, lines 53-63. In a preferred embodiment the sachet for use herein has a substantially rectangular shape, preferably a rectangular shape, although the present invention is not so limited. However, it will be easily apparent to those skilled in the art that, depending upon the particular aesthetic impression which is ultimately aimed at, other configurations and shapes of the sachet may be used.

According to an alternative embodiment of the present invention, the sachet for use herein may be incorporated within a suitable container which may in turn be provided with aesthetic features. Suitable containers for use herein will be easily recognized by those skilled in the art. Typically, such containers shall be provided with suitable openings as required for the released chlorine dioxide to diffuse through said container. As a way of example, suitable containers include but are not limited to, a box, a bottle, a pouch, an envelope, a can, a tube, and a bag.

As a further optional feature, the water-impervious sachet for use herein may comprise a visual means indicating when the water-impervious needs to be replaced. Suitable visual means for use herein may be any such visual means commonly known in the art of functional sachets. Typical visual means for use herein comprise but are not limited to badges or patches based upon colour-changing or degrading material technologies. Preferably, the visual means is selected to be a patch based upon colour-changing technology.

DRY CHLORINE DIOXIDE PRECURSOR

According to the present invention, the moisture-permeable, water-impervious sachet for use herein further comprises a dry chlorine dioxide precursor. Preferably, the dry chlorine dioxide precursor for use in the context of the present invention is a metal chlorite. Preferred metal chlorites are alkali metal chlorites, such as sodium chlorite and potassium chlorite. Also suitable for use herein are alkaline earth chlorites. Examples of such alkaline earth chlorites include but are not limited to barium chlorite, calcium chlorite, and magnesium chlorite. The most preferred metal chlorite for use in the present invention is sodium chlorite.

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DRY CHLORINE DIOXIDE ACTIVATOR

As indicated above, the moisture-permeable, water-impervious sachet for use herein further comprises a dry chlorine dioxide activator. The dry chlorine dioxide activator for use herein is any material capable of reacting with said dry chlorine dioxide precursor to produce chlorine dioxide gas. According to a preferred execution of the present invention, such dry chlorine dioxide precursor and said dry chlorine dioxide activator are capable of reacting with each other in presence of water vapor. In a very preferred embodiment, said dry chlorine dioxide precursor and said dry chlorine dioxide activator are capable of reacting with each other to produce chlorine dioxide gas in the presence of water vapor, but do not generate chlorine dioxide in the substantial absence of liquid water or water vapor.

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Preferably, the dry chlorine dioxide activator for use in the context of the present invention is a dry solid hydrophilic material, preferably a dry solid inorganic hydrophilic material. Examples of suitable dry solid inorganic hydrophilic material for use in the context of the present invention include but are not limited to, synthetic zeolites, such as A, X, Y, and mordenite; natural zeolites such as chabazite and clinoptilolite; hydrous clays, such as bentonite, kaolin, attapulgite and halloysite; calcinated clays, such as metakaolin, spinel phase kaolin, calcinated bentonite, calcinated halloysite, and calcinated attapulgite; acidified synthetic zeolites, such as A, X, Y, and mordenite that have been contacted with one or more acidic solutions containing sulfuric acid, hydrochloric acid, nitric acid, or other acidic compound (e.g. calcium chloride) so that the pH of the resulting aqueous phase of the mixture is below 10.5; acidified natural zeolites such as chabazite and clinoptilolite; acidified clays, such as bentonite, kaolin, attapulgite and halloysite that have been contacted with one or more acidic solutions containing sulfuric acid, hydrochloric acid, nitric acid, or other acidic compound (e.g. lanthanum chloride) so that the pH of the resulting aqueous phase of the mixture is below 10.5; acidified calcinated clays, such as metakaolin, spinel phase kaolin, calcinated bentonite, calcinated halloysite, and calcinated attapulgite that have been contacted with one or more acidic solutions containing sulfuric acid, hydrochloric acid, nitric acid, or other acidic compound (e.g. acetic acid) so that the pH of the resulting aqueous phase of the mixture is below 10.5; salts, such as aluminium sulfate, magnesium sulfate, calcium carbonate, and particularly deliquescent acidic salts, such as calcium chloride, magnesium chloride, chloride and magnesium nitrate; solid acids, such as boric acid, tartaric acid and citric acid; organic acid anhydrides such as phthalic anhydride, maleic anhydride, succinic anhydride and glutaric anhydride; and mixtures thereof.

In a preferred embodiment of the invention, the dry chlorine dioxide activator for use herein is selected from the group consisting of calcinated clays, acidified synthetic zeolites, acidified natural zeolites, acidified calcinated clays, and mixtures thereof. More preferably, the dry chlorine dioxide activator for use in the present invention is selected from acidified calcinated
5 clays.

In accordance with the present invention, the mixture of the dry chlorine dioxide precursor and the dry chlorine activator generates the chlorine dioxide gas in a sustained concentration of from 0.001 to 1000 ppm, preferably from 0.001 to 100 ppm, more preferably from 0.01 to 10 ppm,
10 and most preferably from 0.01 to 0.1 ppm. The measurement of chlorine dioxide gas is made in the atmosphere into which the chlorine dioxide gas is generated. For example, if the generating mixture is exposed to water vapor in air, the concentration of chlorine dioxide gas in ppm will be measured based upon the total atmosphere including air and water vapor. Also, the generation of chlorine dioxide need not be at a constant rate. It is permissible to have a fluctuating rate so long
15 as the chlorine dioxide gas concentration does not exceed, for a sustained period of time, the limits which are safe for human contact depending upon the particular environment where the chlorine dioxide generating sachet is being used.

The reaction of said dry chlorine activator and said dry chlorine dioxide precursor may last for a
20 sustained period of time, i.e. the chlorine dioxide gas will be generated during a short period of time (e.g. several minutes) to a long period of time spanning several hours or weeks. The length of the sustained period of time will depend upon the relative amounts of the constituents in the mixture. In any case, during the course of the reaction, chlorine dioxide gas will be produced in a sustained concentration as defined above.

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According to a preferred embodiment of the invention, the generation of chlorine dioxide gas within the specified range will vary depending on the relative humidity of the surrounding atmosphere, the ratio of the reactants, the diluent gas flow rate (e.g. air) through the treated space, and the ratio of the amount of chlorine dioxide gas releasing material to the volume of the
30 treated space. Generally, the higher the relative humidity the higher rate of production of chlorine dioxide gas. The lower the flow of the diluent gas through the treated space, the higher the resultant chlorine dioxide gas concentration.

The amount of each of the dry chlorine dioxide precursor and said dry chlorine dioxide activator will depend on several factors, including but not limited to, the quantity of chlorine dioxide gas needed for a particular application, the basicity of the dry chlorine dioxide precursor and the acidity of the dry chlorine dioxide activator. In general, the weight ratio of the chlorine dioxide precursor and the dry chlorine dioxide activator is in the range of from 0.001 to 0.25:1.0. It is well within the capability of the skilled person to choose the proper ratio for a particular application.

In accordance with a preferred embodiment of the present invention, said dry chlorine dioxide precursor and said dry chlorine dioxide activator are admixed so as to form a mixture. Such mixture may be formulated in several ways which will be easily recognized by those skilled in the art. The preferred method is to prepare in a dry atmosphere an intimate physical mixture of fine powders of both constituents having particle sizes preferably below 200 μm . Larger particles may be used and may achieve a slower rate of chlorine dioxide gas release in certain circumstances.

The mixture formed in accordance with the present invention may optionally comprise at least one dehydrating agent which is primarily intended to absorb water to minimize or eliminate an initial brief duration production of chlorine dioxide due to residual water vapor present in the atmosphere when the mixture is packaged within the moisture permeable, water-impervious sachet. Also, it has been surprisingly discovered that the combination of chlorine dioxide precursor and said dry chlorine dioxide activator together with a dehydrating agent contributes to obtain improved deodorizing effect. The optional use of dehydrating agent to minimize chlorine dioxide gas production in the sachet during storage can ensure that the mixture will react for the longest period of time when exposed to water vapor under operating conditions. The presence of dehydrating agent may delay the desired onset of production of chlorine dioxide gas when the mixture is exposed to water vapor. Therefore, the length of time of the reaction is also dependent, in part, on how much water vapor is present in the atmosphere contained within the sachet.

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Alternatively, said dehydrating agent may be kept separate from said moisture-permeable, water-impervious sachet. According to this alternative embodiment, the kit according to the present invention further comprises a dehydrating agent as a distinct element.

Suitable dehydrating agents for use herein include but are not limited to, activated calcium chloride, activated calcium sulfate, activated zeolite X, activated zeolite A, activated bentonite clay, activated silica gel, activated attapulgit, and mixtures thereof. The term "activated" means
5 that the particular material has been substantially dehydrated, for example, by heating at 300C for one hour. The total amount of dehydrating agent may vary depending on several factors, for example, the ambient humidity when the material is packaged into the suitable sachet, the water permeability of the sachet material and the desired shelf life of the product. Typically, the dehydrating agent is present in a total amount from 0.1% to 25% by weight based o the total
10 weight of the mixture.

In a preferred execution of the present invention whereby a slow release rate of long duration is produced, the mixture comprises 5 wt% of dry chlorine dioxide precursor and 95% of dry chlorine dioxide activator. A preferred mixture for a shorter duration, higher rate of generation
15 of chlorine dioxide is a mixture of 5 wt% of dry chlorine dioxide precursor, 10 wt% of dehydrating agent and the balance of dry chlorine dioxide activator.

It will be understood that for a given unit of the mixture represented by a unitary sachet, a sustained amount of chlorine dioxide gas will be produced. For some specific applications, it
20 may be desirable to employ multiple units of the mixture to achieve the desired deodorizing effect.

According to the preferred embodiment wherein said dry chlorine activator and said dry chlorine dioxide precursor are not capable of reacting with each other to produce chlorine dioxide gas in
25 the substantial absence of water, both reagents may be prepared in advance and stored for prolonged time under dry conditions without premature release of chlorine dioxide gas. In accordance with this preferred embodiment of the invention, it is allowed to achieve a precise control of the concentration, strength and rate of release of chlorine dioxide.

30 In the practice of the present invention, the relative humidity of the atmosphere to which the mixture is exposed during use can range from low humidity (e.g. 10% relative humidity) up to 100% relative humidity conditions. As above indicated, in a preferred execution of the invention, the amount of chlorine dioxide gas generated per given amount of the mixture will

depend, in part, on the relative humidity of the surrounding atmosphere. In general, higher humidity will result in a higher concentration of chlorine dioxide gas.

The kit of the present invention may be used for a variety of commercial applications involving solid, liquid and/or gaseous environments. As a way of example, chlorine dioxide gas generated may be used to treat solids such as those having metal fabric, wood and/or plastic surfaces. The chlorine dioxide may also be used to treat spaces comprising diverse items such as animal waste; pet litters; medical devices; food products including meats, vegetables, fruit, grain and nuts; as well as items made from fabrics including drapes, upholstery, and clothes. Examples of liquids which may be treated with chlorine dioxide gas include liquid waste and water including potable water. Examples of gaseous environments which may be treated include those containing noxious and/or objectionable gases such as animal environments, smoke-laden environments (tobacco smoke), and exhaust systems from noxious gas producing facilities (e.g. chemical plants).

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In the preferred embodiment of the present invention wherein said dry chlorine activator and said dry chlorine dioxide precursor are not capable of reacting with each other to produce chlorine dioxide gas in the substantial absence of water, the sachet for use in the present invention is particularly suitable for deodorizing confined spaces which are known to have relatively high humidity such as bathroom, kitchens, cellars, closets and shoes. It has been indeed discovered that confined spaces with relative high humidity are particularly prone to develop malodors.

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PERFUME COMPOSITION

The present invention is based on the discovery that gaseous chlorine dioxide is offending to the olfactory senses. Although gaseous chlorine dioxide is generally well recognized as providing malodor reduction benefits, it may be perceived by consumers as unacceptable because of its unpleasant odor. This unrecognized problem may detrimentally affect the overall deodorizing benefit provided by systems making use of chlorine dioxide gas.

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The kit according to the present invention further comprises a perfume composition. As used herein the term "perfume" is used to indicate any odoriferous material that is subsequently released into the ambient air. The perfume will most often be liquid at ambient temperatures. A wide variety of chemicals are known for perfume uses, including materials such as aldehydes,

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ketones, and esters. More commonly, naturally occurring plant and animal oils and exudates comprising complex mixtures of various chemical components are known for use as perfumes. The perfumes herein can be relatively simple in their compositions or can comprise highly sophisticated complex mixtures of natural and synthetic chemical components, all chosen to provide any desired odour. Typical perfumes can comprise, for example, woody/earthy bases containing exotic materials such as sandalwood, civet and patchouli oil. The perfumes can be of a light floral fragrance, e.g. rose extract, violet extract, and lilac. The perfumes can also be formulated to provide desirable fruity odours, e.g. lime, lemon, and orange. Likewise, the perfumes delivered in the compositions and articles of the present invention may be selected for an aromatherapy effect, such as providing a relaxing or invigorating mood. As such, any material that exudes pleasant or otherwise desirable odours can be used as a perfume active in the compositions and articles of the present invention. Perfume materials are described more fully in S. Arctander, *Perfume Flavors and Chemicals*. Vols. I and II. Aauthor, Montclair, N.J., and the Merck Index, 8th Edition, Merck & Co., Inc. Rahway, N.J.

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According to the present invention, perfume composition for use herein may either be part of the moisture-permeable, water-impervious sachet or alternatively may be kept separate from said sachet.

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In the specific embodiment of the invention wherein the perfume composition is part of the sachet, the composition may be loaded onto the external surface of the sachet or onto the internal surface of the sachet. Suitable techniques for loading said perfume composition onto the sachet will be easily recognized by the skilled person. For example, perfume composition may be incorporated directly within the material used to form such sachet, or may applied onto the surface of said sachet by means of printing or spraying.

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Alternatively, said perfume composition may be incorporated in the mixture together with said dry chlorine activator and said dry chlorine dioxide precursor, inside said sachet. In such specific embodiment of the invention, the perfume composition may be selected from any perfume composition commonly known as being compatible with oxidizing agents, and more particularly with oxidizing gases. Suitable perfume composition for use according to this particular embodiment of the invention may be easily determined by those skilled in the art of perfumery. As a way of example, suitable perfume compositions are described e.g. in US-B1-

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6,255,268 on column 6 line 10 to column 9 line 50. Other examples of suitable perfume compositions are disclosed in EP-B1-0622451 on column 3 lines 22-50.

According to a preferred execution however, the perfume composition for use in the context of the present invention is kept separate from said moisture-permeable, water-impervious sachet. In accordance with this specific embodiment, suitable perfume composition may be selected from any perfume composition commonly known in the art of perfumery including perfume composition known to be chemically incompatible with oxidizing gases. It will be understood that one of ordinary skill in the art, may easily recognize suitable perfume composition for use in the present invention. Typically, the perfume composition for use in accordance with this specific embodiment is a mixture of organic compounds admixed so that the combined odors of the individual components produce a pleasant or desired fragrance. Suitable perfume composition for use in accordance with the present embodiment may take any physical form including solid, particulate, gel, liquid, paste, tablet, bar, gas, and mixtures thereof. In a preferred embodiment, the perfume composition for use herein is in the form of liquid, solid, gel, adhesive gel, paste, tablet, and mixtures thereof.

In a preferred execution of the present invention, the perfume composition for use herein is a polymeric composition obtained by combining a low melting point polyamide polymer with a polar thermoplastic elastomer and a perfume. Such polymeric compositions are described for example in US-A1-2006/0099168.

The term "low melting point polyamide polymers" includes all polyamides having a melting point below 130°C, preferably below 110°C, more preferably below 100°C. Typically and preferably, the low melting point polyamides for use in the present invention are solid at room temperature. Preferred polyamides are terminated polyamides, particularly preferred are ester terminated polyamides. Examples of these low melting point polyamides include those marketed by Arizona chemicals under the trade name of SYLVACLEAR®.

The term "polar thermoplastic elastomer" includes multiphase polymers that comprise "hard" and "soft" phases chemically bonded together in the polymer chain. The "hard" phase is solid at room temperature and flows upon heating. Examples include blocks of amide, ester and urethane groups. The "soft" phase is rubbery at room temperature. Examples include polyether

blocks such as poly(ethylene glycol), poly(propylene glycol) or poly(tetramethylene glycol). At room temperature, the presence of the "hard" phases in the polymer imparts strength and good mechanical properties. When the polymer is heated, these phases become liquid and the polymer melts, allowing for processing in the molten state. Upon recooling to room temperature, the phases solidify and the good mechanical properties are regained. A comprehensive definition of thermoplastic elastomers can be found in Vol 9 of the Kirk-Othmer Encyclopedia of Chemical Technology (4th Edition - Wiley- Interscience, 1996) – under the voice “Elastomers”, subvoice “Thermoplastic Elastomers”. Among these polymers those which are suitable for the present invention are those comprising at least one polar monomer. Polar monomers are those monomers which comprise at least a C-X linkage in the molecule wherein said C-X linkage is a polar linkage. Preferably X is an N, S, F, Cl or O atom. More preferably said polar linkage is part of a carbonyl group and, more preferably, of an ester group. Preferred polar monomers for the present invention are vinyl acetate, vinyl alcohol, methyl acrylate, ethyl acrylate, butyl acrylate, acrylic acid and salts formed therefrom, methacrylic acid and salts formed therefrom, maleic anhydride, glycidyl methacrylate and carbon monoxide. More preferably the hard phases preferably comprise blocks of amide, ester or urethane groups and the soft phases preferably comprise polyether blocks. Examples of these polar thermoplastic elastomers include thermoplastic polyurethanes, such as those produced under the trade names ESTANE® by Noveon, and PELLETHANE® by Dow Chemicals; thermoplastic polyesters, also known as polyether ester copolymers, such as those produced under the trade names HYTREL® by Dupont and ARNITEL® by DSM, and thermoplastic polyamides, also known as polyether amide copolymers, such as those produced under the trade name PEBAX® by Atofina.

According to a highly preferred execution of the present invention, the perfume composition for use herein is a polymeric composition obtained by combining an ester terminated polyamide, a thermoplastic polyether amide copolymer and a perfume, according to the method described in US-A1-2006/0099168.

Preferably, the perfume composition is provided with an aesthetically appealing shape or form. Depending upon the ultimately desired aesthetic effect, the perfume composition may alternatively be comprised within a distinct container which may in turn be provided with aesthetic features. Suitable containers for use herein will be easily recognized by those skilled in

the art of perfumery. Typical containers include but are not limited to, a box, a bottle, a pouch, an envelope, a can, a tube, beads, flakes and bags.

Typically, such containers shall be provided with suitable openings as required for perfume composition to diffuse through said container. Such openings will also allow free circulation of air within said container.

According to the present invention, the Applicant has surprisingly discovered that by providing a kit as now claimed, i.e. comprising a gaseous chlorine dioxide releasing sachet in combination with a perfume composition, the potential user is not overcome by the unpleasant odor associated with chlorine dioxide gas. The present invention therefore provides the user with a more pleasant deodorizing experience since the kit according to the invention does not only neutralize malodors which may be present in confined spaces but also delivers a desired fragrance unaffected by any other unwanted side malodors.

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In accordance with a preferred embodiment of the present invention wherein said dry chlorine activator and said dry chlorine dioxide precursor are only able to produce chlorine dioxide gas when exposed to moisture vapor in ambient atmosphere, the kit according to the invention provides the additional benefit that the treated confined spaces are kept fresher since the ambient humidity is absorbed by the kit according to the present invention. Therefore, the kit according to the present invention may incidentally operate as a dehumidifying device. In that sense, the kit according to the present invention may particularly be beneficial to persons suffering from rheumatism when exposed to humidity.

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25 **PROCESS OF REDUCING THE FORMATION OF MALODORS**

In another embodiment, the present invention is directed to a process of reducing the formation of malodors in confined spaces comprising the step of positioning a kit as above described in said confined space.

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The moisture-permeable, water-impervious sachet and the perfume composition comprised in the kit of the present invention may be either placed on a flat surface in said confined space or hang on a hook or similar holder. According to a preferred embodiment of the invention, both the sachet and the perfume composition are placed inside separate containers and hanged (or

placed on a flat surface) in separate locations of the treated confined space. It is understood that the person skilled in the art as well as the potential user will easily determine the most suitable locations for placing the different components of the kit, in order to achieve the desired deodorizing and fragrance delivery benefit.

5

Also, depending upon the intensity of the malodors to be reduced, the user may find useful to place one or more units of said moisture-permeable, water-impervious sachet and/or said perfume composition in the confined space to be treated.

10 Accordingly, the kit according to the invention preferably contains specific instructions which may help the user to select the number of sachets to use depending on the confined spaces to be treated and to choose specific suitable locations for said sachet and said perfume composition.

Such set of usage instructions for selecting and dosing the sachet and the perfume composition
15 may be provided in the kit, and/or on a location such as a pamphlet, a computer screen, a printed ticket, a kiosk, a sign, a product container, an advertisement, a product display, an Internet website, a video, and a combination thereof. Preferably the set of usage instructions are provided on the container, a product display, or a combination thereof, as these locations are easy to reference. More preferably, the set of usage instructions are provided on the sachet
20 container, as the set of usage instructions is thus unlikely to become lost and/or separated from the sachet when it is needed. Without intending to be limited by theory, it is believed that such set of usage instructions may significantly reduce misuse and/or inappropriate use of the different elements of the kit of the present invention by the consumer. Also, the set of usage instruction may help the user achieving an enhanced perfume/aroma experience in the treated
25 confined spaces.

Incidentally, the kit of the present invention may also find use in a process of reducing humidity in confined spaces due to the water-vapor absorbing properties of the sachet according to the present invention.

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USE OF THE KIT FOR REDUCING FORMATION OF MALODORS

The present invention is further directed to the use of a kit according to the invention for reducing the formation of malodors in confined spaces.

The kit of the present invention may find use in any confined spaces which may be present in residential and commercial establishments or within industrial facilities. In a preferred embodiment, the kit of the invention is particularly suited for confined spaces which are known to have relatively high humidity. As way of example, suitable confined spaces include but are not limited to, bathroom, toilets, shower cabins, indoor swimming pools, boats, kitchens, cellars, closets, lockers, shoes and cars. In a preferred embodiment, the kit according to the invention is used in confined spaces selected from bathroom, toilets and shower cabins. Most preferably, the kit of the invention is used to reduce formation of malodors in a bathroom.

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According to the present invention, the kit of the invention is useful to reduce the formation of a broad variety of malodors in confined spaces. Examples of malodors include but are not limited to, smoke, household odors such as toilet and kitchen odors arising from a variety of sources including pets and food wastes or odors from cooking foods , especially burned food odors. In a preferred embodiment, the kit of the present invention is used to reduce the formation of mildew and mold odors, which are particularly present in confined spaces with relatively high humidity.

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EXAMPLES

20 Example 1:

A moisture-permeable, water-impervious sachet (about 50 grams) available from Engelhard Corporation under the tradename Aseptrol® is hanged in a regular bathroom at 1 meter from the bathtub. A perfume composition in solid form (about 200 grams) is obtained by charging 70 parts of Lavender natural extract into a vessel (sealed or under reflux) together with 10 parts of sucrose acetate isobutyrate (SAIB from Eastman Chemical) as plasticizer and mixed at room temperature. The temperature is then elevated to 80°C. 10 parts of Pebax® 2533 (from Total Fina) as polar thermoplastic elastomer and 10 parts of low melting point polyamide Sylvaclear® AF 1900 from Arizona Chemical are charged into the vessel and stirred till complete dissolution. The composition is then let to cool down and solidify at room temperature. The obtained perfume composition is placed on a flat surface at about 1 meter from said water-impervious sachet. The formation of malodors, for instance mold and mildew malodors, are reduced for about 1 month and no chlorine dioxide odor is noticeable during that period. Also, ambient air is perceived as fresher due to the reduction of persistent humidity inside the treated bathroom.

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Example 2:

A moisture-permeable, water-insoluble sachet (about 100 grams) and a perfume composition (about 200 grams) as described in example 1 are placed in distinct cardboard-made containers provided with openings. Both containers are hanged to the roof of a regular basement at about 1 meter distance from each other. The formation of malodors, for instance mold and mildew malodors, are reduced for about 1 month and no chlorine dioxide odor is noticeable during that period. Also, ambient air is perceived as fresher due to the reduction of persistent humidity inside the treated basement.

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The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as “40 mm” is intended to mean “about 40 mm”.

CLAIMS

What is claimed is:

1. A kit comprising a moisture-permeable, water-impervious sachet and a perfume
5 composition, wherein said sachet comprises a dry chlorine dioxide precursor and a dry
chlorine dioxide activator.
2. A kit according to claim 1 wherein said dry chlorine dioxide precursor is selected from
metal chlorites, preferably alkali metal chlorites.
- 10 3. A kit according to claim 2 wherein said dry chlorine dioxide precursor is sodium chlorite.
4. A kit according to any preceding claims wherein said dry chlorine dioxide activator is
selected from the group consisting of calcinated clays, acidified synthetic zeolites,
15 acidified natural zeolites, acidified calcinated clays, and mixtures thereof.
5. A kit according to claim 4 wherein said dry chlorine dioxide activator is selected from
acidified calcinated clays.
- 20 6. A kit according to any preceding claims wherein the weight ratio of said dry chlorine
dioxide precursor and said dry chlorine dioxide activator is in the range from 0.001 to
0.25:1.0.
7. A kit according to any preceding claims wherein said dry chlorine dioxide precursor and a
25 dry chlorine dioxide activator are admixed so as to form a mixture.
8. A kit according to claim 7 wherein said mixture comprises 5 wt% of said dry chlorine
dioxide precursor and 95 wt% of said dry chlorine dioxide activator.
- 30 9. A kit according to claim 7 wherein said mixture further comprises a dehydrating agent.
10. A kit according to claims 9-10 wherein said mixture comprises from 0.1 wt% to 25 wt%
of said dehydrating agent.

11. A kit according to claims 1-8 which further comprises a dehydrating agent as a distinct element.
- 5 12. A kit according to any preceding claims wherein said dehydrating agent is selected from the group consisting of activated calcium chloride, activated calcium sulfate, activated zeolite X, activated zeolite A, activated bentonite clay, activated silica gel, and mixtures thereof.
- 10 13. A kit according to claim 11 wherein said sachet, said perfume composition and said dehydrating agent are placed within distinct containers provided with openings so as to allow free circulation of air within said container.
14. A kit according to claims 7-12 wherein said perfume composition is comprised within
15 said mixture.
15. A kit according to claims 1-12 wherein said perfume composition is loaded onto said sachet.
- 20 16. A kit according to any of the preceding claims wherein said dry chlorine dioxide precursor and said dry chlorine dioxide activator are not capable of reacting with each other to produce chlorine dioxide gas in substantial absence of water.
17. A kit according to any of the preceding claims which generates chlorine dioxide gas in a
25 sustained concentration of from 0.001 ppm to 1000 ppm, preferably from 0.001 ppm to 100 ppm, more preferably from 0.01 to 10 ppm, and most preferably from 0.01 to 0.1 ppm.
18. A kit according to any of the preceding claims which further comprises a set of usage
30 instructions to direct the user towards selecting, dosing and placing said sachet and said perfume composition in a suitable manner.

19. A process of reducing the formation of malodors in confined spaces comprising the step of positioning a kit according to any preceding claims in said confined space.
20. A process according to claim 19 wherein said confined space is selected from the group consisting of bathrooms, toilets, shower cabins, indoor swimming pools, boats, kitchens,
5 cellars, closets, lockers, shoes and cars.
21. A process according to claim 20 wherein said confined space is a bathroom.
- 10 22. The use of a kit according to claims 1-18 for reducing the formation of malodors in confined spaces.
23. The use according to claim 22 for reducing the formation of mold and mildew odors.

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2007/051955

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61L9/01 C01B11/02

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)
A61L C01B D06M

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>US 6 294 108 B1 (SPERONELLO BARRY K [US] ET AL) 25 September 2001 (2001-09-25) cited in the application</p> <p>column 4, line 35 - column 5, line 30 column 6, line 4 - line 57 column 7, line 66 - column 8, line 43 column 9, line 34 - line 64</p> <p style="text-align: center;">----- -/--</p>	<p>1-12,14, 16,17, 19,20, 22,23</p>

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
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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
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2007/051955

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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Y	<p>US 6 605 304 B1 (WELLINGHOFF STEPHEN T [US] ET AL) 12 August 2003 (2003-08-12)</p> <p>paragraphs [0018], [0060], [0062], [0090], [0099], [0106], [0136], [0182], [0184], [0198]</p>	1-12,14, 16-20, 22,23
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