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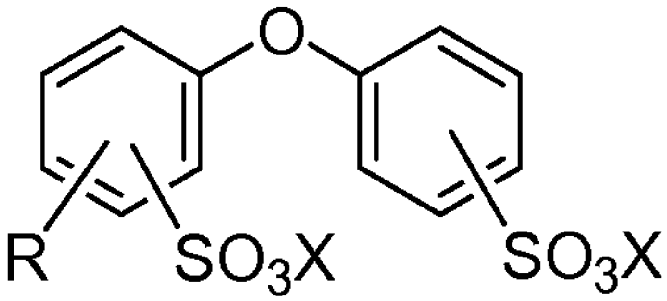
(54) **Title**: ANTI ALLERGEN COMPOSITION AND SPRAY FORMULATION COMPRISING THE SAME

Formula 1



(57) **Abstract**: The present invention relates to an anti-allergen composition comprising (a) a compound represented by the following formula 1, and (b) oil extracted from plant, anti-bacterial agent, or a mixture thereof, and spray formulations comprising the same: (1) <Please insert the chemical formula here as it appears in the paper copy.> wherein R and X are the same as defined in disclosure of the invention.

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ANTI ALLERGEN COMPOSITION AND SPRAY FORMULATION COMPRISING THE SAME

Technological Field

This disclosure relates to an anti-allergic composition and spray that deactivates allergens that originate from dust mites, pollen, pets, the main factors that causes allergy both outdoors and indoors.

Background

Allergy is the response of the defense system of an organism against foreign substance (antigen) that invades an organism. In other words, it's abnormal response of an immune system. Generally, when foreign substance (antigen) invades, an organism generates antibody and lymphocyte with special response. If this foreign substance invades again, it has various immune responses as defense mechanism for self-preservation. This is called allergic response.

An allergen is an antigen that causes an allergic response. Exemplary allergens include house dust tick (i.e., dust mites), pollen, animal hair, skin fragment, vegetable fiber, germ, food, dye, and certain chemical substances. The secretion of dust mites gets in the human body by breathing or directly contacts skin which causes allergy. Pollen in the air gets in the eyes, nose and lungs of a human causing allergy. Specially, when pollen comes in the nose and the neck of a human, this causes a series of seasonal allergic rhinitis called pollen allergy.

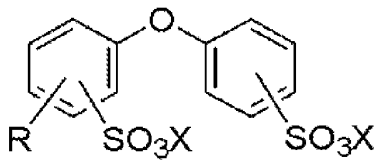
Pet hair and skin fragments are also allergens. It can take more than two years for allergy to animal to be progressed. Allergy can't be reduced more than 6 months after the contact is made with animal.

US Patent No. 4,806,526 describes removing dust mite allergen and plant allergen with tannic acid solution. KR release patent 10-2010-0031468 describes an antibiotic rostellum agent prepared with one or more of rostellum agent and surfactant selected from glycine, cycsteine and glycylglycine.

Summary

Prior solutions do not provide have effect of removing allergen or the effect of antibiosis / rostellum. The present disclosure provides an anti-allergic composition and spray with this composition that has excellent anti-allergic effect for various allergens and the effect of antibiosis and rostellum.

The disclosure provides an anti-allergen composition that has (a) chemical according to the following chemical formula 1:



(R is straight or branching strain of alkyl radical for C_1 - C_{30} and X is H, Na, K, Mg or Ca in the above chemical formula 1)

and (b) plant extract oil, an antimicrobial or a mixture thereof:

The above anti-allergen composition can further include a solvent. The above solvent can be water, alcohol or a mixture thereof.

Also, the above anti-allergen composition can further include a surfactant and/or a spice.

The above anti-allergen composition can further include 0.1-5 weight % of the chemical according to chemical formula 1; 0.01-3 weight % of plant extract oil, antimicrobial or a mix with these based on the total weight of composition.

In another aspect, this disclosure provides a spray that includes the previously described anti-allergic composition.

The anti-allergen composition of the invention has enhanced effect of anti-allergy, antibiosis and deodorization. Therefore, when making the above composition a dosage form to use as spray, it can effectively remove microorganism such as bacteria and odor as well as the allergen that generates from the surrounding environment odor.

The above summary of the present invention is not intended to describe each disclosed embodiment or every implementation of the present invention. The description that follows more particularly exemplifies illustrative embodiments. In several places throughout the application, guidance is provided through lists of examples, which examples can be used in various combinations. In each instance, the recited list serves only as a representative group and should not be interpreted as an exclusive list.

Brief Description of the Drawings

Figure 1(a) shows bacterial growth 24 hours after injecting *Staphylococcus* ATCC 6538 into non-woven fabric that is not sprayed with the anti-allergen composition of performing example 1.

Figure 1(b) shows bacterial growth 24 hours after injecting *Staphylococcus* ATCC 6538 into non-woven fabric that is sprayed with the anti-allergen composition of performing example 1.

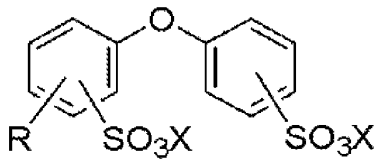
Figure 2(a) shows bacterial growth 24 hours after injecting *Escherichia Coli* ATCC 25922 into non-woven fabric that is not sprayed with the anti-allergen composition of performing example 1.

Figure 2(b) shows bacterial growth 24 hours after injecting *Escherichia Coli* ATCC 25922 into non-woven fabric that is sprayed with the anti-allergen composition of performing example 1.

Figure 3 is a graph depicting the concentration of ammonia and hydrogen over time when exposed to the anti-allergen spray of performing example 4.

Detailed Description of Illustrative Embodiments

The anti-allergen composition of the disclosure includes (a) a chemical marked with the following Chemical Formula 1:



(R is straight or branching strain of alkyl radical for C_1 - C_{30} and X is H, Na, K, Mg or Ca in the above chemical formula 1)

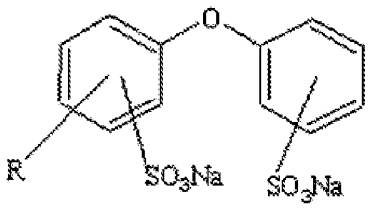
and (b) plant extract oil, an antimicrobial or a mixture thereof.

A chemical according to Chemical Formula 1 is an anionic surfactant with excellent cleaning power and emulsification and is commonly known as an effective ingredient of detergent. Also, a chemical according to Chemical Formula 1 has an ability to absorb, break down or change protein substance that is the cause of allergy in addition to its commonly known cleaning power. Therefore, when a chemical according to Chemical Formula 1 is included in the anti-allergen compositions disclosed herein, it can have the effect of antibiosis and anti-allergy effectively removing various allergens and bacteria that are generated from surrounding environments. Also, since the chemical in Chemical Formula 1 is a type of

anionic surfactant, it has high penetrating depth. Therefore, and without wishing to be bound by theory, it can easily reach the surface of a sheet, clothing fiber or germ to effectively deactivating the allergen.

Preferably, R is straight or branching strain of alkyl radical for C_{10} - C_{25} and straight chain of alkyl radical for C_{10} - C_{25} is more preferred in Chemical Formula 1.

An example of a chemical according to Chemical Formula 1 can be a chemical marked with the following Chemical Formula 1a:



R is a straight or branching strain of alkyl radical for C_1 - C_{30}. Preferably, R is a straight or branching chain of alkyl radical for C_{10} - C_{25} and more preferably R can be a straight chain of alkyl radical for C_{10} - C_{25} in the above Chemical Formula 1a.

The most preferred example, in certain circumstances, of a chemical according to Chemical Formula 1 can be sodium hexadecyl diphenyl oxide disulfonate.

The amount of a chemical (a) in the anti-allergen compositions is not particularly limited. In certain implementations, a concentration of about 0.1 to 5 weight % based on the total weight of composition can have the desirable effect of reducing allergen activation without increasing the composition viscosity.

An example of allergen that is reduced or deactivated by this chemical of Chemical Formula 1 can be animal allergen and plant allergen. Specifically, it can be, the cause of allergy disease, dust mites, pollen, pet hair, but it's not limited to these.

The anti-allergen compositions of the present disclosure include plant extract oil and/or antimicrobial with the previously mentioned chemical according to Chemical Formula 1. Such compositions can have the effect of antibiosis and deodorization as well as anti-allergic effect by including the plant extracts oil, antimicrobial, or a mixture thereof.

In certain implementations, the plant extract oil is extracted from plant with the method of steam distillation, which can enhance the antibiosis and deodorization capabilities of the composition. The plant extract oil is very compatible with a chemical according to Chemical Formula 1. Therefore, the composition that includes the plant extract oil and a chemical of Chemical Formula 1 can feature

enhanced antibiosis and deodorization without a reduced anti-allergen effect. Furthermore, since the plant extract oil is typically a hydrophobic substance, a composition that includes the plant extract oil and a chemical of Chemical Formula 1 can be easily applied to a hydrophobic surface.

The particular plant extract oil used is not limited, but oil that is extracted from tea plant, oil that is extracted from grapefruit, and olive oil are preferred under certain circumstances. Tea plant extract oil is particularly suitable for use in the anti-allergen compositions of the present disclosure.

These plant extract oils can be obtained with various methods of extracting plant oil that are known in the art. Suitable examples include, but are not limited to, the water method, wherein a plant is directly put in water and heated; the steam method, wherein the plant is put on shelf or sieve and hot steam is injected into it; the water and steam method that is a combination process of the water method and the steam method; the compressing method, wherein a fruit peel is pressed to extract oil; the solvent extract method, wherein oil is extracted from a plant with a solvent such as oil ether, hexane, methanol, ethanol.

The amount of the plant extract oil in the anti-allergen composition is not particularly limited. In certain implementations, a concentration of about 0.1 to 3.0 weight % or more preferably about 0.1 to 1.5 weight % based on the total weight of the composition, can have the potentially desirable effect of antibiosis and deodorization without a reduction of the anti-allergen effect of the chemical of Chemical Formula 1.

If the plant extract oil is mixed with an antimicrobial (including those describe below), the mix rate of the plant extract oil and antimicrobial is not particularly limited. In certain implementations, a weight ratio of about 1:1 to 1:3, can have a deodorization effect, which can lead to an increased effect of anti-allergy and antibiosis.

Antimicrobials used in the anti-allergen compositions reduce the growth of a microorganism such as bacteria, fungi and also inhibits their survival.

The antimicrobials have the effect of antibiosis / sterilization and have enhanced compatibility with the chemical of Chemical Formula 1. Therefore, a composition that contains antimicrobial and the chemical (a) of the Chemical Formula 1 can feature enhanced or even excellent antibiosis effect. The antimicrobial can, in certain implementations, intensify the anti-allergic effect from the chemical (a) of Chemical Formula 1.

Suitable antimicrobials include, but are not limited to, sodium pyrithione, benzalkonium chloride can have excellent antibiosis effect.

The antimicrobial amount is not particularly limited. In certain implementations, a concentration of about 0.01 to 3.0 weight % based on the total weight of the composition, can increase and enhance the effect of anti-allergy and antibiosis.

The composition in the invention can further include a solvent. The solvent dissolves or disperses the chemical of the Chemical Formula 1, plant extract oil and/or antimicrobial to mix these evenly. When the composition is used as spray, it can be evenly dispersed in wide area and the presence of a solvent may decrease the drying time. Furthermore, the solvent can, in certain circumstances, dramatically increase the effect of anti-allergy, antibiosis and sterilization.

Suitable solvents include water, alcohol, and mixtures thereof. Suitable alcohols include low level alcohols, such as C_1 to C_6 alcohols and preferably ethanol. When low level alcohol is used, the anti-allergen composition can be dried fast in the air, also its stability can be improved due to low flammability.

The amount of the above solvent can be the remaining amount that adjusts the total amount of anti-allergic composition to be 100 weight %.

When using water and alcohol as solvent in this invention, the mix rate of water and alcohol is not particularly limited. In certain implementations, the concentration of alcohol is about 1 to 20 weight % and more suitably around 4 to 10 weight %, and the total weight of anti-allergic composition in the water amount to be 100 weight %. In such circumstances, the solvent easily dissolves or disperses other ingredients of the composition and can be dried fast in the air when the composition is used as a spray.

The composition in the invention can further include a surfactant. Without wishing to be bound by theory, the surfactant forms molecular aggregates with the chemical of Chemical Formula 1, thereby providing low surface tension for the composition to quickly reach a hydrophobic surface. Therefore, the anti-allergen composition can penetrate into hydrophobic substance with the above surfactant effectively removing allergen or odor ingredient. The above surfactant can be commonly classified into surfactant of anionic polymerization, cationic polymerization, amphiprotic, nonionic polymerization depending on the ionization status and the subject of activating agent.

Suitable surfactants include, but are not limited to, polyvinylpyrrolidone (PVP), polyethyleneimine (PEI), poly methyl vinyl ether (PMVE), polyvinyl alcohol (PVA), polyoxyethylene alkyl phenyl ether, polyoxyethylene sorbitan monostearate, fluoroacrylate copolymer-ethyl acetate. In certain particularly suitable implementations, it can be sorbitan fatty acid ester since it can disperse evenly spice and oil.

The amount of the above surfactant in the anti-allergen composition is not particularly limited. In certain circumstances, a concentration of about 0.1 to 1 weight % based on the total weight of the composition, can further increase the effect of anti-allergy, antibiosis and deodorization.

The composition in the invention can further include a spice. The spice may remove odor covering odorous substance, reduce stress or tension and increase concentration. Therefore, a composition with the above spice can increase deodorization effect and the effect of fragrance and aromatherapy.

An example of the above spice can be common fragrant spice or natural aroma oil in the market.

Suitable spices include, but are not limited to, peppermint oil, citronella oil, rose oil, lavender oil, jasmine oil, lemon oil, orange oil, sandalwood, frankincense, German Chamomile, ylang-ylang oil.

The amount of the spice in the anti-allergen composition is not particularly limited. In certain circumstances, a concentration of about 0.01 to 1 weight % based on the total weight of the composition, can intensify the deodorizing effect without reducing the effect of anti-allergy and antibiosis, as well as enhancing the effect of fragrance or aromatherapy.

The present disclosure provides a spray that the previously mentioned anti-allergic composition is made in a dosage form. The spray reduces the activation of various allergens, and deactivates them. Furthermore, it can reduce the bacteria growth or sterilize bacteria and effectively remove odor.

The spray is commonly charged in a spray container with a propellant. If a certain pressure is applied to spray under high pressure, it can spray in a mist form. Exemplary propellants include nitrogen, carbon dioxide, dimethyleter, LPG.

Generally, the amount of composition in the spray container can be around 10-1,000 ml, preferably around 30-750 ml and more preferably around 50-500 ml. Suitable spray containers include trigger, pump and axis force styles of a spray container.

Objects and advantages of this invention are further illustrated by the following examples, but the particular materials and amounts thereof recited in these examples, as well as other conditions and details, should not be construed to unduly limit this invention. Unless otherwise indicated, all parts and percentages are by weight.

Performing example 1

Anti-allergic composition including sodium hexadecyl diphenyl oxide disulfonate 1 weight %, tea plant extract oil 1 weight %, sorbitan fatty acid ester 0.48 weight %, flower extract floral scent 0.04 weight %, ethanol 5 weight % and the residual water was made. This was made in a dosage form to make spray.

Performing example 2

Anti-allergic composition and spray were made in the same way as the performing example except using grapefruit extract oil 1 weight % instead of tea plant extract oil 1 weight % used in the performing example 1.

Performing example 3

Anti-allergic composition and spray were made in the same way as the performing example 1 except using silver ion 0.05 weight % instead of tea plant extract oil 1 weight % used in the performing example 1.

Comparative example 1

A spray product, Febreze fiber deodorant, from P&G was used in the comparative example 1.

Comparative example 2

Airwick deodorant, the spray product from Oxy Reckitt Benckiser, was used in the comparative example 2.

Performing example 3

Anti-allergic composition and spray were made in the same way as the performing example 1 except using silver ion 1 weight % instead of tea plant extract oil 1 weight %, not sodium hexadecyl diphenyl oxide disulfonate 1 weight % used in the performing example 1

Experimental example 1 - Test of anti-allergic function

ELISA-enzyme LISA was used to measure the deactivating function of allergen. This method is to check the color change made by antigen antibody response to measure the allergen concentration.

The method of making the sample and reactive reagent and measuring its test result used in the performing examples of the invention are basically as shown below.

1. Making reactive reagent

Used allergen: Pollen

An ELISA test kit, such as those available from Indoor Biotechnologies (Charlottesville, VA) was supplied for each antigen. Each antigen was dissolved into PBS making test allergen solution 250 ng/ml. Other methods of making reagent were given by the ELISA kit provider.

2. Making samples

0.1 g of the spray in the performing examples 1 to 3 was sprayed on non-woven fabric making samples 1 to 3. The spray in the performing examples 1 to 3 was used as its control group.

3. Reaction of samples and antigens

Each sample was cut by 5 × 5 mm and remained in antibody solution (400 ng/ml) 300 μl for 1 hour at 25°C. After 1 hour, this solution (equivalent solution) 100 μl was put in 96 well microplate that is covered with antibody. After measuring the optical density at 405 nm with microplate reader, the allergen concentration was measured each sample.

4. Measuring the test result

Each antigen concentration was measured in the reactive solution including the sample with microplate reader at 405 nm to calculate the efficiency of allergen deactivation. The removing rate (%) of protein was calculated with this. Also, OD (Optical Density) value was measured.

Efficiency (%) = (250 – concentration measured in each sample) / 250

Table 1

	Protein concentration (ng/ml)	OD value	Rate of removing protein (%)
Performing example 1	400	0.2	> 99
Performing example 2	400	0.3	> 99
Performing example 3	400	0.1	> 99
Performing example 1	400	1.1	< 10
Performing example 2	400	0.92	< 10
Performing example 3	400	10.4	76.8

As shown in the Table 1, the rate of removing protein for the spray in the performing example 1 to 3 was around 99% or more. Comparing with the rate of removing protein for the commercialized spray in the performing example 1 and 2 is below around 10%, the spray in the performing example 1 to 3 showed the dramatic effect of anti-allergy.

Also, the spray in the performing example 1 to 3 showed high rate of removing protein, compared with the spray of the comparative example 3. Compared with the composition including the traditional antimicrobial, the composition including the chemical of the Chemical Formula 1 had very excellent anti-allergic effect for the tested allergen.

Experimental example 2 - Test of antibiosis function

Test of *Staphylococcus* ATCC 6538

Staphylococcus ATCC 6538 was injected into non-woven fabric (test piece 1) where the composition of the performing example 1 was sprayed and non-woven fabric (contrast piece 1) where the composition of the performing example 1 wasn't sprayed. The bacteria number at the early stage was measured. 24 hours later, the bacteria number was measured to check the status of bacteria breeding. The result is shown in the following Table 2.

Table 2

	Bacteria type	Number of injected bacteria (0 hour)	Bacteria number after 24 hours	Rate of reduced bacteria (%)
Test piece 1	*Staphylococcus* ATCC 6538	8.60×10^4	< 10	> 99.9
Contrast piece 1	*Staphylococcus* ATCC 6538	2.0×10^5	1.1×10^8	0

The test result showed that 24 hours later, the bacteria number was greatly reduced by 99.9% or more for test piece 1.

(a) and (b) of figure 1 show the status of bacteria breeding after 24 hours for each contract piece 1 and test piece 1. Bacteria were mostly removed for test piece 1 also in figure 1, while a great amount of bacteria existed for contrast piece 1.

Test of colon bacillus ATCC 6538

Escherichia Coli ATCC 25922 was injected into non-woven fabric (test piece 2) where the composition of the performing example 1 was sprayed and non-woven fabric (contrast piece 2) where the composition of the performing example 1 wasn't sprayed. The bacteria number at the early stage was measured. 24 hours later, the bacteria number was measured to check the status of bacteria breeding. The result is shown in the following Table 3.

Table 3

	Bacteria type	Number of injected bacteria (0 hour)	Bacteria number after 24 hours	Rate of reduced bacteria (%)
Test piece 2	*Escherichia Coli* ATCC 25922	8.60×10^4	< 10	> 99.9
Contrast piece 2	*Escherichia Coli* ATCC 25922	2.0×10^5	1.1×10^8	0

The test result showed that 24 hours later, the bacteria number was greatly reduced by 99.9% or more for test piece 2.

(a) and (b) of figure 2 show the status of bacteria breeding after 24 hours for each contract piece 2 and test piece 2. Bacteria were mostly removed for test piece 2 also in figure 2, while a great amount of bacteria existed for contrast piece 2.

Experimental example 3 - Test of deodorizing function

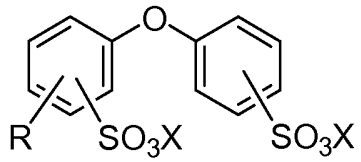
Odor ingredient (ammonia, hydrogen) was injected in a sealed conical flask to test the deodorizing effect. The spray of the performing example 1 was sprayed in a sealed conical flask injected with the odor ingredient. The concentration of remaining odor ingredient in a sealed conical flask was measured after 1 minutes, 2 minutes, 5 minutes, and 10 minutes. The result is shown in figure 3.

The test result showed that the concentration of ammonia and hydrogen injected in a sealed conical flask was gradually reduced by the spray of the performing example. The odor producing compounds were mostly removed 10 minutes later. Therefore, the spray in the invention has excellent effect of deodorization.

What is claimed is:

1. An anti-allergen composition comprising:

(a) a compound represented by the following formula 1,



wherein R is C_1 to C_{30} linear or branched alkyl, and

X is H, Na, K, Mg or Ca; and

(b) an oil extracted from plant, an anti-microbial agent, or a mixture thereof:

2. The anti-allergen composition according to Claim 1, which further comprises a solvent.

3. The anti-allergen composition according to Claim 2, wherein the solvent includes water, alcohol or a mixture thereof.

4. The anti-allergen composition according to Claim 1, which further comprises a surfactant, fragrance, or a mixture thereof.

5. The anti-allergen composition according to Claim 1, which comprises (a) 0.1 to 5 wt% of the compound, and (b) 0.01 to 3 wt% of the oil extracted from plant, the anti-microbial agent, or the mixture thereof, based on the total weight of the anti-allergen composition.

6. A spray formulation comprising the anti-allergen composition as claimed in any one of claims 1 to 5.

7. The anti-allergen composition in claim 1 or claim 6, wherein the compound is sodium hexadecyl diphenyl oxide disulfonate.

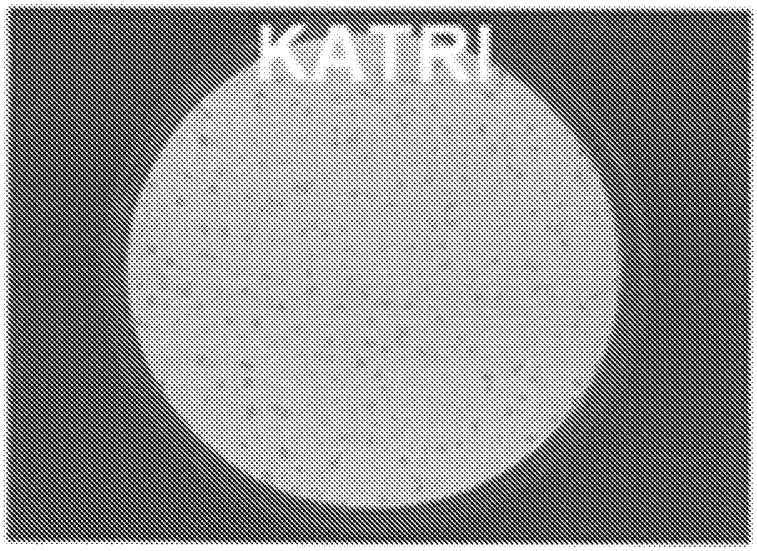


Fig. 1a

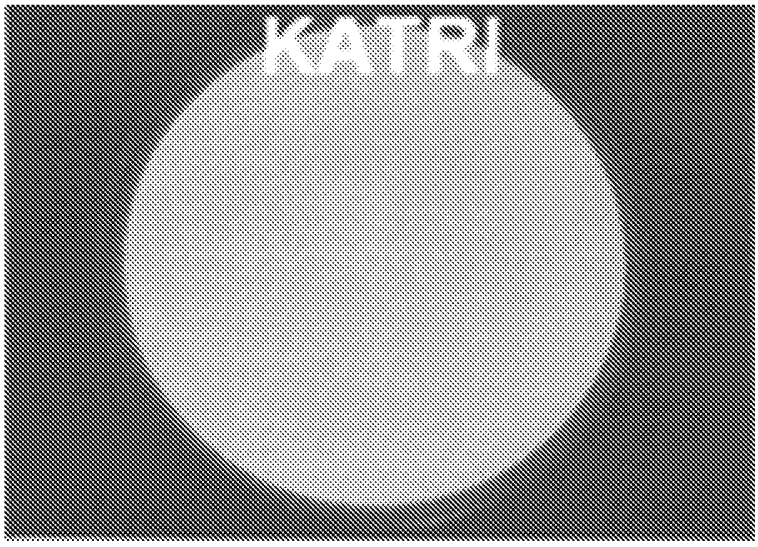


Fig. 1b

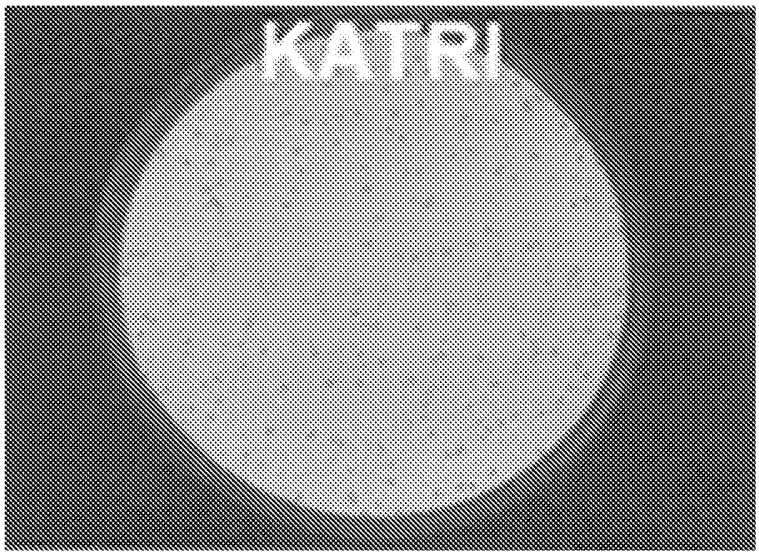


Fig. 2a

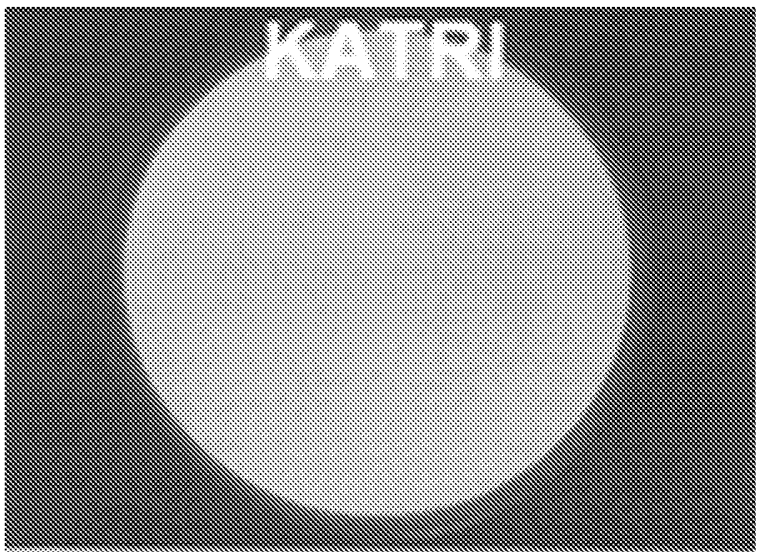


Fig. 2b

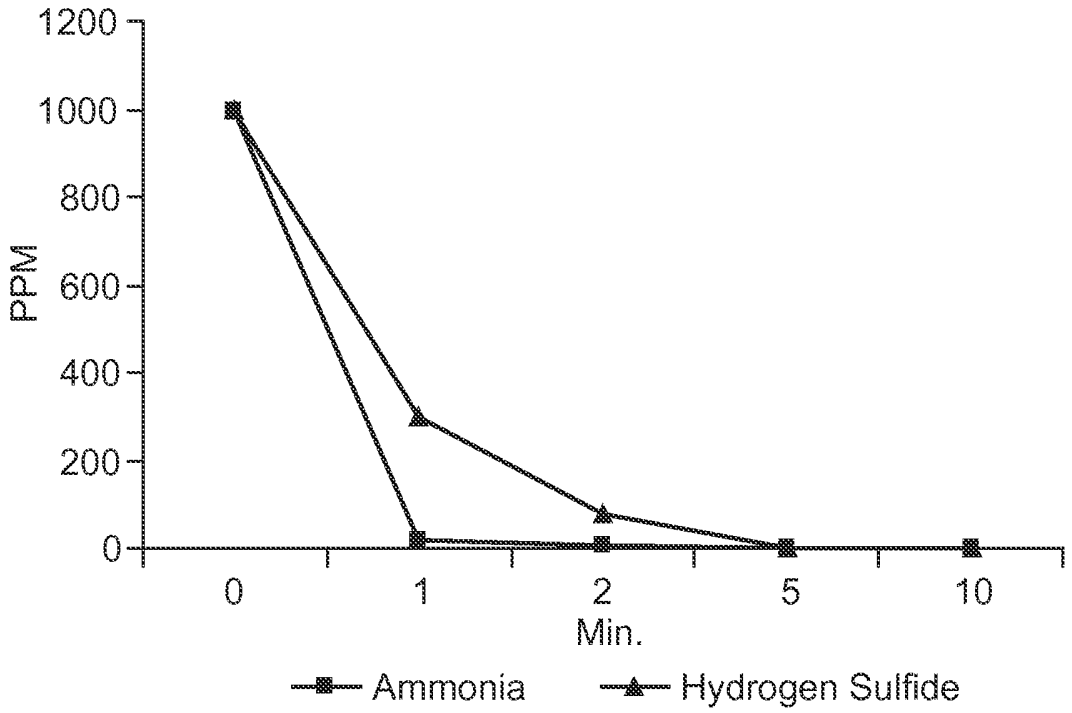

1200
1000
800
600
400
200
0
PPM
0
1
2
5
10
Min.
Ammonia
Hydrogen Sulfide

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/071076

A. CLASSIFICATION OF SUBJECT MATTER

A61K 31/05(2006.01)i, A61K 31/095(2006.01)i, A61K 9/12(2006.01)i, A61P 27/14(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61K 31/05; A61K 31/095; A61K 9/12; A61P 27/14; A01N 25/34; A61K 31/765; A61L 2/18; A61K 39/35; A01P 1/00; A61K 35/78; A61K 31/185; C11D 3/00; A01N 25/00

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: anti-allergen, diphenyl oxide disulfonate, extract, anti-microbial, spray

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005-0095222 A1 (SUZUKI, T. et al.) 05 May 2005 See claims 1 and 7; and paragraphs [0082], [0083], [0097], [0098] and [0174].	1-6
A	US 2007-0014687 A1 (TABOR, R. L. et al.) 18 January 2007 See claims 9, 16, 18 and 30; and paragraphs [0004] and [0013].	1-6
A	US 2006-0293214 A1 (CHENG, L. et al.) 28 December 2006 See claims 1, 8, 13, 15 and 16; paragraph [0115]; and table 1A.	1-6
A	US 7037535 B2 (TYRRELL, D. J. et al.) 02 May 2006 See claims 1-12.	1-6
A	US 2008-0107716 A1 (ARGO, B. P. et al.) 08 May 2008 See claims 1-14.	1-6

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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

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

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 April 2013 (26.04.2013)	**29 April 2013 (29.04.2013)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer CHOI, Sung Hee Telephone No. 82-42-481-8740

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/071076

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☒ Claims Nos.: 7
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required addtional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/071076

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005-0095222 A1	05.05.2005	US 2008-0138311 A1	12.06.2008
		US 2012-0213996 A1	23.08.2012
US 2007-0014687 A1	18.01.2007	AT 521370 T	15.09.2011
		CA 2615253 A1	18.01.2007
		CA 2615253 C	15.03.2011
		EP 1926503 A1	04.06.2008
		EP 1926503 B1	24.08.2011
		WO 2007-008938 A1	18.01.2007
US 2006-0293214 A1	28.12.2006	WO 2007-001594 A2	04.01.2007
US 7037535 B2	02.05.2006	AU 2003237239 A1	15.06.2004
		AU 2003237239 B2	01.05.2008
		AU 2008203235 A1	07.08.2008
		AU 2008203235 B2	04.06.2009
		BR 316035 A	13.09.2005
		EP 1562431 A1	17.08.2005
		JP 2006-506503 A	23.02.2006
		KR 10-2005-0084666 A	26.08.2005
		MX PA05004728 A	03.08.2005
		US 2004-0096525 A1	20.05.2004
		US 2006-0141074 A1	29.06.2006
		WO 2004-045292 A1	03.06.2004
US 2008-0107716 A1	08.05.2008	AU 2005251677 A1	22.12.2005
		CN 1964625 A	16.05.2007
		EP 1758451 A1	07.03.2007
		IL 177061 D	10.12.2006
		JP 2008-501685 A	24.01.2008
		KR 10-2007-0029732 A	14.03.2007
		MX PA06014074 A	15.02.2007
		TW I281958 B	01.06.2007
		US 2005-0271710 A1	08.12.2005
		US 7998495 B2	16.08.2011
		WO 2005-120228 A1	22.12.2005