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(72) Inventor(s):
Avijit Das
Scott Rudkin
Anne Renée Jeanne Szklar

(73) Proprietor(s):
Reckitt Benckiser (Brands) Limited
103-105 Bath Road, Slough, Berkshire, SL1 3UH, United Kingdom

(74) Agent and/or Address for Service:
Reckitt Benckiser Corporate Services Limited
Legal Department - Patents Group, Dansom Lane, HULL, HU8 7DS, United Kingdom

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New air freshening formulation

Background to the invention

Air freshening products are widely used and come in a variety of forms. These include scented candles, wax melters, reed stick emanators, scented gels, liquid electrical plugins and aerosols. Of these aerosols are probably the most widely used air freshening product. The reason for their popularity no doubt stems from their ease of use (portable and requires no power source), rapid effect (the product is dispensed and dispersed immediately into the air), safety (no need for either electrical power or combustion) and simplicity.

Household aerosol products are generally divided into two classes, those that use LPG (liquid petroleum gas) propellants and those that use compressed gas (such as nitrogen) propellants.

LPG propellant aerosols are well known to offer better performance in terms of particle size and pressure profile.

Compressed gas propellant aerosols have well documented performance drawbacks, such as poor particle break up (large particle sizes), directionality (propellant does not mix with formulation) and pressure reduction over the lifetime of the product.

Despite these disadvantages, compressed gas propellants are increasingly used as they are both environmentally less damaging and less expensive.

The world market trend is also to move towards water-based aerosol formulations. This is due mainly to a regulatory issue; the reductions of the volatile organic content (VOC) levels in aerosol product has involved the reduction of the solvent level in many products and an increase of the water content.

Currently it is desirable to have a VOC propellant level of below 30% w/w not only to reduce cost but also to comply with increasingly stringent regulatory limits (e.g. a maximum of 24.5% w/w in the USA for air freshener products).

Increased water can give fall out problems and corrosion problems in standard tin-plate aerosol cans. EP2566525 A1 details a solution to this utilising a corrosion inhibitor and surfactant system.

However this solution has been found to cause problems, particularly in automatic aerosol dispensers. An example of which is Air Wick's ® Freshmatic® device. This is because the surfactants are difficult to effectively aerosolise and cause build up gradually on the surfaces surrounding the dispenser.

It is one object of the present invention to solve this problem.

Summary of the invention

In a first aspect the invention provides an air freshening formulation comprising;

a) water 30-65 % by weight;
b) alcohol 10 -50 % by weight;
c) co-solvent 12-28 % by weight;
d) fragrance composition 0.1-15 % by weight;

where the air freshening composition comprises no surfactant and wherein the alcohol is ethanol and the co-solvent is dipropylene glycol n-propyl ether (DPnP).

In a second aspect the invention provides an aerosol canister comprising a formulation according to the first aspect of the invention and an aerosol propellant.

A third aspect of the invention provides a method of treating the air comprising the use of a canister according to the second aspect of the invention in an automatic aerosol dispensing device.

Description of the invention

The applicants have found a highly effective aqueous air freshening composition. Preferably the composition is used as the basis of an air freshening aerosol formulation/product. The composition when used as an aerosol formulation provides excellent dispersion characteristics. The composition does not produce a significant residue build-up when regularly sprayed over time in an automatic aerosol spraying device.

In its broadest the invention comprises an air freshening formulation with:

a) water 30-65 % by weight;
b) alcohol 10-50 % by weight;
c) co-solvent 12-28 % by weight;
d) fragrance composition 0.1-15 % by weight;

and wherein the air freshening composition comprises no surfactant; wherein the alcohol is ethanol and the co-solvent is dipropylene glycol n-propyl ether (DPnP).

For the purposes of the present invention the terms “alcohol” and “co-solvent” are discrete, chemically distinct components to the inventive formulation. Additionally, for the purposes of the present invention the term “glycol ether” means any alkyl ethers of ethylene glycol or propylene glycol.

Preferably the water comprises between 35 and 55%, and more preferably between 40 and 50% by weight of the formulation.

Preferably the alcohol comprises between 15 and 40 %, and more preferably between 20 and 35% by weight of the formulation.

Other alcohols disclosed herein include the group consisting of methanol, propanol, isopropanol, butanol and mixtures thereof. In particularly preferred embodiments the solvent is ethanol.

The co-solvent is miscible or partially miscible with water and/or the alcohol at normal conditions. It is preferred that the solvent be miscible with water under standard conditions.

The co-solvent comprises between 12 and 28 % and preferably between 15 and 25% by weight of the formulation.

Co-solvents disclosed herein include acetone, DMF (dimethylformamide), acetonitrile, diethyl ether, glycerol, MMB (3 methoxy 3 methyl 1 butanol), glycol ethers and mixtures thereof.

The glycol ether may comprise an ethylene glycol ether or a propylene glycol ether or a mixture of two or more ethylene or propylene glycol ethers.

Examples of other suitable propylene glycol ethers include propylene glycol n-butyl ether (PnB), dipropylene glycol n-butyl ether (DPnB), dipropylene glycol methyl ether acetate (DPMA), tripropylene glycol methyl ether (TPM), propylene glycol methyl ether (PM) propylene glycol methyl ether acetate (PMA), and dipropylene glycol methyl ether (DPM).

Examples of suitable ethylene glycol ethers include; ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, ethylene glycol monopropyl ether, ethylene glycol monoisopropyl ether, ethylene glycol monobutyl ether, ethylene glycol monophenyl ether, ethylene glycol monobenzyl ether, diethylene glycol monomethyl ether, diethylene glycol monoethyl ether, and diethylene glycol mono-n-butyl ether and mixtures thereof.

The glycol ether may comprise a single ethylene or propylene glycol ethers or a mixture of two or more different glycol ethers.

The glycol ether used alone or in combination with others in the present invention is dipropylene glycol n-propyl ether (DPnP).

Preferably the fragrance composition comprises between 1 and 6% by weight and more preferably between 1.5 and 4% by weight of the air freshening formulation. Any fragrance composition may be used with the present formulation.

The alcohol is ethanol and the glycol ether is dipropylene glycol n-propyl ether (DPnP). Another formulation disclosed herein comprises ethanol and MMB (3 methoxy 3 methyl 1 butanol). And another formulation disclosed herein comprises ethanol and glycerol. Yet another formulation disclosed herein comprises ethanol and acetone.

A particularly preferred air freshening formulation according to the present invention comprises;

a) water 48-52% by weight;

b) ethanol 26-30% by weight;

c) dipropylene glycol n-propyl ether (DPnP) 18-22 % by weight; and

d) a fragrance composition 1-3 % by weight

The air freshening formulation may further comprise a corrosion inhibiter. Preferably the corrosion inhibitor, if included, comprises less than 0.5 % by weight of the composition.

Particular examples of suitable corrosion inhibitors include borate salts.

The formulations of the present invention are preferably used as aerosol formulations/ compositions. To achieve this the formulations are combined with one or more aerosol propellants and stored in a suitable canister.

The aerosol formulations may be prepared using any suitable aerosol propellant. The aerosol formulations may be prepared using a single propellant or a mixture of two or more different propellants.

Propellants for aerosols form two general classes,

1) LPG propellants such as propane, *n*-butane, *iso*-butane dimethyl ether (DME) and methyl ethyl ether; and
2) Compressed gas propellants such as nitrogen, carbon dioxide nitrous oxide and air.

In terms of performance small particle size and dispersion characteristics, generally LPG propellants are preferred. In terms of cost and environmental considerations, compressed gasses are generally preferred.

Aerosol compositions of the present invention are preferably compressed gas propellant aerosols, preferably nitrogen or air.

In a second aspect the present invention comprises an aerosol product comprising the formulation of the first aspect of the invention, at least one aerosol propellant and a suitable aerosol container or canister. For the purposes of the present invention the terms container and canister are interchangeable and have the same meaning.

The at least one propellant may be any propellant suitable in the art. Preferably the at least one aerosol propellant is a compressed gas propellant. And more preferably the at least one compressed gas propellant is selected from the group consisting of air, nitrogen and carbon dioxide.

Any suitable aerosol container or canister may be used. Preferably the container/canister will be selected from the group comprising, a steel canister, tin-plated steel canister or other corroding metal canister.

Preferably the volume ratio of propellant to formulation is propellant is within the range from 80:20 to 30:70, preferably from 70:30 to 50:50.

Preferably the initial flow rate of aerosol product from the canister is between 0.5 and 3.0 grams per second. The initial flow rate measured for the purposes of the present invention according the average release for the first 15 seconds of the product.

Preferably the mean particle size of the released aerosol is between 20 and 80 microns.

A particularly preferred use of the aerosol products of the present invention are in automatic aerosol dispensing devices.

A good example of which is the Freshmatic® product from Air Wick®. These products enable the constant, steady release of aerosol over weeks and months by activating the aerosol canister to release the fragrance formulation every few mins.

The aerosol products of the present invention have excellent fragrance parameters while having no residue problems when used in automatic spray devices.

CLAIMS:

1. An air freshening formulation comprising;
   a) water 30-65% weight %;
   b) alcohol 10 - 50 weight %;
   c) co-solvent between 12 and 28 weight %;
   d) fragrance composition 0.1 -15 weight %;
   and wherein the air freshening composition comprises no surfactant;
   wherein the alcohol is ethanol and the co-solvent is dipropylene glycol n-propyl ether (DPnP).
2. The air freshening formulation according to claim 1 wherein the water comprises between 35 and 55% by weight of the formulation.
3. The air freshening formulation according to claim 2 wherein the water comprises between 40 and 50% by weight of the formulation.
4. The air freshening formulation according to any of the previous claims wherein the alcohol comprises between 15 and 40 % by weight of the formulation.
5. The air freshening formulation according to any of the previous claims wherein the alcohol comprises between 20 and 35% by weight of the formulation
6. The air freshening formulation according to any of the previous claims wherein the co-solvent comprises between 15 and 25% by weight of the formulation.
7. The air freshening composition of any of the previous claims wherein the fragrance composition comprises between 1 and 6% by weight by weight of the formulation.
8. The air freshening composition of any of the previous claims wherein the fragrance composition comprises between 1.5 and 4% by weight of the formulation.
9. The air freshening formulation according to claim 1 wherein the formulation comprises;
   a) water 48-52% by weight;
   b) ethanol 26-30% by weight;
   c) dipropylene glycol n-propyl ether (DPnP) 18-22 % by weight; and
   d) a fragrance composition 1-3 % by weight
10. The air freshening formulation according to any of the previous claims wherein the composition further comprises a corrosion inhibiter.
11. The air freshening formulation according to claim 10 wherein the corrosion inhibitor comprises less than 0.5 % by weight of the composition.

12. The air freshening composition according to any of the previous claims wherein formulation is further combined with any suitable propellant to form an aerosol composition for use in an aerosol canister.
13. The air freshening composition according to claim 12 wherein the propellant is a compressed gas propellant.
14. An aerosol product comprising the formulation of any one of claims 1 to 11, at least one aerosol propellant and a suitable aerosol container.
15. The aerosol product of claim 14 wherein the at least one aerosol propellant is a compressed gas propellant.
16. The aerosol product of claim 15 wherein the compressed gas propellant is selected from the group consisting of air, nitrogen and carbon dioxide.
17. The aerosol product of any one of claims 14 to 16 wherein the container is any one of a steel canister, tin-plated steel canister or other corroding metal canister.
18. The aerosol product of any one of claims 14 to 17 wherein in the volume ratio of propellant to formulation is propellant is within the range from 80:20 to 30:70.
19. The aerosol product of any one of claims 14 to 18 wherein in the volume ratio of propellant to formulation is propellant is within the range from from 70:30 to 50:50.
20. The aerosol product of any one of claims 14 to 19 wherein the initial flow rate of aerosol from the canister is between 0.5 and 3.0 grams per second.
21. The aerosol product of any of claims 14 to 20 wherein the mean particle size of between 20 and 80 microns.
22. The use of an aerosol product of any of claims 14 to 21 in an automatic aerosol dispensing device.
23. A method of freshening the air comprising inserting an aerosol canister of any of claims 14 to 21 to an automatic aerosol dispensing device and activating the device.