The present invention relates to novel compositions of matter suitable for use as liquid deodorants and has particular reference to pressurized liquid room and air deodorant compositions suitable for packaging under pressure in a dispensing device commonly known as a aerosol dispenser. Several types of liquid room and air deodorant compositions have been developed within recent years. Such compositions generally contain an odoriferous substance such as a volatile oil or perfume dissolved in alcohol or some other appropriate solvent. The effectiveness of perfumery materials in a room and air deodorant is predicated upon the principle of concealing or masking a disagreeable odor by the substitution of a dominant odor of a more agreeable nature. The deodorizing perfumes have been passed into the air by diffusion from cotton or wood wicks or swabs previously soaked in the said perfumery materials.

Recently, it has been found that a new group of cationic surface active agents, generally known as quaternary morpholinium alkyl sulfates, have powerful deodorant properties, although they are themselves odorless. The mechanism of the deodorant action exhibited by those materials is not fully understood, but it is known that the said materials destroy the odors upon which they act, and do not merely function as masking agents or as perfumery materials. It has been suggested that the deodorant properties of these novel materials are utilized by spraying or atomizing the said materials into the air from conventional aerosol type dispensers, atomizers or the like. Attempts, however, to prepare a satisfactory pressurized liquid room and air deodorant containing the novel compounds have been, in general, unsuccessful. It has been found, for example, that when the morpholinium alkyl sulfates are packaged in solid combination with known propelling agents in conventional aerosol containers, completely unsatisfactory products result due to a lack of solubility of the deodorant in the propellant. The two ingredients form separate layers, an upper layer containing substantially all of the deodorant and a lower layer containing substantially all of the heavier propellant. Upon depression of the outlet valve, propellant only is expelled and practically all of the deodorant remains unrecoverable from the container.

The surprising discovery has now been made that satisfactory pressurized liquid room and air deodorant compositions, containing certain morpholinium alkyl sulfates as a deodorant and a liquefied normally gaseous material as the propellant, can be prepared by incorporating a partial ester of a polyhydric alcohol in the final composition. The compositions of the present invention comprise novel liquid room and air deodorants adapted to be dispersed from commercially available aerosol containers in the form of particles reduced to such a size that the said particles will remain in the air for relatively long periods of time.

The particular quaternary morpholinium alkyl sulfates which may be used in preparing the novel liquid deodorant compositions of the present invention include those morpholinium alkyl sulfate compounds having an alkyl substituent containing 8 to 24 and preferably about 12 to 18 carbon atoms per molecule. These materials may be prepared in any suitable manner, e. g., by first preparing N-alkyl morpholine by reacting morpholine with an appropriate alkyl halide in the presence of sodium carbonate; or, by reacting morpholine with the long chain aliphatic esters of the mixed fatty acids contained in coconut oil, soya bean oil, corn oil, palm oil, tallow, etc., as well as the individual fatty acids derived from these oils, e. g., lauric acid, myristic acid, palmitic acid, linoleic acid, stearic acid, oleic acid, etc., or suitable admixtures thereof, to form the morpholide which then may be reduced catalytically to the tertiary N-alkyl morpholine; or, by reacting B, B' dichlorodiethyl ether with an appropriate long chain aliphatic amine in the presence of sodium carbonate in alcoholic solutions, etc. The N-alkyl morpholine prepared by any of these methods is then converted into the desired morpholinium alkyl sulfate by treatment with di-methyl sulfate, diethyl sulfate, dipropyl sulfate, etc.

The concentrations of the active deodorant ingredient in the novel liquid room and air deodorant composition generally is at least about 0.5%, usually between about 1 to about 5%, and preferably from about 1 to 3%. It has been determined that the beneficial air deodorizing effects afforded by the novel compositions are achieved to an optimum degree when the deodorant compositions contain an appreciable amount of the active deodorant ingredients, such as specified within the preferred range. As propellants, any suitable liquefied, normally gaseous, organic material may be used. In general said material should be substantially non-toxic, non-inflammable, low-boiling, odorless, etc. Suitable propellants include liquefied, normally gaseous, low molecular weight halogenated hydrocarbon materials, such as halogenated methane, ethane, propane, butane, pentane, and mixtures thereof. Other halogenated hydrocarbon materials which have been found to be particularly suitable for use as propellants in accordance with the present invention include monochlordifluoromethane, monochlorodifluoroethane, dichloromono-fluoroethane, dichlorodifluoroethane, dichlorotrifluoroethane, trichloromonfluoroethane, dichloroethane, etc. In some instances it may be desirable to use a combination of two or more of the liquefied, normally gaseous, materials as a propellant in order to achieve a suitable pressure within the container and impart such desired properties as stability, ease of delivery, etc., to the deodorant compositions.

The amount of propellant may be varied depending upon the properties desired in the final product. It has been found, however, that the amount employed generally should amount to at least about 80% and preferably about 85% to about 90% by weight of the total liquid deodorant composition, although other amounts may be employed if desired, e. g., up to about 95%.

As stated hereinabove, it has been found that these propellants in sole combination with the morpholinium alkyl sulfates give unsatisfactory products due to a lack of solubility of the deodorant in the propellant. However, very effective pressurized liquid deodorants can be prepared if a partial ester of a polyhydric alcohol, e. g., prepared by reacting a higher fatty acid with a suitable aliphatic polyhydric alcohol, is included in the formulation. The higher fatty acids which may be employed in preparing the partial ester compounds generally contain about 8 to 24 carbon atoms and preferably about 12 to 18 carbon atoms per molecule. Suitable aliphatic polyhydric alcohols which may be employed in preparing the said partial esters include ethylene glycol, propylene glycol, diethylene glycol, glycerine, etc., as well as poly-
glycols such as polyethylene glycol, polypropylene glycol, etc. More particularly, representative partial ester compounds are, for example, ethylene glycol monostearate, polyethylene glycol monostearate, propylene glycol monolaurate, polypropylene glycol monolaurate, propylene glycol monopalmitate, ethylene glycol monopalmitate, glyceryl dilaurate, etc. The amount of the partial ester compound employed should be sufficient to assure complete solubility of the various ingredients. In general, it has been found that the said partial esters should be present in a concentration of at least 5%, usually between about 10 and 20%, and preferably from about 5 to 15%

The compositions herein disclosed may be prepared in any suitable manner. One satisfactory method comprises admixing the active deodorant ingredient and the partial ester compound and adding the mixture to the pressure container which is subsequently sealed. Thereafter, the propellant while under pressure may be admitted to the container through a valve or other appropriate means, the container generally being slightly chilled during this operation. The chilling of the container permits it to be charged under conditions which provide a greater available propellant pressure when the container regains prevailing atmospheric temperature. Another satisfactory method comprises pre-chilling the various ingredients, either individually or as a mixture, to a temperature below the boiling point of the propellant, and then charging said ingredients into the container which is sealed thereafter.

In order to indicate even more fully the nature of the present invention the following specific examples are set forth. It will be understood that these examples are presented for illustrative purposes only and that they are not intended to limit the scope of the invention in any manner. The parts given are by weight unless otherwise indicated.

**Example I**

Approximately one part of a deodorant consisting of N-sola-N-ethyl morpholinium ethyl sulfate is weighed into a vessel containing about 9 parts of propylene glycol monolaurate. The mixture is heated to about 160° F. and stirred until the deodorant is completely dissolved in the propylene glycol monolaurate. Thereafter the mixture is cooled to about 90° F. and placed into an open, inverted pressure container having a manually operated valve. The contents are cooled by suitable means to a temperature of about -5° F. and about 90 parts of a cooled and liquefied propellant comprising about 76% monochlorodifluoroethane, 16% dichlorodifluoroethane and 8% trichloromonofluoromethane are added to the contents after which the container is sealed. The product, after it has warmed to room temperature, is ready to be dispensed through the manually operated valve.

**Example II**

About 3 parts of a deodorant consisting of N-sola-N-ethyl morpholinium ethyl sulfate and about 1 part of menthol are placed in a vessel containing about 10 parts of ethylene glycol monostearate. The ingredients are heated to a temperature around 150° F. and thoroughly stirred. The mixture is permitted to cool and then is transferred to a pressure container. The container is sealed and about 86 parts of the same propellant as described in Example I are admitted through the valve while the contents are slightly cooled. The liquid composition thus prepared exhibits satisfactory deodorant properties when dispensed into the air.

**Example III**

Following a procedure of mixing and filling as set forth in Example I, about one part of pine oil and about 1.5 parts of N-lauryl-N-methyl morpholinium methyl sulfate are placed in a vessel. To the mixture is added about 12 parts of propylene glycol monopalmitate, about one part of camphor, and about 0.5 part of clove oil. This mixture together with approximately 84 parts of a cooled and liquefied propellant comprising about equal percentages by weight of difluorochloro and monochlorodifluoromethane are introduced into an aerosol container. At the point of use, the liquid room deodorant thus prepared may be dispersed in the form of particles reduced to such a size that they will remain in the air for a relatively long period of time.

Other suitable formulations productive of desired results include:

**Example IV**

<table>
<thead>
<tr>
<th>Parts</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N-myristyl-N-methyl morpholinium methyl sulfate</td>
<td>5.0</td>
</tr>
<tr>
<td>Glyceril dilaurate</td>
<td>10.0</td>
</tr>
<tr>
<td>Peppermint oil</td>
<td>2.5</td>
</tr>
<tr>
<td>Menthol</td>
<td>1.0</td>
</tr>
<tr>
<td>Glycerine</td>
<td>1.5</td>
</tr>
<tr>
<td>Propellant</td>
<td>80.0</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Example V**

<table>
<thead>
<tr>
<th>Parts</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N-oleyl-N-methyl morpholinium methyl sulfate</td>
<td>0.5</td>
</tr>
<tr>
<td>Ethylene glycol monopalmitate</td>
<td>8.0</td>
</tr>
<tr>
<td>Menthol</td>
<td>1.4</td>
</tr>
<tr>
<td>Clove oil</td>
<td>1.5</td>
</tr>
<tr>
<td>Pine oil</td>
<td>2.6</td>
</tr>
<tr>
<td>Benzoin</td>
<td>1.0</td>
</tr>
<tr>
<td>Propellant</td>
<td>85.0</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
</tr>
</tbody>
</table>

As indicated in the preceding examples, the addition of various adjuvant materials to the deodorant compositions is contemplated by the present invention. Thus, ingredients which impart further desired qualities to the deodorant, e.g., camphor, menthol, pine oil, synthetic munks, clove, rose, and peppermint oils, benzoin, etc., may be incorporated in the present compositions in minor proportions. Similarly, coloring materials, glicerine, sorbitol, etc., may be used if desired.

The novel liquid deodorant compositions herein disclosed are adapted for use in conventional aerosol dispensers now in commercial use. Inasmuch as the dispensers and valve parts are made from a wide variety of materials, e.g., aluminum, tinplate, steel, bronze, copper, brass, cadmium, nickel, etc., certain chemical reactions may occur between the said materials and the contained product. As a result undesirable changes may occur in the product. Furthermore, possible malfunctioning of the valve parts, perforation of the container, etc., may result. In order to avoid such undesirable results, corrosion inhibitors such as silicates, borates, phosphates, chromates, nitrates, benzoates, etc., may be incorporated in the product before final sealing of the container. In some cases it may be desirable to coat the inside of the container and other parts thereof with which the deodorant may come in contact with a suitable lacquer or other corrosion resistant coating.

While there has been discussed and described what is at present considered to be the preferred embodiment of the present invention, it will be understood, of course, that many modifications and changes and substitutions may be made therein without departing from the true scope of the invention as defined in the appended claims.

Having thus described the invention, what is claimed is:

1. A liquid room and air deodorant composition which comprises about 0.5% to 5% of a quaternary morpholinium alkyl sulfate having an alkyl radical containing 8 to 24 carbon atoms per molecule as a deodorant, about 80% to 95% of a liquefied normally gaseous low molecular weight halogenated hydrocarbon propellant, and a sufficient amount of a partial ester of a polyhydric alcohol and a higher fatty acid having about 8 to 24 carbon...
atoms per molecule to assure solubility of said deodorant in said propellant, said composition being maintained under pressure in a container.

2. A liquid room and air deodorant composition which comprises about 0.5% to 5% of a deodorant consisting essentially of a quaternary morpholinium alkyl sulfate having an alkyl radical containing about 8 to 24 carbon atoms per molecule, about 80% to 95% of a liquefied normally gaseous low molecular weight halogenated hydrocarbon propellant, and a sufficient amount of a partial ester of a polyhydric alcohol and a higher fatty acid having about 8 to 24 carbon atoms per molecule to assure solubility of said deodorant in said propellant, said composition being maintained under pressure in a container.

3. A liquid room and air deodorant composition which comprises about 0.5% to 5% by weight of a deodorant consisting essentially of a quaternary morpholinium alkyl sulfate having an alkyl radical containing about 8 to 24 carbon atoms per molecule, about 80% to 95% of a liquefied normally gaseous low molecular weight halogenated hydrocarbon propellant, and an amount up to 20% of a partial ester of an aliphatic polyhydric alcohol and a higher fatty acid having about 8 to 24 carbon atoms per molecule, said composition being maintained under pressure in a container and said partial ester being sufficient to assure solubility of said deodorant in said propellant.

4. A liquid room and air deodorant composition as set forth in claim 3 in which said deodorant comprises N-soya-N-ethyl morpholinium ethyl sulfate.

5. A liquid room and air deodorant composition as set forth in claim 3 in which said deodorant comprises N-lauryl-N-methyl morpholinium methyl sulfate.

6. A liquid room and air deodorant composition as set forth in claim 3 in which said deodorant comprises N-myristyl-N-methyl morpholinium methyl sulfate.

7. A liquid room and air deodorant composition as set forth in claim 3 in which said deodorant comprises N-oleyl-N-methyl morpholinium methyl sulfate.

8. A liquid room and air deodorant composition as set forth in claim 3 in which said partial ester of an aliphatic polyhydric alcohol and a higher fatty acid having about 8 to 24 carbon atoms per molecule comprises propylene glycol monolaurate.

9. A liquid room and air deodorant composition as set forth in claim 3 in which said partial ester of an aliphatic polyhydric alcohol and a higher fatty acid having about 8 to 24 carbon atoms per molecule comprises ethylene glycol monopalmitate.

10. A liquid room and air deodorant composition which comprises about 1% of N-soya-N-ethyl morpholinium methyl sulfate as a deodorant, about 80% to 95% of a liquefied normally gaseous propellant comprising about 76% monochlorodifluoroethane, 16% dichlorodifluoromethane and 8% trichloromonofluoromethane, and a partial ester of an aliphatic polyhydric alcohol and a higher fatty acid having about 8 to 24 carbon atoms per molecule effective in combination therewith to assure solubility of said deodorant in said propellant, said composition being maintained under pressure in a container.

11. A liquid room and air deodorant composition which comprises about 1% of N-soya-N-ethyl morpholinium methyl sulfate as a deodorant, about 90% of a liquefied normally gaseous propellant comprising about 76% monochlorodifluoroethane, 16% dichlorodifluoromethane and 8% trichloromonofluoromethane, and about 9% of propylene glycol monolaurate, said composition being maintained under pressure in a container.

12. A liquid room and air deodorant composition maintained under pressure in a container and consisting essentially of a liquefied normally gaseous low molecular weight halogenated hydrocarbon propellant and a quaternary morpholinium alkyl sulfate in which the alkyl substituent has about 8 to 24 carbon atoms per molecule as a deodorant in suitable proportions to effect air deodorization when released from said container, said deodorant being present in an amount in excess of its solubility in said propellant, and an amount of a partial ester of a polyhydric alcohol and a higher fatty acid having about 8 to 24 carbon atoms per molecule sufficient to assure solubility of said deodorant in said propellant.

References Cited in file of this patent

UNITED STATES PATENTS
2,524,590 Boe ---------------- Oct. 3, 1950
2,541,248 Hibbs ---------------- Feb. 13, 1951

OTHER REFERENCES
Thomsen, Modern Cosmetics, 1947, p. 275.
Jacs 70, 1948, p. 618.
Niederl, article on Synthetic Morpholinium Alkyl Sulfates,