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LIQUID MIXTURE FOR EXPULSION FROM A PRESSURE CONTAINER

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This invention relates to a liquid mixture comprising an active liquid and a propellant and intended for expulsion in the form of an aerosol from a pressure container, the propellant of said mixture having a different, for instance higher, specific gravity than the active liquid.

The term "aerosol" here and in the following includes all those products which depend upon the power of a compressed liquefied gas to dispense them from their container. These comprise three basic types:

(1) True aerosols, such as insecticides and space deodorants;
(2) So-called wet sprays such as lacquers, sun tan lotions and window-cleaning solutions;
(3) Foam products, such as shaving-cream lather and hand-creams.

An aerosol container in a container from which the contents are expelled through a valve by means of the pressure generated by a propellant provided in the container. Such containers are known per se, and the name originates from the fact that the first packages of this kind were so designed that the contents were expelled from the package in the form of a true aerosol. Such packages may, for example, be used for fly-killing agents and certain other insecticides, etc. The denomination aerosol container or aerosol bomb has been kept in spite of the fact that they are now used for expelling the product with a much coarser particle size than that occurring in true aerosols. Such containers are thus used for the production of foam such as shaving cream lather. The functioning of the container depends upon its containing a propellant which is gaseous at a normal temperature and which at the pressure prevailing in the container is present for the most part in liquid form. As examples of such propellants may be mentioned trichlorofluoromethane (Freon 11), dichlorodifluoromethane (Freon 12), dichlorotetrafluoroethane (Freon 114), monochlorodifluoroethane (Genetron-101) vinyl chloride, butane, propane and similar hydrocarbons. In the original forms of this type of package the active substances were soluble in the propellant. Such packages are produced substantially by two methods. Accordingly to one of these either the active substance alone, or the active substance and the propellant, are cooled down to such a low temperature that they can, in liquid form, be introduced into the container. The container is thereafter sealed, and when the temperature rises, a certain pressure is obtained in the container. The amount of this pressure depends upon the choice of propellant and solvent for the active substance. According to the other method the active substance is introduced at a normal temperature, whereafter the container is sealed and the propellant is introduced through a valve under pressure. In this case too, the final result is a container standing under pressure. Thus, in a package produced according to one of the above-mentioned methods there are two phases, viz. at the top a gaseous phase consisting of the propellant and, possibly, a solvent, and a liquid phase, consisting of a mixture of the propellant and the active substance and, possibly, of the latter's solvent. From this original type of aerosol package some other forms have been developed, such as foam aerosol containers, in which there are three phases, viz. a gaseous

phase, a liquid phase and an emulsified phase. If the contents of this type of foam aerosol container are shaken, they can be expelled in the form of foam through the valve. If the container is left to stand undisturbed for a long period of time separation takes place into a gaseous phase, a water phase and a phase consisting of the propellant in liquefied form.

In those cases in which spirit solutions with high alcohol percentage can be used as solvents for the active substances, such products do not offer any fundamental difficulties as to package and use in aerosol containers. Where on the other hand, the product does not admit of using 85–90% of spirit as the solvent for the active substance but requires the addition of water, or other substances which do not dissolve the propellant, it has hitherto been impossible to manufacture the product in question in the form of an aerosol. The attempts which have been made in this direction have given rather bad results as the contents have been discharged in the form of a jet instead of in the form of a cloud. Among such products may be mentioned face and shaving lotions, certain types of sun tan lotions and several other substances. In these preparations, it is necessary to use so much water or other substances which are not dissolved in, or do not dissolve the propellant, that the quantity of propellant which is dissolved becomes too small to atomize the active constituents when the contents are expelled through the valve.

These drawbacks are eliminated by the present invention which relates to a liquid mixture, comprising an active liquid and a propellant, in which the propellant is present in the container, dissolved in a liquid selected so that the solution of the propellant in the liquid is substantially insoluble in the active liquid and has the same, or about the same specific gravity as the active liquid. Through a light shaking of the container a mixture of active liquid and liquefied propellant is obtained. When the liquid mixture is expelled from the container, the propellant is gasified and brings about the desired atomization of the active liquid.

The propellant may be one of those previously mentioned, such as a halogenated hydrocarbon, e.g. Freon of different kinds and vinyl chloride, or propane, butane and similar hydrocarbons.

The liquid, in which the propellant is to be dissolved, must fulfill the following three demands:

(1) The liquid and the propellant must be mutually soluble.

(2) The specific gravity of the liquid must be such that the liquid and the propellant form a solution with the same, or about the same specific gravity as the active liquid, e.g. 1, if the active substance is dissolved in water. Thus, if the propellant is light, a heavy liquid e.g. a chlorinated hydrocarbon should be used. If on the other hand, the propellant used is heavy a light liquid e.g. petroleum ether, should be selected.

(3) The liquid must be insoluble in the active substance which is usually a water solution; furthermore the liquid must not be such that it is unfavourably affected, e.g. hydrolyzed, by water if water is the solvent for the active substance.

The proportion of propellant to liquid may vary considerably for several reasons, e.g. the choice of components and the amount of pressure required. The amount of propellant must, however, be sufficient to expel the active substance in the form of an aerosol.

The propellent solution may comprise several propellants, or it may contain a solvent which does not possess any propellant qualities itself.

Example 1.—By mixing 50 cc. of a mixture of butane and close homologues with a specific gravity of 0.6 in liquid form with 50 cc. of Freon 114 with a specific

gravity of 1.4 in liquid form, a propellant mixture with a specific gravity of 1 is obtained. If an aerosol container is filled with 40 parts by weight of this solution and 60 parts by weight of water, it is very easy to expel the contents in an atomized form.

Example 2.—If 20 cc. of a hydrocarbon with a specific gravity of 0.8, e.g. petroleum ether, is mixed with 10 cc. of Freon 12 with a specific gravity of 1.4, a mixture with a specific gravity of 1 is obtained. If this mixture, as in Example 1, is used as a propellant in an aerosol container, a similar spraying of the contents is obtained although the pressure in the container is considerably lower in this case. More propellant must therefore be used in this case than in Example 1.

Example 3.—If an aerosol container is filled with 2–10 parts by weight of the solution according to Example 1 and 98–90 parts of weight of a detergent solution such as a soap solution it is very easy to expel the contents as a spray or foam.

I claim:

1. A liquid mixture which comprises an active liquid and a propellant and which is intended for expulsion from a pressure container, said propellant comprising halogenated hydrocarbon substantially all of which has no more than two carbon atoms and which has a specific

gravity substantially higher than that of said active liquid, said mixture containing a liquid solvent for said halogenated hydrocarbon in which said halogenated hydrocarbon is dissolved, and the solution of said halogenated hydrocarbon in said liquid solvent being substantially insoluble in said active liquid and being substantially non-reactive with said active liquid and having essentially the same specific gravity as said active liquid.

2. A liquid mixture according to claim 1, characterized in that the propellant solution comprises several propellants.

3. A liquid mixture according to claim 1, characterized in that the propellant solution contains a solvent which has no propellant qualities in itself.

4. A liquid mixture as defined in claim 1 in which the active liquid and the solution of said halogenated hydrocarbon in said liquid solvent have the same specific gravities.

References Cited in the file of this patent

UNITED STATES PATENTS

2,655,480	Spitzer et al.	Oct. 13, 1953
2,968,628	Reed	Jan. 17, 1961
2,995,521	Estignard-Bluard	Aug. 8, 1961