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DRY-CLEANING FLUID

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This invention relates to new fluids for use in dry cleaning processes and more particularly to new dry cleaning processes wherein surface active organic compounds, the positive ion of which contains an aliphatic radical having a chain of eight or more carbon atoms, are added to the conventional dry cleaning solvents which are employed.

In the dry cleaning of textiles, e. g., materials of wool or silk, it has been a common practice to employ an organic solvent, such as benzene, white spirit or trichlorethylene, in which is dissolved a soap, for instance, potassium or triethanol ammonium oleate, frequently with the addition of a higher fatty acid, for instance, oleic acid, and, if desired, water. (See, e. g., Farrell and May, Journal of the Society of Dyers and Colourists, 1908, p. 43; Bird, ibid., 1933, p. 316; Harvey, American Dyestuff Reporter, 1930, p. 249.)

That part of the molecule of the dissolved soap in such a composition which is believed to be mainly active is the negatively charged long chain radical to which the carboxylic group is attached.

This invention has as an object to provide new processes for dry cleaning textile fabrics. A further object is to provide novel dry cleaning fluids for use in said processes. A still further object is to provide new uses for surface active organic compounds which contain a long chain aliphatic radical in their positive ions. Other objects will appear hereinafter.

These objects are accomplished by the following invention which in its broadest aspect involves the use in a dry-cleaning fluid of any surface active organic compound, the positive ion of which contains an aliphatic radical having a chain of eight or more carbon atoms. In a more restricted sense this invention relates to the use in a dry cleaning solvent of a quaternary ammonium salt, the positive ion of which contains an aliphatic radical having a chain of eight or more carbon atoms. In its preferred embodiment this invention relates to dry cleaning fluids which contain a quaternary ammonium salt, the positive ion of which contains a straight chain alkyl group having from twelve to eighteen carbon atoms directly linked to the nitrogen atom.

I have discovered that dry cleaning solvents in which are dissolved organic quaternary ammonium salts, one or more radicals of which consist of a carbon chain, either saturated or unsaturated, containing eight or more carbon atoms and directly or indirectly linked to the nitrogen atom, are exceedingly potent as dry cleaning agents; and the present invention consists in a process for dry cleaning textile materials by means of a solution as above described of an organic quaternary ammonium salt. Such agents are distinguished from the soaps hitherto employed in dry cleaning in that the effective properties may be regarded as due to the positively charged and not the negatively charged portion of the molecule. By the use of the process of the present invention, certain advantages are secured.

Quaternary ammonium salts which are at present preferred for use in the processes of this invention are: cetyl pyridinium bromide, cetyl trimethyl ammonium bromide, dimethyl dicetyl ammonium bromide, p-stearophenyl trimethyl-ammonium methyl sulphate and p-stearamidophenyl trimethyl ammonium methosulphate, but others may be employed.

The following examples illustrate but do not limit the invention. The parts are by weight.

Example 1

Serge suiting is cleaned by immersing in a cold solution of 2 parts of cetyl pyridinium bromide in 1000 parts of trichlorethylene, working gently for 10 minutes or longer, and drying.

Example 2

Serge suiting is cleaned by immersing in a cold solution of 1 part of cetyl trimethyl ammonium bromide in 1000 parts of trichlorethylene, working gently for 10 minutes or longer, and drying.

Example 3

Serge suiting may also be cleaned by immersing it in white spirit containing 0.2 per cent of dimethyl dicetyl ammonium bromide.

Example 4

A cotton fabric is cleaned by immersing in a cold solution of 0.5 part of cetyl pyridinium bromide in 1000 parts of trichlorethylene and working gently for 15 minutes or longer and drying.

Numerous quaternary ammonium salts, containing a long chain aliphatic radical in the positive ion may be used in connection with the present invention. In place of cetyl pyridinium bromide, use may be made of dodecyl pyridinium bromide, dodecyl pyridinium sulphate, tetradecyl pyridinium bromide, cetyl pyridinium iodide, octadecyl pyridinum bromide, octadecyl pyridinium iodide, octadecyl picolinium bromide, undecyl quinolium chloride, and other similar quaternary ammonium salts which may be pre-

pared by the methods set forth in British Patents 379,396, 392,763, and 434,856. Other quaternary ammonium salts which are useful are methyl cetyl piperidinium methyl sulphate, the preparation of which is described in British Patent 424,410; dicetyl piperidinium bromide hydroxyethyl octadecyl morpholinium bromide, the preparation of which is set forth in U. S. Patent 2,019,124; the products described in Examples 2, 3, and 4 of British Patent 394,196; the cetyloxymethyl pyridinium chloride mentioned in British Patent 390,553, French Patent 725,637, and U. S. Patent 2,004,476; and the stearic, oleic, ricinoleic, palmitic, myristic, and lauric acid esters of hydroxy ethyl pyridinium chloride and dihydroxy propyl pyridinium chloride, which are described in British Patent 390,553, French Patent 725,637, and U. S. Patent 2,004,476. Still other useful quaternary ammonium salts are those obtained according to French Patent 788,898 such as the addition product of pyridine and the ethyl ester of alpha bromostearic acid, the addition product of pyridine and the ethyl ester of alpha bromopalmitic acid, the addition product of pyridine and alpha bromostearic acid amide, the addition product of pyridine and alpha bromostearic acid, the addition product of trimethyl amine and alpha bromostearic acid, the addition product of trimethyl amine and the methyl ester of alpha bromostearic acid, the addition product of pyridine and alpha bromostearic acid anilide, the addition product of pyridine and alpha bromolauric acid anilide, the addition product of trimethyl amine and alpha bromolauric acid anilide, the addition product of dimethyl cyclohexyl amine and alpha bromostearic acid, etc.

In place of cetyl trimethyl ammonium bromide and dimethyl dicetyl ammonium bromide, there may be employed octadecyl trimethyl ammonium bromide, octadecyl trimethyl ammonium iodide, cetyl trimethyl ammonium iodide, cetyl triethyl ammonium iodide, cetyl triethyl ammonium bromide, cetyl benzyl diethyl ammonium chloride, eicosyl trimethyl ammonium bromide, docosyl trimethyl ammonium iodide, cetyl benzyl dimethyl ammonium chloride, octadecyl trimethyl ammonium methosulphate, decyl trimethyl ammonium iodide, cetyl cyclohexyl dimethyl ammonium bromide, dodecyl cyclohexyl dimethyl ammonium bromide, dodecyl cyclohexyl diethyl ammonium bromide, dodecyl trimethyl ammonium chloride, cetyl trimethyl ammonium chloride, octyl trimethyl ammonium iodide, octadecyl triethyl ammonium bromide, dodecyl trimethyl ammonium bromide, octadecyl benzyl dimethyl ammonium chloride, cetyl triethanol ammonium bromide, dodecyl ethanol dimethyl ammonium sulphate, etc.

In place of p-stearamidophenyl trimethyl ammonium methosulphate, use may be made of oleylamido-ethyl diethyl methyl ammonium iodide, oleylamido-ethyl diethyl methyl ammonium methosulphate, stearamido-ethyl diethyl methyl ammonium methosulphate, oleylamido-ethyl diethyl benzyl ammonium chloride, oleylamido-propyl diethyl methyl ammonium iodide, oleylamido-ethyl diethyl allyl ammonium bromide, oleyl amido-ethyl methyl piperidinium methosulphate, oleylamido-ethyl ethyl cyclohexyl methyl ammonium methosulphate, oleylamido-ethyl trimethyl ammonium methosulphate, stearamido-ethyl trimethyl ammonium methosulphate, and other similar compounds which may be prepared according to the methods set forth in German Patent 559,500, British Patent 294,582, and U. S. Patent 1,737,458.

Still further quaternary ammonium salts which may be used in place of those set forth in the preceding paragraphs are the products described in Examples 1 and 3 of the German Patent 275,344; the products described in British Patent 394,196; the alkylated acidyl polyalkylene polyamines described in U. S. Patent 1,924,698; stearoyl choline chloride; the nitrogen-containing esters described by Harris in U. S. Patent 2,023,075; and the long chain betaines disclosed in French Patent 789,304 such as the dodecyl dimethyl, the cetyl dimethyl, the octadecyl dimethyl, and the dodecyl dibutyl betaines which are derived from chloracetic acid.

The various quaternary ammonium salts mentioned above are generally used individually in a dry-cleaning fluid, but it is contemplated that two or more of them may be used conjointly.

In place of quaternary ammonium salts which contain a long chain aliphatic radical in their positive ion, use may be made of the analogous quaternary phosphonium salts. Among the quaternary phosphonium salts which may be employed are cetyl trimethyl phosphonium bromide, cetyl triethyl phosphonium bromide, dodecyl trimethyl phosphonium bromide, dodecyl triethyl phosphonium bromide, cetyl ethyl dimethyl phosphonium chloride, diethyl dioleyl phosphonium sulphate, dodecyl triethyl phosphonium sulphate, octyl trimethyl phosphonium iodide, octadecyl triethyl phosphonium bromide, octadecyl trimethyl phosphonium bromide, tetradecyl triethyl phosphonium bromide, etc. These quaternary phosphonium salts may be prepared according to the methods described in British Patents 424,410, 434,810, 434,856, and 435,443. If desired, one or more of these quaternary phosphonium salts may be used in combination with one or more of the quaternary ammonium salts hereinabove mentioned.

In place of the quaternary ammonium and phosphonium salts, use may be made of ternary sulphonium salts, the positive ion of which contains an aliphatic radical having a chain of eight or more carbon atoms. Among the suitable ternary sulphonium compounds are cetyl dimethyl sulphonium methosulphate, cetyl methyl benzyl sulphonium methosulphate, dodecyl dimethyl sulphonium bromide, cetyl methyl ethyl sulphonium iodide, cetyl methyl ethyl sulphonium methosulphate, octadecyl diethyl sulphonium chloride, dodecyl dipropyl sulphonium bromide, decyl dimethyl sulphonium iodide, tetradecyl dimethyl sulphonium bromide, dodecyl methyl cyclohexyl sulphonium iodide, octadecyl dimethyl sulphonium iodide, dodecyl methyl ethyl sulphonium methosulphate, dodecyl methyl ethyl sulphonium iodide, dodecyl dimethyl sulphonium methosulphate, dodecyl benzyl methyl sulphonium chloride, etc. These sulphonium compounds may be prepared by the methods set forth in British Patents 424,410, 434,810, 434,856, and 435,444. If desired, these sulphonium salts may be used in admixture with one or more of the ammonium and phosphonium salts rather than in place of these latter salts.

The compounds mentioned above may be used in solution in any of the dry-cleaning solvents commonly in use such as those mentioned by Brown in the Journal of the Society of Dyers and Colourists 1933, p. 42.

As many apparently widely different embodiments of this invention may be made without

departing from the spirit and scope thereof; it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.

I claim:

1. A dry cleaning fluid consisting of a dry cleaning solvent containing from 0.2% to 0.5% of a quaternary ammonium salt, the positive ion of which contains an aliphatic radical having a chain of eight to twenty-two carbon atoms.

2. A dry cleaning fluid consisting of a dry cleaning solvent containing from 0.2 to 0.5% of a surface active organic compound selected from the group consisting of quaternary ammonium, quaternary phosphonium and ternary sulphonium salts, the positive ion of which compound contains an aliphatic radical having a chain of 8 to 22 carbon atoms.

3. A dry cleaning fluid consisting of a dry cleaning solvent containing from 0.2% to 0.5% of a quaternary ammonium salt, the positive ion of which contains an alkyl group having from twelve to eighteen carbon atoms in a straight chain.

4. A dry cleaning fluid consisting of a chlorinated hydrocarbon dry cleaning solvent containing from 0.2% to 0.5% of a surface active organic compound selected from the group consisting of quaternary ammonium, quaternary phosphonium, and ternary sulphonium salts, the positive ion of which compound contains an aliphatic hydrocarbon radical having a chain of 8 to 22 carbon atoms.

5. A dry cleaning fluid consisting of a chlorinated hydrocarbon dry cleaning solvent containing from 0.2% to 0.5% of a quaternary ammonium salt, the positive ion of which contains an aliphatic hydrocarbon radical having a chain of 8 to 22 carbon atoms.

6. A dry cleaning solvent consisting of trichlorethylene containing from 0.2% to 0.5% of a quaternary ammonium salt, the positive ion of which contains an alkyl group having from 12 to 18 carbon atoms in a straight chain.

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