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CLEANING COMPOSITION

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This invention relates to a cleaning fluid formulated of organic chemical compounds and materials and it relates more particularly to a cleaning fluid for use in the dry cleaning of textiles formed of natural and/or synthetic fibers and in the cleaning of other materials and surfaces, such as parts formed of metal and the like materials.

With reference particularly to a solvent system for use in dry cleaning of textile materials, a suitable dry cleaning fluid should embody a number of characteristics such as chemical stability, non-inflammability, easy and complete distillation for complete removal from the textile material and for solvent recovery, and non-toxicity. It should have high solvent power for the removal of grease, dirt and the like substances. It should have no effect on the textile fibers or other materials that are treated. It should be compatible with various additives usually employed in dry cleaning systems and the dry cleaning solvent should be low in cost.

The dry cleaning solvents which have been used in present practice include tetrachloroethylene and trichloroethylene. Because of the relatively high boiling points of these materials, complete removal of solvent in the drying step and in the deodorizing step consumes a considerable amount of time and thus adds undesirably to the length of the cleaning cycle which includes washing, wringing, drying, and deodorizing.

Dichloroethylene has a lower boiling point but it has been incapable of use to the present in dry cleaning because it is flammable, having a flash point at about 4° C.

It is an object of this invention to produce a dry cleaning solvent system which meets the desirable characteristics heretofore described and overcomes the deficiencies of solvent systems presently in use in that it has a much lower boiling point and is therefore more easily and quickly removed during the drying and deodorizing steps thereby materially to shorten the dry cleaning cycle, and it is a related object to produce a new and improved cleaning fluid system which not only finds beneficial use in the dry cleaning of textile materials but which can also be used advantageously in the cleaning of metal and other surfaces for the removal of grease, dirt and the like.

It is an object of this invention to produce a dry cleaning process which includes the steps of washing the textile material with a liquid cleaning composition containing as its major ingredient trans-dichloroethylene whereby the solvent system can be more easily and quickly removed from the textile material and which is formulated to contain as a minor ingredient a component selected from the group consisting of ethyl bromide, methylene chloride, and trifluorotrichloroethane whereby the system is rendered non-inflammable and ceases to have a flash point, and it is a related object to produce a liquid dry cleaning composition of the type described.

It has been found that the desired objectives are achieved to produce a non-flammable dry cleaning system which is stable, easily distilled, inert to textile fibers, and of low cost when the system is formulated of trans-dichloroethylene in admixture to contain at least 15% by weight of one or more of the aforementioned compounds ethyl bromide, methylene chloride, or trichlorotrifluoroethanes, and preferably an amount within the range of 15–30%

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by weight. Best results are secured with the combination of trans-dichloroethylene in admixture with about 20% by weight trifluoro-1,1,2-trichloro-1,2,2-ethane.

The combination of trans-dichloroethylene and trifluoro-1,1,2-trichloro-1,2,2-ethane is preferred because the two components have closely related boiling point ranges whereby they are capable of being distilled together to maintain their original ratio during distillation and redistillation or in the recovery of the solvent system.

In accordance with the practice of this invention, the dry cleaning composition can be formulated to contain other substances in the form of additives such as are usually employed in dry cleaning systems, as represented by surface active agents, cleaning reinforcing agents, water, soaps, and the like, which additives are incorporated in the usual proportions, preferably in an amount less than 1% by weight. The cleaning composition prepared in accordance with the practice of this invention also defines beneficial use as a solvent for cleaning or degreasing in general and particularly metals and insulation materials such as are employed in electric and telephone equipment, motors and the like.

The following examples are given by way of illustration, but not by way of limitation, of this invention:

Example 1

Composition:	Percent by wt.
Trans-dichloroethylene	80
Trifluoro-1,1,2-trichloro-1,2,2-ethane	20

8 kg. of textile material, consisting of various garments formed of different types of fibers and highly soiled with greasy spots on wristbands, collars and buttonholes, were introduced into the dry cleaning machine. The tank of the machine was filled with 130 liters of the dry cleaning system described above and the cleaning process was carried out in accordance with known techniques consisting of the steps of washing, wringing, drying and deodorizing.

The temperature of the cleaning system was maintained at about 20–23° C. and the washing step with the solvent was continued for about 7 minutes, followed by the steps of wringing, drying and deodorizing which consumed 3 and 6 minutes, respectively, to provide for a total cleaning cycle of 16 minutes.

The clothes removed from the washing machine were spotless and no greying was noticed on any of the garments.

Example 2

Composition:	Parts by wt.
Trans-dichloroethylene	80
Trifluoro-1,1,2-trichloro-1,2,2-ethane	20
Liquid detergent (alkyl aryl sulfonate) marketed by Lever Brothers under the name "Sactisol"	0.1
Water	0.1

The foregoing solvent system is employed in a cleaning cycle as describe din Example 1. In addition to the results secured in Example 1, the cleaning composition of Example 2 is effective for the removal of water spots or water-soluble spots.

Example 3

Composition:	Percent by wt.
Trans-dichloroethylene	80–70
Trifluoro-1,1,2-trichloro-1,2,2-ethane	15–30

To illustrate the ability to dry clean textiles formed of the various synthetic polymeric fibers as well as natural fibers, the dry cleaning machine was loaded with 8 kg. of soiled garments of the following textile fibers, namely—glycol polyterephthalate and wool (trousers), polyacrylonitrile (pull-over sweater), polyamide 6/6 (Anorak),

viscose artificial silk (bodice), glycol polyterephthalate (kilted skirts), wool (suits).

Remnants of the aforementioned textile materials in the form of strips have also been introduced for the purpose of verifying the dimensional stability as well as the mechanical resistance during cleaning.

The total cleaning cycle was as follows:

About 7 minutes for washing with the temperature of the washing bath at about 20–23° C.;

About 3 minutes for wringing;

About 4 minutes for drying and deodorizing.

This provides for a total dry cleaning cycle of about 14 minutes.

The garments removed from the washing machine were practically unaltered insofar as the textiles formed of natural fibers as well as synthetic fibers, and cleaning was complete. The dimensional stability tests, completed by mechanical resistance tests carried out with an eclatometer and dynamometer, showed no noticeable change compared with tests carried out on samples having the same fiber composition but which were not submitted to the action of the cleaning system.

The procedures of Examples 1, 2 and 3 can be practiced with the following composition:

Example 4

85–70% by weight trans-dichloroethylene

15–30% by weight of either ethyl bromide or methylene chloride or trifluorotrichloroethane, or mixtures thereof

It will be apparent from the foregoing that we have provided a dry cleaning solvent system which is capable of more efficient and effective use in the cleaning and dry cleaning processes by reason of maintaining the desirable characteristics heretofore specified for a dry cleaning solvent while achieving marked reduction in the distillation temperature without increase in the inflammability of the resulting product.

It will be understood that changes may be made in the details of formulation and use without departing from the spirit of the invention, especially as defined in the following claims.

I claim:

1. A liquid cleaning composition consisting essentially

of a major portion of trans-dichloroethylene and a minor portion of a compound selected from the group consisting of ethyl bromide, methylene chloride, and trifluorotrichloroethanes, said compound being present in admixture with the trans-dichloroethylene in an amount within the range of 15–30% by weight.

2. A liquid cleaning composition as claimed in claim 1 in which the compound present in admixture with the trans-dichloroethylene is trifluoro-1,1,2-trichloro-1,2,2-ethane present in an amount of about 20% by weight.

3. A liquid dry cleaning composition consisting essentially of a major portion of trans-dichloroethylene, a minor portion of a compound selected from the group consisting of ethyl bromide, methylene chloride and trifluorotrichloroethanes, said compound being present in an amount within the range of 15–30% by weight of the dry cleaning system and in which a surface active agent is present in an amount less than 1% by weight.

4. A liquid dry cleaning composition as claimed in claim 3 which includes water present in an amount less than 1% by weight.

5. A cleaning composition consisting essentially of a major portion of trans-dichloroethylene, about 20% by weight of trifluoro-1,1,2-trichloro-1,2,2-ethane, and less than 1% by weight of a surface active agent.

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