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DRY CLEANING

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This invention relates to methods of dry cleaning and to dry cleaning compositions used in such processes.

In accordance with the most common dry cleaning practices, the soiled garments or other materials are put into a tank containing the solvent and tumbled for a period which usually lasts from 15 to 20 minutes, this operation being employed for the purpose of dissolving oils and loosening insoluble dirt. A dry cleaning soap is frequently used and with this procedure, the soap is added to the solvent at the end of the tumbling period and the treatment is continued for an additional period, usually of about 10 to 20 minutes. Upon termination of this period, the garments are rinsed with fresh solvent, ordinarily circulated in a system including a filter. The rinsed garments are then placed in a centrifuge to extract the solvent after which they are deodorized and "spotted" for the removal of stains such as ink, tea, lipstick, and the like.

The dry cleaning fluids most commonly employed are various cuts of naphtha (as Stoddard solvent), carbon tetrachloride, perchloroethylene, and trichloroethylene. These solvents are classified as non-hazardous in view of their incombustibility or low flash points. Other solvents or fluids sometimes used include chloroform, dichloroethane, benzol, and toluol. The soaps ordinarily employed are water soluble salts of higher molecular weight fatty acids particularly the sodium, potassium and triethanol amine salts of oleic, stearic, and palmitic acids or mixtures of the same. These soap additions impart enhanced cleansing powers to the cleaning operation through the detergent power of the aqueous solution formed with water or moisture present, which water is introduced with the soap, with the solvent, or with the garments to be cleaned.

These prior conventional dry cleaning practices are not capable of effecting complete removal of soil, for examination of white woolens cleaned thereby invariably reveals that they are not restored to their original whiteness but instead retain a greyness of varying value. Neither repeated cleansing nor increases in the time of contact will completely remove the greyness and in fact the latter sometimes increases the discoloration. This grey color is due to redeposition of a portion of the soil in the fibers, attributable at least in part to the building up of opposite electrostatic charges upon the fibers of the material being treated and the soil particles floating in the solvent.

An object of the invention is to provide dry cleaning processes and compositions for use therein which not only effect cleansing results superior to those obtainable by the use of the solvent alone but also prevent redeposition of any of the soil.

These and other advantageous results are obtained, in accordance with an exemplary embodiment of the invention, by processes which involve treating the garments or other materials to be cleaned with any conventional non-hazardous solvent containing in admixture therewith an addition of calcium dichlorostearate in a small amount until the desired cleanliness is effected and separating the cleansed material from the solvent containing the said agent and the removed soil. The calcium dichlorostearate may have the halogen atoms joined at the carbon atom adjacent to the carboxyl group but such structure is not essential to the successful performance of the additive.

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The time during which the garments or other material should be tumbled in the new solvent additive mixture varies with many factors including the particular solvent selected and the degree and nature of the soil. Optimum times of treatment have generally been between 10 and 80 minutes. Since redeposition of soil does not occur, prolongation of the time of treatment does not adversely affect the cleanliness of the material but only increases costs of operation.

The amount of calcium dichlorostearate which should be employed in any particular operation depends upon the solvent used, the time of treatment, and other factors. The amount is not critical. Too small amounts will not accomplish the prevention of redeposition of the soil and too large amounts are wasteful. Ordinarily, from .5 to 2.5 grams per liter of solvent gives satisfactory results although smaller or larger amounts may be used to advantage in some operations.

The ability to inhibit redeposition of soil in dry cleaning operations is not unique in calcium dichlorostearate for other compounds tested have this property in varying degrees. The said compound usually gave outstanding results. Other water insoluble salts of higher molecular weight organic acids, particularly of the fatty acids of 8 or more carbon atoms, whether halogenated or not, possess the property in some measure. The preferred metal components are those of the alkaline earth group although salts of the heavy metals can be employed. Specifically, calcium phenyl stearate and calcium naphthenate exemplify operable classes of compounds.

The effectiveness of calcium dichlorostearate and other compounds hereindisclosed in preventing redisposition of soil appears to depend upon their ability to impart electrical conductivity to the solvent and prevent electrostatic buildup. Easily dissociated water-insoluble polar substances tested have this property in varying degrees and especially the bivalent metal salts. Salts of organic acids which are substituted with atoms or radicals of the type herein indicated generally give better results, because the substituents impart greater polarity to the molecules.

The chlorinated hydrocarbon dry cleaning sol-

vents in combination with calcium dichlorostearate or other compound hereindisclosed lead to exceptionally good results, the best solvent usually being perchloroethylene under the conditions of the tests employed. Hydrocarbon solvent compositions as those containing Stoddard solvent with calcium dichlorostearate while showing some improvement did not give as good results under ordinary conditions but by grounding the equipment in which the cleaning operation is carried out, the cleaning power was raised comparable to that of the chlorinated solvent compositions containing calcium dichlorostearate. This grounding procedure with hydrocarbon solvent compositions containing this addition is considered within the scope of the present invention. To a lesser degree, grounding is effective in improving the detergency of all of the solvent compositions hereindisclosed.

An advantage in the dry cleaning processes of the present invention lies in the effect of the polar compound in permitting extension in the tumbling period without causing redeposition. Within reasonable limits, the condition of the solvent, as to acid and oil content and color has little if any effect in determining the detergency obtainable.

The effectiveness of calcium dichlorostearate in preventing redeposition of soil as compared with a conventional high grade dry cleaning soap solution is illustrated in the table below. In exactly parallel procedures, clean swatches of cream serge cut from a bolt of fresh cloth were placed together with uniformly soiled swatches in a launderometer with trichloroethylene containing the respective agents and after the time periods given, the treated swatches were removed and the unsoiled swatches tested in a photocolorimeter to determine the reflectance decrease or discoloration imparted to the clean swatches by deposition from the solvent containing soil removed from the soiled swatches.

Agent added	Concentration Amt./200 ml. of Solvent	Washing Time in Minutes	Reflectance Decrease in Units
Soap	1.0 ml.	20	20.5
		40	19.5
		60	25.0
		80	20.5
		100	19.5
		120	35.5
Calcium dichloro stearate	0.5 g.	20	5
		40	5
		60	5
		80	5
		100	5
		120	6

The addition compounds of the present invention should not be confused with the alkali metal soaps commonly employed in dry cleaning operations. The difference in operation is clear from the fact that although the alkali metal soaps require water or moisture for successful performance of their intended function, the additives of the present invention do not.

It should be understood that the present invention contemplates not only immersion type dry cleaning fluid compositions but also extends to spotting fluid compositions which may contain not only the solvents hereinbefore mentioned but also compounds such as ether, amyl and ethyl acetate, carbon bisulfide, orthodichlorobenzene, benzaldehyde, furfural, pyridine, cresol, and phenol.

It should also be undearstood that the invention is not limited by any theory of operation by which redeposition is prevented nor to any of the specific details herein given but that it extends to all equivalent materials and procedures which will occur to those skilled in the art upon consideration of the scope of the claims appended hereto.

I claim:

1. The process of dry cleaning soiled garments and other materials wherein soil redeposition is substantially prevented, which comprises tumbling the soiled materials to be cleaned in a chlorinated hydrocarbon dry cleaning solvent containing a small amount of calcium dichlorostearate, and separating the solvent containing the soil suspended therein from the materials treated.

2. The process of dry cleaning soiled garments and other materials wherein soil redeposition is substantially prevented, which comprises tumbling the soiled materials to be cleaned with a chlorinated hydrocarbon dry cleaning solvent containing calcium dichlorostearate in a quantity of from .5 to 2.5 gms. per liter of solvent and separating the solvent containing the soil suspended therein from the materials treated.

3. The process of dry cleaning soiled garments and other materials wherein soil redeposition is substantially prevented, which comprises tumbling the materials to be cleaned with Stoddard solvent containing a small amount of calcium dichlorostearate, continuously conducting from the solvent the electricity developed therein and separating the solvent containing the soil suspended therein from the material treated.

4. The process of dry cleaning soiled garments and other materials wherein soil redeposition is substantially prevented, which comprises tumbling the soiled materials to be cleaned with Stoddard solvent containing calcium dichlorostearate in a quantity of from .5 to 2.5 gms. per liter of solvent, continuously conducting from the solvent the electricity developed therein and separating the solvent containing the soil suspended therein from the materials treated.

5. The process of dry cleaning soiled garments and other materials wherein soil redeposition is substantially prevented, which comprises tumbling the soiled materials to be cleaned with a non-hazardous solvent selected from the group consisting of chlorinated hydrocarbon dry cleaning solvent and Stoddard solvent, containing calcium dichlorostearate in a quantity of from .5 to 2.5 grams per liter of the selected solvent, and separating the solvent containing the soil suspended therein from the materials treated.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,810,660	Kritchevsky	June 16, 1931
1,911,289	Reddish	May 30, 1933
2,251,691	Richardson	Aug. 5, 1941
2,272,923	Prutton	Feb. 10, 1942

FOREIGN PATENTS

Number	Country	Date
20,818	Great Britain (1893)	Oct. 20, 1894

OTHER REFERENCES

Practical Science for the Dry Cleaning Industry, Cooley, 1930, pages 123–126.