

[54] **DRY CLEANING VARIOUS ARTICLES**
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 abandoned.

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 [58] **Field of Search**..... **8/142**

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ABSTRACT

[57] A bath for dry cleaning solid articles, consisting essentially of at least one usual hydrocarbon dry cleaning solvent having 2 to 8 carbon atoms, which contains per liter 0.5 to 50 grams of water, 1 to 20 grams of isopropylamine-dodecylbenzene sulfonate, and 0.05 to 10 grams of a copolymer of at least 10 moles of a first monomer selection from the group consisting of methacrylic acid with at most 90 moles of a second monomer and consisting of alkyl acrylate and alkyl methacrylate the alkyl of which has 1 to 8 atoms, the molecular weight of the copolymer being 2,000 to 100,000.

9 Claims, No Drawings

DRY CLEANING VARIOUS ARTICLES

This is a continuation, of application Ser. No. 218,021 filed Jan. 14, 1972, now abandoned.

The invention relates to an improvement to dry-cleaning various articles, inter alia textile articles, i.e. the washing of textile or other fibres or articles with nonaqueous solvents. The invention relates more particularly to the use of a novel kind of adjuvant which improves cleaning and gives better stain removal and whiteness. Accordingly, the invention comprises a novel agent which prevents soil redeposition on an article from which stains have been removed in an organic solvent bath. The invention also relates to baths containing the aforementioned agent.

Dry-cleaning is very widely used at present, and its usefulness is becoming more evident every day. Whether, the solvent used is dry or contains a little water, it is usually necessary to add surface-active agents soluble in the given solvent to the cleaning bath, in order to improve stain removal. It has thus become conventional to mix the solvents with intensifiers, more particularly agents such as amine alkyl-aryl-sulphonates ethoxylated derivatives or amines or of aliphatic alcohols, or alkyl-polyethoxy phenols. In spite of these admixtures, which are often accompanied by optical bluing agents and bleaching agents, the degree of stain removal or whiteness of washed articles is often reduced because dirt in the baths is redeposited on the washing. To obviate this disadvantage, the invention provides a novel means which can give much better cleaning than can be obtained with conventional baths.

The novel anti-redeposition agent for dry-cleaning baths comprises one or more polymers of acrylic or methacrylic acid or a copolymer of one of the aforementioned acids with an acrylic or methacrylic ester which is soluble in or at least swells considerably in water.

Usually, the esters which can form copolymers with acrylic and/or methacrylic acids, are aliphatic; in practice they are usually alkyl esters containing from 1 to 8 carbon atoms and, more particularly, methyl, ethyl, propyl, isopropyl, butyl, isobutyl and tert-butyl acrylates and/or methacrylates.

In order to satisfy the required conditions of solubility or at least of adequate swelling in water, the polymers according to the invention preferably have a molecular weight of between 2,000 and 100,000, or preferably between 5,000 and 50,000.

When the agent is a copolymer of an acid with an ester, there should be at least 10 molecules of acrylic and/or methacrylic acid per 100 molecules of monomer which it contains.

Since the preparation of acrylic homopolymers and copolymers is well known, it will not be described here.

It has unexpectedly been found that the aforementioned polymers, when added in small proportions to dry-cleaning baths, are very effective in preventing soil redeposition, when the bath contains a small proportion of water, e.g. up to 100 g H₂O per liter of solvent.

It is found that acrylic polymers according to the invention containing from 10 to 100 acid groups per 100 acrylic or methacrylic groups have the most effective anti-redeposition action when the organic solvent contains between 0.5 and 50 g of water per liter.

Preferably, the adjuvant according to the invention is used with one or more other additives of known kind,

inter alia with cleaning intensifiers. Usually the proportion of the adjuvant is small compared with the proportion of intensifier; it may be e.g. as low as 1% of the weight of the intensifier and is preferably between 2 and 20%. Compared with the quantity of solvent, the quantity of the adjuvant according to the invention may advantageously vary between 0.05 and 10 g/liter; of course, these figures are approximate and the proportion may vary outside the afore-mentioned limits depending on the nature of the solvent, the water content, the nature and proportion of the intensifier and the particular nature of the chosen anti-redeposition agent.

Very advantageously, known amine alkyl-aryl-sulphonates may be associated with the acrylic homopolymers or copolymers according to the invention.

The agents according to the invention can be used with all solvents commonly used for dry-cleaning, inter alia chlorinated, fluorinated or chlorofluorinated hydrocarbons, more particularly aliphatic hydrocarbons, and especially trichloroethylene and perchloroethylene; benzene hydrocarbons, inter alia benzene, toluene or xylene; or aliphatic hydrocarbons such as hexane, heptane, octane, petroleum distillate, petroleum ether, etc.

The agents according to the invention can be used in cold or hot cleaning and are of use in all known methods of cleaning with organic solvents, provided that the latter contain a certain proportion of water as explained hereinbefore.

The invention is non-limitatively illustrated in the following examples.

GENERAL METHOD OF OPERATION

In all the examples, the bath comprised 500 ml perchloroethylene in which the quantities stated in each example of the intensifier and acrylic polymer according to the invention had been dissolved. Cleaning was performed at 22°C for 30 minutes, with agitation at 150 reciprocations per minute. The operations were performed in a machine known as a "Tergotometer" (standardised), containing 4 tubs for making 4 tests simultaneously.

In each test, a strip of cotton fabric measuring 13 × 21 cm which had been artificially soiled (EMPA soil of Fabric Incorporated (New York)) was treated in the presence of a clean strip of the same cloth.

After cleaning, the whiteness of the previously soiled strip and of the accompanying clean strip were determined in known manner with an Elrepho apparatus having a number 8 filter. The whiteness of the first strip after washing shows the degree of cleaning, whereas the whiteness of the second strip shows the extent to which soil redeposition has been reduced. In the following examples, use is made of the two aforementioned parameters and their sum is also noted, since this is important in showing the total effect of the adjuvant tested.

The following abbreviations are used in the examples:

TS: soiled cloth

TP: clean cloth

DBSI: isopropylamine-dodecyl-benzene sulphonate

ABSA: another amine aryl alkyl sulphonate

GIL: an agent according to the invention comprising a copolymer of 50 mols of acrylic acid with 50 mls of isopropyl acrylate and having a molecular weight of approx. 10,000.

EXAMPLES 1 to 5

The perchloroethylene bath contained 6 g of water per liter and 5 g/l of an intensifier, which was DBSI in Examples 1 to 3 and ABSA in Examples 4 and 5. In a first series of tests, the measured whiteness was as follows:

No.	EXAMPLES	WHITENESS		
		TS	TP	Total
1	DBSI	59.2	65.3	124.5
2	DBSI + 0.3 g/l GIL	63.7	77.-	140.7
3	DBSI + 0.05 g/l GIL	59.5	72.5	132.0
4	ABSA	61.-	69.-	130.-
5	ABSA + 0.3 g/l GIL	61.8	75.4	137.2

As can be seen, the addition of small quantities of GIL acrylic polymer according to the invention substantially improves the whiteness of the clean fabric in the presence of a conventional amine alkyl-aryl-sulphonate.

EXAMPLES 6 to 10

Washing tests similar to those of Examples 1 to 5 were made using 10 g of water and 5 g of intensifier per liter of solvent. The observed results were as follows:

No.	EXAMPLES	WHITENESS		
		TS	TP	Total
6	DBSI	65.-	65.5	130.5
7	DBSI + 0.3 g/l GIL	67.2	79.6	146.8
8	DBSI + 0.1 g/l GIL	67.7	78.-	145.7
9	ABSA	64.-	72.-	136.-
10	ABSA + 0.3 g/l GIL	64.4	80.7	145.1

These results, by comparison with Examples 1 to 5, show that an increase in the water content is accompanied by an increase in the antiredeposition effect of the adjuvant according to the invention.

EXAMPLES 11 to 16

Tests were made using a still larger content of water, i.e. 20 g per liter of solvent, all the other conditions remaining the same as in the preceding examples.

No.	EXAMPLES	WHITENESS		
		TS	TP	Total
11	DBSI	71.5	80.6	152.1
12	DBSI + 0.3 g/l GIL	71.3	84.-	155.3
13	DBSI + 0.1 g/l GIL	73.8	83.6	157.4
14	DBSI + 0.05 g/l GIL	72.5	82.-	154.5
15	ABSA	68.3	78.-	146.3
16	ABSA + 0.3 g/l GIL	71.4	83.5	154.9

Example 13, compared with the other results, shows that the optimum content of GIL acrylic polymer was about 0.1 g/l under the test conditions.

We claim:

1. A bath for dry cleaning solid articles, consisting essentially of at least one usual hydrocarbon dry cleaning solvent having 2 to 8 carbon atoms, which contains per liter 0.5 to 50 grams of water, 1 to 20 grams of isopropylamine-dodecyl-benzene sulfonate, and 0.05 to 10 grams of a copolymer of at least 10 moles of a first monomer selection from the group consisting of acrylic acid and methacrylic acid with at most 90 moles of a second monomer and consisting of alkyl acrylate and alkyl methacrylate the alkyl of which has 1 to 8 carbon atoms, the molecular weight of the copolymer being 2,000 to 100,000.

2. Bath according to claim 1, wherein said solvent is trichloroethylene.

3. Bath according to claim 1, wherein said solvent is perchloroethylene.

4. Bath according to claim 1, wherein said copolymer is formed by about 50 moles of acrylic acid with 50 moles of isopropyl acrylate, the molecular weight of the copolymer being in the range of 5,000 to 50,000.

5. Bath according to claim 4, wherein said solvent is trichloroethylene.

6. Bath according to claim 4, wherein said solvent is perchloroethylene.

7. A bath for dry cleaning solid articles, consisting essentially of at least one usual hydrocarbon dry cleaning solvent having 2 to 8 carbon atoms, which contains per liter 0.5 to 50 grams of water, 1 to 20 grams of a surface active agent which is isopropyl-amine dodecyl-benzene sulfonate, and 0.05 to 10 grams of a copolymer of 50 moles of acrylic acid with 50 moles of isopropyl acrylate.

8. A bath for dry cleaning solid articles, consisting essentially of at least one usual hydrocarbon dry cleaning solvent which is trichloroethylene, which contains per liter 0.5 to 50 grams of water, 1 to 20 grams of a surface active agent selected from the group consisting of amine alkyl-aryl-sulfonates, and 0.05 to 10 grams of a copolymer of at least 10 moles of a first monomer selection from the group consisting of acrylic acid and methacrylic acid with at most 90 moles of a second monomer and consisting of alkyl acrylate and alkyl methacrylate the alkyl of which has 1 to 8 carbon atoms, the molecular weight of the copolymer being 5,000 to 50,000.

9. A bath for dry cleaning solid articles, consisting essentially of at least one usual hydrocarbon dry cleaning solvent which is perchloroethylene, which contains per liter 0.5 to 50 grams of water, 1 to 20 grams of a surface active agent selected from the group consisting of amine alkyl-aryl-sulfonates, and 0.05 to 10 grams of a copolymer of at least 10 moles of a first monomer selection from the group consisting of acrylic acid and methacrylic acid with at most 90 moles of a second monomer and consisting of alkyl acrylate and alkyl methacrylate the alkyl of which has 1 to 8 carbon atoms, the molecular weight of the copolymer being 5,000 to 50,000.

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