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54 **Method for treating fabrics.**

57 A method for treating fabrics in a laundry dryer, comprising the steps of  
(i) inserting into a flexible container one or more fabrics to be treated, and one or more substrate articles;  
(ii) closing the container;  
(iii) tumbling the flexible container in a laundry dryer;  
(iv) opening the container and removing the fabrics therefrom;  
wherein the substrate article comprises a flexible sheet substrate.

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## FABRIC CONDITIONING ARTICLE

The present invention relates to a method for the conditioning of fabrics, in particular the conditioning of fabrics in a tumble dryer, and to an article suitable for use in this method.

In the treatment of fabrics in for instance a tumble dryer, it is known in the art to add one or more conditioning articles. For instance, for imparting a softening benefit to fabrics, it is known from CA 1 005 204 (Procter & Gamble) to commingle fabrics in a tumble dryer with a flexible substrate carrying a normally solid fabric-conditioning agent.

It has also been suggested in US 3 432 253 (DIXON) to clean fabrics by placing in a bag a fabric to be cleaned and a sawdust vehicle impregnated with a cleaner, sealing the bag and tumbling the bag in a hot air tumbler. A similar cleaning system, whereby gasoline is used as the cleaning material is disclosed in US 1 747 324 (SAVITT). The use of sawdust as vehicle for cleaning materials, however has the disadvantage that after cleaning a second drying cycle for the fabric in the absence of the bag is often necessary to remove the sawdust material. Also sometimes staining of the fabrics occurs, due to dye transfer from the sawdust under tumble dryer conditions. The use of sawdust may also impart an unpleasant smell to the fabrics treated therewith.

Surprisingly it has now been discovered that the above described clean-in-bag method can markedly be improved by using a substrate material of specific shape.

Accordingly the invention relates to a method for treating fabrics in a laundry dryer, comprising the steps of:

- (i) inserting into a flexible container one or more fabrics to be treated and one or more substrate articles;
- (ii) closing the container;
- (iii) tumbling the container in a laundry dryer;
- (iv) opening the container and removing the fabrics therefrom;

wherein the substrate article comprises a flexible sheet substrate.

The flexible sheet substrate can be made of any material suitable for conditioning fabrics in a tumble dryer. Examples of suitable substrate material include non-woven and woven fibrous structures, of natural and synthetic fibres and foams.

The substrate comprises at least one flexible sheet substrate such as cotton substrates and non-woven substrates such as paper substrates and poly-urethane substrates. Preferably the flexible sheet substrate is a porous substrate, having a water absorption capacity (in grams of water per gram of substrate) of more than 1.0, more preferred more than 2.0, typically between 2.5 and 7.5. Particularly preferred is the use of a substrate of filter-paper.

The upper surface area of the substrate article is preferably more than 0.5cm<sup>2</sup>, more preferred more than 1 cm<sup>2</sup>, typically from 1.5-100cm<sup>2</sup>. Depending on the size of each individual substrate one or more substrates may be used in a method according to the invention. If substrates having the shape of a coarse flake are used, then usually more than one substrate, say for example from 5-500 flakes are used; if substrates having the shape of elongated strips are used, then conveniently also more than one substrate is used, say for example 3-100. If larger substrates are used, then often only one substrate will be used.

Surprisingly it has been found that by using a flexible porous sheet substrate a cleaning benefit can be obtained, even when only low levels or even no cleaning material are applied to the substrate.

For further improving the cleaning benefit, the substrate may be impregnated with one or more cleaning materials. These cleaning materials may be aqueous cleaning materials, but especially preferred is the use of non-aqueous "dry-cleaning" solvents. Suitable solvents of this type include the alcohols such as phenyl alcohol, phenyl propyl alcohol, benzyl alcohol, terpineol and propylene glycol, and other solvents such as terpenes, pinenes, silicones, tetrachloroethylene, benzyl benzoate, diethylphthalate, alkyl citrates and alkyl myristate. Especially preferred is the use of terpenes, pinenes and volatile silicones.

When solvents are used in combination with the substrate it is preferred that the add-on ratio (in grams solvent per gram of substrate) is more than 0.5, preferably more than 1.0, typically from 1.0 to 7.5. Preferably the add on ratio is more than 20% of the water absorption capacity, especially preferred from 25 to 100%, wherein 100% indicates full saturation of the substrate.

Instead of or in addition to the above mentioned solvent materials, the substrate may comprise other materials which are suitable for the treating of fabrics in a tumble dryer.

One preferred class of materials for this purpose are capable of providing a fresh smell to the fabrics. These perfume ingredients may be present at low levels calculated on the weight of the substrate. Typical levels being from 0.01 to 20%, preferably from 0.5 to 10% based on the weight of the substrate. Surprisingly it has been found that when perfumes are applied to fabrics by the above mentioned method,

the freshening effect is more pronounced than by applying the perfume from a substrate in the absence of the flexible container.

Preferably about 5-50g of (optionally impregnated) substrate is used per tumble dryer cycle, more preferably from 10-30g.

5 After inserting the fabrics and the substrate articles in the flexible container, the container is closed. The closing of the flexible container does allow for one or more small apertures in the container, as long as these are small enough to prevent escape of the fabrics and the substrates during the tumbling of the flexible container in the laundry dryer. If volatile materials are used in combination with the substrate, it is however often preferred that the flexible container is completely closed to prevent escape of volatile  
10 material from the container during further use.

The flexible container for use in a method according to the invention is preferably an air-impermeable bag, for example a heat resistant plastic bag. The size of the bag is not very critical, although it is preferred to use a bag having an internal volume which is greater than the volume of the fabrics to be treated. In use the bag containing the fabrics and the substrate is closed, preferably such that an amount of air is trapped  
15 within the bag to facilitate tumbling in the dryer.

The tumble dryer for use in a method according to the invention may be a standard household tumble dryer. Preferably the dryer is operated at relatively low temperatures, the operating time will generally be from 1 to 100 minutes, preferably from 5 to 30 minutes.

In practice the articles for use in a method of the present invention will often be sold as a set. Such a  
20 set preferably comprises one or more flexible containers, preferably provided with means for closing these, and one or more flexible substrates, optionally impregnated as described above. The complete set may be enclosed in an outer pack, such as for example a carton box or a plastic wrap. A preferred embodiment of such a complete product comprises 2-20 plastic bags (preferably of a size of about 30x50 cm) and 10-1000g of paper substrate most preferably impregnated with non-aqueous solvents e.g. orange terpene  
25 and/or perfume ingredients. Preferably the amount of (optionally impregnated) substrate per bag is from 5-50g, more preferred from 10-30g.

The invention will be further illustrated by means of the following examples:

#### EXAMPLE 1

30 Fine sawdust material having an average particle size of 500 $\mu$ m was impregnated with tetrachloroethylene up to its saturation. The add-on ratio of solvent to carrier was 2.5. A piece of cotton/polyester fabric of size 15 x 14cm soiled with 1g of oily soil (glycerol trioleate) was inserted in a plastic bag of 38 x 25 cm together with 10g of impregnated sawdust material. The bag was closed and tumbled in a tumble  
35 dryer (REVISAIR) for 20 minutes at the low temperature setting.

After removing the fabric from the bag a considerable amount of sawdust adhered to the fabric, also the fabrics were stained due to dye-transfer from the sawdust into the fabrics. To remove the sawdust an additional tumble drying cycle in the absence of the bag was necessary, even after this second cycle small amounts of sawdust remained adhered to the fabric.

40 This example illustrates that the use of a particulate substrate gives unsatisfactory results in a clean in bag method.

#### EXAMPLE 2

45 10g of paper strips of 4.0 x 0.5cm and having a water absorbance capacity of 2.9 were impregnated with different levels of orange terpene and tetrachloroethylene. The impregnated paper strips were enclosed in a polyethylene bag of size 38 x 25cm in the presence of a pastel blue polyester/cotton piece of fabric of size 14 x 10cm soiled with about 1g of oily soil (glycerol trioleate). The bag was inserted in a tumble dryer (REVISAIR) and subjected to a 20 minute drier cycle on the cold setting. The cloth was  
50 removed from the bag and gently shaken to remove the paper strips and left to dry, the percentage of oily soil removed and determined by weight loss.

The following results were obtained:

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TEST	solvent	solvent (g)	% soil removed
1	--	---	27
2	TCE*	1	35
3	OT**	1	46
4	TCE	2	46
5	OT	2	43
6	TCE	5	60
7	OT	5	67
8	TCE	10	64
9	OT	10	85
10	TCE	25	98
11	OT	25	88

\*) TCE is tetrachloroethylene  
 \*\*) OT is orange terpene

20 The fabrics treated with orange terpene were preferred over the fabrics treated with TCE because of the fresher smell.  
 These results indicate that even in the absence of solvents some cleaning performance can be obtained. An increase in the level of solvent, increases the amount of soil removed. With lower solvent levels better cleaning results were obtained with OT than with TCE.

25 EXAMPLE 3

10g of paper strips as used in example 2, were impregnated with 10 grams of solvent. A polyester cotton fabric of size 14 x 10 cm was soiled with 1g of cooking fat. The fabric was treated as described in  
 30 example 2.  
 The following results were obtained:

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TEST	solvent	% soil removed
1	volatile silicone 244	51.4
2	orange terpene	44.1
3	volatile silicone 255	37.7
4	terpineol	23.0
5	benzyl alcohol	19.0
6	pinene	17.6
7	benzyl benzoate	13.3
8	isopropyl myristate	5.8
9	diethyl phthalate	5.1
10	acetyl tributyl citrate	3.9

Of the above-mentioned solvents, especially the use of orange terpene, terpineol and pinene were preferred for additional freshening benefits. The use of the volatile silicones 244 and 255 (ex Dow Corning)  
 50 was preferred for their softening ability.  
 This example clearly illustrates that cleaning benefits can be obtained by using several types of solvents. A clear benefit for using terpene like solvents or silicones is illustrated.

55 EXAMPLE 4

Pieces of cotton towelling of 15g each were exposed to cigarette smoke. Their odour was assessed by a trained panel on a scale of 0 to 5, wherein 0 is no odour and 5 is an extremely strong odour. The pieces of fabric were enclosed in plastic bags of 38x25 cm together with 10g of paper strips as used in example 2,

and tumbled in a REVISAIR dryer for 20 minutes on the cold setting. In a first set of experiments the paper strips were used as such. In other experiments the paper strips were impregnated with 5% by weight of the substrate of a perfume (Quest perfume 0035). The odour of the fabrics after treatment was assessed as described above. The following results were obtained.

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Odour Score			
TEST	before treatment	without perfume	with perfume
A	3.0	1.0	0.3
B	3.8	1.7	0.7
C	4.2	3.2	1.5

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These results show that by using a sheet substrate alone a clear odour reduction may be obtained. The odour reduction is even more pronounced if perfumes are added to the substrate.

## 20 Claims

1. A method for treating fabrics in a laundry dryer, comprising the steps of
  - (i) inserting into a flexible container one or more fabrics to be treated, and one or more substrate articles;
  - (ii) closing the container;
  - 25 (iii) tumbling the flexible container in a laundry dryer;
  - (iv) opening the container and removing the fabrics therefrom;
 wherein the substrate article comprises a flexible sheet substrate.
2. Method according to claim 1, wherein the flexible sheet substrate has a water absorption capacity of more than 1.0.
- 30 3. Method according to claim 1 or 2, wherein the flexible sheet substrate is impregnated with a non-aqueous solvent material.
4. Method according to claim 3, wherein the solvent material is selected from the group of terpenes, pinenes and volatile silicones or mixtures thereof.
5. Method according to one or more of the preceding claims wherein the substrate comprises from 0.01 to
 35 20% based on the weight of the substrate of perfume ingredients.
6. Method according to one or more of the preceding claims wherein from 5-50g of (optionally impregnated) substrate is used.
7. Article suitable for use in a method according to one or more of the claims 1-6, comprising a flexible sheet substrate impregnated with a non-aqueous solvent material.
- 40 8. Article according to claim 7, wherein the solvent material is selected from the group of pinenes, terpenes and volatile silicones or mixtures thereof.
9. Set of articles suitable for use in a method according to one or more of the claims 1-6, comprising at least one flexible container and one or more flexible sheet substrates.
10. Set according to claim 9, wherein the amount of (optionally impregnated) substrate per flexible container
 45 is from 5-50g.

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**EUROPEAN SEARCH  
REPORT**

<b>DOCUMENTS CONSIDERED TO BE RELEVANT</b>			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	GB-A-1 598 911 (KENNETH DAVID GOMM) * the whole document * - - -	1,3,4,7-9	D 06 F 43/00 D 06 F 95/00
A,D	US-A-1 747 324 (B.M. SAVITT) * the whole document * - - -	1,3,7,9	
A,D	US-A-3 432 253 (P.R. DIXON AND A.D. COPPOCK) * the whole document * - - -	1,9	
A,D	CA-A-1 005 204 (THE PROCTER & GAMBLE COMPANY) - - - - -		
			<b>TECHNICAL FIELDS SEARCHED (Int. Cl.5)</b>
			D 06 F D 06 G
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of search 28 January 91	Examiner COURRIER,G.L.A.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention		E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	