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(54) **Process and composition for steam ironing**

(57) The invention provides a process for ironing cloth wherein steam containing a steam-volatile silicone lubricant is directed onto the surface of the cloth while applying heat and pressure to the cloth. Also provided is an aqueous composition suitable for use in the water

reservoir of a steam iron, which composition comprises a steam-volatile silicone lubricant and a sequestering agent. Further provided is a concentrate suitable for addition to water to give said aforementioned aqueous composition.

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DescriptionTechnical Field

5 The present invention relates to a method of ironing clothes, an aqueous composition for use in a steam iron to carry out the method, and to a concentrate suitable for adding to water to produce an aqueous composition for use in the method.

Background Art

10 Compositions which are diluted with water to give a aqueous product for addition to the water reservoirs of steam irons are commercially available in a number of countries. These compositions are used to prevent the formation of lime scale in the iron if water containing dissolved calcium and magnesium salts is used, and to give a pleasant fragrance to the cloth being ironed.

15 US 5 409 619 discloses a composition for use in the steam chamber of a steam iron which comprises propylene glycol, glycerine, and optionally a volatile fragrance in deionized water. The composition is said to provide improved glide characteristics.

The presence of glycerine on the fabric which has been ironed is likely to leave a sticky residue. It would be desirable to provide a method of ironing fabrics which did not require the use of glycerine but which gave some improvement in ease of ironing compared with the use of water alone in a steam iron.

Disclosure of Invention

25 According to one aspect of the present invention, there is provided a process for ironing cloth which comprises directing steam on to the surface of the cloth to deliver a lubricant to the cloth in the steam directed on to the cloth while applying heat and pressure to the cloth, wherein the lubricant is a steam-volatile silicone.

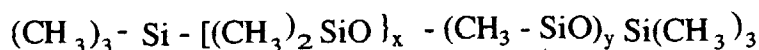
According to a further aspect of the present invention, there is provided an aqueous composition suitable for use in the water reservoir of a steam iron comprising a steam-volatile lubricant wherein the composition comprises a steam-volatile silicone and a sequestering agent.

30 According to a further aspect of the present invention, a concentrate suitable for addition to water to give a liquid suitable for use in a steam iron comprises a steam-volatile lubricant which is a steam-volatile silicone and a sequestering agent.

The process of the present invention may be carried out using a conventional domestic steam iron having a reservoir for water communicating with openings in the sole (base) plate of the iron through which steam can be directed on to cloth which is being ironed. The reservoir may be incorporated in the iron or may be a separate component connected to the iron by a flexible tube.

35 The lubricant is a silicone which is volatile in steam so that it can be carried to the cloth in the steam generated by the steam iron. Preferably the lubricant will not adversely affect the appearance or the feel of the cloth. It is preferred for the lubricant to be dispersible in water. If the lubricant is not itself dispersible in water, then a surfactant may be used to keep it dispersed.

40 It is particularly preferred to use polydimethyl siloxanes modified by incorporation of polyoxyalkylene groups. These are also known as dimethicone polyols. Such compounds having surfactant properties are commercially available. Two types of block co-polymers are available. One type is a linear polydimethylsiloxane to which polyethers have been grafted (by a hydrosilation reaction) to give an alkyl pendant (AP) polymer with the polyalkylene groups linked to the siloxane backbone by Si-C bonds, which are hydrolytically stable. The preferred polymers have the formula



|
PE

55 where PE is a pendant group which is $-\text{CH}_2\text{CH}_2\text{CH}_2\text{O}(\text{EO})_m(\text{PO})_n\text{Z}$ and Z is lower alkyl, e.g. $\text{C}_1\text{-C}_4$.

Materials of this type are commercially available, for example from OSi Specialities of Harefield, Middlesex, UK under the trade name "Silwet". The ethoxy and propoxy groups may be present in a ratio corresponding to an ethylene oxide to propylene oxide molecular ratio of 40/60 to 100/0 and molecular weights in the range 4000 to 81000. It is

preferred to use dimethicone polyols with molecular weights in the range 10000 to 30000, e.g. 10000 to 22000.

Another class of block co-polymer silicone surfactants are those obtained by condensing polyethers at the ends of the siloxane backbone through Si-O-C bonds.

These products have the general formula

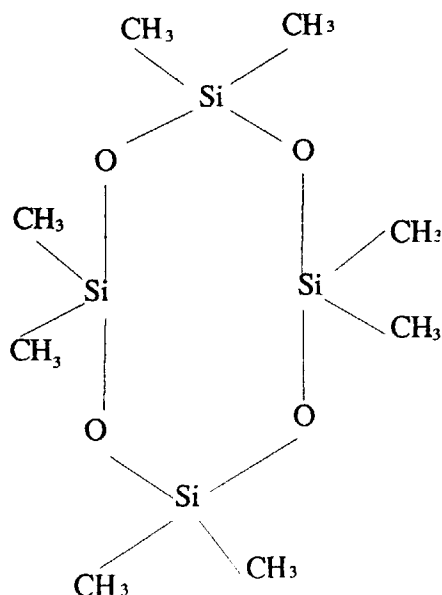


where PE is

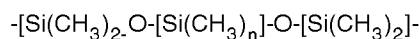


where EO is an ethoxy group and PO is a propoxy group and R is a lower alkyl group e.g. C₁-C₄. These alkoxy end-blocked (AEB) copolymers have less resistance to hydrolysis than the AP polymers, and are thus less preferred.

Another preferred class of silicone compounds are the cyclic polydimethyl siloxanes, which are also known as cyclomethicones. The cyclic compounds are commercially available as the tetramers or pentamers. They may be obtained from Dow Corning under the designations Dc 244, 245, 344, and 345. These materials are water-insoluble and but may be emulsified with surfactants to give oil-in-water emulsions. The formula of the tetramer is given below.



Another class of silicones which may be used in the invention are the lower molecular weight polydimethyl silicones



which are available in a range of molecular weights and viscosities. It is preferred to use polydimethyl silicones with a molecular weight in the range 1000 to 20000.

The aqueous composition preferably contains a sequestering agent. The purpose of the sequestrant is to prevent the deposition of scale in the iron. Examples of suitable sequestering agents are diethylene triamine penta-acetate.

The aqueous composition may contain a fragrance, as is used in known additives for steam irons.

If the fragrance is not miscible with water as is the case with many fragrance oils, then a fragrance solubilizer may be included in the composition. This may for example be a nonionic surfactant, for example sorbitan monolaurate 20EO, i.e. the product of reacting 20 molecules of ethylene oxide with each molecule of the sorbitan monolaurate.

The composition preferably contains a preservative to protect it against microbial attack. Suitable preservatives are well-known. Thus 4,4-dimethyl oxazolidine may be used.

The amounts of lubricant in the liquid which is vapourized to give the steam required in the ironing process may

be in the range 0.001 to 5 % w/w of the total composition, preferably 0.001% to 0.4% w/w.

The amount of any sequestering agent present may be, for example, in the range 0.003% to 5% w/w, preferably 0.003% to 0.2% w/w

The concentrate which is mixed with water to give the aqueous composition used to deliver the lubricant in the ironing process, may be a liquid, e.g. an aqueous liquid. Alternatively it may be a gel or a powder.

The amount of lubricant in the concentrate may be 0.05% to 20%, preferably 2 to 8%, e.g. 5% w/w.

The amount of any sequestering agent in the concentrate may be 0.2 to 10.00 % w/w, preferably 0.3 to 0.7% w/w.

The amount of any fragrance present in the concentrate may be in the range 0.05% to 0.3%, e.g. 0.10% w/w.

The amount of any fragrance solubilizer in the concentrate may be from 0.1 to 0.3% w/w, e.g. 0.2%.

In the case of a liquid concentrate, the remainder of the liquid may be water, preferably deionized water.

Best Mode of Carrying Out the Invention

Example 1

A composition was prepared from the following ingredients.

Ingredient	%wt/wt
Deionized water	96.10
Preservative	0.10
Perfume	0.10
Sequestering agent	1.00
Lubricant	2.5
Surfactant	0.2

The preservative was 4,4-dimethyl oxazolidine, commercially available under the trade name "Bioban CS 1135".

The sequestering agent was diethylene triamine penta-acetate, commercially available under the trade name "Dis-solvine D50".

The lubricant was a polyalkylene oxide silicone copolymer surfactant commercially available under the trade name "Silwet L7200" from OSi Specialities of Harefield, Middlesex, UK. The polymer was an alkyl-pendant (AP) polymer as described above. It had a molecular weight of about 19000 and the polyoxyalkylene oxide component was derived from a mixture of ethylene oxide and propylene oxide in the molecular ratio 75:25.

The composition was prepared by mixing the ingredients together.

Example 2

A composition was prepared as in Example 1 except that the lubricant was a cyclic polydimethyl silicone pentamer commercially available from Dow Corning as DC 245.

Comparative Test A

A composition was prepared as in Example 1 except that it contained no lubricant.

Ironing Tests

The compositions of Examples 1, 2, and comparative Test A were subjected to a test with a panel of users who tested them in random order using a separate ironing board and iron for each product. The products of Examples 1, 2 and Test A were tested at two different dilutions with tap water, namely 1:60 and 1:120 by volume. The composition of Comparative Test A was tested at a dilution of 1:60. The testers were then asked questions about the products tested. The higher the score reported, the greater the agreement with the proposition put to the testers.

The proposition that "the product makes the iron glide easily over the fabric" received the following scores:

Example 1 (1:120)	5.92
Example 1 (1:60)	5.83
Example 2 (1:60)	5.75
Test A	a low score was obtained

The proposition that "the product makes ironing easier" received the following scores:

Example 1 (1:120)	5.96
Example 1 (1:60)	5.89
Test A	5.14

The proposition that "the product removes wrinkles well" received the following scores:

Example 1 (1:120)	6.00
Example 1 (1:60)	6.05
Test A	5.13

Claims

1. A process for ironing cloth which comprises directing steam on to the surface of the cloth to deliver a lubricant to the cloth in the steam directed on to the cloth while applying heat and pressure to the cloth wherein the lubricant is a steam-volatile silicone.
2. A process according to claim 1 wherein the silicone is a polydimethyl siloxane modified by incorporation of poly-oxyalkylene groups.
3. A process according to claim 2 wherein the silicone is a linear polydimethylsiloxane to which polyethers have been grafted to give an alkyl pendant polymer with the polyalkylene groups linked to the siloxane backbone by Si-C bonds,
4. A process according to claim 3 wherein the silicone has a ratio of ethoxy to propoxy groups corresponding to an ethylene oxide to propylene oxide molecular ratio of 40/60 to 100/0.
5. A process according to claim 3 or claim 4 wherein the silicone has a molecular weight in the range 10000 to 30000.
6. A process according to claim 5 wherein the molecular weight is 10000 to 22000.
7. A process according to claim 1 or claim 2 wherein the silicone is a cyclic polydimethyl siloxane.
8. A process according to claim 7 wherein the cyclic polydimethyl siloxane is a tetramer or pentamer.
9. An aqueous composition suitable for use in the water reservoir of a steam iron comprising a steam-volatile lubricant wherein the composition comprises a steam-volatile silicone and a sequestering agent.
10. A concentrate suitable for addition to water to give a liquid suitable for use in a steam iron comprising a steam-volatile lubricant which is a steam-volatile silicone and a sequestering agent.



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EUROPEAN SEARCH REPORT

Application Number
EP 97 30 5222

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X A	GB 743 944 A (LEROY BRISTO EDWARDS & HERMAN ISAAC HERSH) * page 1, line 12 - line 69 * * page 2, line 28 - line 61 * * page 3, line 74 - line 108 * * example 2 * ---	1 2,5-8	D06M15/647 D06M13/513 D06M23/00 D06M11/05
A,D	US 5 409 619 A (DERENZO JACQUELINE) * column 2, line 20 - column 3, line 11 * ---	1	
A	EP 0 292 909 A (COLGATE PALMOLIVE CO) * column 5, line 38 - column 6, line 3 * * claims; example 1 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			D06M C11D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 3 November 1997	Examiner Herrmann, J
CATEGORY OF CITED DOCUMENTS 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			

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