

SPECIFICATION

Deodorant Laundry Composition

This invention relates to deodorant detergent products for use in suppressing human body malodour.

Background to the Invention

It has long been recognised that the development of body malodour is largely due to bacterial action on the products of the sweat glands. Washing the skin with a detergent, for instance in the form of a personal washing detergent bar, removes malodorous products and reduces the concentration of bacteria on the skin. Likewise, washing soiled clothing with a fabric washing detergent product, for instance in the form of a powder or liquid detergent product removes, malodorous products and bacteria derived from the skin.

It has been customary to incorporate germicides into detergent products, particularly those designed for personal washing, in the belief that growth of those skin microflora that contribute to body malodour can be inhibited and the production of malodorous substances suppressed. Germicides are at least partly effective in reducing or retarding the development of body malodour, but they do not completely solve the problem, possibly because there are other causes of malodour development on the skin which are unrelated to the proliferation of bacteria.

Summary of the Invention

It has now been discovered that certain combinations of substances other than germicides, hereinafter referred to as "deodorant compositions", when incorporated into a fabric washing detergent product, can be deposited onto the fabric of a garment washed with the product so, that the fabric of the garment then has the property of reducing body malodour when the garment is subsequently worn in contact with the skin.

In the course of attempts to characterise this new principle, many hundreds of substances and blends of substances have been screened for evidence of their deodorant activity.

Definition of the Invention

In its widest aspect, the invention provides a deodorant detergent product comprising a soap, a deodorant composition having a deodorant value of from 0.50 to 3.5 as measured by the Deodorant Value Test, and other detergent adjuncts including at least one chosen from detergency builders (other than soap) and bleaches, the deodorant composition comprising substances that depress the partial vapour pressure of morpholine by at least 10% more than that required by Raoult's Law.

The invention also provides a process for preparing a deodorant detergent product which process comprises blending a soap, other

detergent adjuncts including at least one chosen from detergency builders (other than soap) and bleaches and a deodorant composition as herein defined to provide a deodorant detergent product.

The invention also provides a method for treating fabric, which comprises washing fabric clothing or other articles intended for contact with human skin with a deodorant detergent product as herein defined.

The invention also provides a deodorant fabric which comprises a deodorant detergent product-washed fabric intended for contact with human skin, the fabric comprising a deodorant-effective amount of a deodorant composition as herein defined.

The invention furthermore provides a method for suppressing human body malodour which comprises contacting the skin with a fabric treated with a deodorant detergent product as herein defined.

The deodorant detergent product of the invention should comprise a deodorant composition which satisfies a deodorancy test when applied to the skin of human subjects. The average amount by which body malodour should be reduced is expressed in terms of the deodorant value of the deodorant composition contained in the detergent product. Products of the invention accordingly comprise a deodorant composition having a deodorant value of from 0.50 to 3.5. Products in which the deodorant composition has a deodorant value of below 0.50 are outside the scope of this invention and are considered to be incapable of reducing body malodour to a significant extent.

The Deodorant Value Test

In this test the deodorant value of a deodorant composition is measured by assessing its effectiveness, when contained in a standard soap bar at a standard concentration, in reducing body malodour when the standard soap bar is used to wash the axillae (armpits) of a panel of human subjects.

The choice of a soap base is not critical to the performance of the test but as illustrative of the conduct of the test in this respect the procedure followed in the preparation of the base employed in many of the tests referred to later in this specification is included in the description of the test.

Standard soap bars prepared as follows, all amounts given being by weight.

As soap base there is used a neutral wet sodium soap containing 63% of total fatty matter of which 82% is tallow fatty acid and 18% is coconut oil fatty acid. To a homogeneous mixture of 9000 parts of this soap base and 340 parts of free coconut oil fatty acid at 80°C are added with mixing, 9.4 parts of a 20% aqueous solution of tetrasodium ethylenediamine tetraacetate, 2.2 parts of a 60% aqueous solution of 1-hydroxyethane-1,1-diphosphonic acid and 7.2 parts of butylated hydroxy toluene (BHT) antioxidant dissolved in a little methylated spirits

and the temperature of the mass is raised to 140° under super-atmospheric pressure. The mass is then sprayed at about 30 mm of mercury, to produce a dried soap composition which is collected and extruded at 30°C as noodles of about 12% moisture content.

9,770 parts of the soap noodles thus obtained are mixed at ambient temperature with 150 parts of the deodorant composition to be tested, together with 30 parts of a titanium dioxide opacifier and 50 parts of a colourant suspension. The resulting mixture is milled and plodded in conventional equipment, cut into billets and stamped into bars. The deodorant composition to be tested is therefore present at the standard level of 1.5%. These bars are described as 80/20/5 soap base and consist of 80 parts tallow soap and 20 parts coconut soap, 5 parts of this soap mixture being free fatty acids expressed as coconut oil fatty acid.

Control soap bars are prepared in a similar manner except that the deodorant composition is omitted. In other respects, the control bar should only contain those additives conventionally present in personal washing products and for the purpose in the amount conventionally used in the art. For example, it is permissible as indicated in the foregoing description to include antioxidants in the control bar, but these should be present in the amount required to stabilise the soap base.

The test is conducted in a manner based on that devised by Whitehouse & Carter as published in "The Proceedings of the Scientific Section of the Toilet Goods Association", Number 18, December 1967, at pages 31 to 37, under the title "Evaluation of Deodorant Toilet Bars".

The test described in that publication was modified in three ways: firstly, the standard soap bar containing 1.5% by weight of a deodorant composition instead of germicides was employed, secondly, a 0 to 5 instead of a 0 to 10 grading scale was employed as a basis for determining the deodorant value, and thirdly, grading of odour intensity was performed 5 hours instead of 24 hours after treatment. This test is referred to herein as the Deodorant Value test.

Although the invention in its widest aspect provides deodorant detergent products comprising deodorant compositions having a deodorant value of from 0.50 to 3.5, preferred deodorant detergent products are those comprising deodorant compositions which have a deodorant value of at least 0.60, or 0.70, or 0.80, or 0.90, or 1.00, or 1.20, the higher the minimum value, the more effective is the product as a deodorant detergent product.

Detergent Active Compound

The product will contain soap which is a water-soluble or water-dispersible alkali metal salt of an organic acid, especially a sodium or a potassium salt, or the corresponding ammonium or substituted ammonium salt. Examples of suitable organic acids are natural or synthetic aliphatic carboxylic acids of from 10 to 22 carbon atoms,

especially the fatty acids of triglyceride oils such as tallow and coconut oil.

The preferred soap is a soap of tallow fatty acids, that is fatty acid derived from tallow class fats, for example beef tallow, mutton tallow, lard, palm oil and some vegetable butters. Minor amounts of up to about 30%, preferably 10 to 20%, by weight of sodium soaps of nut oil fatty acids derived from nut oils, for example coconut oil and palm kernel oil, may be admixed with the sodium tallow soaps, to improve their lathering and solubility characteristics if desired. Whereas tallow fatty acids are predominantly C₁₄ and C₁₈ fatty acids, the nut oil fatty acids are of shorter chain length and are predominantly C₁₀—C₁₄ fatty acids.

The amount of soap that can be incorporated into the deodorant detergent product according to the invention is from 1 to 99%, preferably 2 to 50% by weight.

The product can also optionally contain non-soap detergents which can be non-soap anionic or nonionic or cationic or amphoteric or Zwitterionic in character. Typical non-soap anionic detergent-active compounds include water-soluble salts, particularly the alkali metal, ammonium and alkanolammonium salts, of organic sulphuric reaction products having in their molecular structure an alkyl group containing from about 8 to about 22 carbon atoms and a sulphonic acid or sulphuric acid ester group. (included in the term "alkyl" is the alkyl portion of acyl groups). Examples of this group of non-soap detergents which can be used are the sodium and potassium alkyl sulphates, especially those obtained by sulphating the higher alcohols (C₈—C₁₈ carbon atoms) produced by reducing the glycerides of tallow or coconut oil; and sodium and potassium alkyl benzene sulphonates, in which the alkyl group contains from about 9 to about 15 carbon atoms in straight chain or branched chain configuration.

Other anionic detergent-active compounds include the sodium alkyl glycerol ether sulphonates, especially those ethers of higher alcohols derived from tallow and coconut oil; sodium coconut oil fatty acid monoglyceride sulphonates and sulphates; and sodium or potassium salts of alkyl phenol ethylene oxide ether sulphate containing about 1 to about 10 units of ethylene oxide per molecule and wherein the alkyl groups contain about 8 to about 12 carbon atoms.

Other useful non-soap anionic detergent-active compounds include the water-soluble salts of esters of α -sulphonated fatty acids containing from about 6 to about 20 carbon atoms in the ester group; water-soluble salts of 2-acyloxy-alkane-1-sulphonic acids containing from about 2 to 9 carbon atoms in the acyl group and from about 9 to about 23 carbon atoms in the alkane moiety; alkyl ether sulphates containing from about 10 to 20 carbon atoms in the alkyl group and from about 1 to 30 moles of ethylene oxide; water-soluble salts of olefin sulphonates containing from about 12 to 24 carbon atoms;

and 6-alkyloxy alkane sulphonates containing from about 1 to 3 carbon atoms in the alkyl group and from about 8 to 20 carbon atoms in the alkane moiety.

- 5 Preferred water-soluble non-soap anionic detergent-active compounds include linear alkyl benzene sulphonates containing from about 11 to 14 carbon atoms in the alkyl group: the tallow range (C_{12-20}) alkyl sulphates; the coconut range
- 10 alkyl glyceryl sulphonates; and alkyl ether sulphates wherein the alkyl moiety contains from about 14 to 18 carbon atoms and wherein the average degree of ethoxylation varies between 1 and 6.
- 15 Specific preferred non-soap anionic detergent-active compounds include: sodium linear $C_{10}-C_{12}$ alkyl benzene sulphonate; triethanolamine $C_{10}-C_{12}$ alkyl benzene sulphonate; sodium tallow alkylsulphate; and sodium coconut alkyl glyceryl ether sulphonate; and the sodium salt of a
- 20 sulphated condensation product of tallow alcohol with from about 3 to about 10 moles of ethylene oxide.

It is to be understood that any of the foregoing optional anionic detergent-active compounds can be used separately or as mixtures.

- Examples of suitable nonionic detergent-active compounds are condensates of linear and branched-chain aliphatic alcohols or carboxylic acids of from 8 to 18 carbon atoms with ethylene oxide, for instance a coconut alcohol-ethylene oxide condensate of 6 to 30 moles of ethylene oxide per mole of coconut alcohol; condensates of alkylphenols whose alkyl group contains from 6 to 12 carbon atoms with 5 to 25 moles of ethylene oxide per mole of alkylphenol; condensates of the reaction product of ethylenediamine and propylene oxide with ethylene oxide, the condensates containing from 40 to 80% of polyoxyethylene radicals by weight and having a molecular weight of from 5,000 to 11,000; tertiary amine oxides of structure R_3NO , where one group R is an alkyl group of 8 to 18 carbon atoms and the others are each methyl, ethyl or hydroxyethyl groups, for instance dimethyldodecylamine oxide; tertiary phosphine oxides of structure R_3PO , where one group R is an alkyl group of from 10 to 18 carbon atoms, and the others are each alkyl or hydroxyalkyl groups of 1 to 3 carbon atoms, for instance dimethyldodecylphosphine oxide; and dialkyl sulphoxides of structure R_2SO where the group R is an alkyl group of from 10 to 18 carbon atoms and the other is methyl or ethyl, for instance methyltetradecyl sulfoxide.

Suitable cationic detergent-active compounds are quaternary ammonium salts having an aliphatic radical of from 8 to 18 carbon atoms, for instance cetyltrimethyl-ammonium bromide.

- 60 Examples of suitable amphoteric detergent-active compounds are derivatives of aliphatic secondary and tertiary amines containing an alkyl group of 8 to 18 carbon atoms and an aliphatic radical substituted by an anionic water-solubilizing group, for instance sodium 3-

dodecylaminopropionate, sodium 3-dodecylaminopropane sulphonate and sodium N-2-hydroxydodecyl-N-methyltaurate.

- Suitable zwitterionic detergent active compounds are derivatives of aliphatic quaternary ammonium sulphonium and phosphonium compounds having an aliphatic radical of from 8 to 18 carbons atoms and an aliphatic radical substituted by an anionic water-solubilising group, for instance 3-(N,N-dimethyl-N-hexadecylammonium) propane-1-sulphonate betaine, 3-(dodecylmethyl sulphonium) propane-1-sulphonate betaine and 3-(cetylmethylphosphonium) ethane sulphonate betaine.

Further examples of optional detergent-active compounds are compounds commonly used as surface-active agents given in the well-known textbooks "Surface Active Agents", Volume 1 by Schwartz and Perry and "Surface Active Agents and Detergents", Volume II by Schwartz, Perry and Berch.

- The total amount of soap and other optional detergent-active compounds that can be incorporated into deodorant detergent products according to the invention is from 1% to 99% by weight. The preferred amount will depend on the nature of the product (i.e. whether it is liquid or solid and whether it comprises soap or both soap and non-soap detergents).

It can be stated generally that the preferred amount of soap together with optional detergent active compounds to be employed is within the range of from 5 to 95% by weight of the product.

100 The Deodorant Composition

The essential substances required for the formulation of deodorant compositions having a deodorant value of from 0.50 to 3.5 are those that depress the partial vapour pressure of morpholine by at least 10% more than that required by Raoult's Law, as determined by the following test, which is designated "The Morpholine Test".

The Morpholine Test

- 110 In this test the capacity of a substance to depress the partial vapour pressure of morpholine more than that required by Raoult's Law is measured. Substances that undergo chemical reaction with morpholine are to be regarded as excluded from the test, even though they will generally depress the partial vapour pressure of morpholine by at least the defined amount, since not all such substances are operative according to the new principle. It is to be understood, however, that such substances can be included in the formulation of the deodorant composition, provided that, when included, the composition has the ability to reduce odour intensity by at least 0.50 as herein defined.

125 The morpholine test is carried out in the following manner:

Into a sample bottle of capacity 20 ml is introduced morpholine (1 g), the bottle fitted with

a serum cap and then maintained at 37°C for 30 minutes for equilibrium to be reached. The gas in the headspace of the bottle is analysed by piercing the serum cap with a capillary needle through which nitrogen at 37°C is passed to increase the pressure in the bottle by a standard amount and then allowing the excess pressure to inject a sample from the headspace into gas chromatograph apparatus, which analyses it and provides a chromatographic trace curve with a peak due to morpholine, the area under which is proportional to the amount to morpholine in the sample.

The procedure is repeated under exactly the same conditions using instead of morpholine alone, morpholine (0.25 g) and the substance to be tested (1 g); and also using the substance (1 g) without the morpholine to check whether it gives an interference with the morpholine peak (which is unusual).

The procedure is repeated until reproducible results are obtained. The areas under the morpholine peak are measured and any necessary correction due to interference by the substance is made.

A suitable apparatus for carrying out the above procedure is a Perkin - Elmer Automatic GC multifract F40 for headspace analysis. Further details of this method are described by Kolb in "CZ-Chemie-Technik", Vol 1, No. 2, 87—91 (1972) and by Jentzsch et al in "Z. Anal. Chem." 236 96—118 (1968).

The measured areas representing the morpholine concentration are proportional to the partial vapour pressure of the morpholine in the bottle headspace. If A is the area under the morpholine peak when only morpholine is tested and A' is the area due to morpholine when a substance is present, the relative lowering of partial vapour pressure of morpholine by the substance is given by $1 - A'/A$.

According to Raoult's Law, if at a given temperature the partial vapour pressure of morpholine in equilibrium with air above liquid morpholine is p, the partial vapour pressure p' exerted by morpholine in a homogeneous liquid mixture of morpholine and the substance at the same temperature is $pM/(M+PC)$, where M and PC are the molar concentrations of morpholine and the substance. Hence, according to Raoult's Law, the relative lowering of morpholine partial vapour pressure $(p-p')/p$, is given by $1 - M/(M+PC)$, which under the circumstances of the test is $87/87+m/4$, where m is the molecular weight of the substance.

The extent to which the behaviour of the mixture departs from Raoult's Law is given by the ratio:

$$\frac{1 - A'/A}{87/(87+m/4)}$$

The above ratio, which will be referred to as the Raoult Variance Ratio, is calculated from the test results. Where a substance is a mixture of

compounds, a calculated or experimentally determined average molecular weight is used for m. A substance that depresses the partial vapour pressure of morpholine by at least 10% more than that required by Raoult's Law is one in which the Raoult Variance Ratio is at least 1:1.

Deodorant compositions can be incorporated in deodorant detergent products according to the invention at a concentration of from 0.01 to 10%, preferably from 0.05 to 3% and most preferably from 0.1 to 1% by weight.

It is apparent that if less than 0.01% of a deodorant composition is employed, then use of the detergent product is unlikely to provide a significant reduction in body malodour intensity. If more than 10% of a deodorant composition is employed, then use of the detergent product is unlikely to further reduce body malodour intensity beyond that observed at the 10% level. A method for assessing the deodorant effectiveness of the deodorant detergent product when employed in the washing of fabrics is described hereinafter in Example I.

Detergent Adjuncts

Deodorant detergent products of the invention contain other detergent composition ingredients (adjuncts), which will include at least one adjunct chosen from detergency builders (other than soap) and bleaches.

Detergency Builders Other than Soap

Useful builders include inorganic and organic water-soluble builder salts, as well as various water-insoluble and so-called "seeded" builders.

Inorganic detergency builders include, for example, water-soluble salts of phosphates, pyrophosphates, orthophosphates, polyphosphates, phosphonates, carbonates, bicarbonates, borates and silicates. Specific examples of inorganic phosphate builders include sodium and potassium tripolyphosphates, phosphates and hexametaphosphates. The polyphosphates specifically include, for example, the sodium and potassium salts of ethylene diphosphonic acid, the sodium and potassium salts of ethane 1-hydroxy-1,1-diphosphonic acid, and the sodium and potassium salts of ethane-1,1,2-triphosphonic acid. Sodium tripolyphosphate is an especially preferred, water-soluble inorganic builder.

Non-phosphorous containing sequestrants can also be selected for use as detergency builders. Specific examples of non-phosphorous, inorganic builder ingredients include water-soluble inorganic carbonate, bicarbonate, borate and silicate salts. The alkali metal, e.g. sodium and potassium carbonates, bicarbonates, borates (Borax) and silicates are particularly useful.

Water-soluble, non-phosphorous organic builders are also useful. For example, the alkali metal, ammonium and substituted ammonium polyacetates, carboxylates, polycarboxylates, succinates, and polyhydroxysulphonates are useful builders in the present compositions and processes. Specific examples of the polyacetate

and polycarboxylate builder salts include sodium, potassium, lithium, ammonium and substituted ammonium salts of ethylene diamine tetraacetic acid, nitrilotriacetic acid, oxydisuccinic acid, mellitic acid, benzene polycarboxylic acids, and citric acid.

Highly preferred non-phosphorous builder materials (both organic and inorganic) include sodium carbonate, sodium bicarbonate, sodium silicate, sodium citrate, sodium oxydisuccinate, sodium mellitate, sodium nitrilotriacetate, and sodium ethylenediaminetetraacetate; carboxymethoxysuccinate, carboxymethoxymalonate and mixtures thereof.

Another type of detergency builder material useful in the products of the invention comprises a water-soluble material capable of forming a water-insoluble reaction product with water hardness cations in combination with a crystallisation seed which is capable of providing growth sites for said reaction product.

Specific examples of materials capable of forming the water-insoluble reaction product include the water-soluble salts of carbonates, bicarbonates, sequecarbonates, silicates, aluminates and oxalates. The alkali metal, especially sodium salts of the foregoing materials are preferred for convenience and economy.

Another type of builder useful herein includes various substantially water-insoluble materials which are capable of reducing the hardness content of laundering liquors, e.g. by ion-exchange processes.

The complex aluminosilicates, i.e. zeolite-type materials, are useful pre-soaking/washing adjuvants in that these materials soften water, i.e. remove Ca^{++} hardness. Both the naturally occurring and synthetic "zeolites", especially zeolite A and hydrated zeolite A materials, are useful for this builder purpose.

The detergency builder component when present will generally comprise from 1% to 90%, preferably from 5% to 75% by weight of the product.

45 Bleaches

Useful bleaches include, for example, the various organic peroxyacids such as peracetic acid, peradipic acid, perphthalic acid, diperphthalic acid, diperisophthalic acid, diperazelaic acid and the like. Inorganic bleaches, i.e. persalts including such materials as sodium perborate, sodium perborate tetra-hydrate, urea peroxide, and the like, can be employed in the compositions. Bleach precursors such as tetraacetyl ethylene diamine and sodium acetoxybenzoyl sulphonate can also be employed. Bleaches or their precursors when employed can be used at a level of from about 1% to 45% by weight of the composition.

An especially preferred bleaching agent is sodium perborate tetrahydrate, at an effective concentration of from about 10% to about 40% by weight of the product.

If necessary, bleach stabilisers such as

65 magnesium sulphate can also be included together with a bleach.

Other Detergent Adjuncts

Other detergent adjuncts that can optionally be present in the product include sequestrants, superfatting agents, such as free long-chain fatty acids, lather boosters, such as coconut monethanolamide; lather controllers; inorganic salts such as sodium and magnesium sulphates; moisturisers; plasticisers and anti-caking agents; 70 anti-redeposition agents; soil release agents; filler materials; optical brighteners; anti-spotting agents; dyes; thickeners; opacifiers, colourants, fluorescers, perfumes, germicides and other deodorant materials such as zinc ricinoleate; and 80 water.

Various detergency enzymes well-known in the art for their ability to degrade and aid in the removal of various soils and stains can also optionally be employed in products according to this invention. Detergency enzymes are 85 commonly used at concentrations of from about 0.1% to about 1.0% by weight of such compositions. Typical enzymes include the various proteases, lipases, amylases, and mixtures thereof, which are designed to remove a variety of 90 soils and stains from fabrics.

The total amount of detergent adjuncts that can be incorporated into the deodorant detergent product according to the invention will normally form the balance of the product after accounting for the deodorant perfume and the detergent-active compound. The detergent adjuncts will accordingly form from 0.99 to 98.99% by weight of the product.

100 Product Types and Formulations

The deodorant detergent product can be formulated as a solid product, for example in the form of a laundry bar or a powder which can be used for fabric washing. Alternatively, the product 105 can take the form of a liquid product for fabric washing. As a further alternative, the composition can take the form of a gelled product for fabric washing.

It is to be understood that the foregoing 110 products are examples of forms which the deodorant detergent product can take; other product forms within the purview of the art are to be included within the scope of monopoly claimed.

115 Preparation of Deodorant Detergent Products

The deodorant detergent products of the invention, as intended for fabric washing, can be prepared as liquid products or as solid products, for example in the form of a bar or a powder.

120 Liquid products can be prepared simply by mixing the ingredients in any desired order, although it is preferable to add any volatile components which can include the deodorant composition towards the end of the mixing process to limit loss by evaporation of these volatile components. Some agitation is usually

necessary to ensure proper dispersion of any insoluble ingredients and proper dissolution of soluble ingredients.

5 Solid products in the form of a powder can be prepared by first making a slurry with water of all ingredients of the composition except those which are heat labile, volatile or otherwise unstable to heating, for example the deodorant composition and bleach ingredients.

10 By way of example, a typical slurry will have the following composition:

	% w/w
Detergent actives, including soap	17
Sodium tripolyphosphate	25
15 Sodium sulphate	7
Sodium silicate ($\text{SiO}_2:\text{Na}_2\text{O}=2:1$)	6
Sodium carboxymethyl cellulose	1
Sodium ethylene diamine	
tetraacetic acid	0.5
20 Calcium bentonite clay	2.5
Other heat stable minor ingredients	3
Water	38
	100

25 The aqueous slurry is then spray dried by a conventional technique to produce detergent granules containing about 10% moisture.

30 Additional detergent composition components including the deodorant composition and bleaches and bleach activators are then mixed with the spray dried detergent granules.

In a typical example, the finished product has the following composition:

	% w/w
35 Spray dried detergent granules	68.5
Deodorant composition	0.2
Sodium perborate (bleach)	30.0

40 Solid products in the form of a bar or tablet can be prepared by first mixing together the heat stable non-volatile materials and then adding heat labile volatile materials, such as the deodorant composition at a later stage in the process, preferably shortly before extruding and stamping.

45 Use of Deodorant Detergent Composition

50 The deodorant detergent product can be employed in a normal domestic or other laundry processes conveniently employing a washing machine. It is intended that the product is effective both in removing soil from fabrics being washed and in delivering to the fabric deodorant effective amount of the deodorant composition. A 'deodorant effective amount' of the deodorant composition is defined as sufficient of the composition to reduce body malodour (as measured by the Deodorant Value Test) when the fabric, in the form of a shirt to be worn in contact with the skin, has been subjected to a laundry

60 washing process employing the deodorant detergent product.

65 For most purposes, the product can be employed at a concentration of 0.05 to 5% by weight of the wash liquor. Preferably, the concentration in the wash is from 0.2 to 2%, most preferably from 0.3 to 1% by weight of the wash liquor.

Examples of the Invention

70 The invention is illustrated by the following examples which exemplify granular soap powders suitable for use as fabric washing products.

75 It should be noted that each of these soap powder products was evaluated in a manner similar to that described for the Deodorant Value Test referred to hereinbefore. However, in view of the fact that testing the fabric washing soap powders involved the assessment of body malodour after wearing a shirt which had been washed with such a powder (instead of by

80 washing the axillae with a standard soap bar containing the deodorant composition previously described as the Deodorant Value Test) the effectiveness of each soap powder was expressed in terms of "odour reduction value".

85 It should be recognised that if an odour reduction value of less than 0.50 is recorded following use of products of the invention, it is indicative that insufficient deodorant composition has been transferred to the skin of the axilla, rather than evidence that the product itself contains insufficient of a deodorant composition as herein defined.

Example 1

A spray dried granular soap powder was prepared according to the method described herein, the bleach and deodorant composition being mixed with the base after spray drying. The test product had the following composition:

	% w/w
100 Anhydrous soap (80:20 tallow:coconut)	40
Anhydrous sodium silicate ($\text{SiO}_2:\text{Na}_2\text{O}=2.5:1$)	8
Magnesium sulphate	0.5
105 Sodium EDTA	0.15
Sodium perborate	30
Sodium tripolyphosphate	8
Sodium carboxymethyl cellulose	0.5
Sodium carbonate	2.0
110 Deodorant composition 1	0.2
Moisture and minor ingredients to	100

The control product had a similar composition except that the deodorant composition was omitted.

115 The deodorant composition employed in the test product had the following formulation:

Deodorant Composition 1

	<i>Parts</i>
Amber AB 358	3.0
iso-Amyl salicylate	5.0
5 Benzyl salicylate	4.0
Bergamot AB 430	15.0
o-t-Butylcyclohexyl acetate	0.5
Cedar atlas oil	5.0
Citronellol	7.0
10 Citronella oil	16.1
Citronellyloxyacetaldehyde	0.5
Geranium base 76	4.0
1,3,4,6,7,8-Hexahydro- 4,6,6,7,8,8-hexamethyl 15 cyclopenta- γ -2-benzopyran	10.0
Hexyl aldol	0.7
Jasmin AB 284	12.0
LRG 201	5.0
Nonanolide-1:4	0.2
20 Opoponax resinoid	1.7
Orange oil sweet	8.0
10-Undecen-1-al	0.30
Vetyvert oil	2.0
	100.00

25 In this example, the deodorant effectiveness of a fabric washing soap powder according to the invention was evaluated in terms of its odour reduction value in the following manner.

30 Polyester cotton coat style button through shirts were first prewashed in an automatic washing machine using a nonionic detergent fabric washing powder. This was to ensure that the shirts to be used in the test were all equally clean and free from dressing prior to washing in the deodorant fabric washing product.

35 The washed shirts were line dried and then washed again in the automatic washing machine. The test deodorant fabric washing product was then added to the wash liquor at a concentration of 0.4% by weight of the liquor. The ratio of shirt fabric (dry weight basis) to wash liquor was 40 g fabric per litre wash liquor.

40 The shirts were agitated in the wash liquor for 10 minutes at a temperature of 50°C, then rinsed and spun to a moisture content of about 50% water and finally line dried to a moisture content of not greater than 10%.

45 A further batch of prewashed shirts which were to serve as control shirts were washed again and then dried under similar conditions except that deodorant composition was omitted from the fabric washing product added to the wash liquor.

50 The shirts were folded and stored overnight in polyethylene bags until required for testing by a

55 panel of male subjects and assessing for odour by a panel of female assessors.

The above procedure was repeated on four consecutive days without prewashing, half of the subjects wearing shirts treated with the deodorant composition-containing detergent product and half wearing control shirts without deodorant composition treatment.

60 Body odour transferred to the shirts in the region of the axillae was assessed by the trained female assessors in the manner described in the Deodorant Vague Test, the odour of the shirt fabric being scored in each case rather than the axillae of the panel subjects and the results expressed as odour reduction value.

70 Results of the Odour Reduction Value Test 1 Using Soap Powder

	<i>Control powder</i>	<i>Test powder</i>
Average scores	2.54	1.98
75 Odour reduction value		0.56

Example 2

In this example the effect of a deodorant composition incorporated in a non-soap detergent (NSD) soap fabric washing powder was evaluated by the Odour Reduction Test referred to above.

The powder had the following formulation:

	<i>% w/w</i>
Sodium C ₁₃₋₁₈ alkane sulphonate	8.0
85 C ₁₂₋₂₀ n-alcohol+25 moles ethylene oxide	3.4
Sodium soap (containing 4 parts tallow fatty acid to 1 part coconut fatty acid)	3.4
90 Pentasodium tripolyphosphate	37.3
Sodium sulphate	6.7
Carboxymethylcellulose	2.0
Ethylene diamine tetraacetic acid	1.0
Magnesium silicate	2.0
95 Fluorescer	0.3
Waterglass powder (Na ₂ O:SiO ₂ =1:3.4)	5.9
Sodium carbonate	1.0
Sodium perborate monohydrate	19.0
100 Water	10.0

This product was employed as the control product, while a corresponding test product was prepared by adding to the formulation 0.2% by weight of Deodorant Composition 2 which had the following composition:

105

Deodorant Composition 2

	Parts
5 6-Acetyl-1,1,3,4,4,6-hexamethyl-tetrahydro naphthalate	3.00
Bergamot base 37	20.00
Carvacrol	3.50
Citronellyl acetate	5.00
Dipropylene glycol	4.75
10 Geranyl nitrile	1.50
Indole	1.00
Lemongrass oil	3.00
Lime AB 402	10.00
Lavandin oil	4.00
15 1-Menthol	8.00
3a-Methyl-dodecahydro-6,6,9a-trimethyl naphtho-2(2,1-b)-furan	0.25
β -Methyl naphthyl ketone	5.00
20 β -Naphthol methyl ether	9.00
Neroli base 78	6.00
Pomeransol AB 314	6.00
Petitgrain oil (terpeneless)	4.00
Orange oil sweet	5.00
25 Thyme oil red	1.00
	100.00

Results of Odour Reduction Value Test Using NSD/Soap Powder

	Control bar	Test bar
30 Average scores	2.72	1.26
Odour reduction value		1.46

Example 3

- 35 In this example, the effect of a deodorant composition incorporated in a non-soap detergent (NSD)/soap powder was evaluated by the Odour Reduction Test referred to above.

The powder had the following formulation:

	% w/w
40 Sodium dodecyl benzene sulphonate	15
Tallow alcohol 18 EO } nonionic	3
Tallow alcohol 12 EO } detergent	3
45 Sodium stearate (soap)	6
Sodium tripolyphosphate	40
Sodium silicate	5
Sodium carboxymethylcellulose	2
Fluorescer	0.2
50 EDTA	0.2
Enzyme	0.66
Sodium sulphate	14
Water	to 100

- 55 This product was employed as the control product, while a corresponding test product was prepared by adding to the formulation 0.2% by weight of deodorant composition 3 which had the following composition:

Deodorant Composition 3

	Parts
60 p-t-Amylcyclohexanone	5.00
Benzoin Siam resinoid	5.00
Bergamot AB 430	15.00
Coumarin	4.00
65 Diethyl phthalate	4.35
Geranium oil	5.00
Hercolyn D	12.25
1,3,4,6,7,8-Hexahydro-4,6,6,7,8,8-hexamethyl cyclopenta- γ -2-benzopyran	3.00
70 Lavandin oil	10.00
α -iso-Methyl ionone	12.00
Mousse de chene yugo	1.25
Musk ambrette	3.00
75 Pimento leaf oil	10.00
Rosenta AB 380	10.00
Rose-D-oxide	0.15
	100.00

Results of Odour Reduction Test 3 Using NSD/Soap Powder

	Control bar	Test bar
80 Average scores	2.68	1.68
Odour reduction value		1.00

Examples 4 to 12

Examples 1 to 3 can be repeated by employing any of the soap powder formulations disclosed herein with any of the following deodorant compositions:

90 compositions:

Deodorant Composition 4

	Parts
95 Bergamot AB 430	8.00
p-6-Butylcyclohexyl acetate	4.30
Citronella oil	6.00
Diethyl phthalate	8.25
Ethyl vanillin	0.20
iso-Eugenol	5.00
Green Herbal AB 502	15.00
100 2-n-Heptylcyclopentanone	0.50
Indole	1.50
Inonyl formate	5.00
LRG 201	1.25
α -iso-Methyl ionone	5.00
105 β -Naphthol methylether	7.50
Nonanediol-1:3-diacetate	4.00
Patchouli oil	7.00
Phenylethyl phenyl acetate	5.00
Rosenta AB 380	6.00
110 Sandalone	4.00
Tetrahydro muguol	6.00
γ -Undecalactone	0.50
	100.00

Deodorant Composition 5

	<i>Parts</i>
5	6-Acetyl-1,1,3:4,4,6-Hexamethyl tetrahydro naphthalate 2.5
	p-t-Amylcyclohexanone 0.06
	Benzyl salicylate 15.0
	Bergamot AB 430 15.0
	Cinnamic alcohol 5.0
	Diethyl phthalate 8.04
10	Dimethyl benzyl carbiny acetate 2.5
	Dimyrcetol 16.0
	Dipropylene glycol 14.25
	Geraniol 5.0
	Isobutyl phenyl acetate 5.0
15	3a-methyl-dodecahydro-6,6,9a-trimethylnaphtho-2-(2,1-b)furan 0.75
	Methyl salicylate 0.5
	Mousse de Chene Yugo 6.0
20	Nonanolide-1:4 0.2
	Pelargene 4.0
	Trichloromethyl phenyl carbiny acetate 0.2

Deodorant Composition 6

	<i>Parts</i>
25	Benzyl propionate 4.0
	Bergamot oil 15.0
	o-t-Butylcyclohexyl acetate 2.0
30	p-t-Butyl- α -methyl hydrocinnamic aldehyde 15.0
	Clove leaf oil 10.0
	Diethyl phthalate 9.25
	Dimethyl benzyl carbiny acetate 5.0
	Inonyl acetate 10.0
35	iso-Butyl benzoate 5.0
	LRG-201 1.25
	3a-Methyl-dodecahydro-6,6,9a-trimethylnaphtho-2-(2,1-b)-furan 0.5
40	Neroli oil 3.0
	Petitgrain oil 10.0
	Phenyl ethyl alcohol 10.0

Deodorant Value of Deodorant Compositions 1 to 6

- 45 The deodorant value of each of the deodorant compositions illustrated in the foregoing Examples was determined by the Deodorant Value Test as described herein before using the Standard 80/20/5 soap base. The results were as follows:

	<i>Deodorant Composition</i>	<i>/Average Scores</i>		<i>Deodorant Value</i>
		<i>Control Bar</i>	<i>Test Bar</i>	
	1	3.46	2.93	0.53
	2	3.34	2.73	0.61
55	3	3.04	2.47	0.57
	4	3.25	2.10	1.15
	5	3.30	2.70	0.60
	6	3.25	2.33	0.92

- 60 It can be seen from the above results that each of the Deodorant Compositions 1 to 6 had a deodorant value which was greater than 0.50, which defines the minimum deodorant value of a

deodorant composition suitable for use in the deodorant detergent compositions of the invention.

Appendix

The following glossary provides further information, including the suppliers' names, which will aid identification of some of the aforementioned deodorant components and ingredients.

65	Dimyrcetol	Dimyrcetol (IFF)
	Hercolyn D	Tetrahydro abietate + dihydro abietate (HP)
70	LRG 201	Oakmoss speciality (RB)
	Pelargene	Pelargene (PPL)
	Rose-D-Oxide	Rose oxide synthetic (PPL)
	Sandalone	Sandalone (PPL)
75		
	<i>Perfume Houses</i>	
80	HP	Hercules Powder Co.
	IFF	International Flavour & Fragrances Inc.
	RB	Roure Bertrand
	PPL	Proprietary Perfumes Ltd.

- 85 All materials which are classified by a name and number, such as those having the 'AB' notation, are obtainable from Proprietary Perfumes Limited.

Claims

1. A deodorant detergent product comprising a soap, a deodorant composition having a deodorant value of from 0.50 to 3.5 as measured by the Deodorant Value Test, and other detergent adjuncts including at least one chosen from detergency builders (other than soap) and bleaches, the deodorant composition comprising substances that depress the partial vapour pressure of morpholine by at least 10% more than that required by Raoult's Law.
2. A product according to claim 1, in which the soap comprises from 1 to 99% by weight of the product.
3. A product according to claim 1 or 2, in which the deodorant composition comprises from 0.01 to 10% by weight of the product.
4. A product according to claim 1, 2 or 3, in which the other detergent adjuncts comprise from 0.99 to 98.99% by weight of the product.
5. A product according to any preceding claim, in which the builder is an organic phosphate.
6. A product according to any of claims 1 to 4, in which the builder is an alkali metal salt chosen from carbonates, bicarbonates, borates and silicates.
7. A product according to any preceding claim in which the bleach is a perborate or a percarbonate.
8. A product according to any preceding claim, further comprising a non-soap detergent active compound selected from anionic, nonionic, cationic, amphoteric and zwitterionic detergent active compounds.
9. A product according to any preceding claim,

**Deodorant Composition 5**

	Parts
5 6-Acetyl-1,1,3:4,4,6-Hexamethyl tetrahydro naphthalate	2.5
p-t-Amylcyclohexanone	0.06
Benzyl salicylate	15.0
Bergamot AB 430	15.0
Cinnamic alcohol	5.0
Diethyl phthalate	8.04
10 Dimethyl benzyl carbinyl acetate	2.5
Dimyrcetol	16.0
Dipropylene glycol	14.25
Geraniol	5.0
Isobutyl phenyl acetate	5.0
15 3a-methyl-dodecahydro-6,6,9a-trimethylnaphtho-2-(2,1-b)furan	0.75
Methyl salicylate	0.5
Mousse de Chene Yugo	6.0
20 Nonanolide-1:4	0.2
Pelargene	4.0
Trichloromethyl phenyl carbinyl acetate	0.2

Deodorant Composition 6

	Parts
25 Benzyl propionate	4.0
Bergamot oil	15.0
o-t-Butylcyclohexyl acetate	2.0
p-t-Butyl- α -methyl hydrocinnamic aldehyde	15.0
30 Clove leaf oil	10.0
Diethyl phthalate	9.25
Dimethyl benzyl carbinyl acetate	5.0
Inonyl acetate	10.0
35 Iso-Butyl benzoate	5.0
LRG-201	1.25
3a-Methyl-dodecahydro-6,6,9a-trimethylnaphtho-2-(2,1-b)-furan	0.5
40 Neroli oil	3.0
Petitgrain oil	10.0
Phenyl ethyl alcohol	10.0

Deodorant Value of Deodorant Compositions 1 to 6

- 45 The deodorant value of each of the deodorant compositions illustrated in the foregoing Examples was determined by the Deodorant Value Test as described herein before using the Standard 80/20/5 soap base. The results were as follows:

	Deodorant Composition	Average Scores		Deodorant Value
		Control Bar	Test Bar	
	1	3.46	2.93	0.53
	2	3.34	2.73	0.61
55	3	3.04	2.47	0.57
	4	3.25	2.10	1.15
	5	3.30	2.70	0.60
	6	3.25	2.33	0.92

- 60 It can be seen from the above results that each of the Deodorant Compositions 1 to 6 had a deodorant value which was greater than 0.50, which defines the minimum deodorant value of a

deodorant composition suitable for use in the deodorant detergent compositions of the invention.

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Appendix

The following glossary provides further information, including the suppliers' names, which will aid identification of some of the aforementioned deodorant components and ingredients.

70

Dimyrcetol	Dimyrcetol (IFF)
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LRG 201	Oakmoss speciality (RB)
Pelargene	Pelargene (PPL)
Rose-D-Oxide	Rose oxide synthetic (PPL)
Sandalone	Sandalone (PPL)

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Perfume Houses

HP	Hercules Powder Co.
IFF	International Flavour & Fragrances Inc.
RB	Roure Bertrand
PPL	Proprietary Perfumes Ltd.

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- 85 All materials which are classified by a name and number, such as those having the 'AB' notation, are obtainable from Proprietary Perfumes Limited.

Claims

1. A deodorant detergent product comprising a soap, a deodorant composition having a deodorant value of from 0.50 to 3.5 as measured by the Deodorant Value Test, and other detergent adjuncts including at least one chosen from detergency builders (other than soap) and bleaches, the deodorant composition comprising substances that depress the partial vapour pressure of morpholine by at least 10% more than that required by Raoult's Law.
2. A product according to claim 1, in which the soap comprises from 1 to 99% by weight of the product.
3. A product according to claim 1 or 2, in which the deodorant composition comprises from 0.01 to 10% by weight of the product.
4. A product according to claim 1, 2 or 3, in which the other detergent adjuncts comprise from 0.99 to 98.99% by weight of the product.
5. A product according to any preceding claim, in which the builder is an organic phosphate.
6. A product according to any of claims 1 to 4, in which the builder is an alkali metal salt chosen from carbonates, bicarbonates, borates and silicates.
7. A product according to any preceding claim in which the bleach is a perborate or a percarbonate.
8. A product according to any preceding claim, further comprising a non-soap detergent active compound selected from anionic, nonionic, cationic, amphoteric and zwitterionic detergent active compounds.
9. A product according to any preceding claim,

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- in which the deodorant composition has a deodorant value of at least 0.70.
10. A product according to any of claims 1 to 8, in which the deodorant composition has a deodorant value of at least 1.00.
- 5 11. A product according to any of claims 1 to 8, in which the deodorant composition has a deodorant value of at least 1.20.
- 10 12. A deodorant detergent product according to any preceding claim and substantially as described in any one of the Examples.
- 15 13. A process for preparing a deodorant detergent product according to any preceding claim, which process comprises mixing soap and detergent adjuncts, including at least one adjunct chosen from detergency builders (other than soap) and bleaches, with a deodorant composition having a deodorant value of from 0.50 to 3.5 as measured by the Deodorant Value
- 20 Test, the deodorant composition comprising substances that depress the partial vapour pressure of morpholine by at least 10% more than that required by Raoult's Law.
14. A method for treating fabrics which
- 25 comprises washing fabric clothing or other articles intended for contact with human skin with a deodorant detergent product according to any of claims 1 to 12.
15. A deodorant fabric intended for contact
- 30 with human skin, comprising a deodorant detergent product-washed fabric composition comprising an effective amount of a deodorant composition, the product being that defined in any of claims 1 to 12.
- 35 16. A method for suppressing human body malodour, which comprises contacting the skin with a fabric treated with the deodorant detergent product according to any of claims 1 to 12.