

SPECIFICATION

Deodorant soap bars

5 This invention relates to non-germicidal deodorant toilet soap bars for use in suppressing human body malodour. 5

Background to the Invention

It has long been recognised that the development of body malodours is at least partly due to bacterial action on the products of the sweat glands. Washing the skin with a toilet soap bar usually removes some 10 malodorous products and reduces the concentration of bacteria on the skin, but body malodour is likely to redevelop rapidly, particularly if physical activity accompanied by sweating is subsequently undertaken. 10

It has been customary to incorporate germicides, such as 2,2'-methylene bis(3,4,6-trichlorophenol), 2,4,4'- and 3,4,4'-trichlorocarbanilide, 3,5,4'-tribromosalicylanilide 3-trifluoromethyl-4,4'-dichlorocarbanilide and 2,4,4'-trichloro-2'-hydroxy diphenyl ether, into toilet soap bars, in the belief that growth of these skin 15 microflora that contribute to body malodour can be inhibited, and that the subsequent formation on the skin of malodorous substances can be prevented, at least for a few hours. Germicides are thus 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. 15

20 *Summary of the Invention* 20

It has now been discovered that certain combinations of materials other than germicides, hereinafter referred to as "deodorant compositions", when incorporated into the formulation of certain special toilet soap bars intended for personal washing provide a more effective means for inhibiting malodour development on the skin than do germicides.

25 In the course of attempts to characterise this new principle, many hundreds of materials have been screened. Soap bars containing hundreds of formulations made by blending materials have been examined in order to characterise the new principle. 25

Definition of the Invention

In its widest aspect, the invention provides a non-germicidal deodorant toilet soap bar comprising from 0.5 30 to 99.8% by weight of a soap mixture, from 0 to 15% by weight of C₆ to C₁₈ straight chain fatty acids, from 0.1 to 2.5% by weight of electrolyte and from 0.1 to 10% by weight of a deodorant composition having a deodorant value of from 0.5 to 3.5 as measured by the Deodorant Value Test. 30

The invention also provides a process for preparing a non-germicidal deodorant soap bar which process comprises blending a soap mixture together with if necessary straight chain fatty acids, electrolyte and a 35 deodorant composition as herein defined and thereafter extruding and stamping the soap to provide a deodorant toilet soap bar. 35

The invention furthermore provides a method for suppressing human body malodour which comprises washing human skin with a non-germicidal deodorant soap bar as herein defined.

By "non-germicidal deodorant soap bar" is meant a toilet soap bar which contains less than 0.1% by 40 weight of the bar of any substance which has a minimum inhibitory concentration (MIC) of up to 2.5 ppm against *Staphylococcus aureus* (NCTC 6571) or of up to 50 ppm against *Escherichia coli* (NCTC 8196) when tested according to the method described by Hurst et al in J. Hyg. Camb. (1960) 58, 159. Examples of such substances are the aforementioned germicides, but it is to be understood that any other substance in addition to these germicides having an MIC within the limits herein defined should be present in the soap bar 45 at a concentration of less than 0.1%. Preferably, such substances are excluded from the deodorant soap bar. 45

It is a property of the deodorant soap bar of the invention that it 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 soap bar. Soap bars of the invention accordingly comprise a deodorant 50 composition having a deodorant value of from 0.50 to 3.5. Soap bars 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. 50

The Deodorant Value Test

In this test the deodorant value of a deodorant composition is measured by assessing its effectiveness, 55 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. 55

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 is included in the description of the test.

60 Standard soap bars are prepared as follows, all amounts given being by weight. 60

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- 65 disphosphonic acid and 7.2 parts of butylated hydroxy toluene (BHT) anti-oxidant dissolved in a little 65

(3)

methyated spirits and the temperature of the mass is raised to 140°C under superatmospheric 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 stamped into tablets. The deodorant composition to be tested is therefore present at the standard level of 1.5%. These tablets are the test soap bars described as 80/20/5 soap base in the examples, and consist of 80 parts tallow soap and 20 parts coconut oil soap, 5 parts of this soap mixture being free fatty acids expressed as coconut oil fatty acid.

Examples of alternative soap bars are those prepared in a similar manner except that they consist of 80 parts tallow soap and 20 parts coconut oil soap, with no added free fatty acid (described as 80/20 soap base), or 70 parts tallow soap and 30 parts coconut oil soap, with no added free fatty acid (described as 70/30 soap base), or 55 parts tallow soap and 45 parts of coconut soap, 7.5 parts of this soap mixture being free fatty acids expressed as coconut oil fatty acid (described as 55/45/7.5 soap base).

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 only in the amount required to stabilise the soap base.

The test is conducted as follows:

A team of 3 Caucasian female assessors of age within the range of from 20 to 40 years is selected for olfactory evaluation on the basis that each is able to rank correctly the odour levels of the series of aqueous isovaleric acid solutions listed in Table 1 below, and each is able to detect the reduction in body odour following application to the axillae of human subjects of soap containing 2% germicides, according to the procedure described in Whitehouse and Carter, Proc. Scientific Section of the Toilet Goods Association, 48, 31, (1967).

A panel of 50 human subjects for use in the test is assembled from Caucasian male subjects of age within the range of from 20 to 55 years. By screening, subjects are chosen who develop axillary body malodour that is not unusually strong and who do not develop a stronger body malodour in one axilla compared with the other. Subjects who develop unusually strong body malodour, for example due to a diet including curry or garlic, are not selected for the panel.

For two weeks before the start of a test, the panel subjects are assigned a non-deodorant soap bar for exclusive use of bathing and are denied the use of any type of deodorant or antiperspirant. At the end of this period, the 50 subjects are randomly divided into two groups of 25. The control soap bars are then applied to the left axillae of the first group and the right axillae of the second, and the test soap bars are applied to the right axillae of the first group and the left axillae of the second.

The soap bars are applied by a technician using a standard technique in which a wet flannel is soaped with the soap bar for 15 seconds, the axilla is washed with the soaped flannel for 30 seconds, then wiped with a water rinsed flannel and dried with a clean towel. Each subject then puts on a freshly laundered shirt, and 5 hours after application the odour intensity of each subject is assessed, the left axilla of each subject being assessed before the right. The application and assessment are carried out on each of four successive days.

The odour intensity is evaluated by all three assessors who, operating without knowledge of the soap bars used for each subject or the result of evaluation of their fellow-assessors, sniff each axilla and assign a score corresponding to the strength of the odour on a scale from 0 to 5, with 0 corresponding to no odour and 5 representing very strong odour. Before evaluation each subject stands with his arms against his side: he then raises one arm straight overhead, flattening the axilla vault and making it possible for the assessor's nose to be brought close to the skin, the assessor makes an evaluation and the procedure is repeated with the other axilla.

Standard aqueous solutions of isovaleric acid which correspond to each of the scores 1,2,3,4 and 5 are provided for reference to assist the assessors in the evaluation. These are shown in Table 1 below.

Table 1

Score	Odour Level	Concentrations of aqueous solution of isovaleric acid (ml/l)
0	No odour	0
1	Slight	0.013
2	Definite	0.053
3	Moderate	0.22
4	Strong	0.87
5	Very strong	3.57

The scores recorded by each assessor for each soap bar are averaged and the average score of the test soap bars deducted from the average score of the control soap bars to give the deodorant value of the deodorant composition present in the test soap bars.

As a check that the selection of panel subjects is satisfactory for operation of the test, the average score with the control soap bars should be between 2.5 and 3.5.

Although the standard concentration of a deodorant composition for the purposes of this test is 1.5% by weight of the standard soap bar, soap bars containing concentrations of the deodorant composition above or below this figure will in practice yield correspondingly higher or lower "deodorant values".

Although the invention in its widest aspect provides deodorant soap bars comprising deodorant compositions having a deodorant value of from 0.50 to 3.5, preferred deodorant soaps 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 1.10, the higher the minimum value, the more effective is the soap bar as a deodorant soap as recorded by the assessors in the deodorant value test. It has also been noted that consumers, who are not trained assessors, can detect by self-assessment a noticeable reduction in body malodour where the deodorant value is at least 0.90, the higher the deodorant value above this figure, the more noticeable is the deodorant effect.

Deodorant Soap Bar Materials

1. The Soap Mixture

Soaps are water soluble salts of higher fatty acids and include alkali metal soaps such as the sodium, potassium, ammonium and alkanol ammonium salts of straight chain saturated or unsaturated fatty acids containing from about 8 to about 24 carbon atoms, and preferably from about 10 to 20 carbon atoms.

The soap mixture consists of a special mixture of such soaps including the following:

- (a) a soap of lauric acid,
- (b) a soap of myristic acid,
- (c) a soap of palmitic acid,
- (d) a soap of stearic acid, and
- (e) a soap of oleic acid.

Preferably the soap mixture comprises:

- (a) from 2 to 35%, most preferably 5 to 25% by weight of a soap of lauric acid,
- (b) from 0.5 to 25%, most preferably 5 to 10% by weight of a soap of myristic acid,
- (c) from 5 to 45%, most preferably 20 to 30% by weight a soap of palmitic acid,
- (d) from 1 to 25% most preferably 14 to 18% by weight a soap of stearic acid, and
- (e) from 10 to 40%, most preferably 20 to 35% by weight a soap of oleic acid.

The soap mixture can also comprise soaps of other fatty acids having from 8 to 24 carbon atoms in the molecule, in particular the soaps of dehydrated hardened castor oil fatty acids, and the soaps of erucic and behenic acids.

The preferred soaps are sodium soaps, although a proportion of potassium soaps, ammonium soaps or alkanol ammonium soaps, such as monoethanolamine soaps, can be included in the soap mixture to impart to the finished soap bar a desired degree of softness or plasticity.

The soap mixture can be obtained by the saponification of one or more naturally occurring oils or fats (hereinafter referred to as oils). Usually, at least two oils are saponified to provide the soap mixture.

The first oil has the following characteristics:

- (a) a saponification value of from 170 to 220, preferably 190 to 210;
- (b) an iodine value of from 25 to 70, preferably from 35 to 55;
- (c) a fatty acid titre of from 30 to 55°C, preferably from 40 to 50°C; and (d) an INS value of from 120 to 210, preferably from 140 to 180.

The first oil, when saponified, also comprises at least 15 parts by weight, preferably 20 to 50 parts by weight of a soap of palmitic acid, at least 2 parts by weight, preferably 3 to 20 parts by weight, of a soap of stearic acid and at least 30 parts by weight, preferably 35 to 50 parts by weight of a soap of oleic acid.

The first oil may also comprise a mixture of oils which individually or collectively exhibit the properties and fatty acid analysis as herein defined.

Examples of the first oil are vegetable oils such as Bornea tallow, chinese vegetable tallow, Illipe butter, mowrah butter and palm oil, and animal oils such as beef tallow, mutton tallow, lard and bovine butter fat.

The first oil, when saponified, forms at least 30% by weight, preferably from 60 to 90% by weight of the soap mixture.

When a second oil is used, it has the following characteristics:

- (a) a saponification value of from 240 to 265, preferably from 245 to 260;
- (b) an iodine value of from 5 to 20, preferably from 10 to 15;
- (c) a fatty acid titre of from 15 to 30°C, preferably from 20 to 25°C; and
- (d) an INS value of from 220 to 260, preferably from 230 to 250.

The second oil, when saponified, also comprises at least 40 parts by weight, preferably from 45 to 50 parts by weight of a soap of lauric acid and at least 10 parts by weight, preferably from 12 to 25 parts by weight of a soap of myristic acid.

The second oil may also comprise a mixture of oils which individually or collectively exhibit the properties and fatty acid analysis as herein defined.

Examples of the second oil are vegetable oils including coconut oil, palm kernal oil, cohune nut oil, murumuru palm kernal oil, khakan oil and babassu oil.

The second oil, when saponified, forms up to 70% by weight, preferably from 5 to 40% by weight of the soap mixture.

5 It should be explained that the Saponification Value is defined as the number of milligrams of potassium hydroxide required for the complete saponification of one gram of an oil or fat. The Saponification Value can be determined by the method described in "Chemical Technology and Analysis of Oils Fats and Waxes" by Lewkowitsch and Warburton, published by Macmillan & Co., London, in 1921, at page 388.

10 Furthermore, the Iodine Value is defined as the percentage of iodine chloride absorbed by an oil or fat expressed in terms of iodine. The Iodine Value can be determined by the method described in the above treatise by Lewkowitsch and Warburton at page 401.

Furthermore, the Fatty Acid Titre Value is defined as the solidifying point in degrees centigrade of the mixed fatty acids obtained from a saponified oil or fat. The Titre Value can be determined by the method described in the above treatise by Lewkowitsch and Warburton at page 511.

15 Furthermore, the INS value is defined as the numerical difference between the Saponification Value and the Iodine Value, i.e. INS value equals Saponification Value minus Iodine Value.

The soap mixture can also contain saponified oils chosen from vegetable oils such as olive oil, arachis oil, cottonseed oil, maize oil, linseed oil, soyabean oil, castor oil, rice bran oil, mustard seed oil, sesame seed oil, jojoba oil, rosin (tall oil), sal oil, almond oil, hempseed oil, Japan tallow, kapok oil, nigerseed oil, olive kernal oil, perilla oil, poppyseed oil, rapeseed oil, safflower oil, shea nut butter, sunflower seed oil and ucuhuba butter oil, and animal oils such as bone grease, horse fat, Neat's foot oil, cod liver oil, herring oil, menhaden oil, porpoise oil, salmon oil, sardine oil and whale oil.

25 As a further guide to the appropriate selection and blending of oils or fats from which the soap mixture is prepared, it is helpful to ensure that the INS value of the oil or fat mixture, which can then be saponified to provide the soap mixture, is from 160 to 220, preferably 165 to 200.

It is apparent that oil or fat mixtures having an INS value of greater than 220 are likely to yield soap bars which are too hard in that cracking or splitting may occur during stamping or within a few days or weeks thereafter. Conversely, oil or fat mixtures having an INS value of less than 160 are likely to yield soap bars which are too soft in that their durability can be short-lived and that there will be a greater tendency for the bars to become misshapen or broken in use.

The INS value of the mixture of oils or fats can be calculated by summing the product of the INS value of each oil or fat and its percentage by weight in the mixture of oils and fats, and dividing this product by 100.

As a further guide to the appropriate selection and blending of oils or fats from which the soap is prepared, it is also helpful to ensure that the solubility ratio of the oil or fat mixture, is from 1.1 to 2.5.

35 It is apparent that oil or fat mixtures having a solubility ratio of greater than 2.5, are likely to yield soap bars which are excessively soluble in water and hence exhibit short-term durability in use, even though the lathering properties, especially in hard water, can be excellent. Conversely, oil or fat mixtures having a solubility ratio of less than 1.1 are likely to yield soap bars which are undesirably insoluble in water such that, even in soft water, lathering properties can be poor.

40 It should be explained that the solubility ratio of a mixture of oils or fats is determined by dividing the INS value of the mixture by the sum of the INS values of those oils or fats present in the mixture possessing an INS values of from 130 to 180 multiplied by the weight fraction of each of those oils present in the mixture.

A simple example will illustrate the calculation of both the INS value of a mixture of oil or fats and its solubility ratio.

45 Assume that soap tablets are to be manufactured from a mixture of tallow, having an INS value of 150 and coconut oil having an INS value of 250. For an 80:20 mixture by weight of tallow:coconut oil, the INS value of the mixture is given by the following expression:

$$\frac{(80 \times 150) + (20 \times 250)}{100} = 170$$

The INS value of the mixture is therefore 170.

Similarly, for a mixture of tallow and coconut oil having the same respective INS values in the weight ratio of 90 parts tallow to 10 parts coconut oil, the INS value of the mixture is given by the following expression:

$$\frac{(90 \times 150) + (10 \times 250)}{100} = 160$$

The INS value of the mixture in this case is therefore 160.

The solubility ratio of each of the above mixtures can then be calculated as follows:

60 For the 80:20 mixture, the solubility ratio is:

$$\frac{170}{100} \div \frac{150 \times 80}{100} = 1.41$$

Similarly, for the 90:10 mixture, the solubility ratio is:

$$\frac{160 \div 150 \times 90}{100} = 1.18$$

- 5 The solubility ratio of the two example mixtures are accordingly 1.41 for the 80:20 tallow:coconut oil mixture and 1.18 for the 90:10 tallow:coconut oil mixture. 5

- As an alternative, it is also possible to provide the mixture of fatty acid soaps which comprise the soap mixture by saponification of natural or synthetic free fatty acids. Individual saponified fatty acids of different chain length can be blended in appropriate amounts to provide the soap mixture or, alternatively, a mixture of free fatty acids, obtained for example by the splitting of fats or oils into their component glycerin and fatty acids, can be saponified together to provide the soap mixture. 10 10

The soap mixture can also contain soaps of natural or synthetic branched chain fatty acids.

It is also possible to employ any of the above-mentioned oils in a hardened or a dehydrated form wherever this is appropriate.

- 15 The amount of the soap mixture that is incorporated into non-germicidal deodorant soap bars according to the invention is from 0.5 to 99.8% by weight. The preferred amount is within the range of from 5 to 95% by weight of the bar. 15

2. Unsaponified Fatty Acids

- The non-germicidal deodorant soap bar can also optionally comprise C_6 to C_{18} straight chain fatty acids in addition to the mixture of saponified fatty acids. The presence of these additional unsaponified fatty acids can improve the lathering properties of the soap bar, particularly when used in hard water areas. A preferred source of unsaponified fatty acid is that derived as a mixture from coconut oil. 20 20

The quantity of unsaponified fatty acids that can be present can form up to 15%, preferably 1 to 10%, by weight of the soap bar.

- 25 If more than 15% by weight of unsaponified fatty acids are employed in this manner, there may be a tendency for the soap bar to be too soft in use and to develop off-odours. 25

3. Electrolyte

- The deodorant soap bar will contain electrolyte in an amount sufficient to ensure that the soap bar is not too hard and prone to cracking or splitting and not too soft as would adversely affect the durability of the bar in use. 30 30

Examples of electrolytes are the sodium, potassium, ammonium, and magnesium salts of chloride, carbonate, phosphate, polyphosphate, nitrate, sulphate and lactate, but other electrolyte salts can be incorporated into the soap bars. The preferred electrolyte is sodium chloride.

- The amount of electrolyte in the soap bar will form from 0.1 to 2.5% by weight of the bar. Preferably, the bar will contain from 0.2 to 1.5% and most preferably 0.25 to 1% by weight of electrolyte. 35 35

- If more than 2.5% by weight of electrolyte is present at the time the bar ingredients are finally milled, plodded and stamped to form soap bars according to conventional soap manufacture, cracking or splitting of the bars can occur at the stamping stage or within a few days or weeks after stamping. This is a problem which can be cured by ensuring that the amount of electrolyte present in the mixture of bar ingredients is within the range as herein defined. It is apparent that soap bars which crack or split at the stamping stage represent a loss to the soap manufacture, and that bars which crack or split within a few days or weeks of manufacture will not satisfy the requirement of the consumer who will turn to alternative brands of soap bar which are free from this problem. It is furthermore apparent that soap bars containing the deodorant composition as defined herein, which split or crack in use or on storage, are likely to be less effective in reducing body malodour due to premature loss of some of the volatile components that can be present in the deodorant composition incorporated during manufacture of the bar. 40 40 45 45

- If less than 0.1% by weight of electrolyte is present at the time the bar ingredients are finally milled, plodded and stamped to form soap bars, the bars so obtained can be undesirably soft. Such a soap bar can lack durability and may tend to become misshapen or even disintegrate in use. This is clearly an attribute which the soap manufacturer will wish to avoid. It is furthermore apparent that soap bars containing insufficient electrolyte can be insufficiently hygroscopic such that they can prematurely dry-out, and at the same time more rapidly lose some of the volatile components that can be present in the deodorant composition incorporated during manufacture of the bar. 50 50

- It is clearly desirable that deodorant soap bars according to the invention should contain an amount of electrolyte within the broadest limits as herein defined. 55 55

- It is to be understood that the electrolyte sodium chloride conventionally added after saponification of oils in soap making to more readily separate the soap solids from glycerin (i.e. "salting out") can provide the source of electrolyte in the finished deodorant soap bar. It should be recognised, however, that if this is the case, the soap making process should be so regulated, for example by leaching with water or by further addition of sodium chloride or other electrolyte, as to ensure that the final concentration of electrolyte in the deodorant soap bar is within the limits defined herein. 60 60

- If, on the other hand, the soap bar is derived from a manufacturing process in which electrolyte such as sodium chloride is not normally added for the purposes of "salting out" glycerin from soap, it is necessary to add electrolyte or to ensure that it is otherwise present in the mixture of ingredients from which the deodorant soap bars are made. 65 65

4. The Deodorant Composition

The characterisation of the deodorant composition of the invention presents difficulties, since it cannot be defined solely in terms of substances of specified structure and combinations in specified proportions. Nevertheless, procedures have been discovered that enable the essential materials of the deodorant

5 compositions to be identified by tests.

The essential materials required for the formulation of deodorant compositions are those having a lipoxidase-inhibiting capacity of at least 50% or those having a Raoult variance ratio of at least 1,1, as determined by the following tests, which are designated the lipoxidase and morpholine tests respectively.

The Lipoxidase Test

10 In this test the capacity of a material to inhibit the oxidation of linoleic acid by lipoxidase (EC1.13.1.13) to form a hydroperoxide is measured.

Aqueous 0.2M sodium borate solution (pH 9.0) is used as buffer solution.

A control substrate solution is prepared by dissolving linoleic acid (2.0 ml) in absolute ethanol (60 ml), diluting with distilled water to 100 ml and then adding borate buffer (100 ml) and absolute ethanol (300 ml).

15 A test substrate solution is prepared in the same way as the control substrate solution except that for the absolute ethanol (300 ml) is substituted the same volume of a 0.5% by weight solution in ethanol of the material to be tested.

A solution of the enzyme lipoxidase in the borate buffer and having an activity within the range of from 15,000 to 40,000 units per ml is prepared.

20 The activity of the lipoxidase in catalysing the oxidation of linoleic acid is first assayed spectrophotometrically using the control. An automatic continuously recording spectrophotometer is used and the increase in extinction at 234 nm (the peak of hydroperoxide) is measured to follow the course of oxidation, the enzyme concentration used being such that it gives an increase in optical density (ΔOD) at 234 nm within the range of from 0.6 to 1.0 units per minute. The following ingredients are placed in two 3 ml cuvettes:

25	Control (ml)	Blank (ml)	25
Control substrate solution	0.10	0.10	
Absolute ethanol	0.10	0.10	
30 Borate buffer	2.75	2.80	30
Lipoxidase solution	0.05	-	

35 The lipoxidase solution is added to the control cuvette last and the reaction immediately followed spectrophotometrically for about 3 minutes, with recording of the increase in optical density at 234 nm as a curve on a graph.

The capacity of a material to inhibit the oxidation is then measured using a test sample containing enzyme, substrate and a deodorant material. The following ingredients are placed in two 3 ml cuvettes.

40	Test Sample (ml)	Blank (ml)	40
Test substrate solution	0.10	0.10	
Absolute ethanol	0.10	0.10	
45 Borate buffer	2.75	2.80	45
Lipoxidase solution	0.05	-	

50 The lipoxidase solution is added to the test sample cuvette last and the course of the reaction immediately followed as before.

The lipoxidase-inhibiting capacity of the material is then calculated from the formula $100 (S_1 - S_2) / S_1$, where S_1 is the slope of the curve obtained with the control and S_2 is the slope of the curve obtained with the test sample, and thus expressed as % inhibitor. A material that gives at least 50% inhibition in the test is hereafter referred to as having a lipoxidase-inhibiting capacity of at least 50%.

The Morpholine Test

In this test the capacity of a material 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, for example aldehydes, are to be regarded as excluded from the test.

60 Into a sample bottle of capacity 20 ml is introduced morpholine (1g) 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

65 chromatographic trace curve with a peak due to morpholine, the area under which is proportional to the

amount of morpholine in the sample.

The procedure is repeated under exactly the same conditions using instead of morpholine alone, morpholine (0.25g) and the material to be tested (1g); and also using the material (1g) 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 peaks are measured and any necessary correction due to interference by the material is made.

A suitable apparatus for carrying out the above procedure is a Perkin-Elmer Automatic GC Multifract F40 for Head Space 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 material is present, the relative lowering of partial vapour pressure of morpholine by the material 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 material at the same temperature is $pM/(M+PC)$, where M and PC are the molar concentrations of morpholine and material. 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 perfume material.

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

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

$$87/(87 + m/4)$$

The above ratio, which will be referred to as the Raoult variance ratio, is calculated from the test results.

Where a material is a mixture of compounds, a calculated or experimentally determined average molecular weight is used for m. A material 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.

A large number of materials which satisfy one or both tests is described later in this specification and these are hereafter referred to as "components", in contrast to other materials which fail both tests which are referred to as "ingredients".

Before defining the more detailed aspects of the invention so far as it relates to deodorant compositions, it is necessary to clarify some of the terms that will be employed.

A composition is a blend of organic compounds. For the purpose of this specification it is necessary to identify the "components" in the composition. This is done by first describing the composition in terms of four categories. These categories are given below. Examples of components in each category are provided.

- 1) Single chemical compounds whether natural or synthetic, e.g. coumarin (natural or synthetic), iso-eugenol, benzyl salicylate. The majority of components are in this category.
- 2) Synthetic reaction products (products of reaction), mixtures of isomers and possibly homologues, e.g. α -iso-methyl ionone.
- 3) Natural oils, gums and resins, and their extracts, e.g. patchouli oil, geranium oil, clove leaf oil, benzoin resinoid.
- 4) Synthetic analogues of category 3. This category includes materials that are not strict analogues of natural oils, gums and resins but are minerals that result from attempts to copy or improve upon materials of category 3, e.g. Bergamot AB 430, Geranium AB 76, Pomeransol SB 314.

Components of Categories (3) and (4) although often uncharacterised chemically are available commercially.

Where a material is supplied or used conventionally for convenience as a mixture, e.g. p-t-Amylcyclohexanone diluted with diethyl phthalate, for the purposes of this specification two components are present, so that use of 5% of a blend of 1 part of this ketone and 9 parts of diethyl phthalate is represented as 0.5% of the ketone and 4.5% of diethyl phthalate.

It has been found advantageous in formulating the most effective deodorant composition for incorporation into the soap bar of the invention to use components that, as well as satisfying the lipoxidase or morpholine tests, satisfy further conditions. These conditions are:

- i) there must be at least five components present,
- ii) each of these components must be selected from at least four different chemical classes (to be defined below),
- iii) a component from each of classes 1, 2 and 4 must be present,
- iv) at least 45%, preferably at least 50 and most preferably from 60 to 100%, by weight of the deodorant composition must comprise components,
- v) a component is not considered to contribute to the efficacy of the deodorant composition if it is present in the deodorant composition at a concentration of less than 0.5% by weight, and
- vi) a class is not considered to contribute to the efficacy of the deodorant composition if it is present in the deodorant composition at a concentration of less than 0.5% by weight.

Therefore, according to a preferred embodiment of the invention, there is provided a deodorant soap bar as herein defined in which the deodorant composition consists essentially of from 45 to 100% by weight of at

least five components and from 0 to 55% by weight of ingredients, each of the components being selected from components having a lipoxidase inhibiting capacity of at least 50% and components having a Raoult variance ratio of at least 1.1, the components and ingredients being so chosen that the deodorant value of the deodorant composition is within the range 0.50 to 3.5.

5 Each component should be allocated to one of six classes. These classes are:

Class 1 - Phenolic substances;

2 - Essential oils, extracts, resin, "synthetic" oils (denoted by "AB");

3 - Aldehydes and ketones;

4 - Polycyclic compounds;

10 5 - Esters;

6 - Alcohols.

In attributing a component to a class, the following rules are to be observed. Where the component could be assigned to more than one class, the component is allocated to the class occurring first in the order given above: for example clove oil, which is phenolic in character, is placed in Class 1 although it otherwise might have been allocated to Class 2. Similarly, 2-n-heptyl cyclopentanone which is a polycyclic ketone is attributed to Class 3 instead of Class 4.

The following are examples of deodorant components that either have a lipoxidase inhibiting capacity (LIC) of at least 50% or have a Raoult variance ratio (RVR) of at least 1.1. Their class, molecular weight (m), LIC and RVR as determined by the tests already described herein are also listed.

20 The nomenclature adopted for the components listed below and for the ingredients which appear in the deodorant formulations of the Examples is, so far as is possible, that employed by Steffen Arctander in "Perfume and Flavour Chemicals (Aroma Chemicals)" Volumes I and II (1969) and the "Perfume & Flavour Materials of Natural Origin" (1960) by the same author. Where a component or other ingredient is not described by Arctander, then either the chemical name is given or, where this is not known (such as is the case with perfumery house specialities), then the supplier's identity can be established by reference to the appendix which appears at the end of the specification.

Class 1 - Phenolic Substances

	LIC	RVR	m	
30 iso-Amyl salicylate	95	1.24	208	30
Benzyl salicylate	0	1.58	228	
Carvacrol	32	1.43	150	
35 Clove leaf oil	79	1.43	164	35
Ethyl vanillin	100	1.43	152	
40 iso-Eugenol	100	1.48	164	40
LRG 201	100	1.21	196	
Mousse de chene Yugo	98	1.29	182	
45 Pimento leaf oil	100	-	165	45
Thyme oil red	55	1.37	150	
50 <i>Class 2 - Essential oils, extracts, resins, "synthetic" oils, (denoted by "AB")</i>				50
Benzoin Siam resinoid	87	-	-	
Bergamot AB 37	58	0.97	175	
55 Bergamot AB 430	58	0.97	175	55
Geranium AB 76	26	1.29	154	
Geranium oil	26	1.29	154	
60 Opoponax resinoid	96	1.33	150	60
Patchouli oil	76	1.25	140	
65 Petitgrain oil	34	1.27	175	65

	<i>Pomeransol AB 314</i>	100	-	-	
	<i>Class 3 - Aldehydes and Ketones</i>				
5	6-Acetyl-1,1,3,4,4,6-hexamethyl-tetrahydronaphthalene	100	1.03	258	5
	p-t-Amyl cyclohexanone	50	1.10	182	
10	p-t-Butyl- α -methyl hydrocinnamic aldehyde	74	-	204	10
	2-n-heptylcyclopentanone	56	1.05	182	
15	α -iso-Methyl ionone	100	1.13	206	
	β -Methyl naphthyl ketone	100	0.96	170	15
	<i>Class 4 - Polycyclic Compounds</i>				
20	Coumarin	LIC	RVR	m	20
	1,3,4,6,7,8-Hexahydro-4,6,6,7,8,8-hexamethyl cyclopenta- γ -2-benzopyran	58	1.22	146	
25	3a-Methyl-dodecahydro-6,6,9a-trimethylnaphtho(2,1-b)furan	100	-	240	25
	β -Naphthyl methyl ether	58	1.30	230	
30		100	-	158	30
	<i>Class 5 - Esters</i>				
	o-t-Butylcyclohexyl acetate	52	1.08	198	
35	p-t-Butylcyclohexyl acetate	54	0.98	198	35
	Diethyl phthalate	79	1.20	222	
40	Nonanediol-1,3-diacetate	33	1.17	244	
	Nonanoide-1:4	92	0.87	156	40
	i-Nonyl acetate	50	0.83	186	
45	i-Nonyl formate	19	1.49	172	45
	<i>Class 6 - Alcohols</i>				
	Dimyrcetol	16	1.22	156	
50	Phenylether alcohol	22	1.24	122	50
	Tetrahydromuguol	24	1.23	158	

It has been shown that for best results, a certain minimum average concentration of components should be present. This minimum concentration is a function of the number of classes present - the more classes present, the lower the minimum concentration. The minimum average concentration in the various situations that can apply is shown in the Table below:

*Number of classes
represented in
deodorant composition*

*Average concentration
of components*

5	<i>minimum not less than (%)</i>	<i>preferably not less than (%)</i>	5
4	5	6	
10 5	4.5	5.5	10
6	4.5	5	

Also, it is preferred that at least 1% of each of four classes is present in the deodorant composition, but individual components which are present at a concentration of less than 0.5% are eliminated from this calculation, as is the class into which they fall if there is present no component at a concentration of at least 0.5% which falls within that class.

More specifically, the invention also provides a deodorant soap bar as herein defined wherein the amount of deodorant components in the deodorant composition present in the classes 1, 2 and 4 as herein defined is at least 1%, most preferably at least 3% by weight of the deodorant composition for each class, and the amount of components present in each of at least two other classes is at least 1% by weight of the composition, provided also that any component that is present in the deodorant composition at a concentration of less than a threshold value of 0.5% by weight is eliminated from the calculation of the amounts of components in each class.

Although at least four different classes of components should preferably be represented in the deodorant composition, superior compositions can be obtained if more than four classes are represented. Accordingly five or six classes can be represented in the deodorant composition.

It has been shown by the preparation, examination and testing of many hundreds of deodorant compositions that the best results are obtained by keeping within the aforementioned rules when selecting types and amounts of components and ingredients. For example, deodorant compositions which contain less than the minimum concentration of components of 45% are unlikely to result in a deodorant composition having a deodorant value of at least 0.50. Therefore, in preparing the best deodorant compositions of the invention, the rules for selection of components according to their classification, the representation of different classes, the amounts of each component present, bearing in mind the threshold value below which it is believed a component will not significantly contribute, are all important to observe if the best results are to be obtained.

It should be explained that components present in the deodorant soap bar for purposes other than obtaining deodorant effects, for example an adjunct like the anti-oxidant included in a soap bar for the stabilisation of the soap base, are excluded from the operation of the preceding instructions to the extent that the component is required for that other purpose. The levels at which adjuncts are conventionally present in soap bars is well-established for established materials and readily determinable for new materials so that the application of the above exclusion presents no difficulty.

Deodorant compositions can be incorporated in soap bars according to the invention, at a concentration of from 0.1 to 10%, preferably from 0.5 to 5% and most preferably from 1 to 3% by weight.

It is apparent that if less than 0.1% of a deodorant composition is employed, then use of the soap bar 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 soap bar is unlikely to further reduce body malodour intensity beyond that observed at the 10% level.

5. Other soap adjuncts

Deodorant soap bars of the invention can contain other ingredients (adjuncts), for instance opacifiers such as titanium dioxide, lather boosters, lather controllers, chelating agents such as EDTA, moisturisers, plasticisers and thickeners and perfumes.

The deodorant toilet soap bar also comprises from 5 to 20%, preferably 7 to 15% by weight of water. This water may be present in the saponified soaps which constitute part of the soap mixture, or it can be incorporated into the soap bar as a separate ingredient.

The total amount of soap adjuncts that can be incorporated into the deodorant soap bar according to the invention will normally form the balance of the bar formulation after accounting for the main components as herein defined. The other soap adjuncts will accordingly form from 0 to 99.4% preferably from 5 to 95% by weight of the composition.

The invention is further illustrated by the following four examples of soap bar formulations of which mixture A is a 55/45/7.5 soap base, mixture B is a 80/20/5 soap base, mixture C is a 80/20 soap base and mixture D is a 70/30 soap base as defined herein. These can be used as a basis for incorporation of a deodorant composition at a concentration of from 0.1 to 10% by weight to form deodorant soap bars according to the invention, although in these four examples, the amount of deodorant composition present in each formulation is the same in each case.

Data relevant to the beef tallow and coconut oil from which these soap bars were manufactured is given in the following table:

TABLE								
5		Tallow	Coconut oil	Tallow/coconut oil mixture before saponification				5
				A	B	C	D	
10	Saponification Value	196	256	221	207	208	214	10
	Iodine Value	45	8	29	38	38	34	
	INS value	151	248	192	169	170	180	
15	Fatty acid titre (°C)	45	23	-	-	-	-	15
	Solubility ratio	-	-	2.19	1.36	1.41	1.70	
20	SOAP BAR FORMULATION							20
			A	B	C	D		
	SOAP MIXTURE		(% by weight of soap bar)					
25	sodium caprylate		2.90	-	-	0.68	25	
	sodium caprate		2.49	1.19	1.19	1.78		
30	sodium laurate		17.42	8.04	8.04	11.93	30	
	sodium myristate		8.46	5.93	5.93	5.16		
	sodium palmitate		17.42	22.26	22.26	27.41		
35	sodium stearate		9.54	13.37	13.37	2.37	35	
	sodium oleate		21.57	29.63	29.63	28.85		
40	sodium linoleate		2.74	2.79	2.79	6.43	40	
	FREE FATTY ACID (coconut)		6.1	4.1	-	-		
	ELECTROLYTE							
45	NaCl		0.45	0.6	0.5	0.55	45	
	Na ₂ HPO ₄		0.17	0.17	-	-		
50	DEODORANT COMPOSITION		1.5	1.5	1.5	1.5	50	
	OTHER SOAP ADJUNCTS							
	butylated hydroxy toluene		0.013	0.08	-	-		
55	sodium EDTA		0.024	0.024	0.05	0.05	55	
	EHDP		0.018	0.018	0.036	0.036		
60	titanium dioxide		0.24	0.31	0.25	0.25	60	
	water		9.485	10.588	14.954	13.554		

Process for Preparing Deodorant Soap Compositions

65 The process for preparing deodorant soap bars thereby employing a deodorant composition as a means 65

for inhibiting body malodour development comprises mixing fatty acid soaps, free fatty acids if required, electrolyte and soap adjuncts, as appropriate, from 0.1 to 10% by weight of a deodorant composition to provide a deodorant soap bar which is capable of reducing odour intensity by at least 0.50 (i.e. a deodorant value within the range of from 0.50 and 3.5) as measured by the Deodorant Value Test. The selection of the fatty acid soaps for the soap mixture, the soap adjuncts and their respective amounts employed in the process of the invention will depend upon the required properties of the soap bar.

Usually, it is convenient to add the deodorant composition to the soap mixture and other ingredients at a stage towards the end of its manufacture so that loss of any volatile ingredients such as may occur during a heating step is minimised. Usually, the deodorant composition is incorporated before extruding and stamping the soap to form toilet soap bars.

It is furthermore usual to incorporate the deodorant composition in such a manner that it is thoroughly mixed with the other ingredients and is uniformly distributed throughout the soap bar, although, as an alternative, it is possible to incorporate composition in a soap bar having a striped or marbled construction.

The deodorant toilet soap bar of the invention is to be employed particularly for suppressing human body malodour by applying it in a washing mode to the skin. It is particularly effective when applied in this way to the regions of the skin where apocrine sweat glands are most abundant, notably in the groin, axilla, anal and genital regions and in the areola of the nipple.

Specific Examples of the Invention

The invention is illustrated by the following examples, in which all parts and percentages are by weight. In each of Examples 1 to 6 a deodorant composition was prepared by mixing the components and other ingredients listed in the relevant Deodorant Composition, which gives the amount of components in each class. Test soap bars (containing 1.5% of the deodorant composition) representing non-germicidal deodorant soap bars of the invention and control soap bar were prepared using soap bar Formulation B (a 80/20/5 superfatted bar as hereinbefore defined) and tested as described in the Deodorant Value Test given above, with the results as shown in each instance.

Similar examples are described in Examples 7 to 9, except that different soap bar formulations were employed.

Example 1

The formulation of the Deodorant Composition 1 is as follows:

Deodorant Composition 1				
Components	Parts	Class	Total in class	
iso-Amyl salicylate	5.0	1)		
35 Benzyl salicylate	4.0	1)	10.25	35
LRG 201	1.25	1)		
40 Bergamot AB 430	15.0	2)		40
Geranium AB 76	4.0	2)	20.7	
Opoponax resinoid	1.7	2)		
45 1,3,4,6,7,8-Hexahydro-4,6,6,- 7,8,8-hexamethylcyclopenta- γ-2-benzopyran	10.0	4	10.0	45
50 o-t-Butylcyclohexyl acetate	0.5	5)		50
Diethyl phthalate	3.75	5)	4.25	
Nonanolide-1,4	0.2*	(5)		
55 <i>Ingredients</i>				55
Amber AB 358	3.0			
60 Benzyl alcohol	0.15			60
Cedar atlas oil	5.0			
Citronellol	7.0			

	Citronella oil	16.1	
	Citronellyloxyacetaldehyde	0.5	
5	Hexyl aldol	0.7	5
	Jasmin AB 284	12.0	
	Orange oil sweet	8.0	
10	10-Undecenal-1-al	0.15	10
	Vetivert oil	2.0	
15		100.0	15

*eliminated from calculation - below threshold value of 0.5%.

Total amount of components

45.2

20	Number of components present	9	20
	Average amount of each component	5.0	
	Number of classes represented	4	
25	Results of Deodorant Value Test 1		25

Control Bar

Test Bar

	Average scores	3.46	2.93
30	Deodorant value		0.53

Example 2

The formulation of Deodorant Composition 2 is as follows:

35	<i>Deodorant Composition 2 Components</i>				35
		<i>Parts</i>	<i>Class</i>	<i>Total in class</i>	
	Carvacrol	3.5	1)	4.5	
40	Thyme oil red	1.0	1)		40
	Bergamot AB 37	20.0	2)		
	Pimeransol AB 413	6.0	2)	30.0	
45	Petitgrain oil	4.0	2)		45
	6-Acetyl-1,1,3,4,4,6-hexa methyl-tetrahydro- naphthalene	3.0	3)	8.0	50
	β-Methyl naphthyl ketone	5.0	3)		
55	3a-Methyl-dodecahydro-6,6,9a- trimethyl naphtho-2(2,1-b) furan	0.25*	(4)		55
	β-Naphthyl methyl ether	9.0	4	9.0	
60	<i>Ingredients</i>				60
	Citronellyl acetate	5.0			
	Dipropylene glycol	4.75			

	Geranyl nitrile	1.5	
	Indole	1.0	
5	Lemongrass oil	3.0	5
	Lime AB 402	10.0	
	Lavandin oil	4.0	
10	1-Menthol	8.0	10
	Neroli AB 78	6.0	
15	Orange oil sweet	5.0	15
		100.0	

*eliminated from calculation - below threshold value of 0.5%.

20	Total amount of components	51.5	20
	Number of components present	8	
	Average amount of each component	6.4	
25	Number of classes represented	4	25

Results of Deodorant Value Test 2

	<i>Control Bar</i>	<i>Test Bar</i>	
30			30
	Average scores	3.34	2.73
	Deodorant value		0.61

35 *Example 3* 35

The formulation of Deodorant Composition 3 is as follows:

Deodorant Composition 3

	<i>Components</i>	<i>Parts</i>	<i>Class</i>	<i>Total in class</i>	
40	Mousse de chene Yugo	1.25	1)		40
	Pimento leaf oil	10.0	1)	11.25	
	Benzoin Siam resinoid	5.0	2)		
45	Bergamot AB 430	15.0	2)	25.0	45
	Geranium oil	5.0	2)		
	p-t-Amylcyclohexanone	5.0	3)		
50	α-iso-Methyl ionone	12.0	3)	17.0	50
	Coumarin	4.0	4)		
	1,3,4,6,7,8-Hexahydro- 4,6,6,7,8,8-hexamethyl- cyclopenta-γ-2-benzopyran	3.0	4)	7.0	
55	Diethyl phthalate	4.35	5	4.35	55
	<i>Ingredients</i>				
60	Hercolyn D	12.25			60
	Lavandin oil	10.0			
	Musk ambrette	3.0			

15	Rosenta AB 380	10.0			
	Rose-D-oxide	0.15			
5		100.0			5
	Total amount of components		64.6		
10	Number of components present		10		10
	Average amount of each component		6.5		
	Number of classes represented		5		
15	Results of Deodorant Value Test 3				15
		Control Bar	Test Bar		
	Average scores	3.04	2.47		
20	Deodorant value		0.57		20
	Example 4				
	The formulation of Deodorant Composition 4 is as follows:				
25	Deodorant Composition 4				25
	Components	Parts	Class	Total in class	
	Ethyl vanillin	0.2*	(1)		
	iso-Eugenol	5.0	1)	6.25	
30	LRG 201	1.25	1)		30
	Bergamot AB 430	8.0	2)		
	Patchouli oil	7.0	2)	15.0	
35	2-n-Heptylcyclopentanone	0.5	3)		35
	α -iso-Methyl ionone	5.0	3)	5.5	
	β -Naphthyl methylether	7.5	4	7.5	
40	p-t-Butylcyclohexyl acetate	4.3	5)		40
	Diethyl phthalate	8.25	5)		
	i-Nonyl formate	5.0	5)	26.55	
	Nonanediol-1,3-diacetate	4.0	5)		
	Phenylethyl phenyl acetate	5.0	5)		
45	Tetrahydro muguol	6.0	6	6.0	45
	Ingredients				
	Citronella oil	6.0			
50	Green Herbal AB 502	15.0			50
	Indole	1.5			
55	Rosenta AB 380	6.0			55
	Sandalone	4.0			
	γ -Undecalactone	0.5			
60		100.0			60

24

*eliminated from calculation - below threshold value of 0.5%.

Total amount of components 66.8

5 Number of components present 14

5

Average amount of each component 4.8

Number of classes represented 6

10 Results of Deodorant Value Test 4

10

Control Bar

Test Bar

Average scores 3.25 2.10

15 Deodorant value 1.15

15

Example 5

The formulation of Deodorant Composition 5 is as follows:

Deodorant Composition 5

20 Components Parts Class Total in class 20

Benzyl salicylate 15.0 1)

Mousse de chene Yugo 6.0 1) 21.0

25 Bergamot AB 430 15.0 2 15.0

25

6-Acetyl-1,3,3,4,4,6-hexa
methyltetrahydro-
naphthalene 2.5 3 2.5

30 p-t-Amylcyclohexanone 0.06* (3) 30

35 3a-Methyl-dodecahydro-6,6,9a-
trimethyl-naphtho-2(2,1-b)
furan 0.75 4 0.75

35

Diethyl phthalate 8.04 5 8.04

40 Nonanolide-1,4 0.2* (5) 40

Dimyrcetol 16.0 6 16.0

Ingredients

45 Cinnamic alcohol 5.0 45

Dimethyl benzyl carbiny
acetate 2.5

50 Dipropylene glycol 14.25 50

Geraniol 5.0

55 iso-Butyl phenyl acetate 5.0 55

Methyl salicylate 0.5

Pelargene 4.0

60 Trichloromethyl phenyl
carbiny acetate 0.2 60

100.0

*eliminated from calculation - below threshold value of 0.5%.

Total amount of components

63.29

Number of components present

7

5

Average amount of each component

9.0

Number of classes represented

6

10 Results of Deodorant Value Test 5

Control Bar

Test Bar

Average scores

3.30

2.70

15 Deodorant value

0.60

Example 6

The formulation of Deodorant Composition 6 is as follows:

Deodorant Composition 6

20 Components

Parts

Class

Total in class

20

Clove leaf oil

10.0

1)

LRG 201

1.25

1)

11.25

25 Petitgrain oil

10.0

2

10.0

25

p-t-Butyl- α -methyl hydro
cinnamic aldehyde

15.0

3

15.0

30 3a-Methyl-dodecahydro-6,6,9a- trimethylnaphtho-2(2,1-b) furan

0.5

4

0.5

30

o-t-Butylcyclohexyl acetate

2.0

5)

35 Diethyl phthalate

9.25

5)

21.25

35

i-Nonyl acetate

10.0

5)

Phenyl ethyl alcohol

10.0

6

10.0

40 Ingredients

40

Benzyl propionate

4.0

Bergamot oil

15.0

45

Dimethyl benzyl carbiny
acetate

5.0

iso-Butyl benzoate

5.0

50

Neroli oil

3.0

50

100.0

55 Total amount of components

68.0

55

Number of components present

9

Average amount of each component

7.6

60

Number of classes represented

6

60

86

Results of Deodorant Value Test 6

	<i>Control Bar</i>	<i>Test Bar</i>	
5			
Average scores	3.25	2.33	
Deodorant value		0.92	5

Example 7

10 Example 2 employing Deodorant Composition 2 was repeated except that the soap bars were prepared using Soap Bar Formulation C (a 80/20 non-superfatted bar as hereinbefore described). 10
Results of Deodorant Value Test 7

	<i>Control Bar</i>	<i>Test Bar</i>	
15			
Average scores	3.30	2.60	
Deodorant value		0.70	15

Example 8

20 Example 2 employing Deodorant Composition 2 was also repeated using a non-superfatted soap bar in which the soap was entirely tallow soap. 20
Results of Deodorant Value Test 8

	<i>Control Bar</i>	<i>Test Bar</i>	
25			
Average scores	3.30	2.72	
Deodorant value		0.58	25

Example 9

30 Example 4 employing Deodorant Composition 4 was repeated except that the soap bars were prepared using Soap Bar Formulation A (a 55/45/7.5 superfatted bar as hereinbefore described). 30
Results of Deodorant Value Test 9

	<i>Control Bar</i>	<i>Test Bar</i>	
35			
Average scores	3.30	1.64	
Deodorant value		1.66	35

APPENDIX

40 The following glossary provides further information, including the suppliers' names, which will aid identification of some of the aforementioned deodorant components and ingredients. 40

Dimyrcetol	-	Dimyrcetol (IFF)	
Hercolyn D	-	Tetrahydro abietate + dihydro abietate (HP)	
45 LRG 201	-	Oakmoss speciality (RB)	45
Pelargene	-	Pelargene (PPL)	
50 Rose-D-Oxide	-	Rose oxide synthetic (PPL)	50
Sandalone	-	Sandalone (PPL)	
55 <i>Perfume Houses</i>			55
HP	-	Hercules Powder Co.	
60 IFF	-	International Flavour & Fragrances Inc.	60
RB	-	Roure Bertrand	
65 PPL	-	Proprietary Perfumes Ltd.	65

27

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

CLAIMS

- 5 1. A non-germicidal deodorant toilet soap bar comprising 5
- (i) from 0.5 to 99.8% by weight of a soap mixture;
 - (ii) from 0 to 15% by weight of C₆ to C₁₈ straight chain fatty acids.;
 - (iii) from 0.1 to 2.5% by weight of electrolyte and;
- 10 (iv) from 0.1 to 10% by weight of a deodorant composition having a deodorant value of from 0.50 to 3.5 10
as measured by the Deodorant Value Test, the deodorant composition comprising essential materials having a lipoxidase activity of at least 50% or a Raoult variance ratio of at least 1.1 as herein defined.
2. A deodorant soap bar according to claim 1, in which the deodorant composition has a deodorant value of from 0.90 to 3.5 as measured by the Deodorant Value Test.
- 15 3. A deodorant soap bar according to claim 1, in which the deodorant composition has a deodorant value 15
of from 1.10 to 3.5 as measured by the Deodorant Value test.
4. A deodorant soap bar according to claim 1, 2 or 3, in which the deodorant composition comprises from 45 to 100% by weight of deodorant active components, said components being classified into six classes consisting of:
- 20 Class 1 : phenolic substances 20
Class 2 : essential oils, extracts, resin and synthetic oils
Class 3 : aldehydes and ketones
Class 4 : polycyclic compounds
Class 5 : esters
25 Class 6 : alcohols 25
- provided that where a component can be classified into more than one class, it is placed in the lower or lowest numbered class;
said components being so selected that
- (a) the deodorant composition contains at least five components of which at least one must be selected
- 30 from each of Class 1, Class 2 and Class 4; 30
(b) the deodorant composition contains components from at least 4 of the 6 classes; and
(c) any component present in the deodorant composition at a concentration of less than 0.5% by weight of said composition is eliminated from the requirements of (a) and (b).
5. A deodorant soap bar according to claim 4, in which the amount of deodorant components present in
- 35 said class comprising phenolic substances and said class comprising essential oils, extracts, resins and 35
synthetic oils and said class comprising polycyclic compounds, is at least 1% by weight of the deodorant composition for each of said classes, and the amount of deodorant components present in said further class chosen from the remaining three classes is at least 1% by weight of the deodorant composition.
6. A deodorant soap bar according to claim 4 or 5, in which the average concentration of all such
- 40 components present is at least 5% by weight where four of said classes is represented, or at least 4.5% by 40
weight where five or six of said classes is represented.
7. A deodorant soap bar according to claim 4, 5 or 6, in which the amount of deodorant components present in said class comprising phenolic substances and said class comprising essential oils, extracts, resins and synthetic oils and said class comprising polycyclic compounds, is at least 3% by weight of the
- 45 deodorant composition for each of said classes and the amount of deodorant components present in said 45
further class chosen from the remaining three classes is at least 3% by weight of the deodorant composition.
8. A deodorant soap bar according to any of claims 4 to 7, in which at least five of the classes are represented.
9. A deodorant soap bar according to any of claims 4 to 8 in which all six classes are represented.
- 50 10. A deodorant soap bar according to any of claims 4 to 9, in which the deodorant components are 50
chosen from:
- Class 1 - Phenolic substances*
- iso-Amyl salicylate
- 55 Benzyl salicylate 55
Carvacrol
Clove leaf oil
Ethyl vanillin
iso-Eugenol
60 LRG 201 60
Mousse de chene Yugo
Pimento leaf oil



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

CLAIMS

- 5 1. A non-germicidal deodorant toilet soap bar comprising 5
- (i) from 0.5 to 99.8% by weight of a soap mixture;
 - (ii) from 0 to 15% by weight of C_6 to C_{18} straight chain fatty acids.;
 - (iii) from 0.1 to 2.5% by weight of electrolyte and;
 - 10 (iv) from 0.1 to 10% by weight of a deodorant composition having a deodorant value of from 0.50 to 3.5 10
- as measured by the Deodorant Value Test, the deodorant composition comprising essential materials having a lipoxidase activity of at least 50% or a Raoult variance ratio of at least 1.1 as herein defined.
2. A deodorant soap bar according to claim 1, in which the deodorant composition has a deodorant value of from 0.90 to 3.5 as measured by the Deodorant Value Test.
- 15 3. A deodorant soap bar according to claim 1, in which the deodorant composition has a deodorant value 15
- of from 1.10 to 3.5 as measured by the Deodorant Value test.
4. A deodorant soap bar according to claim 1, 2 or 3, in which the deodorant composition comprises from 45 to 100% by weight of deodorant active components, said components being classified into six classes consisting of:
- 20 Class 1 : phenolic substances 20
- Class 2 : essential oils, extracts, resin and synthetic oils
- Class 3 : aldehydes and ketones
- Class 4 : polycyclic compounds
- Class 5 : esters
- 25 Class 6 : alcohols 25
- provided that where a component can be classified into more than one class, it is placed in the lower or lowest numbered class;
- said components being so selected that
- (a) the deodorant composition contains at least five components of which at least one must be selected
- 30 from each of Class 1, Class 2 and Class 4; 30
- (b) the deodorant composition contains components from at least 4 of the 6 classes; and
- (c) any component present in the deodorant composition at a concentration of less than 0.5% by weight of said composition is eliminated from the requirements of (a) and (b).
5. A deodorant soap bar according to claim 4, in which the amount of deodorant components present in
- 35 said class comprising phenolic substances and said class comprising essential oils, extracts, resins and 35
- synthetic oils and said class comprising polycyclic compounds, is at least 1% by weight of the deodorant composition for each of said classes, and the amount of deodorant components present in said further class chosen from the remaining three classes is at least 1% by weight of the deodorant composition.
6. A deodorant soap bar according to claim 4 or 5, in which the average concentration of all such
- 40 components present is at least 5% by weight where four of said classes is represented, or at least 4.5% by 40
- weight where five or six of said classes is represented.
7. A deodorant soap bar according to claim 4, 5 or 6, in which the amount of deodorant components present in said class comprising phenolic substances and said class comprising essential oils, extracts, resins and synthetic oils and said class comprising polycyclic compounds, is at least 3% by weight of the
- 45 deodorant composition for each of said classes and the amount of deodorant components present in said 45
- further class chosen from the remaining three classes is at least 3% by weight of the deodorant composition.
8. A deodorant soap bar according to any of claims 4 to 7, in which at least five of the classes are represented.
9. A deodorant soap bar according to any of claims 4 to 8 in which all six classes are represented.
- 50 10. A deodorant soap bar according to any of claims 4 to 9, in which the deodorant components are 50
- chosen from:

Class 1 - Phenolic substances

- 55 iso-Amyl salicylate 55
- Benzyl salicylate
- Carvacrol
- Clove leaf oil
- Ethyl vanillin
- iso-Eugenol
- 60 LRG 201 60
- Mousse de chene Yugo
- Pimento leaf oil

*Class 2 - Essential oils, extracts, resins, "synthetic" oils (denoted by 'AB')*

- Benzoin Siam resinoid
Bergamot AB 37
Bergamot AB 430
5 Geranium AB 76
Geranium oil
Opoponax resinoid
Patchouli oil
Petitgrain oil
10 Pomeransol AB 314

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Class 3 - Aldehydes and ketones

- 6-Acetyl-1,1,3,4,4,6-hexamethyltetrahydronaphthalene
p-t-Amyl cyclohexanone
15 p-t-Butyl- α -methyl hydrocinnamic aldehyde
2-n-Heptylcyclopentanone
 α -iso-Methyl ionone
 β -Methyl naphthyl ketone

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Class 4 - Polycyclic compounds

- Coumarin
1,3,4,6,7,8-Hexahydro-4,6,6,7,8,8-hexamethyl cyclopenta- α -2-benzopyran
3a-Methyl-dodecahydro-6,6,9a-trimethylnaphtho-(2,1-b)furan
 β -Naphthyl methyl ether

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Class 5 - Esters

- o-t-Butylcyclohexyl acetate
p-t-Butylcyclohexyl acetate
Diethyl phthalate
30 Nonanediol-1,3-diacetate
Nonanolide-1:4
i-Nonyl acetate
i-Nonyl formate

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Class 6 - Alcohols

- Dimyrcetol
Phenylethyl alcohol
Tetrahydromuguol.

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40 11. A deodorant soap bar according to any preceding claim, in which the soap mixture comprises a soap of lauric acid, a soap of myristic acid, a soap of palmitic acid, a soap of stearic acid and a soap of oleic acid.

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12. A deodorant soap bar according to claim 11, in which the soap mixture comprises from 2 to 35% by weight of a soap of lauric acid, from 0.5 to 25% by weight of a soap of myristic acid, from 5 to 45% by weight of a soap of palmitic acid, from 1 to 25% by weight of a soap of stearic acid and from 10 to 40% by weight of a soap of oleic acid.

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13. A deodorant soap bar according to any preceding claim, in which the soap mixture comprises at least two saponified naturally occurring oils, the first oil having a saponification value of from 170 to 220, an iodine value of from 25 to 70, a fatty acid titre of from 30 to 55°C and an INS value of from 120 to 210, the first saponified oil comprising at least 15 parts by weight of a soap of palmitic acid, at least 2 parts by weight of a soap of stearic acid and at least 30 parts by weight of a soap of oleic acid; and a second oil having a saponification value of from 240 to 265, an iodine value of from 5 to 20, a fatty acid titre of from 15 to 30°C and an INS value of from 220 to 260, the second saponified oil comprising at least 40 parts by weight of a soap of lauric acid and at least 10 parts by weight of a soap of myristic acid.

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14. A deodorant soap bar according to claim 13, in which the first and second oils together have a combined INS value of from 160 to 220.

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15. A deodorant soap bar according to claim 14, in which the combined INS value is from 160 to 175.

16. A deodorant soap bar according to any preceding claim, in which the straight chain fatty acids comprise from 1 to 10% by weight of the bar.

17. A deodorant soap bar according to any preceding claim, in which the electrolyte comprises from 0.2 to 1.5% by weight of the bar.

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18. A deodorant soap bar according to claim 17, in which the electrolyte comprises from 0.25 to 1% by weight of the bar.

19. A deodorant soap bar according to any preceding claim, in which the electrolyte comprises sodium chloride.



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20. A deodorant soap bar according to any preceding claim and substantially as described in any of the Examples.

21. A process for preparing a deodorant soap bar according to any preceding claim, which comprises blending the soap mixture and electrolyte with the deodorant composition and thereafter extruding and
5 stamping the soap to provide the deodorant soap bar.

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22. A method for suppressing human body malodour which comprises washing the skin with a deodorant soap bar according to any of claims 1 to 20.