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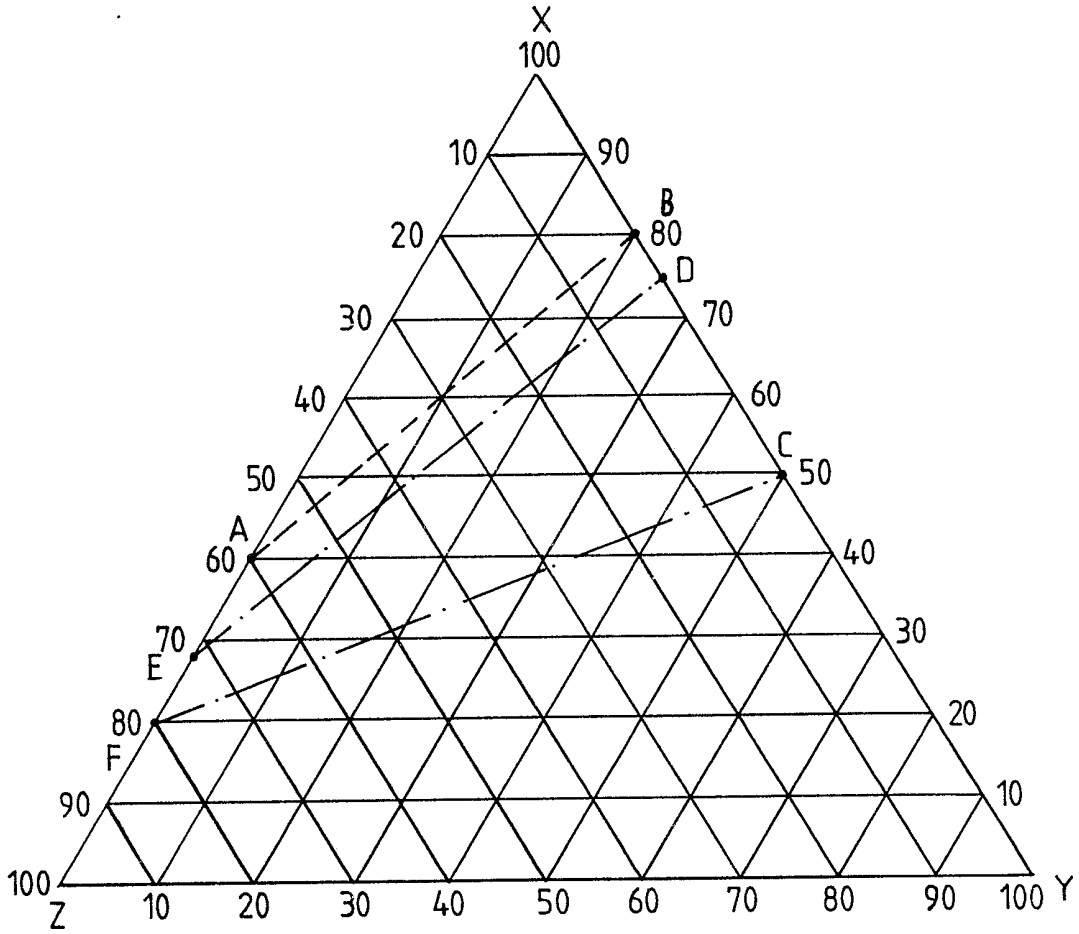
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(54) **Soap bars**

(57) Soap bars comprising at least 30% by wt of tallow scrap and 3–30% by wt of water soluble hydroxy stearic acid salts are obtained by using castor wax (hydrogenated castor oil) acids as substitute for the nut oil derived acids normally used in soap formulations.

Castor wax is preferably utilised as a soap feedstock by ensuring the weight proportions of hydroxy-stearic acid (the major ingredient of castor wax acids) relative to oleic and lauric acids are within specified limits.

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SPECIFICATION

Soap compostions and processes of manufacture

Field of the Invention

The invention relates to soap bars and their manufacture, and in particular to soap bars manufactured from a feedstock containing hardened castor oil. In this specification castor oil which has been subjected to a substantially complete hardening process is referred to as castor wax. The invention is suitable for the manufacture of optionally filled, laundry soap bars and milled soap tablets containing up to about 30% by weight of castor wax in the fat charge. Castor oil subjected to a partial hardening will contain a measurable proportion of the hydroxystearic acid, the major component of fully hardened material (castor wax).

Background of the Invention

Soap feedstocks will usually contain a major part of fats/oils providing fatty acids comparable with those obtained from tallow and a minor part of fats/oils providing shorter chain length acids. The latter will normally be obtained from nut oils, for example coconut and babassu, and provide the lather properties required in the product. The cost of nut oils and their utility in human diet has encouraged the search for materials to replace the nut oil acids in whole or in part. Previous work in this field is disclosed in UK patent specifications 1,281,895, 1,287,895, 1,295,275 and 1,314,604.

Tallow type materials are beef tallow, mutton tallow, lard and palm oil. These materials will supply a fatty acid mixture containing at least 90% of C_{16} acids and above.

Castor oil is not a conventional soapery oil, but processes are known, for example UK patents 1130092, 1130623 and 1178544 by which it has been utilised as a constituent of fat charges for soap making after hydrogenation and dehydroxylation. However, use of castor wax in the fat charge for soap making by conventional methods gives rise to processing problems, eg reduced throughput, and results in a product of poor quality eg lower total fatty material content, higher sodium chloride content and brittle texture. These characteristics can be attributed to the high fatty acid titre (75.5°C) of castor wax; this raises the titre beyond the normal titre range of 36° to 44° if the wax is incorporated at up to 30 per cent level in the fat charge.

General description of the Invention

The invention relates firstly to the use of castor wax in detergent formulations as a substitute for nut oil feedstocks and secondly to a preferred region of compositions which allow the castor wax to be efficiently incorporated in the fat charge.

The invention provides detergent bars comprising at least about 30% by weight of soap derived from tallow or like material and from about 3% to about 30% by weight of water soluble salts of hydroxy stearic acid. Preferably the tallow type soap is present in an amount up to about 70% and the hydroxy stearic acid salts are present in an amount up to 15% by weight.

The detergent bars may contain non soap detergents in minor proportions; examples are alkaryl sulphonates, alkane sulphonates, alcohol sulphates, alkane sulphonates and nonionic actives, eg ethoxylated alcohols.

The water soluble salts will normally be the sodium salts but potassium and ammonium salts may be used for some compositions.

A general consideration in selecting fat mixtures for soap making is that it should contain saturated, unsaturated, long and short chain fatty acids, to provide a titre in the range about 36° to 44°C and an INS factor (Saponification number minus Iodine Value) in the range from about 140 to about 170. This mixture will provide the desired qualities of, for example, processing, texture, solubility and lather.

Because of the high titre of castor wax, soap bars are preferably manufactured from a fat charge containing up to 30% of castor wax provided the proportion by weight of hydroxy stearic acid to lauric acid is not above about 4.00 and to oleic acid is not above about 0.67. 12-Hydroxy-stearic acid (HSA) is the major fatty acid component of castor wax. The choice of other soap making oils containing other component fatty acids, such as stearic, palmitic, linoleic, are preferably governed by the ratios of lauric, oleic and HSA given above.

The proportions of hydroxy stearic acid (apex X), lauric acid (apex Y) and oleic acid (apex Z) which can be utilised by operation of this invention are shown in the accompanying ternary diagram. The area within which the invention is preferably utilised is below the line AB, preferably within the area CDEF, subject to the limitation of 30% of castor wax in the fat charge.

It is believed the presence of lauric and/or oleic fatty acid salts in the product reduce the free hydroxystearic acid salt content by complex formation. By ensuring the product is substantially free of free HSA salts, the properties are comparable to the standard commercial bars. Thus the invention allows the utilisation of castor oil after hydrogenation but without the dehydroxylation

stage. Relatively soft, that is unhardened, feedstock oils, for example rice bran oil and coconut oil, are sources of the oleic and lauric acids and use of castor wax allows a level of these oils above normal to be used. Soft oils can be used at a level of about 15 to 22 per cent in the fat charge whereas the normal commercial level of use is about 6 per cent.

The absence of free HSA salts in the product is ensured by keeping the proportion of HSA below 4.00 relative to the lauric acid and below 0.67 relative to oleic acid. In the event both the latter acids are present in the product as salts, the amount of HSA must be proportioned between the lauric and oleic acids. Thus, a product containing 5g HSA 1g lauric and 1g oleic would contain free HSA salts because although 4g of the acid would be complexed, ie associated with the laurates (1g), there would be insufficient oleates to complex with the remaining HSA salts.

Preferably, the proportion of HSA to lauric acid is in the range from about 1.0 to about 3.0 and the proportion relative to oleic acid is in the range from about 0.25 to about 0.40.

The invention also extends to processes for manufacturing soap bars using castor wax as a component of the fat charge. The fatty acid or fat charge must be in liquid form at neutralisation of saponification to ensure the effective formation of complex of HSA with oleic and/or lauric acid or the salts forms. These complexes are present in both the acid and salt forms of the components and are stable at the normal soap processing temperatures.

The required amounts of oleic and lauric acids can be derived from a number of known sources, examples are hardened rice bran oil and coconut oil.

Examples

Examples of the product and process of the invention will now be given to illustrate but not limit the invention.

EXAMPLE I

Control and experimental soap bars were prepared using the following fat charges (% by weight).

	Control	*Experimental*
Coconut oil	15	7.5
Castor wax	nil	7.5
Distilled fatty acids from hardened rice bran oil	40	40
Castor olein	40	40
Palm stearin	4	4
Rosin	1	1
Titre	41°C	44°C

Castor olein is castor oil which has been subjected to hydrogenation and dehydroxylation. Palm stearin is palm oil from which a proportion of the oleic fraction has been removed.

The fat charges were saponified using normal procedures and dried to form chips with a TFM of 78%. The chips were milled and plodded to form bars. Samples of each bar were subjected to standard hand washing procedures and the lather collected and measured.

The control bar gave a lather volume of 188 mls and the Experimental bar a volume of 206 mls. These results demonstrate castor wax acts as a substitute for the nut oil component of the fat charge.

The rate of wear and mush of the experimental bar were satisfactory for commercial use.

EXAMPLE II

This describes the preparation of a product suitable for use as a laundry soap. Iodine Value is quoted as IV.

Fat Charge	*Charge composition (wt. per cent)* *Experimental*	*Control*
Hardened rice bran oil (IV = 50)	62.0	87.0
Soft rice bran oil	21.5	6.5
Hardened & dehydroxylated castor oil (IV = 65)	5.0	5.0
Rosin	1.5	1.5
Castor wax (IV below 5)	10.0	Nil
	100.0	100.0
Titre of fatty acids from fat mixture:	33.4°C	45.2°C
HSA/oleate fatty acid ratio in the fat mixture:	0.30	0.02

The experimental fat mixture (300 g) was preblended through melting in a 2-litre glass beaker kept half-immersed in a boiling water bath. Water (500g) was added and after the fat-water mixture attained 95°C, 30ml of 25w/v per cent aqueous sodium hydroxide was slowly added with stirring. The fat-water-alkali mixture was stirred for one hour while maintaining its temperature at about 95°C. 25 w/v per cent sodium hydroxide was added in three aliquots (viz 40 ml, 50 ml and 130 ml) with gentle stirring of the hot mixture for one hour after each alkali addition. The mixture was allowed to remain on the boiling water bath with gentle stirring for an additional period of 5–6 hours.

The mixture was tested for complete saponification by checking that an aqueous solution of the product (a drop of molten soap mass added to about 50 ml water) was clear and not turbid. The saponified mixture was then grained and fitted in the conventional manner. The 'fitted' soap mass was cooled to room temperature and the entire soap mass removed from the beaker as a cylindrical block. The 'niger' phase (which was easily distinguished by its darker colour compared to the 'neat' phase) was scrapped from the block. The neat soap was then subjected to analytical and textural characterisation.

A control fat charge (300 g) was similarly saponified, washed ('grained') and 'fitted'.

The analytical characteristics (viz. TFM, NaCl, free fat/alkali contents) of the experimental neat soap, as well as its textural characteristics (viz. 'flaking', tendency, grain size, opacity) were found to be comparable with those pertaining to the Control neat soap.

EXAMPLE III

This example describes the preparation of a toilet soap using coconut as the source of lauric acid.

Fat Charge	*Charge composition (wt. per cent)* *Experimental*	*Control*
Distilled fatty acids ex. hardened rice bran oil (IV = 50)	45.0	60.0
Hardened & dehydroxylated castor oil (IV = 65)	25.0	25.0
Coconut oil	15.0	15.0
Castor wax (IV below 5)	15.0	Nil
	100.0	100.0
Titre of fatty acids from fat mixture:	38.6°C	39.7°C
HSA/laurate fatty acid ratio in fat mixture:	1.84	0.30
HSA/oleate fatty acid ratio in fat mixture:	0.69	0.07

Neat soaps using the above Experimental and Control fat charge compositions were prepared from 300 gms of each fat mixture as described under Example II.

The analytical and textural characteristics (as discussed in Example II above) of the Experimental and the Control neat soaps were found to be similar.

EXAMPLE IV

This describes a toilet soap using coconut oil as the source of lauric acid.

Fat Charge	*Charge composition (wt. per cent)* *Experimental*	*Control*
Hardened, refined ground nut oil (IV = 65)	41.0	66.0
Refined (soft) ground nut oil (IV = 92)	11.0	6.0
Coconut oil	28.0	28.0
Castor wax (IV below 5)	20.0	Nil
	100.0	100.0
Titre of fatty acids from fat mixture:	37.0°C	38.1°C
HSA/laurate fatty acid ratio in fat mixture:	1.10	Nil

Neat soaps wer manufactured from the Experimental and Control fat charges (300 g) with above compositions using the procedures described in detail under Example II.

The analytical and textural characteristics (as described under Example II) of the Experimental and the Control 'neat' soaps were found to be similar.

The Experimental and Control products from each of Examples II, III, and IV were formed into bar products. The pair of products from each Example were found to be comparable in properties.

CLAIMS

1. A detergent bar comprising at least about 30% of tallow soap as defined herein and from about 3% to about 30% by weight of water soluble hydroxy stearic acids salts.

2. A detergent bar as claimed in Claim 1, wherein the tallow soap is present in an amount up to about 70%.

3. A detergent bar as claimed in Claim 1 or 2, wherein the water soluble salts of hydroxy stearic acid are present in an amount up to about 15%.

4. A detergent bar as claimed in any preceding claim containing water-soluble salts of

hydroxy-stearic, lauric and oleic acids wherein the weight proportions of the acids lie below the line AB (point A is hydroxy-stearic/oleic ratio of 0.67 and point B is hydroxy-stearic/lauric ratio of 4) in the accompanying ternary diagram.

5. A detergent bar according to claim 4, wherein the proportions of the acids lie within the area CDEF of the ternary diagram.

6. A detergent bar as claimed in Claim 1 or Claim 4 substantially as herein described.

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