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Improvements in or relating to
Products Containing Sodium Alpha Olefin Sulphonate

This invention relates to a method of
manufacturing hard water and sea water resistant
laundry detergent products containing sodium alpha
olefin sulphonate as the active detergent and hard
5 water and sea water resistant laundry detergent
products obtained thereby.

The subject matter hereof has been divided out
from our co-pending patent application 8324202 which
is directed to a method of manufacturing sodium alpha
10 olefin sulphonate from fatty oil and sodium alpha
olefin sulphonate obtained thereby. More especially

co-pending patent application is directed to a method of manufacturing sodium alpha olefin sulphonate from fatty oil, which method comprises the steps of converting the fatty oil into fatty acid, converting the fatty acid into saturated fatty alcohol, dehydrating the saturated fatty alcohol at an elevated temperature in the presence of a catalyst to remove a molecule of water and form an olefin having a double bond in the alpha position, and sulphonating, neutralising and hydrolysing the alpha olefin to produce sodium alpha olefin sulphonate. The catalyst may be alumina and the saturated fatty alcohol may be distilled and dehydrated by a continuous phase dehydration process in the presence of an alumina. The saturated fatty alcohol may be dehydrated at a temperature of between 300°C and 400°C and the fatty oil may be split into fatty acid at a pressure of the order of 32kg/cm² and a temperature of the order of 230°C. The fatty acid may be hydrogenated at a pressure of the order of 250kg/cm² and a temperature of the order of 300°C and the sulphonated alpha olefin may be neutralised with sodium hydroxide.

The sodium olefin sulphonate preferably has a chainlength of from C₁₂ to C₁₈ and, more preferably, has a chainlength of from C₁₆ to C₁₈.

The present invention concerns laundry detergent

products containing sodium alpha olefin sulphonate manufactured in accordance with the method claimed in the aforesaid co-pending patent application 8324202.

When ordinary soap is used in hard water, the
5 calcium and magnesium ions in the hard water react with the soap and form insoluble calcium and magnesium soaps, which have no detergency and no lathering property. Thus, a part of the soap is wasted when used in hard water. In sea water, ordinary laundry
10 soaps cannot be used at all. The amount of wastage depends on the hardness of water. Assuming the weighted average hardness of water as 200 ppm calcium carbonate, and considering the weighted average use of laundry soap in India, one-third of the soap used is
15 wasted outright, and the remaining two-thirds does not function efficiently. Thus, 100,000 tons per annum of fatty matter in laundry soap is wasted outright. Reckoning rice bran oil at Rs.7500 per ton, the annual wastage is of the magnitude of at least Rs.75 crore.

20 The term 'fatty oil' wherever referred to in this specification includes a fatty oil or a mixture of fatty oils such as Rice Bran Oil, Coconut Oil, Palm Oil or Tallow.

The invention provides a method of manufacturing
25 a laundry detergent product containing sodium alpha olefin sulphonate as the active detergent, which method comprises the steps of converting fatty oil

into fatty acid, converting the fatty acid into saturated fatty alcohol, dehydrating the saturated fatty alcohol at an elevated temperature in the presence of a catalyst to remove a molecule of water and form an olefin having a double bond in the alpha position, sulphonating, neutralising and hydrolising the alpha olefin to produce sodium alpha olefin sulphonate, mixing the sodium alpha olefin sulphonate so produced with a detergency builder to form a homogeneous mixture and further processing said homogeneous mixture to obtain a laundry detergent product which is resistant to hard water and sea water.

The sodium alpha olefin sulphonate used for the manufacture of said laundry detergent product has, preferably, a C₁₂ to C₁₈ chainlength and still preferably a C₁₆ to C₁₈ chainlength.

The mixture may contain a detergency builders such as, for example, borax, tetrasodium pyrophosphate, potassium pyrophosphate, trisodium phosphate, sodium silicate, sodium carbonate, sodium bicarbonate, sodium tripolyphosphate, polyvinyl pyrrolidine and carboxymethyl cellulose.

The mixture may contain fillers such as, for example, sodium sulphate, sodium chloride, talc, china clay and starch.

The mixture may contain additives such as, for

example, optical brighteners, colouring agents, perfumes, emollients, preservatives, pearlescent agents and/or foam boosters.

- Optical brighteners may, for example, comprise
- 5 "Ranipal" and "Photine C" (a Registered Trade Mark). Colouring agents may, for example, comprise phthalocyanine blue and phthalocyanine green. Perfumes are, for example, jasmine, rose, lavender and citronella. Emollients may, for example, comprise
- 10 hydrogenated castor oil and paraffin wax. Preservatives may, for example, comprise methyl paraben and propyl paraben. Pearlescent agents may, for example, comprise ethylene glycol monostearate. Foam boosters may, for example, comprise coconut
- 15 monoethanolamide and coconut diethanolamide.

Examples of soap which may be present in the mixture are as follows:

- 1 Soap made from a mixture of Palm Oil, Coconut Oil and Groundnut Oil.
- 20 2 Soap made from a mixture of Tallow, Coconut Oil and Groundnut Oil.

Examples of said other detergents which may be present in the mixture include alkyl benzene sulphonate, sodium lauryl ether sulphate and sodium

25 lauryl sulphate.

The proportion of said sodium alpha olefin sulphonate is preferably 5 to 30% by weight.

The proportion of said other synthetic detergent(s) and/or soap(s) is up to 10% by weight.

In case the hard water and sea water resistant laundry detergent product is required in the form of bars, said mixing is carried out at ambient temperature or at an elevated temperature, for example, between 50 to 55 °C, preferably, in a mixer such as sigma mixer and the resulting homogeneous mixture is further processed, for example, by milling in a triple roll mill into ribbons and extruding the ribbons into bars through an extrusion plodder. In case said mixing is carried out at elevated temperature the time for carrying out said mixing can be reduced.

In case the hard water and sea water resistant laundry detergent product is required in the form of powder, said mixing is carried out with water preferably, in a crutcher and the resulting homogeneous mixture in the form of a slurry is further processed by spray drying into powder.

In case the hard water and sea water resistant laundry detergent product is required in the form of a clear liquid or a pearlescent liquid, said mixing is carried out with water preferably in a mixer.

The advantages of the laundry detergent product containing sodium alpha olefin sulphonate obtained from fatty oil are as follows:-

- 1 possesses excellent detergency in hard water (well water) and sea water;
- 2 easy to extrude;
- 3 non-irritant and mild to skin;
- 5 4 with sodium alpha olefin sulphonate little or no STPP (sodium tripolyphosphate) is required. STPP causes eutrophication;
- 5 good quality bar can be made without matter insoluble in water and such bar is not mushy;
- 10 6 better for dish washing and petroleum stain removal;
- 7 compatible with other laundry detergent products in any desired proportion;
- 8 completely biodegradable.

15 EXAMPLE I -----

The following ingredients were taken in the proportion (by weight) indicated:

			Parts -----
20	1	Sodium alpha olefin sulphonate (containing 90% anhydrous sodium alpha olefin sulphonate) ...	25
	2	Sodium tripolyphosphate ...	25
	3	Sodium bicarbonate ...	25
	4	Sodium carbonate ...	6
25	5	Neutral sodium silicate (containing 40% anhydrous neutral sodium silicate) ...	22

The ingredients were mechanically mixed in a sigma mixer for 20 to 30 minutes at an elevated temperature of 50 C-55 C. The mixed dough formed was then milled in a triple roll mill into a ribbon form and the ribbons were extruded in bar form through an extrusion plodder.

A moisture loss of about 3% occurred during the entire operation. The final composition of the extruded bar was as follows:

10	1	Sodium alpha olefin sulphonate (on anhydrous basis)	...	22 - 23%
	2	Sodium tripolyphosphate	...	25%
	3	Sodium bicarbonate	...	25%
	4	Sodium carbonate	...	6%
15	5	Neutral sodium silicate (on anhydrous basis)	...	9%
	6	Water	...	12 - 13%

EXAMPLE II

The following ingredients were taken in the proportion (by weight) indicated:

			Parts

	1	Sodium alpha olefin sulphonate (containing 90% anhydrous sodium sodium alpha olefin sulphonate)	... 25
25	2	Sodium bicarbonate	... 6
	3	Sodium carbonate	... 6

4	Neutral sodium silicate (containing 40% anhydrous neutral sodium silicate)	...	25
5	Sodium sulphate	...	40
6	Paraffin Wax	...	2
5	7 CMC	...	1
8	Ranipal	...	0.2
9	Jasmine	...	0.2

The ingredients were mechanically mixed in a sigma mixer for 20 to 30 minutes at an elevated temperature of 50 C-55 C. The mixed dough formed was then milled in a triple roll mill into a ribbon form and the ribbons extruded in bar form through an extrusion plodder.

A moisture loss of about 3% occurred during the entire operation. The final composition of the extruded bar was as follows:

1	Sodium alpha olefin sulphonate (on anhydrous basis)	...	22-23%
2	Sodium bicarbonate	...	6%
3	Sodium carbonate	...	6%
20	4 Neutral sodium silicate (on anhydrous basis)	...	10%
5	Sodium sulphate	...	40%
6	Paraffin Wax	...	2%
7	CMC	...	1%
8	Ranipal	...	0.2%
25	9 Jasmine	...	0.2%
10	Water	...	12-13%

EXAMPLE III

The following ingredients were taken in the proportion (by weight) indicated:

			Parts

5	1	Sodium alpha olefin sulphonate ... (containing 90% anhydrous sodium alpha olefin sulphonate)	18
	2	Sodium tripolyphosphate ...	15
	3	Sodium bicarbonate ...	25
	4	Sodium carbonate ...	5
10	5	Neutral sodium silicate ... (containing 40% anhydrous neutral sodium silicate)	25
	6	Sodium sulphate ...	16
	7	CMC ...	1
	8	Ranipal ...	0.2
15	9	Rose ...	0.2

The ingredients were mechanically mixed in a sigma mixer for 20 to 30 minutes at an elevated temperature of 50° C-55° C. The mixed dough formed was then milled in a triple roll mill into a ribbon form and the ribbons extruded in bar form through an extrusion plodder.

A moisture loss of about 3% occurred during the entire operation. the final composition of the extruded bar was as follows:

1	Sodium alpha olefin ...	15-16%
	(on anhydrous basis)	

	2	Sodium tripolyphosphate	...	15%
	3	Sodium bicarbonate	...	25%
	4	Sodium carbonate	...	5%
5	5	Neutral sodium silicate (on anhydrous basis)	...	10%
	6	Sodium sulphate	...	16%
	7	CMC	...	1%
	8	Ranipal	...	0.2%
	9	Rose	...	0.2%
10	10	Water	...	12-13%

EXAMPLE IV

The following ingredients were taken in the proportion (by weight) indicated:

			Parts

15	1	Sodium alpha olefin sulphonate (containing 90% anhydrous sodium alpha olefin sulphonate)	... 18
	2	Sodium soap flakes (containing 90% anhydrous sodium soap)	... 5.5
	3	Sodium tripolyphosphate	... 15
20	4	Sodium bicarbonate	... 20
	5	Sodium carbonate	... 6
	6	Neutral sodium silicate (containing 40% anhydrous neutral sodium silicate)	... 25
	7	Sodium sulphate	... 17
25	8	Photine C	... 0.2
	9	Rose	... 0.2

The ingredients were mechanically mixed in a sigma mixer for 20 to 30 minutes at an elevated temperature of 50 C-55 C. The mixed dough formed was then milled in a triple roll mill into a ribbon form and the ribbons extruded in bar form through an extrusion plodder.

A moisture loss of about 3% occurred during the entire operation. The final composition of the extruded bar was as follows:

10	1	Sodium alpha olefin sulphonate (on anhydrous basis)	...	15-16%
	2	Sodium soap (anhydrous)	...	5%
	3	Sodium tripolyphosphate	...	15%
	4	Sodium <i>bicarbonate</i> 20%		
	5	Sodium carbonate	...	6%
15	6	Neutral sodium silicate (on anhydrous basis)	...	10%
	7	Sodium sulphate	...	16%
	8	Photine C	...	0.2%
	9	Rose	...	0.2%
	10	Water	...	12-13%

20 EXAMPLE V

The following ingredients were taken in a crutcher in the proportion (by weight) indicated:

	1	Sodium alpha olefin sulphonate (containing 40% anhydrous sodium alpha olefin sulphonate	...	60%
25	2	Sodium carbonate	...	15%



3	Alkaline sodium silicate (containing 48% anhydrous alkaline sodium silicate)	...	32%
4	Sodium sulphate	...	35%
5	CMC	...	1%
6	Photine C	...	0.2%
5	7 Lavender	...	0.2%
8	Phthalocyanine blue paste	...	0.1%
9	Water	...	10%

After mixing, the slurry was spray-dried. The
10 final composition of the spray-dried powder was as
follows:

1	Sodium alpha olefin sulphonate (on anhydrous basis)	...	24%
2	Sodium carbonate	...	15%
15	3 Alkaline sodium silicate (on anhydrous basis)	...	15%
4	Sodium sulphate	...	35%
5	CMC	...	1%
6	Photine C	...	0.2%
7	Lavender	...	0.2%
20	8 Phthalocyanine blue colour	...	0.05%
9	Water	...	10%

EXAMPLE VI

The following ingredients were taken in a
25 crutcher in the proportion (by weight) indicated:

1	Sodium alpha olefin sulphonate (containing 40% anhydrous sodium alpha olefin sulphonate)	...	50%
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	2	Sodium tripolyphosphate	...	15%
	3	Sodium carbonate	...	15%
	4	Alkaline sodium silicate (containing 48% anhydrous alkaline sodium silicate)	...	32%
5	5	Sodium sulphate	...	24%
	6	CMC	...	1%
	7	Ranipal	...	0.2%
	8	Jasmine	...	0.2%
	9	Phthalocyanine blue paste	...	0.1%
10	10	Water	...	15%

After mixing, the slurry was spray-dried. The final composition of the spray-dired powder was as follows:

	1	Sodium alpha olefin sulphonate (on anhydrous basis)	...	20%
15	2	Sodium tripolyphosphate	...	15%
	3	Sodium carbonate	...	15%
	4	Alkaline sodium silicate (on anhydrous basis)	...	15%
	5	Sodium sulphate	...	24%
20	6	CMC	...	1%
	7	Ranipal	...	0.2%
	8	Jasmine	...	0.2%
	9	Phthalocyanine blue colour	...	0.05%
	10	Water	...	10%

25 EXAMPLE VII

The following ingredients were mixed in the proportion (by weight) indicated:

1	Sodium alpha olefin sulphonate (containing 40% anhydrous sodium alpha olefin sulphonate)	...	50%
2	Coconut diethanolamide	...	2%
3	Sodium chloride	...	2%
5	4 Potassium pyrophosphate	...	5%
5	Methyl paraben	...	0.2%
6	Polyvinyl pyrrolidine	...	0.5%
7	Ranipal	...	0.1%
8	Rose	...	0.2%
10	9 Water	...	40%

The final liquid detergent contained 20% sodium alpha olefin sulphonate (on anhydrous basis).

EXAMPLE VIII

15 The following ingredients were mixed in the proportion (by weight) indicated:

1	Sodium alpha olefin sulphonate (containing 40% anhydrous sodium alpha olefin sulphonate)	...	25%
2	Sodium lauryl ether sulphate (containing 28% anhydrous sodium lauryl ether sulphonate)	...	18%
20	3 Coconut diethanolamide	...	2%
	4 Ethylene glycol monostearate	...	2%
	5 Potassium pyrophosphate	...	3%
	6 Sodium chloride	...	1.5%
	7 Polyvinyl pyrrolidine	...	0.5%
25	8 Ranipal	...	0.1%
	9 Methyl paraben	...	0.2%
10	Rose	...	0.5%
	11 Water	...	47.2%

The pH of the product was adjusted to 7.5 with citric acid.

The final pearlescent liquid detergent contained 10% sodium alpha olefin sulphonate (on anhydrous basis) and 5% sodium lauryl ether sulphate (on anhydrous basis).

CLAIMS

1 A method of manufacturing a laundry detergent
product containing sodium alpha olefin sulphonate
as the active detergent, which method comprises the
steps of converting fatty oil into fatty acid,
5 converting the fatty acid into saturated fatty
alcohol, dehydrating the saturated fatty alcohol at an
elevated temperature in the presence of a catalyst to
remove a molecule of water and form an olefin having a
double bond in the alpha position, sulphonating,
10 neutralising and hydrolysing the alpha olefin to
produce sodium *alpha* olefin sulphonate, mixing the
sodium alpha olefin sulphonate so produced with a
detergency builder to form a homogeneous mixture, and
processing said homogeneous mixture to obtain a
15 laundry detergent product which is resistant to hard
water and sea water.

2 A method as claimed in claim 1 wherein said
sodium alpha olefin sulphonate has C₁₂ to C₁₈
chainlength.

20 3 A method as claimed in claim 2, wherein said
sodium alpha olefin sulphonate has C₁₆ to C₁₈
chainlength.

4 A method as claimed in any one of claims 1 to 3
wherein the detergency builder comprises one or more
25 of the following:- borax, tetrasodium pyrophosphate,



* C L H S *

potassium pyrophosphate, trisodium phosphate, sodium silicate, sodium tripolyphosphate, polyvinyl pyrrolidine and carboxymethyl cellulose.

5 A method as claimed in any one of claims 1 to 4
5 wherein the mixture also includes a filler which comprises one or more of the following:- sodium sulphate, sodium chloride, talc, china clay and starch.

6 A method as claimed in any one of claims 1 to 5
10 wherein the mixture also includes an additive which comprises one or more of the following:- an optical brightener, a colouring agent, a perfume, an emollient, a preservative, a pearlescent agent and a foam booster.

15 7 A method as claimed in any one of claims 1 to 6 where in the mixture also includes a soap produced from a mixture of palm oil, coconut oil and groundnut oil.

8 A method as claimed in any one of claims 1 to 6
20 where in the mixture also includes a soap produced from a mixture of tallow, coconut oil and groundnut oil.

9 A method as claimed in any one of claims 1 to 8
25 wherein the mixture also includes a synthetic detergent which comprises one or more of the following:- alkyl benzene sulphonate, sodium lauryl ether sulphate and sodium lauryl sulphate.



- 10 A method as claimed in any one of claims 1 to 9 wherein the proportion of said sodium alpha olefin sulphonate present in said homogeneous mixture is from 5 to 30% by weight.
- 5 11 A method as claimed in claim 8 or claim 9 wherein the proportion of synthetic detergent(s) specified in claim 9 and/or soap(s) present in the mixture is up to 10% by weight.
- 10 12 A method of manufacturing hard water and sea water resistant laundry detergent product containing sodium alpha olefin sulphonate obtained from fatty oil as the active detergent substantially as herein described with reference to Examples I to VIII.
- 15 13 Hard water and sea water resistant laundry detergent product whenever manufactured by the method as claimed in any one of claims 1 to 12.
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