

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN THE MANUFACTURE OF DETERGENT POWDERS

(71) We, BELL CHEMICALS PTY. LIMITED an Australian Company of 28 Hines Road, O'Connor, Western Australia, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to improvements in the manufacture of detergent powders.

Hitherto most detergent powders have been made by neutralising a sulphonic acid with caustic soda and then spray drying the resultant product. As spray drying involves a considerable capital investment, considerable savings could be achieved if a detergent powder could be produced without the need for spray drying. Attempts have been made to use soda ash to neutralise the sulphonic acid but it has generally resulted in a pasty and/or lumpy product which required both drying and grinding or in an incompletely reacted product. It has now been found that a satisfactory product can be produced without the need for spray drying by mixing the sulphonic acid with soda ash in the presence of water, the amount of water being sufficient to ensure complete reaction between the soda ash and the sulphonic acid but insufficient to wet the resultant products.

According to the invention there is provided process for the production of a detergent powder which comprises mixing a sulphonic acid (which in the form of its sodium salt is a surfactant) with soda ash (as herein-after defined) in the presence of sufficient water to initiate and complete the reaction between the soda ash and the sulphonic acid to form a salt of the sulphonic acid but insufficient to wet the resultant product, which is a free flowing powder, the quantity of soda ash being in excess of that required for the reaction.

The amount of water required is critical and is governed by the temperature at which the reaction is carried out. As the temperature of the reaction is increased the amount of

water required is reduced. In practice the amount of water required for carrying out the process at temperatures within the range of 10°C to 180°C is in the range of 0.5% to 6% by weight of the reactants and is generally of the order of 4.0%. If more than 6% of water is used the resultant product contains excess moisture and may require drying. In calculating the amount of water present it is necessary to take into consideration any water of hydration present in the soda ash as well as uncombined water.

The soda ash is preferably finely divided to ensure that the water and sulphonic acid are absorbed readily. In general the particle size of the soda ash should be such that between 30% and 90% by weight will pass through a B.S.S. 120 mesh screen. For most purposes the particle size of the alkali is suitable if 60% by weight passes through a 120 mesh screen. The particle size distribution of a typical alkali for the purposes of the present invention is as follows:—

B.S.S. Screen Size	Percentage by Weight	
+ 16	0.2	
+ 25	2.3	
+ 36	1.5	
+ 60	5.9	75
+ 85	9.1	
+ 120	22.2	
+ 150	19.5	
+ 200	13.7	
+ 300	10.8	80
— 300	14.8	

The reaction is carried out in a suitable type of mixer under conditions in which the reactants are tossed and fluffed rather than balled or pasted. Suitable types of mixers include ribbon blenders, planetary mixers, or air transfer mixers. The mixing time depends to some extent on the type of mixer and the results have been obtained with fifteen minutes mixing in a ribbon blender and with five minutes mixing in a planetary type mixer.

[Price 33p]

The water and the sulphonic acid are preferably sprayed into the mixer and if necessary the sulphonic acid may be warmed slightly to reduce its viscosity.

- 5 If desired, portion (up to 50% by weight) of the soda ash may be replaced by one or more detergent builders such as phosphates to produce a built detergent powder.

- 10 Any alkyl aryl sulphonic acid may be used. A sulphonic acid derived from "DObane" (dodecyl benzene sulphonic acid) marketed by Shell Chemicals under the name "Dobane PT 6" is particularly suitable for the purposes of the present invention. The ratio of sulphonic acid to soda ash is preferably of the order of 1:4 by weight.

- 15 Whilst the invention has been described with particular reference to soda ash which is sodium carbonate, it is equally applicable to sodium or ammonium carbonates, bicarbonates, sesquicarbonates, their mixtures and hydrated forms and the term "soda ash" as used herein and in the claims is to be

interpreted as including the above named compounds and mixtures thereof.

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A satisfactory detergent powder having a moisture content of less than 4% by weight which is free flowing is prepared from the following formulation:—

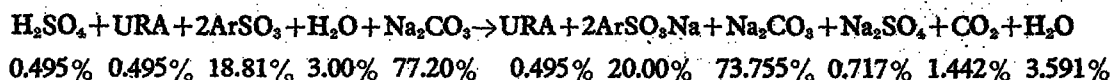
Light Soda Ash	77.2 parts by weight	30
Water	3.0 parts by weight	
Sulphonic Acid	19.8 parts by weight	
(Nansa SSA 055)		

(Nansa SSA 055 is an alkyl aryl sulphonic acid obtained by the sulphonations of a "Dobane" straight chain alkylate and comprises 95% reacted alkylate).

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The reaction involved in carrying out the process with the above formulation may be represented as follows where URA refers to unreacted alkylate and the percentages indicated are by weight of the total reactants:—

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The described embodiment of the present invention has the following advantages:—

1. Product produced is equivalent to spray dried product and is made with equipment of capital cost of 1% the cost of spray drying equipment.

2. Plant running costs are far cheaper than with spray drier as neither vacuum plus high temperatures, no high volume air plus high temperatures are used.

3. Final product is readily soluble due to even dispersion of water and sodium sulphonate.

4. Product is uniform dust free and of medium bulk density due to the formation of spheres of sodium sulphonates, sodium carbonate with water and carbon dioxide. The entrapment of the latter assists the bulk density and the free flowing properties of the resulting powder.

5. The entire process takes place in the one vessel.

6. The final product is ready for packaging for sale at the conclusion of the reaction. There is no need for cooling or aging prior to packaging.

7. The rate of production is higher than in the spray drying process as a completed batch is made in the same time as the first (neutralisation) step in the spray drying process.

WHAT WE CLAIM IS:—

1. A process for the production of a detergent powder which comprises mixing a sulphonic acid (which in the form of its sodium salt is a surfactant) with soda ash (as hereinbefore defined) in the presence of sufficient water of initiate and complete the reaction between the soda ash and the sulphonic acid to form a salt of the sulphonic acid but insufficient to wet the resultant product, which is a free flowing powder, the quantity of soda ash being in excess of that required for the reaction.

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2. A process as claimed in claim 1 wherein the total water content is in the range of 0.5% to 6.0% by weight of the reactants.

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3. A process as claimed in claim 1 or 2 wherein the soda ash is finely divided.

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4. A process as claimed in claim 3 wherein the particle size of the soda ash is such that between 30% and 90% by weight will pass through B.S.S. 120 mesh screen.

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5. A process as claimed in any one of the preceding claims wherein the mixing is carried out under conditions in which the reactants are tossed and fluffed, rather than balled or pasted.

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6. A process as claimed in any one of the preceding claims wherein the sulphonic acid is an alkyl aryl sulphonic acid.

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The water and the sulphonic acid are preferably sprayed into the mixer and if necessary the sulphonic acid may be warmed slightly to reduce its viscosity.

- 5 If desired, portion (up to 50% by weight) of the soda ash may be replaced by one or more detergent builders such as phosphates to produce a built detergent powder.

- 10 Any alkyl aryl sulphonic acid may be used. A sulphonic acid derived from "DObane" (dodecyl benzene sulphonic acid) marketed by Shell Chemicals under the name "Dobane PT 6" is particularly suitable for the purposes of the present invention. The ratio of sulphonic acid to soda ash is preferably of the order of 1:4 by weight.

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interpreted as including the above named compounds and mixtures thereof.

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A satisfactory detergent powder having a moisture content of less than 4% by weight which is free flowing is prepared from the following formulation:—

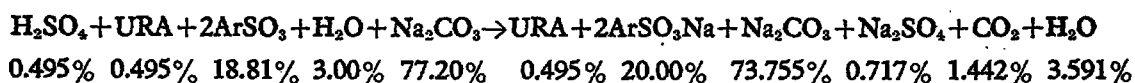
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2. A process as claimed in claim 1 wherein the total water content is in the range of 0.5% to 6.0% by weight of the reactants.

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3. A process as claimed in claim 1 or 2 wherein the soda ash is finely divided.

4. A process as claimed in claim 3 wherein the particle size of the soda ash is such that between 30% and 90% by weight will pass through B.S.S. 120 mesh screen.

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5. A process as claimed in any one of the preceding claims wherein the mixing is carried out under conditions in which the reactants are tossed and fluffed, rather than balled or pasted.

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6. A process as claimed in any one of the preceding claims wherein the sulphonic acid is an alkyl aryl sulphonic acid.

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* C L M S *

7. A process for the production of a detergent powder according to claim 1 substantially as herein described.

5 8. A detergent powder whenever produced by the process claimed in any one of the preceding claims.

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* C L N S *