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GRANULAR SOAP COMPOSITIONS CONTAINING CARBAMIDE

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This invention has to do with granular washing compositions that contain granular soap as an important constituent. This application is a continuation-in-part of my copending patent application, Serial Number 659,498 filed May 16, 1957, under the same title, now abandoned.

Such compositions ordinarily contain one or more major constituents in addition to soap, including, for example, synthetic detergents, trisodium phosphate, borax, and substantially inert fillers such as talc, wood flour, starch and the like. The term "granular" is employed throughout the present specification and claims with reference to compositions consisting of a large number of discrete solid particles, regardless of the fineness of division of the particles. For example, the term includes such materials as are commonly described as powdered.

In many such compositions it is desirable that the granular ingredients, including the soap, be finely divided. That is desirable, for example, to insure rapid solution of the water soluble components when the composition is used. Fine division of the granular materials is also desirable, particularly in a preparation intended for washing the hands, in order to provide a smooth and agreeable texture of the composition both before and after it is wet with water.

In previous soap compositions of the type described, it was generally not practicable to employ soap that was finely enough divided to fully satisfy such requirements. Although methods were known for producing granular soap of the desired fineness, it could not be used effectively, primarily because of its tendency when first wet to form gummy lumps. Such lumps become smeared over the object being washed, and are slow to dissolve and difficult to rinse off. That difficulty is particularly troublesome in granular soap compositions for washing the hands, since the lumps tend to adhere to the skin and may dissolve only after protracted rubbing. In order to avoid such lumping of the composition during use, it was previously not feasible in most granular soap compositions to employ soap particles as fine as was otherwise desirable.

Furthermore, even when the granular soap was not especially finely divided, previous compositions tended to produce lumping upon being wet if the ratio of soap to the other components was as high as was otherwise desirable for some purposes.

The present invention has successfully overcome those difficulties in a very simple and economical manner. The invention thus permits the preparation of effective and satisfactory granular soap compositions in which the soap granules are substantially as finely divided as may be desired. The invention also permits the preparation of granular soap compositions containing a far larger proportion of soap than was previously feasible.

I have discovered that lumping of a granular soap composition upon use can be controlled by including in the soap composition a suitable proportion of carbamide.

The carbamide is most effective for the present purpose when it is added as a solid granular component which is physically mixed with the other components of the composition. The carbamide is then capable of dissolving completely as soon as the composition is wet, and the effective rate of solution of the carbamide is not

significantly limited by the solution behavior of other ingredients of the composition.

Carbamide is useful for reducing lumping of soap compositions when present in proportions from about 0.5% to about 20% of the soap in the composition. Percentage figures here and throughout the present specification refer to percentages by weight.

A further aspect of the invention has to do with the fact that certain additives which may potentially improve the character of granular soap compositions tend to promote lumping of the composition when the latter is used. For that reason it has previously not always been feasible to employ such additives in effective concentrations without sacrifice of other desirable qualities. By providing a novel, effective and economical means of controlling the lumping of granular soap compositions, the invention permits free and effective use of additives of the described type.

A suitable type of polyacrylamide, for example, consists essentially of the high molecular weight polymer hydrolytes produced by homopolymerization of acrylamide and by its copolymerization with up to about 15 percent by weight of other suitable monomers such as alkyl esters of acrylic acid and methacrylic acid, methacrylamide, styrene, vinyl acetate, acrylonitrile, methacrylonitrile, vinyl alkyl ethers and vinyl and vinylidene chloride. From about 0.8 to about 10 percent of the amide groups of the polymer are typically replaced by carboxyl groups. Such polyacrylamide is typically characterized by a viscosity of at least 4 centipoises at a temperature of 21.5° C. for an aqueous 0.5 percent by weight solution adjusted to a pH of 3 to 3.5. Polyacrylamide of that illustrative type is available commercially under the trade name "Separan 2610." Polyacrylamide is known to act as an effective emollient when added to granular soap compositions in typical concentrations from about 0.1% to about 2%. I have discovered, however, that polyacrylamide also tends to promote lumping of the soap composition during use. That is particularly troublesome in just those compositions in which the emollient action of the polyacrylamide is most desirable, namely, in good quality compositions which are designed especially for washing the hands, and which contain a generous proportion of soap in the form of particles that are as finely divided as is practicable. My invention solves that difficutly, and makes it feasible to provide fully satisfactory granular soap compositions which possess in combination the three desirable characteristics: the smooth feel and rapid action of a relatively high concentration of very finely divided soap particles; the useful emollient quality contributed by polyacrylamide; and the rapid, free and uniform spreading of the wetted composition on the hands without lumping.

Many granular soap compositions include one or more granular materials in addition to the soap, which add body and may improve the chemical or physical action of the composition. Among such body-contributing materials, borax is known to be particularly useful and effective. Other granular body-contributing materials include cornstarch, sugar, wood flour, vermiculite, talc, calcium phosphate and potassium sulfate, for example, and mixtures of two or more materials. The soap component in the compositions of the invention may comprise any suitable type of alkali metal salt of a long chain fatty acid, such as is normally obtained by saponification of natural fats and oils. Such soaps as coconut soap, stearate soap, tallow soap and cottonseed soap are illustrative. Many compositions comprise a mixture of two or more such soap types. Other known additives may be included as may be desirable, such as perfume, foaming agents, coloring agents, emollients and other cosmetic agents, for ex-

ample. Such additives, which are ordinarily present in relatively minor proportions, may in some instances be provided as a separate granular component, but are frequently incorporated during preparation of one or more of the principal granular components.

The invention is particularly useful in connection with granular soap compositions containing more than about 30% by weight of soap. Many such compositions of the prior art tend to form gummy lumps during use even when the soap particles are relatively coarse, for example from 10 mesh or larger to about 30 mesh on the scale of United States Standard Sieve Sizes, which is employed throughout the present specification and claims. And as the soap particles of such prior art compositions are made finer, the lumping problem becomes progressively more troublesome. The invention completely solves that difficulty by addition of an appropriate proportion of carbamide. The exact proportion of carbamide that is most economical and otherwise desirable will naturally depend upon many factors, such as the use for which the composition is intended, the quantity and nature of other major components, if any, and the presence or absence of minor components that tend to enhance the described type of lumping. In general, in compositions containing more than about 30% soap of a particle size predominantly larger than about 30 mesh, lumping can be satisfactorily prevented by including in the composition an amount of carbamide equal to from about ½ to about 10% of the soap. The compositions A to C in Table 1 are illustrative of preparations of this general type in which lumping during use is substantially or wholly avoided. In those compositions the soap is made up of 35 percent coconut soap and 65 percent tallow soap, that mixture being typical of good quality hand soap compositions. The compositions of Table 1 are simplified for clarity of description by omitting such minor additives as have been described, which may be included in known manner as may be desired.

Table 1

	A	B	C
Soap (−10 to +30 mesh)——percent	35	60	96
Borax (−30 to +100 mesh)——do	64	38	——
Carbamide, granular——do	1	2	4

The invention is also particularly useful in connection with granular soap compositions in which the soap is predominantly finer than about 30 mesh. Such compositions in the prior art tend to form lumps during use even when they contain a relatively high concentration of ingredients other than soap; and that difficulty increases progressively with the soap content and with the fineness of the soap particles. Addition of an appropriate proportion of carbamide completely eliminates that difficulty, making feasible for the first time a wide and particularly useful range of new granular soap preparations.

For example, even in a composition containing only about 10% of granular soap of a particle size predominantly finer than 30 mesh, some difficulty from lumping may be encountered. That potential difficulty can be avoided by addition of a relatively small proportion of carbamide, for example from about 0.5% to about 10% on the weight of the soap.

On the other hand, previously available compositions consisting substantially wholly of granular soap of comparable fineness were practically useless for such purposes as washing the hands, for example, because they would immediately form pasty masses which would cling to the object being washed and dissolve only with protracted rubbing. By the simple addition of from about 5% to about 20% of carbamide to such compositions, I have found that they spread smoothly and uniformly over the hands and yield a rich lather remarkably rapidly.

The typical compositions D to H listed in Table 2 are

illustrative of the utility of the invention in connection with granular soap compositions in which the soap particles are very finely divided. In those compositions the soap is of the type already described in connection with Table 1. The polyacrylamide is of the typical form already described. As in Table 1, the compositions of Table 2 may be varied in many respects, including amendment by additives of many types.

Table 2

	D	E	F	G	H
Soap (−80 to +200 mesh)——percent	15	35	60	75	85
Borax (−100 to +325 mesh)——do	83	60	33	16	——
Polyacrylamide——do	1	1	1	1	1
Carbamide, granular——do	1	4	6	8	14

All of the compositions of Table 2 are substantially completely free of any tendency toward lumping during use; yet if the carbamide is omitted, lumping is a potentially serious problem in those compositions, and it renders most of them completely useless for any ordinary washing purposes.

In compositions A and B of Table 1 and D to G of Table 2 borax is given illustratively as a principal component, and has been found to be particularly desirable. However, the borax in those compositions may be replaced in whole or in part by other known body-giving ingredients such as have been indicated above, including those materials that are substantially inert fillers.

The indicated polyacrylamide content of compositions D to H is typical of the amount that has been found to be generally beneficial. If that component is omitted, the amount of carbamide required to give the same degree of freedom from lumping is somewhat reduced; and if the amount of polyacrylamide is increased, for example, the corresponding proportion of carbamide is increased somewhat. Also, ingredients tending to enhance lumping, such as polyacrylamide, may be added if desired to the compositions of Table 1, and the corresponding proportion of carbamide is thereby increased somewhat. However, the carbamide proportions given in Tables 1 and 2 are illustrative of intermediate values. That is, carbamide is useful for controlling lumping of the compositions shown when added to such compositions over a considerable range of proportions, which range extends generally on both sides of the illustrative values in the tables.

I have discovered that a given proportion of carbamide acts most effectively to prevent lumping of a granular soap composition when it is provided in granular form and is intimately mixed physically with the other granular components of the composition. To secure satisfactory and stable admixture of the carbamide it is desirable that its particle size is comparable to, or somewhat finer than, that of the other componets. In the compositions of the tables, for example, carbamide predominantly finer than 100 mesh is satisfactory. However, since carbamide is rapidly soluble in water, presence of larger particles of carbamide does not seriously slow its action and is less noticeable to the user than an equal number of large particles of a less soluble component.

The manner of action of the carbamide in preventing lumping of granular soap compositions during use is not fully understood. Although carbamide is somewhat hygroscopic, other hygroscopic materials that have been tried do not accomplish the present result. For example, a composition generally similar to G in Table 2, but in which the carbamide is replaced by 10 percent of disodium phosphate (Na_2HPO_4), lumps bady when used. As a further example, calcium chloride ($CaCl_2$), a well known hygroscopic agent, is useless for the present purpose, since addition of a small proportion such as 1 percent is ineffective, while larger proportions destroy the solubility and lathering qualities of the soap. Moreover, the carbamide definitely does not depend for its action

upon elimination of the fine particles from the composition, as by causing them to agglomerate into larger particles or to adhere to larger particles already present. For example, if a very finely divided soap composition is not treated to remove any soap dust that is present, as by sieving or air separation, the dust is found to persist even in the presence of carbamide under normal packaging and storing conditions. Whereas such dust is not usually desirable in a commercial product, the presence of a suitable proportion of carbamide, as already described, overcomes its normal tendency to produce lumping of the composition during use.

A particularly important field of utility of the invention relates to granular soap compositions for washing the hands. I have discovered that addition of only a few percent of carbamide to such compositions sometimes permits very considerable improvement in the quality of existing compositions, by controlling lumping and thus permitting the compositions to be modified in respects that were previously impracticable. Such improvements include, in particular, reduction of the particle size, especially of the soap, to improve the "feel" of the composition during use and to accelerate its action; increase of the soap content; and addition of components such as polyacrylamide. In many instances only a relatively slight modification of that type is required to provide an important improvement in quality of the composition; and under such conditions only a few percent of carbamide is needed. At the same time, merely by appropriate increase of the carbamide content, the invention permits for the first time in actual practice freedom to carry out such variations as have been described to any degree that may reasonably be desired.

A particularly convenient and effective range of non-lumping compositions for washing the hands comprises from about 20% to about 50% granular soap of a particle size predominantly finer than about 30 mesh and of a type suitable for toilet use such, for example as from 10 to 40 percent coconut soap and from 90 to 60 percent tallow soap; from about 50% to about 80% of body-giving material, preferably borax of a particle size predominantly finer than about 40 mesh; and an amount of carbamide corresponding to from about 1% to about 10% of the soap in the composition.

The specific examples given above are intended only as an illustration of the invention and not as a limitation upon its scope, which is defined in the appended claims. Many changes can be made in the particulars of the described compositions without departing from the proper scope of the invention. In particular, any type of soap suitable for hand use, including those mentioned, may be employed, and the amount of carbamide may be varied within the general limits indicated to produce products having a wide variety of detailed characteristics.

I claim:

1. A free-flowing granular washing composition consisting essentially of at least 10% of granular soap predominantly finer than about 30 mesh, and carbamide in sufficient quantity to substantially prevent lumping of the composition during use, the amount of carbamide in the composition being from about ½% to about 20% of the granular soap in the composition.

2. A free-flowing granular washing composition consisting essentially of more than about 30% of granular soap predominantly finer than about 30 mesh, and carbamide in sufficient quantity to substantially prevent lumping of the composition during use, the amount of carbamide in the composition being between about ½% and about 20% of the granular soap in the composition.

3. A free-flowing granular washing composition consisting essentially of granular soap predominantly finer than about 30 mesh and carbamide, the amount of carbamide in the composition being from about 5% to about 20% and being sufficient to substantially prevent lumping of the composition during use.

4. A free-flowing granular washing composition consisting essentially of at least about 10% of granular soap predominantly finer than about 30 mesh, between about 0.1% and about 2% of a polyacrylamide emollient which tends to promote lumping of the composition during use, and carbamide in sufficient quantity to substantially prevent such lumping, the amount of carbamide in the composition being from about ½% to about 20% of the granular soap in the composition.

5. A free-flowing granular washing composition consisting essentially of from about 20% to about 50% of granular soap of a particle size predominantly finer than about 30 mesh, from about 50% to about 80% of granular borax of a particle size predominantly finer than about 40 mesh, and granular carbamide in sufficient quantity to substantially prevent lumping of the composition during use, the amount of carbamide in the composition being from about 1% to about 10% of the soap in the composition.

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