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SOAP PRODUCT

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This invention relates to novel soap products. More particularly, it relates to soap products in the form of sheets or films which are adapted to be used individually for a single washing of the hands or face.

It has been proposed heretofore to prepare soap in the form of thin perforated sheets or tablets such that a single piece may be torn off for use in each washing operation. Soap sheets of this type, however, have numerous disadvantages which are inherent in the physical properties of soap. They are brittle and fragile and are thus not well adapted to be carried about by the user nor for dispensing in lavatories without excessive breakage and crumbling. Moreover, it is difficult to manufacture soap in thin sheets of this kind for much the same reasons. It has also been proposed to prepare soap leaves by passing continuous sheets of tissue paper through a hot soap solution, scraping off the excess soap from the surface of the paper and then drying. In soap sheets of this kind it is possible to secure only a relatively thin coating of soap, otherwise the soap will tend to break and flake off upon flexing of the sheets. Moreover, when such sheets are used the paper base forms an objectionable insoluble residue.

It is an object of the present invention to provide an improved soap product; a further object is to provide soap products in the form of flexible self-sustaining sheets which are completely and readily soluble in water; a further object is to form soap sheets which contain a predominating proportion of soap. Still other objects of the invention will be apparent from the ensuing description of my invention.

The foregoing and related objects are accomplished in accordance with my invention by preparing films from soap and a hydrophilic polymerized vinyl compound. Such films or sheets can be readily prepared by any of the known methods for producing synthetic sheeting, for example by casting aqueous solutions of soap and the polymerized vinyl compound on a suitable support and drying to form a film, or by extruding such a solution or paste through a flat nozzle.

The term "hydrophilic polymerized vinyl compound," is used herein and in the appended claims to include polyvinyl alcohol and such derivatives thereof as are soluble or self-dispersible in water. Such derivatives include the partial esters, ethers and acetals of polyvinyl alcohol which contain sufficient free hydroxyl groups in the molecule to be water-soluble. Such derivatives may be prepared by the partial saponification or

hydrolysis of polyvinyl esters, polyvinyl ethers and polyvinyl acetals. Conversely, they also may be prepared by the partial reaction of polyvinyl alcohol with acids, aldehydes or other reagents which react with hydroxyl groups. In general, those partial derivatives which contain from about 65% upward of free hydroxyl groups are soluble in water and adapted for use in the present invention. The preferred hydrophilic polymerized vinyl derivatives, for the purposes of the present invention, are the partial esters of polyvinyl alcohol wherein about 4% to 25% of the hydroxyl groups in the molecule have been esterified. In general I prefer to use partial acetates of polyvinyl alcohol having saponification numbers of from about 50 to 250, corresponding to about 5% to 25% esterification of the hydroxyl groups. Such partial esters have the advantage of being more quickly soluble in water, especially in cold water, than the pure polyvinyl alcohols of corresponding degree of polymerization.

Practically any type of soap may be used in preparing the products of the invention, although it is usually preferred to utilize a good grade of toilet soap. Also, I may use any of various soap equivalents or substitutes which are known in the art. For example, I have prepared highly satisfactory soap films utilizing, as the soap ingredient, the sulfates of higher alcohols of the type that have in recent years been introduced into the trade under various trade names such as "Gardinol," "Duponol" and others. For the sake of brevity, I use the term "soap" herein and in the appended claims to include not only the usual soaps consisting of alkali salts of fatty acids but also soap equivalents and substitutes as, for example, the sulfation and sulfonation products of various organic alcohols, acids and esters and salts of such products.

Although satisfactory films can be prepared from the soap ingredient and the hydrophilic polymerized vinyl derivative alone, I usually prefer to incorporate therewith a softening or plasticizing agent which serves to increase the flexibility and strength of the film. For this purpose glycerol has been found to be very satisfactory although other softening agents may be used as, for example, glycols, such as ethylene glycol, propylene glycol, butylene glycol and diethylene glycol; also starches, sugars, dextrin, sorbitol, glucose-amine, formamide, ethanol formamide and salts of ethanolamines such as ethanolamine stearate. The glycerol or other softening agent is usually added in an amount equivalent to about 2% to 10% of the composition.

If desired, other materials may be added to the composition as, for example, perfumes, scents, coloring materials, medicinal or germicidal agents.

- 5 In general, it is desirable to include as large a proportion of soap in the sheet as will yield a film of satisfactory strength and flexibility. It has been found possible to prepare films containing up to 90% of soap although, for the best
10 physical properties of the films, it is generally preferable to use a maximum of about 80% of the soap ingredient. While there is no definite lower limit with respect to the proportion of the soap ingredient, I prefer to utilize at least 50%
15 soap in my compositions.

As illustrative but not restrictive of the invention the following examples are given to show the composition of typical soap sheets prepared in accordance with the invention:

20	<i>Example I</i>	Parts
	"Jap Rose" soap	80
	Polyvinyl alcohol	20
25	<i>Example II</i>	
	"Jap Rose" soap	80
	Partial acetate of polyvinyl alcohol (saponification number 200)	20
30	<i>Example III</i>	
	"Ivory" soap	77
	Partial acetate of polyvinyl alcohol (saponification number 200)	19
	Glycerol	4
35	<i>Example IV</i>	
	"Duponol" AW (sulfated lauryl alcohol)	75
	Partial acetate of polyvinyl alcohol (saponification number 200)	18
40	Glycerol	7
	<i>Example V</i>	
	Kirk's "Cocoa" soap	38
	Kirk's "Tallow" soap	38
45	Partial acetate of polyvinyl alcohol (saponification No. 150)	15
	Glycerol	9

The soap films of the above examples were prepared as follows:

- 50 The dried and finely powdered soap was mixed with a 5% aqueous solution of the polyvinyl alcohol (or partial acetate of polyvinyl alcohol). In the examples where glycerol was used, this was added at the same time. The resulting mixture
55 was slowly heated with stirring until the soap was dissolved and the temperature had reached approximately 70° C. A layer of the solution about 0.02 inch in thickness was then spread on a casting plate and dried at a temperature of 70° C.
60 In all cases a flexible film of excellent mechanical properties was obtained. The film produced in Example I, where pure polyvinyl alcohol was used, was somewhat less satisfactory than the other films, in that it was more slowly soluble in water,
65 particularly in cold water. All of the other films showed excellent water-solubility in addition to satisfactory strength and flexibility. In all cases a sheet about two inches square provided an ample supply of soap for a single washing of the hands and face. Sheets of the type shown in Example
70 IV, wherein a sulfated higher alcohol is utilized as the detergent ingredient, are particularly adapted for use in hard water inasmuch as they do not form insoluble soaps with calcium and
75 magnesium salts.

Soap sheets prepared in accordance with the invention may be cut into sheets two or three inches square and a number of the sheets bound into booklets which may be conveniently carried
5 in the pocket or purse. At the time of use, it is necessary only to tear a sheet from the booklet. The sheets may also be made in the form of continuous strips which may be wound on reels for installation in a suitable dispensing device in
10 lavatories. The desired length of strip may be cut or torn off at the time of use; if desired, suitable perforations may be provided at intervals along the length of the strip to facilitate tearing.

Although the present invention is primarily concerned with the production of flexible soap sheets such as just described, it is not restricted thereto. Thus, I have found it to be of considerable advantage to incorporate hydrophilic polymerized vinyl compounds in soap which is to be formed
20 into the usual cakes, bars, or tablets. The hydrophilic vinyl compounds serve to improve the strength of the cakes, rendering them less susceptible to breakage when worn thin, and to retard drying out and cracking resulting therefrom. In
25 addition, the modified soaps have a pleasing texture and improved detergent properties.

It is to be understood that the invention is not restricted to any of the specific proportions, procedures, or ingredients described hereinabove but includes all such variations, modifications and equivalents as fall within the scope of the appended claims.

I claim:

1. A flexible self-sustaining water-soluble sheet having detergent properties comprising soap as a major constituent and a hydrophilic polymerized vinyl compound.
2. A flexible self-sustaining water-soluble sheet having detergent properties comprising soap as a
40 major constituent and polyvinyl alcohol.
3. A flexible self-sustaining water-soluble sheet having detergent properties comprising soap as a major constituent and a partial ester of polyvinyl alcohol wherein from about 4% to 25% of the
45 hydroxyl radicals are esterified.
4. A flexible self-sustaining water-soluble sheet having detergent properties comprising soap as a major constituent and a partial acetate of polyvinyl alcohol having a saponification number of
50 from about 50 to about 250.
5. A flexible self-sustaining water-soluble sheet having detergent properties comprising soap as a major constituent, a hydrophilic polymerized vinyl compound and a plasticizer therefor.
6. A flexible self-sustaining water-soluble sheet having detergent properties comprising soap as a major constituent, polyvinyl alcohol and a plasticizer therefor.
7. A flexible self-sustaining water-soluble sheet having detergent properties comprising soap as a major constituent, polyvinyl alcohol and glycerol.
8. A flexible self-sustaining water-soluble sheet having detergent properties comprising soap as a
65 major constituent, a partial ester of polyvinyl alcohol wherein about 4% to 25% of the hydroxyl radicals are esterified, and a plasticizer therefor.
9. A flexible self-sustaining water-soluble sheet having detergent properties comprising soap as a
70 major constituent, a partial ester of polyvinyl alcohol wherein about 4% to 25% of the hydroxyl radicals are esterified, and glycerol.
10. A flexible self-sustaining water-soluble sheet having detergent properties comprising soap as a
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major constituent, a partial acetate of polyvinyl alcohol having a saponification number of from about 50 to about 250 and a plasticizer therefor.

11. A flexible self-sustaining water-soluble sheet having detergent properties comprising soap as a major constituent, a partial acetate of polyvinyl alcohol having a saponification number of from about 50 to about 250 and glycerol.

12. A flexible self-sustaining water-soluble sheet having detergent properties comprising about

50% to 90% soap, 10% to 50% of a partial acetate of polyvinyl alcohol having a saponification number from about 50 to about 250.

13. A flexible self-sustaining water-soluble sheet having detergent properties comprising about 50% to 80% soap, 10% to 50% of a partial acetate of polyvinyl alcohol having a saponification number from about 50 to about 250, and about 2% to 10% of glycerol.

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