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DETERGENT BAR

Gordon W. Bell, Jr., Wilmington, Del., assignor to
Avisun Corporation, Philadelphia, Pa., a corpora-
tion of Delaware

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This invention relates to a novel detergent bar, and more particularly to a detergent bar composed of a detergent held in a matrix of a sintered thermoplastic resin.

It is an object of this invention to produce a detergent bar which will retain its original dimensions until substantially all of the detergent has been extracted therefrom.

It is a further object of this invention to provide a detergent bar which, in use, exerts a mildly abrasive action.

In accordance with the invention, these objects are attained by intimately mixing with the detergent a powder of a thermoplastic resin, heating the mixture to a temperature at which the powder will sinter, and then forming the mixture into a bar of the desired size and shape. It is essential to the invention that the mixture contain from about 15% to about 35% of the powder, since at lower concentrations of powder the bar will not retain its original dimensions during use, and at higher concentrations of powder a considerable amount of detergent cannot be leached from the bar during use, and is thus wasted.

The thermoplastic resin component of my novel detergent bar may be any thermoplastic resin having a melting point low enough that the detergent component of the composition will not decompose during the formation of the bar. Such resins include polyethylene, polypropylene, ethylene-propylene crystalline block copolymers, polystyrene, acrylic resins, acrylic copolymers, nylon, vinyl polymers and copolymers such as polyvinyl chloride and polyvinyl butyral, cellulosic plastics such as cellulose acetate and cellulose butyrate, and other thermoplastic polymers of similar nature.

The detergent component of the bar may be any water-soluble material having surface-active properties such as the sodium and potassium soaps of fatty acids. It is noteworthy that the potassium soaps may be utilized in my bar, since heretofore it has not been practicable to use such soaps in bar form due to their very soft consistency. Synthetic detergents may also be used. Examples of anionic detergents useful for my purpose include the alkali metal, ammonium, and alkaline earth metal salts of long chain alkyl aryl sulfonates, such as the sodium salt of dodecyl benzene sulfonate; N-long chain acyl N-alkyl taurates, such as sodium oleoyl methyl taurate; long chain alkyl oxyethylene sulfates, such as sodium laurylpolyoxyethylene sulfates; long chain alkyl aryl oxyethylene sulfates, such as ammonium nonylphenol polyoxyethylene sulfate; long chain alkyl sulfates, such as potassium lauryl stearate; and long chain alkyl isothionates such as sodium lauryl isothionate, and mixtures thereof.

The detergent component may also consist of a nonionic surfactant, such as the condensation product of an epoxide such as ethylene oxide with a fatty acid, an alkyl phenol, an alkyl mercaptan, a fatty alcohol, or a fatty amide, provided only that sufficient epoxide is incorporated into the molecule to render it water soluble.

Cationic surfactants such as long chain quaternary ammonium salts or salts of higher alkyl amines, for example, cetyltriethylammonium chloride or diethylmethyl-(2-oleamidoethyl) ammonium methyl sulfate can also be used as the detergent component.

It will be understood that builders such as sodium sulfate or sodium tripolyphosphate may also form a part of the detergent component.

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In order that those skilled in the art may better comprehend the nature of my invention and the method of carrying it out, the following examples are given.

Example 1

Five parts by weight of soap and one part by weight of a mixture of mono- and di-fatty acid glycerides were melted. About one-half part by weight of polypropylene powder was gradually stirred into the melt, which was heated to 200° C. The resulting lump of molten polypropylene was removed, then placed in a mold and solidified. The bar retained its original dimensions after seven hand-washings.

Examples 2 through 9

Various amounts of a commercial detergent powder recommended for use in cleaning laboratory glassware were mixed with various amounts of a thermoplastic resin. The mixtures were then heated on a hot plate until a sticky uniform mass was obtained. The temperature of the mass was about 200° C. in the examples in which polypropylene was used, and about 150° C. when low density polyethylene was used. This was then placed in a textured mold and cooled to yield a solid plate about one-eighth-inch thick in Examples 2 through 7 and one-inch thick in Examples 8 and 9. One-inch squares were cut from each plate and extracted with warm water until a negligible amount of detergent was detected in the wash water. The squares were then weighed and observed for physical appearance. Results of these tests are given in the following table:

TABLE 1

Ex. No.	Resin	Percent (by wt.) Resin	Percent Detergent Extracted	Appearance of Square
2	PP	50	30	Firm.
3	PP	40	45	Do.
4	PP	30	90	Do.
5	PP	20	97.5	Do.
6	PP	10	97	Soft and crumbly.
7	PP	5	97	Do.
8	PPE	20	96	Firm.
9	PE	20	96	Do.

PP = Crystalline polypropylene.

PPE = Propylene-ethylene crystalline block copolymer.

PE = Polyethylene.

As may be observed from the foregoing, if the resin is present in an amount of 40% by weight or higher, the square remains firm, but over half of the detergent was unextractable and therefore wasted. At resin concentrations of 10% and below, the squares were soft and crumbly and would not have retained their original dimensions during use. However, at 20 and 30% concentration, 90% and over of the original detergent content was usable, and the squares retained their original dimensions.

While in the foregoing examples the powder mixture was sintered prior to being placed in the mold, it should be obvious to those skilled in the art that the powder mixture may be placed in a mold and heated therein to the sintering temperature.

The invention claimed is:

1. As a new composition of matter, a detergent bar consisting of a solid water soluble detergent selected from the group consisting of soaps, anionic, nonionic and cationic detergents held in a solid matrix of a sintered thermoplastic resin, wherein the sintered resin constitutes from about 15% to about 35% of the weight of the bar.

2. The composition of claim 1 wherein the resin is polypropylene.

3. The composition of claim 1 wherein the resin is a crystalline propylene-ethylene copolymer.

4. The composition of claim 1 wherein the resin is polyethylene.

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5. Method of forming a detergent bar which comprises intimately mixing a solid water soluble selected from the group consisting of soaps, anionic, nonionic and cationic detergents with a powdered thermoplastic resin, wherein the resin constitutes from about 15% to about 35% of the weight of the mixture, heating the mixture to the sintering temperature of the resin, and cooling to ambient temperature.

6. The process of claim 5 wherein the resin is polypropylene.

7. The process of claim 5 wherein the resin is a crystalline propylene-ethylene copolymer.

8. The process of claim 5 wherein the resin is polyethylene.

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LEON D. ROSDOL, *Primary Examiner.*

W. E. SCHULTZ, *Assistant Examiner.*