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SOAP FORMULATION FOR POLISHING ALUMINUM SURFACES

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ABSTRACT OF THE DISCLOSURE

Metallic mat scouring pads including a soap formulation containing about from 1 to about 10 percent by weight of pentahydrate borax. The soap formulation can also contain from 8 to about 60 percent saponified fatty acids, from 1 to 8 percent anhydrous sodium carbonate and about 20 to 60 percent water.

The present invention relates to soap formulations suitable for use in metallic mat scouring pads. More specifically the invention provides an improved soap formulation of the foregoing type that is very advantageous for shining aluminum surfaces.

A commercially acceptable scouring pad should provide a good shining effect on aluminum surfaces since most pots and pans in use are made of this metal. Additionally the soap formulation used in scouring pads should have a relatively low viscosity at elevated temperature for ease of applying the soap to the metal pad during its manufacture, and a high consistency at room temperature so that the soap remains in the pad and provides the required cleaning and shining effect when exposed to aqueous scouring conditions.

Prior art soap formulations of the foregoing type are characterized by including a variable amount, usually less than about 10 percent by weight, of an inorganic builder salt to provide alkalinity to the scouring environment and to prevent oxidation of the pad, which is usually a form of steel wool. The most commonly used builder salt for scouring pad formulations is sodium carbonate, which is alkaline, inexpensive, and effective in preventing the steel wool pad from rusting. However, it has been observed that the shining effect provided by sodium carbonate containing soap formulations is unpredictable and seems to improve with ageing of the pad.

In view of the foregoing, a primary objective of the invention is to provide a soap formulation for scouring pads that inhibits rusting of the metallic pad, has a viscosity low enough at slightly elevated temperatures to permit uniform impregnation of the metallic pad and a high consistency at room temperature, while providing aluminum surfaces with a good, consistent shine.

In accordance with the invention, it has been found that the incorporation of a small amount of borax salt into sodium carbonate containing soap formulations provides outstanding shining properties for aluminum surfaces, without adversely affecting the desirable rust inhibiting properties characteristic of sodium carbonate containing soap formulations. The new formulations provide very advantageous aluminum shining properties while retaining a low viscosity at elevated temperatures, high consistency at room temperature and good rust inhibiting properties.

In accordance with a further aspect of the invention, the specific fatty acids used to derive the soap portion of the new formulations, and their relative quantities, have been found to be important in obtaining the desired properties in the final product. The new formulations typically utilize

a combination of saponified distilled palm oil fatty acids and distilled palm kernel-coconut oil fatty acids. Most advantageously the soap portion of the new formulation includes saponified distilled palm oil fatty acids and distilled palm kernel-coconut oil fatty acids in a weight ratio of about 40/60 respectively. Although saponification of the preferred fatty acids can be accomplished with a variety of alkali metal hydroxides, it is preferred to utilize a 34.2 percent by weight potassium hydroxide caustic potash solution.

The new formulations include from about 1 to 8 percent by weight of anhydrous sodium carbonate and from 1 to 10 percent by weight of borax salt preferably in pentahydrate form. It is also advantageous to include from about 1 to 5 percent by weight of technical grade sodium nitrite into the formulation. Of course, various amounts and types of dyes and perfumes can also be present for desired color and fragrance characteristics. A predetermined amount of formula water, usually from 20 to 60 percent by weight is also present.

The preferred method for producing the new soap formulations includes the introduction of the saponifying agent, preferably a 34.2 percent by weight potassium hydroxide caustic potash solution, in a saponification tank followed by the addition to the tank of anhydrous sodium carbonate in the form of an aqueous solution with about one half of the formula water at about 80° C. The alkaline solution is mixed and heated to 80° C.–90° C. The palm oil fatty acids, followed by the palm kernel-coconut oil fatty acids are then added to, and saponified in, the tank. The saponification reaction is run for about 2 hours while maintaining the reaction mass under continuous boiling with direct steam. After the saponification reaction is complete the mixture is boiled for an additional ten minutes after which the steam is shut off and the reaction mass is mixed for about 30 minutes. The formula amount of sodium nitrite is then added and the mass is mixed for an additional 30 minutes or so. The free alkalinity of the mixture, as Na_2O, is adjusted at this point so that less than about 0.10% by weight of Na_2O is present in the final soap formulation. If significantly more than about 0.1% Na_2O by weight is present in the final formulation, the shining ability of the new soap may be adversely affected. A solution containing the borax pentahydrate and the remainder of the formula amount of water is heated to about 80° C. and slowly added to the soap mass in the tank. The mass is again mixed for about 30 minutes and analyzed for weight percent water. If necessary, the amount of water present is adjusted to the formula amount. The dye and perfume are then added, and the soap mass is again mixed for about 30 minutes after which it is ready for application to steel fiber pads in accordance with techniques well known in the art.

In accordance with the invention, the new soap formulation can be characterized by the following Table I (all percentages by weight).

TABLE I

Ingredients	Preferred, weight percent	Range, weight percent
Distilled palm oil fatty acids	14.100	3–25
Distilled palm kernel-coconut oil fatty acids	21.140	5–31
34.2%	24.500	20–35
Anhydrous sodium carbonate	5.000	1–5
Pentahydrate borax	4.000	1–10
Sodium nitrite-technical	2.500	0–8
Perfume	0.100	0–0
Waxokine Red OS (1 Cl)	0.004	0–0.05
Water	28.656	20–60

The final soap product obtained from the foregoing preferred formulation has the following characteristics:

Total fatty acids including unsaponifiables	35.1±1.0%.
Moisture	49.4±1.0%.
Free alkolics as Na_2O	0.10% max.

The following example illustrates the invention in more specific terms and is presently preferred in practicing the invention.

A quantity of 2,820 kg. of distilled palm oil fatty acids and 4,228 kg. of distilled palm kernel-coconut oil fatty acids were saponified with an alkaline solution containing 4,900 kg. of 34.2% KOH caustic potash, 1,000 kg. of sodium carbonate, and 3,000 kg. of water. After saponification, 500 kg. of sodium nitrite and 800 kg. of borax pentahydrate dissolved in 2731.2 kg. of water 80° C. were added to the soap mass. The mixture was then boiled for 10 minutes by direct steam after which 20.8 of a dye-perfume mixture was added.

The foregoing soap formulation has a viscosity of about 1,000 cps. at 70° C. (Brookfield RVT viscometer, speed 20-spindle No. 3) and a consistency at room temperature of about 80 as measured on a Green hardness apparatus. Additionally, this formulation inhibits the rusting of steel wool mats it is combined with and has an excellent shining effect on aluminum surfaces that does not seem to vary with ageing of the pads.

Further, it was found that, although the ability of the new formulation to shine aluminum surfaces did not vary appreciably as the palm oil fatty acid to palm kernel-coconut oil fatty acid weight ratio was varied between about 15/85 and 40/60 respectively, the viscosity and consistency of the soap mass was significantly affected. In accordance with the invention, it was found that as the weight ratio of palm oil fatty acids to palm kernel-coconut oil fatty acids was decreased from the preferred 40/60 ratio the resulting viscosity of the formulation at 70° C. and consistency became progressively more unsatisfactory from a production standpoint. The most satisfactory mixture, and the one preferred at present, is the 40/60 formulation described in the foregoing example.

The new formulations, in accordance with the invention, overcome the variable aluminum shining ability of sodium carbonate containing soap formulations for scouring pads without adversely affecting the advantageous viscosity, consistency and rust inhibiting characteristics of such formulations. The incorporation of the formula amount of borax salt, in the presence of sodium carbonate builder provides the new formulations with an outstanding and consistent ability to shine aluminum surfaces while the utilization of the specifically defined weight ratio of palm oil to palm kernel-coconut oil fatty acids in the soap portion of the formulation result in the desired viscosity and consistency characteristics.

Although the foregoing specific examples are presently preferred in practicing the invention, reference should be made to the following claims in determining the full scope of the invention.

What is claimed is:

1. A scouring pad, comprising a mat of metallic fibers impregnated with a soap formulation, said soap formulation consisting essentially of,
   (a) from about 1 to about 8 percent by weight of anhydrous sodium carbonate,
   (b) from about 1 to about 10 percent by weight of borax,
   (c) from 0 to about 5 percent by weight of sodium nitrite,
   (d) from about 20 to about 60 percent by weight of water,
   (e) from 0 to about 1 percent by weight of dye and perfume, and
   (f) the balance of said soap formulation including the saponification reaction product of from about 3 to about 25 parts distilled palm oil fatty acids and about 5 to 35 parts distilled palm kernel-coconut oil fatty acids, with an alkali metal hydroxide solution.

2. The scouring pad of claim 1 including,
   (a) about 5 percent by weight of said anhydrous sodium carbonate,
   (b) about 4 percent by weight of said borax, and
   (c) about 2.5 percent by weight of said sodium nitrite.

3. The scouring pad of claim 2 wherein,
   (a) said balance of the soap formulation is the saponification reaction product of about 14 parts of distilled palm oil fatty acids and about 21 parts of distilled palm kernel-coconut oil fatty acids with about 24.5 parts of a 34.2% potassium hydroxide solution.

4. The scouring pad of claim 1 wherein said borax is pentahydrate.

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