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EMULSIFIABLE WAX PRODUCT

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The present invention relates to improvements in emulsifiable wax products, and relates more particularly to wax emulsion stocks suitable for use in various processes, such as the manufacture of water-proof paper, cardboard, and the like, or in the finishing of textile materials, leather, and similar fibrous materials.

The present invention is particularly directed toward a wax emulsion stock capable of being readily converted into an aqueous emulsion of a desired concentration, obviating the necessity of carefully compounding the separate ingredients at the time the treating emulsion is formed.

In accordance with this invention, a wax emulsion stock is prepared in a substantially solid form, said stock containing essentially all of the ingredients necessary for the formation of the desired emulsion. This stock, in solid form, may be shipped or handled readily and dispersed easily and accurately into an emulsion of the desired characteristics, thereby obviating the necessity of employing workmen having particular skill in the preparation and handling of emulsions. Furthermore, the use of such stock makes it unnecessary to transport pre-formed emulsions to their place of use, and likewise makes it unnecessary for the users of wax emulsions to store and handle the ingredients required for producing the desired emulsion.

It is an object of this invention, therefore, to provide easy and convenient methods for the preparation and handling of wax emulsions and the ingredients thereof.

It is a further object of this invention to provide a unitary wax emulsion stock particularly adapted for use in wax emulsions for the processing of paper and related fibrous materials.

In accordance with this invention, a substantially solid wax emulsion stock is prepared by incorporating in a hydrocarbon wax, an oil-soluble, water-dispersible soap of a petroleum sulfonic acid in quantities of the order of 3% to 12% by weight, based upon the wax. Hydrocarbon waxes which may be suitably employed may be exemplified by crude scale wax produced by pressing and sweating a paraffin distillate wax, refined paraffin wax, or mixtures of paraffin wax with small amounts of amorphous wax, such as that derived from petrolatum. The oil-soluble, water dispersible sulfonate soaps which I prefer to employ are those produced in the manufacture of mineral white oils by sulfuric acid treatment and neutralization, such soaps being extracted from the treated oil by means of a solvent such as dilute alcohol. The sulfonic acids from which the soaps are derived by neutralization with a base such as an alkali metal hydroxide (sodium or potassium), have acid values of from about 80 to about 140 mg. KOH/gm. (by titration in alcohol solution). The sulfonate soaps, as commercially produced, usually contain about 15%–25% mineral oil and about 25%–35% water, the actual soap content generally being of the order of about 50% of the mixture. Such soaps, when employed directly in the production of emulsifiable wax stocks, must necessarily be used in greater quantities than purified soaps from which oil and/or water has been removed. For example, from about 6% to about 24% of soap comprising 50% sulfonates, 30% water and 20% oil, when admixed with hydrocarbon wax, will produce a satisfactory emulsifiable wax stock. On the other hand, the same soap which has been rendered substantially free of oil and water, may be satisfactorily employed in quantities of the order of from about 3% to about 12%, based upon the wax.

Water-soluble sulfonic acid soaps, such as may be recovered from acid sludge resulting from the sulfuric acid treatment of petroleum oils have been found unsuitable for use in accordance with my invention, and are not considered as within the scope thereof. Such water-soluble sulfonic acid soaps are incompatible with the hydrocarbon waxes and will not produce a solid, homogeneous emulsifiable wax product.

For purposes of convenience and for clarifying the exposition of the present invention, hereafter and in the appended claims, the percentage of sulfonate soap employed will refer, unless otherwise specified, to soap reduced to a substantially oil-free, water-free basis. It is to be understood, of course, that in the practice of this invention, sulfonate soap containing oil and/or water, or free from oil and/or water, may be employed.

In the preparation of the emulsifiable wax stock, in accordance with this invention, a hydrocarbon wax, for example, 120° F.–124° F. melting point crude, yellow scale wax or 128° F.–132° F. refined paraffin wax, is rendered fluid by heating to a temperature not substantially in excess of about 200° F., and sulfonate soap in quantity of from about 3% to 12% by weight, is added, and the admixture is agitated until a substantially homogeneous mixture or solution is obtained. The heated mixture is then cooled to form a substantially solid composition which is readily emulsifiable with water. Such emulsifiable wax stock may be formed into any desired shape, for example, cakes, sticks, granules, pel-

lets, flakes or the like, depending upon the requirements of the user thereof.

Typical examples of substantially solid emulsifiable wax stocks which may be prepared in accordance with this invention are given below. The petroleum sulfonates employed were oil-soluble sodium salts of sulfonic acids derived in the manufacture of mineral white oil by sulfuric acid treatment, said sulfonic acids having an acid value of 119 mg. KOH per gram.

Ingredients (per cent by weight)

120° F.–124° F. M. P. scale wax	128° F.–132° F. M. P. refined paraffin	Petroleum sulfonate (50% sulfonate)	Petroleum sulfonate (95% sulfonate)	Water
88			12	
88		12		
97			3	
85		10		5
	97		3	
	88	12		
	76	24		
	90		5	5

The emulsifiable wax products of this invention have been found to be of particular utility in the manufacture of waterproof paper, cardboard, and the like. In the application of petroleum sulfonates as a wax emulsifier in the production of water-proof paper, care must be taken to avoid the use of excessive quantities of sulfonates, particularly those containing substantial quantities of oil. For example, a composition comprising about 76% of hydrocarbon wax and 24% of oil-soluble, water-dispersible petroleum sulfonate (50% sulfonates, 20% oil, and 30% water), when dispersed in water to give an emulsion containing about 5% of wax, may be successively employed in water-proofing paper. However, the use of quantities of this sulfonate much in excess of about 25% (based on the wax) is undesirable, since the amount of oil which would thus be incorporated in the paper would render same unsatisfactory. Furthermore, the use of excessive quantities of sulfonate emulsifiers would require correspondingly larger amounts of electrolyte for breaking the emulsion and depositing wax on the paper fibers. This, in turn, would result in a deposition on the paper of undesirably large amounts of insoluble products resulting from the reaction of the sulfonate emulsifier with the electrolyte. For example, when alum is employed as the electrolyte, precipitated aluminum sulfonate would be deposited on the paper fibers. Therefore, it is highly desirable to employ the smallest quantity of sulfonate emulsifier which is capable of producing a wax emulsion of the desired stability. I have found that quantities of oil-soluble, water-dispersible alkali metal sulfonates of the order of from about 3% to about 12%, based on the wax, may be suitably employed. Such percentages are based on substantially oil-free sulfonate soap, the sulfonic acid component thereof having an acid value of from about 80 to about 140 mg. KOH per gram.

The application of emulsifiable wax products of my invention to the processing of paper may be illustrated by the following example:

A substantially solid, emulsifiable wax stock comprising about 85% crude, yellow scale wax and about 15% of oil-soluble, water-dispersible sodium sulfonates (containing about 50% sulfonates) was admixed with water to give a stable emulsion containing about 5% of wax. This emulsion was added to paper pulp being subjected to a beating treatment, in such proportion as to give about 3% wax per 100 lbs. of paper pulp. The mixture of paper pulp and wax emulsion was then subjected to beating, and a sufficient quantity of electrolyte, such as alum solution, was added to break the emulsion and cause deposition of the precipitated wax upon the paper fibers. The pulp containing the wax was then subjected to further beating, and then delivered to a sheet fabricating machine.

While, hereinabove, I have described the application of my emulsifiable wax stock in the water-proofing of paper, it is to be understood that such wax stock may also be utilized in processing textiles, leather, and other materials in which it is desired to incorporate hydrocarbon wax.

What I claim is:

1. A wax emulsion stock which is homogeneous and substantially solid at ordinary temperatures and capable of being emulsified upon being mixed with water, said stock comprising hydrocarbon wax and from about 3% to about 12% of oil-soluble, water-dispersible soap of a petroleum sulfonic acid, said sulfonic acid having an acid value of from about 80 to about 140 mg. KOH/gm.

2. A wax emulsion stock which is homogeneous and substantially solid at ordinary temperatures and capable of being emulsified upon being mixed with water, said stock comprising hydrocarbon wax and from about 3% to about 12% of oil-soluble, water-dispersible alkali metal soap of a petroleum sulfonic acid, said sulfonic acid having an acid value of from about 80 to about 140 mg. KOH/gm.

3. A wax emulsion stock which is homogeneous and substantially solid at ordinary temperatures and capable of being emulsified upon being mixed with water, said stock comprising hydrocarbon wax and from about 3% to about 12% of oil-soluble, water-dispersible sodium soap of a petroleum sulfonic acid, said sulfonic acid having an acid value of from about 80 to about 140 mg. KOH/gm.

4. A wax emulsion stock which is homogeneous and substantially solid at ordinary temperatures and capable of being emulsified upon being mixed with water, said stock comprising hydrocarbon wax and from about 3% to about 12% of oil-soluble, water-dispersible soap of a petroleum sulfonic acid derived from the manufacture of mineral white oil, said sulfonic acid having an acid value of from about 80 to about 140 mg. KOH/gm.

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