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TEXTILE TREATING COMPOSITION AND PROCESS OF MAKING SAME

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ABSTRACT OF THE DISCLOSURE

Liquid textile treating composition and process produced by reacting trimethylolpropane with mixture of fatty acids of 10 to 18 carbon atoms and having average molecular weight from 220 to 285. The mole ratio of trimethylolpropane to the fatty acids ranges from 1:2 to 1:3 and reaction takes place at temperature ranging from 140° C. to 200° C. until acid value is from 5 to 15. The reaction product is made water dispersible and textile material is treated therewith.

BACKGROUND OF THE INVENTION

This invention relates to a textile treating composition and process for producing the same and more particularly to a liquid or semi-liquid composition for use as textile assistants in fiber finishes. More specifically, my invention concerns liquid esters formed from the reaction of trimethylolpropane and fatty acids, and the use of such esters alone or with other materials such as lubricants and emulsifiers to modify the properties of textile fibers during processing, or to significantly enhance the qualities of the finished textile material.

As is well known in the art to which my invention relates, various textile assistants have been applied to textile materials derived from both natural and synthetic fibers to render the same more amenable to textile operations or to provide a product which will better serve the user. Preferably, the assistant beneficially modifies the properties of the textile fibers, and is not removed or altered by conventional washing or drycleaning processes. Also, the assistant should be liquid at room temperature and readily dispersible in aqueous media used in textile processing or finishing. Furthermore, the assistant should have the property of retention on textile material without harmful effects thereto, such as discoloration, odor, or decreased light fastness of dyed fabrics.

Softeners are also used in both resin and non-resin finishing of textiles to impart a soft full hand and to provide fabrics with enhanced drape. Desired properties in such softeners include stability against heat, oxidation and odor (rancidity) development, yellowing or scorching, freedom from deleterious effect on the light fastness of dyes, the right lubricity to maintain or improve fabric sewability, the ability to release soil, chlorine and the like and should have no deleterious effect on resistance to wrinkling and tearing.

BRIEF SUMMARY OF INVENTION

It is an object of my invention to provide new carboxylic acid esters of high stability which are advantageously liquid, thus facilitating application, and are suitable as textile softeners, lubricants and otherwise as textile assistants in dyeing, washing scouring, stripping and finishing.

Another object of the invention is to provide a process for imparting such desirable characteristics as improved softness, heat resistance, yellowing resistance, detergent resistance, lubricity, soil releasing, non-chlorine retention, and sewability to textile materials and which shall have no harmful effect on wrinkle resistance and tensile and tear strengths.

My improved treating composition is prepared by reacting trimethylolpropane with a mixture of fatty acids of 10 to 18 carbon atoms and having an average molecular weight ranging from approximately 220 to 285. Preferably the average molecular weight of the fatty acid mixture ranges from 240 to 260. Suitable fatty acids which may be employed in preparing the mixture are: stearic, palmitic, myristic, lauric, capric and oleic. The mole ratio of trimethylolpropane to the fatty acids employed ranges from 1:2 to 1:3 and the reaction takes place at a temperature ranging from approximately 140° C. to 200° C. until an acid value of the reaction mix is in the range of approximately 5 to 15.

In actual practice I have prepared my improved composition as set forth in the following examples which provide complete specific embodiments of the invention, but which are not intended to limit the same.

EXAMPLE 1

134 grams (1.0 mole) trimethylolpropane were reacted with 765 grams (3.0 moles) of mixed fatty acids having an average molecular weight of 255 in the presence of 0.9 gram (0.1%) sulfuric acid at a temperature ranging from 140° C. to 200° C. until an acid value of the reaction mix was in the range of 5 to 15.

The resulting triester was applied to resin treated textile material from an aqueous system by blending from 15% to 30% ethoxylated castor oil into the triester to produce emulsification of the triester in water. The triester thus produced was found to be liquid in nature as low as 5° C. and to impart softening, lubricating and the other improved characteristics mentioned hereinabove to the treated textile material.

EXAMPLE 2

134 grams (1.0 mole) trimethylolpropane were reacted with 510 grams (2.0 moles) of mixed fatty acids as utilized in Example 1 in the presence of 1.6 grams (0.25%) para toluene sulfonic acid catalyst at the temperature range of 140° C. to 200° C. until an acid value of the reaction mix is reduced to the range of 5 to 15.

The diester thus produced was made emulsifiable in water by adding from 15% to 30% ethoxylated coconut fatty acid to the diester.

The resultant diester was found to be liquid in nature as low as 10° C. and to impart softening, lubricating, and the other improved characteristics to both resin treated and non-resin treated textile material.

EXAMPLE 3

A blend of the triester from Example 1 in the range of 10% to 90% was blended with the diester from Example 2 in the range of 90% to 10%. The resulting blend produced greater softening and lubricating properties than either diester or triester alone. I have also found that a blend of the emulsifier system containing the ethoxylated castor oil and the ethoxylated coconut fatty acid in the total range of 15% to 30% was more desirable for emulsion stability than either emulsifier alone.

The degree of ethoxylation of the castor oil might range from 10 to 40 moles of ethylene oxide per mole of castor oil. Also, the coconut fatty acid might be ethoxylated from 5 to 20 moles of ethylene oxide per mole of the coconut aftty acid. The latter emulsifier may also be prepared by direct esterification of the coconut fatty acids with polyoxyethylene glycols in the conventional manner to give the above equivalent range of ethylene oxide moles.

EXAMPLE 4

134 grams (1.0 mole) trimethylolpropane were reacted with 500 grams (2.0 moles) of mixed fatty acids having

an average molecular weight of 250 in the presence of 3.2 grams (0.5%) phosphoric acid at a temperature ranging from 140° C. to 200° C. until the reaction mix is reduced to 5 to 15 acid value.

598 grams (1 mole) of the above diester were then reacted with 660 grams (15 moles) of ethylene oxide in the presence of 2.0 grams (0.05 mole) sodium hydroxide catalyst at a temperature of 150° C. to 160° C. and at a pressure ranging from 70 to 80 pounds per square inch, for a period of approximately 3 to 4 hours. The resultant crude ethoxylate is then cooled to 75° C., the catalyst is neutralized with glacial acetic acid, and the finished ethoxylate in vacuum stripped at 125° C. for about one-half hour before cooling.

The resultant ethoxylated diester was completely water dispersible and did not require any additional emulsifier. Furthermore, the product remained liquid down to 4° C. and also imparted softness and lubrication to treated textile material as well as the other improved characteristics mentioned hereinabove.

From the foregoing, it will be seen that I have devised an improved liquid, textile treating composition and process for producing the same which not only greatly facilitates the application of the composition to textile materials but also imparts desirable characteristics to the fabric, such as softness, heat resistance, yellowing resistance, detergent resistance, lubricity, soil releasing, nonchlorine retention, improved sewability and the like and has no deleterious effect on wrinkle resistance and tensile and tear strengths.

I wish it to be understood that I do not desire to be limited to the precise examples, proportions or embodiments herein disclosed for obvious modifications will occur to a person skilled in the art.

What I claim is:

1. The process of producing a liquid textile treating composition comprising the steps of:

(a) reacting trimethylolpropane with a mixture of fatty acids of 10 to 18 carbon atoms and having an average molecular weight of approximately 220 to 285 at a temeprature ranging from approximately 140° C. to 200° C. until an acid value of the reaction mix is in the range of approximately 5 to 15, with the reaction taking place in the presence of approximately 3.2 grams (0.5%) phosphoric acid for each mole of trimethylolpropane and the raito of trimethylolpropane to said fatty acids being 1:2 to 1:3,

(b) reacting the reaction product of step (a) with approximately 15 moles of ethylene oxide and approximately 0.05 mole of sodium hydroxide catalyst for each mole of the reaction product of step (a) at a temperature ranging from 150° C. to 160° C. and under a pressure ranging from 70 to 80 pounds per square inch for a period ranging from 3 to 4 hours,

(c) cooling the resultant crude ethoxylate to approximately 75° C.,

(d) neutralizing the sodium hydroxide catalyst with glacial acetic acid, and

(e) vacuum stripping the finished ethoxylate at approximately 125° C. for about one-half hour.

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