Patented Sept. 26, 1944 2,359,043

# UNITED STATES PATENT OFFICE

2,359,043

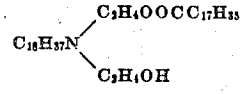
## SOFTENING TEXTILES

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No Drawing. Application June 24, 1940, Serial No. 342,191. In Switzerland July 7, 1939

4 Claims. (Cl. 260—404)

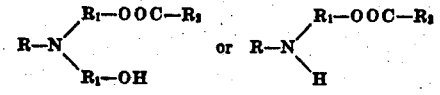
The present invention relates to a process for softening textiles and to the water-soluble salts of the compounds of the formula



which are excellent softening agents

We have found that valuable condensation products are obtained, if hydroxyamines containing in their molecule at least one hydrocarbon chain with at least 8 carbon atoms, are condensed with a compound containing a radical of a high molecular fatty acid with at least 8 carbon atoms. The condensation products thus obtained are basic fatty acid esters generally insoluble in water, but which after neutralization with hydrochloric acid or a low molecular fatty acid give water-soluble salts and may be used as softening agents for textiles of all kind. As hydroxyamines which can be used in the present process we employ the reaction products of for example 1 or 2 mol. of ethylene-oxide or of 1 or 2 mol. of glycol- or glycerine-monohalogenhydrine or glycide with a primary or secondary amine containing at least one hydrocarbon chain with at least 8 carbon atoms, such as dodecylamine, cetylamine, stearylamine, methyldodecylamine, and also the reaction products obtained by treatment of alkanolamines with alkylhalogenides containing at least 8 carbon atoms. As compounds containing the radical of a higher fatty acid, we use the fatty acids themselves such as stearic acid, cocoa nut fatty acids or the anhydrides or halogenides or the esters of such fatty acids, or mixtures of different fatty acids or their derivatives.

The esterification of the hydroxyamine may be carried out at a higher temperature, for example between 150 and 200° C., until the splitting off of water is terminated. It is in some cases preferable to work under such conditions, that the formed water becomes distilled off from the reaction mixture during the heating operation. The compounds thus obtained correspond for instance to the general formula



wherein R and $R_2$ stand for a hydrocarbon chain with at least 8 carbon atoms and $R_1$ stands for a low molecular alkylene and hydroxy-alkylene radical, and which are generally waxy substances, soluble in hydrochloric acid or in organic acids of low molecular weight. Their salts with such acids are soluble in water, giving more or less clear solutions which are eminently useful for softening the textiles, especially their salts with organic acids.

It is not absolutely necessary to realize a complete esterification of the components. We have observed, that the presence of free amine and free carboxylic acid of higher molecular weight may be advantageous, provided that the carboxylic acid is not in excess as compared to the amount of the amine.

We have further observed, that an excess of the amine may be advantageous in both cases, that is in the case of complete and in the case of partial esterification.

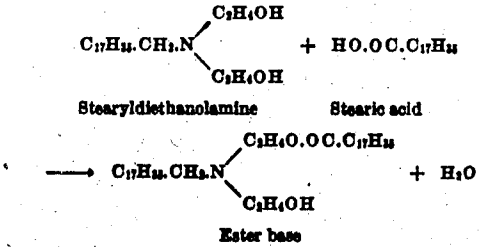
The following examples, without being limitative, illustrate the present invention, the parts being by weight:

### *Example 1*

267 parts of technical stearic acid and 351 parts of technical stearyldiethanolamine are heated together at 155–160° C. and stirred at 160–180° C., until the splitting off of water is terminated. It is preferable to separate the rest of water by subjecting the reaction mixture to vacuo. The ester base thus obtained is on cooling down of wax-like consistence.

In order to transform this base into the respective formate, 25 parts of the base are melted and mixed with 3.1 parts of formic acid of 86% strength, and 72 parts of water at 45° C., until a homogeneous, clear paste, soluble in water, is obtained. The product thus obtained possesses excellent softening properties for textiles of any kind, especially for cotton and rayon.

The reaction involved in the production of the aforementioned base may be illustrated as follows:



Stearyldiethanolamine Stearic acid

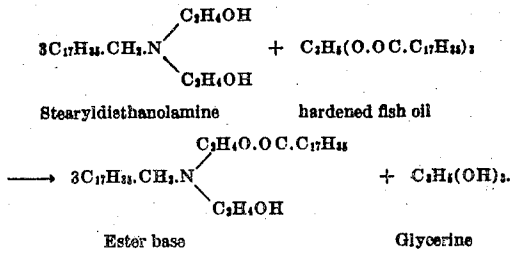
Ester base

### *Example 2*

283 parts of hardened fish oil and 351 parts of technical stearyldiethanolamine are heated

for about 2 hours at 175–185° C. After separation of the glycerine produced during the esterification process, the product obtained becomes on cooling down a clear waxy substance. Its formic acid salt possesses similar softening properties to those of the product of Example 1.

The reaction involved in the production of the ester base according to the present example is as follows:



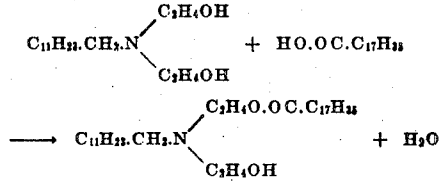
Stearyldiethanolamine — hardened fish oil

Ester base — Glycerine

*Example 3*

267 parts of technical stearic acid and 283 parts of a technical mixture of alkyldiethanolamines, the alkyl radicals of which correspond to acids contained in cocoa nut oil, are heated together in vacuo for 2 hours at 170–180° C., until the separation of water is terminated. The product thus obtained has a fatty character. By mixing the melted ester base with warm dilute formic acid, a clear thin paste will be obtained.

The formation of the ester base, according to the present example, involves the following reaction:



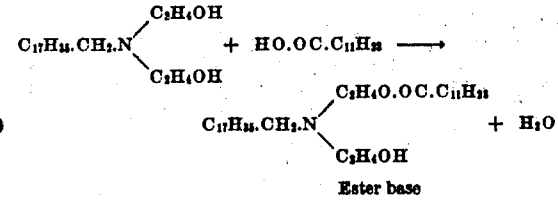
Ester base

($C_{11}H_{23}$ representing the alkyl radical of the cocoa fatty acids.)

*Example 4*

351 parts of technical stearyldiethanolamine and 200 parts of cocoa fatty acids are stirred for 2 hours while heating at 170–180° C., whereby the reaction water produced is distilled off. The last parts of water are then separated in vacuo. The product thus obtained is a clear brownish oil. By neutralization of the base with dilute formic acid a clear paste will be obtained, which is soluble in warm water with a slight opalescence.

The formation of the base in this example takes place as follows:

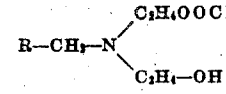


Ester base

($C_{11}H_{23}$ representing the alkyl radical of the cocoa fatty acids.)

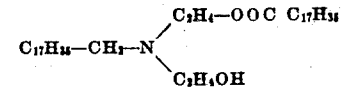
What we claim is:

1. The formic acid salts of the basic condensation products of the formula



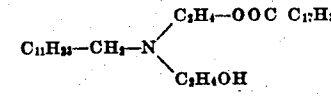
wherein R stands for a hydrocarbon chain with at least 8 carbon atoms and wherein at least one of the R's represents the radical $C_{17}H_{35}$, said salts being water-soluble wax-like products useful for softening textiles.

2. The formic acid salt of the compound



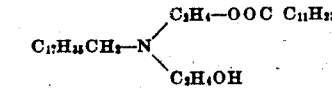
which is a wax-like product soluble in water and which possesses excellent softening properties for textiles.

3. The formic acid salt of the compound



which is a wax-like product soluble in water and which possesses excellent softening properties for textiles.

4. The formic acid salt of the compound



which is a wax-like product soluble in water and which possesses excellent softening properties for textiles.

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