

SPECIFICATION

The present invention relates to a process for the production of liquid or flowable derivatives of natural fats and oils and to their use for the fat-liquoring and greasing of leather, optionally in combination with other lubricating substances and anionic and/or non-ionic emulsifiers for the fat-liquoring and greasing of leather.

DE-OS 36 17 657 describes derivatives of natural fats and oils which are liquid at room temperature, and a process for their production, wherein fats that are solid at room temperature or comprise solid fractions, their mixtures with free fatty acids, mono- and/or diglycerides are oxalkylated at elevated temperatures in the presence of basic catalysts with at least one 1,2-epoxide, and the obtained reaction products - optionally after epoxidation - are sulfonated or sulfated in a manner known per se. The products thus obtained are suitable to grease leather, in particular for fat-liquoring. The process according to DE-OS 36 17 657 makes it possible to convert low-cost fatty raw materials, such as animal fats, that are available in large amounts and which are solid or comprise solid fractions into fat liquors and greases for leather.

EP-A-247490 describes a process for the production of sulfited fatty substances, wherein fatty substances having iodine numbers of smaller than about 100 in admixture with esters of C_{12} to C_{24} fatty acids having monovalent C_1 to C_5 -alcohols are oxidised with oxygen-containing gas mixtures, and are sulfited with hydrogen sulfites, either at the same time or subsequently. Thus difficult-to-sulfite fatty substances are said to provide readily water-soluble products having a high emulsion stability and - as compared to highly iodous fatty substances - a higher light fastness.

Natural fats and oils of vegetable and animal origin mainly serve human nutrition. However, ever greater quantities of these fats

and oils are used as renewable raw materials in various branches of industry. In this connection the technological applicability of these products depends specifically on the respective properties of the fats and oils. These, in turn, are primarily determined by their composition and molecular structure. Natural fats and oils are essentially composed of triglycerides (neutral fats) and - to a smaller extent - of phospholipides, monoglycerides, diglycerides, and free fatty acids. The properties of this substance group - and this particularly applies to neutral fats - are defined by the type of fatty acids bound to the glycerol molecule with regard to chain length (short, medium, and long chain), by their degree of saturation and conformation (saturated, mono-unsaturated or polyunsaturated; cis- trans-configuration), and by the arrangement and quantity per glycerol molecule.

Taken all in all, this means that the respective structure of the components of the natural fats and oils finally largely determines, and very often also limits, their technological applicability, if no changes are (or can be) made to the molecule - either owing to reasons of cost, or because the desired modification cannot be produced in practice by means of conventional chemical methods.

With the present techniques natural fats and oils must be subjected to specific purification processes, or separation steps into solid and liquid phases, or to hardening. Ultimately, the desired "fatty chemicals" result from splitting products or reaction products of the natural oils and fats: fatty acids, glycerol and fatty acid methyl esters - the actual oleo-chemical raw materials - and the fatty alcohols and fatty amines that are important because of their significance for various derivatives.

Since the molecular structure of natural fats and oils is determined by their origin, and fats and oils as such are virtually unusable "fatty chemicals", it is necessary to produce "tailor-made" fats

and oils by means of industrial processes. The processes required for this are characterised by consumption of large amounts of energy and high investment costs. In addition, they frequently are insufficiently specific (danger of isomerisation of the fatty acids, production of mixtures instead of homogeneous products, etc.).

Examples from the leather auxiliaries-producing industry will illustrate that technological usability taking into account specific requirements is only possible with specific compositions of the fat liquors and greases:

- With regard to the technological processability of fats, it is important that these be in a flowable form. Animal fats, the use of which would be desirable in the production of fat liquors and greases for leather, are solid. In order to render these useful, they must be liquefied. This can be done by fractionation. However, this process is difficult, has a large energy consumption, and is relatively costly.
- In search of the cheapest possible fat substitutes available in large quantities, their industrial suitability is diminished by the fact that these mostly are solid fats which have to be liquefied by suitable measures.
- With fats and oils having a high viscosity leather, can only be fat-liquored superficially so that there is a danger of grease stains on the leather so treated. High-quality leather must be fat-liquored with low-viscosity fat, thus requiring the adjustment of a specific viscosity.
- For further technological processing of fats for leather fat liquors, double bonds in the fatty acid molecules are frequently necessary (e.g., for carrying out sulfonation). Up to now,

starting materials of this kind have only been available in natural oils which are relatively expensive.

- On the other hand, polyunsaturated, i.e. correspondingly low-viscous oils are undesirable for the use in leather fat-liquoring, because there is the risk of resinification due to the high content of unsaturated double bonds.

For the above-cited technical reasons, sperm oil (a liquid product) used to be the raw material of choice in the leather-processing industry for many decades. Sperm oil makes finished leather exceptionally supple and has always been used in the production of highest quality leather. Furthermore, the treatment with sperm oil improves the properties of low-quality leather to such an extent that it also satisfies high-quality demands.

Resulting from efforts of protecting the sperm whale - the source of sperm oil - the use of sperm oil has been stopped in Europe to avoid extermination of the species. In addition to lard oil (the liquid phase of lard) synthetically produced triolein has been used as replacement product for sperm oil - particularly in the leather industry. Fat-liquoring is usually carried out in oil/water emulsions using fat liquors.

Fat liquors are self-emulsifying products composed of a neutral oil fraction and an emulsifier fraction. Depending on the charge there are anionic, cationic, amphoteric and non-ionic fat liquors. Very frequently, distinction is also drawn between synthetic and native fat liquors, the distinction between the two becoming increasingly blurred. The greater part of the emulsifier portion is formed in the neutral oil, for example, by partial sulfation, or it is added thereto as a separate component.

Traditionally, the production of such products is carried out by reacting oils and fats that are liquid at room temperature with sulfuric acid, oleum, or SO_3 . Particularly if SO_3 is used, dark-coloured products are frequently obtained. Pure and low-salt products are obtained by sulfation with a SO_3 -air mixture.

One of the difficulties arising in the SO_3 -sulfation of oils and fats that are liquid at room temperature is the considerable viscosity increase in the course of the reaction. The reaction rate decreases. Correspondingly, the reaction times are longer, resulting in discoloration or carbonisation.

The SO_3 -sulfation in falling-film reactors is extremely impeded by an increase in viscosity, since the flow rate decreases considerably in the thin liquid layers.

Sulfonated and sulfited native oils and fats contain α -sulfo-fatty acids and hydroxysulfonates. Alkane-, α -olefin-, dialkylbenzene- and chloroparaffin sulfonates, as well as long-chain fatty alcohol sulfonates, phosphoric acid esters, citric acid esters, and alkylsuccinic acid esters are found in synthetic fat liquors.

The emulsifying, mostly polar fractions of a fat liquor are bonded by the leather predominantly in the form of ionic bonds, or by formation of stable metal complexes in a non-extractable and non-migratable form.

The linking of the emulsified fractions takes place by van der Waals' forces through polar groups. The emulsifying fractions influence the linking of the emulsified fractions in so far as they are responsible for their distribution within the leather and have also an anchoring effect by intermolecular forces.

Fatliquoring is a process that determines the quality in the production of leather. This is especially applicable to very soft types of leather. The following leather characteristics are influenced by fatliquoring to a high degree:

1. Softness
2. Mechanical properties, such as tear strength, tear-propagation resistance, elongation, grain elasticity, etc.
3. Fullness, tightness of grain, and handle
4. Properties of the leather surface for subsequent finishing processes.

It is known that softness is primarily based on a separation of the fibre bundles and fibrils during drying. Accordingly, a fat liquor's capability of changing the surface of the fibres and fibrils such that there is no sticking during drying represents an essential criterion of its softening properties. This property is greatly influenced by the emulsifying portions of the fat liquor. The lubricating effect of the emulsified fractions of a fat liquor plays a decisive role with regard to the elastic properties, such as tensile strength, elongation, and grain elasticity. The fibres "coated" with the lubricant have a better slip and thus a reduced internal friction at the same time.

It is to be assumed that a marked spreading ability of the emulsified fractions decisively influences their lubricating effect. For explanation purposes, it is pointed out that spreading ability on a surface is used to refer to the substance quantity required to completely cover the surface with a monomolecular layer. The greater the spreading ability the smaller the respective quantity of substance required. Unfortunately, there are no test results

concerning the influence of the different spreading ability of a fat liquor's emulsified fractions on the fatliquoring effect. One reason for this is the expensive and complicated measuring technique. Moreover, the emulsifying fractions of a fat liquor can greatly influence the spreading ability of the emulsified fractions.

The practical man is familiar with the fact that quantity and type of the fat liquors influence fullness, grain tightness, and handle of the leather. As far as the filling effect is concerned, its assessment is almost always based on subjective observations. In special cases, however, fullness can be determined objectively by measuring the thickness increase of the leather.

The filling effect of fat liquors is particularly evident in thin leather types up to a maximum thickness of approximately 1.2 mm (for cattle hides). Proper selection and increased use of the product, if required, make it possible to reduce the previously required amount of retanning agents, or even to dispense with retanning.

In soft leather types of more than 1.2 mm in thickness, it is often difficult to achieve good tightness of grain. The main reason for "loose grain" is the differing histological structure of the grain layer - the papillary layer on the one hand, and the reticular layer on the other.

However, "loose grain" is frequently caused by incorrect selection of the fat liquor or by an unsuitable fatliquoring technique. In order to avoid this quality-reducing leather defect, it is important to strive for a fat distribution over the leather cross-section, which ensures that the mechanical properties, in particular the softness of grain and reticular layer, are nearly in the same the critical boundary area between the two layers.

The "handle" of the leather also depends on the type, quantity, and properties of the fat liquor or grease that is used. It cannot be measured objectively and is extremely difficult to define. Softness and tightness of grain are only partial aspects of what the expert understands by this term. There is, for example, a "round handle" or a "tight handle", and only the specialist is able to define the feel of a leather correctly.

The physical properties of the leather surface for subsequent finishing are influenced decisively by the structure of the fat liquors that are used. This in particular applies to the absorbency of the leather surface, which is so important for modern finishing methods. It has already been mentioned that the conventional fat liquors and greases consist of an emulsifying and an emulsified portion. The emulsifying components are predominantly responsible for the behaviour of the leather surface for subsequent processes. These determine the hydrophilic or hydrophobic character of the leather. Additionally, their ionic behaviour influences the electrical charge present on the surface.

It is the object of the present invention to produce fatty derivatives in an energy-saving manner by using as starting materials low-cost fatty raw materials, such as animal fats and tallow fatty acid methyl ester, which are solid or comprise solid fractions and are available in large quantities; in addition to the lubricating and simultaneously emulsifying effect, these fatty derivatives have also a high spreading ability and are therefore particularly suitable as fat liquors and greases for leather.

In a process for the production of liquid or flowable derivatives of natural fats or oils by reaction of fats that are solid at room temperature or comprise solid fractions and/or their mixtures with free fatty acids and/or mono- and/or diglycerides at elevated temperature in the presence of basic catalysts with at least one

alkylene oxide, sulfonation or sulfatization of the obtained reaction products, optionally after epoxidation, and optional neutralisation of the reaction products, this object is achieved by the fact that as starting material either

A) at least one C₈ to C₂₄-fatty acid ester of an aliphatic C₁ to C₅-monoalcohol

or

B) a mixture of at least one C₈ to C₂₄-fatty acid ester of an aliphatic C₁ to C₅-monoalcohol in a mixture ratio of 1 to 99%-wt., relative to the total mixture, and the fats that are solid at room temperature or comprise solid fractions are used, the latter starting materials optionally comprising free fatty acids, mono- and/or diglycerides.

The products of the oxalkylation and optional epoxidation result in operational advantages during the sulfation step with a SO₃-air mixture, such as higher throughput and improved reaction control, and thus result in homogeneous products having improved colour quality and constant sulfation degrees.

Oxalkylation is a reaction known per se. The mechanism of oxalkylating a triglyceride that is substantially free from active hydrogen atoms, i.e., those capable of reacting with alkylene oxides, is discussed in "Tenside 3" (1966, volume 2, page 37). DE-AS 12 70 542 describes the reaction of fats that are solid and liquid at room temperature with alkylene oxides with the aim of modifying the surface-active properties of the fats in such a way that detergents, defoamers, emulsifying agents, and the like result.

When the starting products according to the present invention are used, the lubricating character of the oxalkylation products is most surprisingly not only maintained after sulfitation or sulfonation, but, in addition to that, improvements in the properties of these products with regard to the use as leather auxiliaries are achieved,

e.g., higher light fastness and lower heat-yellowing (see Example 22, Table 1).

The products so obtained display fatliquoring properties that are at least equal to those of products based on high-quality fats that are liquid at room temperature, such as neatsfoot oil or lard oil.

According to the present invention, the alkoxylation carried out prior to sulfation results in fat liquors providing perfectly homogeneous emulsions in high yield, which are superior to conventional fat liquors with added emulsifier (the term "sulfation" is understood to be the common generic term for the introduction of sulfate groups and sulfonic acid groups which are introduced into the fat molecule either by treatment with concentrated sulfuric acid or by oxidizing sulfitation).

Fundamentally, any triglyceride and its mixtures with free fatty acids, mono- and/or diglycerides are numbered amongst the fats that can be used as starting materials according to the present invention. Of particular importance is the conversion of fats or oils that are solid at room temperature having a cloud point above that of lard oil.

The usable fats may also be partially cleaved so that free fatty acid is present in addition to mono- and diglycerides. The acid value of the fats is not critical, as has been shown by oxalkylation experiments under addition of free fatty acid.

Products based on natural or synthetic fatty acids having a chain length of C₈-C₂₄ can be used as fatty acid esters. Aliphatic monoalcohols of a chain length of C₁-C₅ serve as alcohol component of the fatty acid esters. The esters may be solid or liquid at room temperature. Fatty acid esters that are liquid at room temperature result in low viscosities. It is preferable to use fatty acid

esters whose fatty acid component has the chain length of C₁₂-C₂₀ and whose alcohol component is methanol, ethanol, isopropanol and/or isobutanol.

Oxalkylation may be carried out in the presence of small quantities of water, as occur in natural fats or as may be introduced by an aqueous catalyst solution. Suitable epoxides include the following ones:

ethylene oxide, propylene oxide, butylene oxide, 2-methyl-2-butene oxide, 3,3-dimethyl-1-butene oxide, 3,3-dimethyl-1-butene oxide, C₆-C₂₄-epoxides, styrene oxide, 1,2-epoxibutadiene, 1,2-epoxycyclohexene, as well as glycidic ester and glycidic ether. If more than one epoxide is used, these may be reacted with the fatty substances either one after the other or as a mixture.

Alkaline compounds, such as sodium and potassium hydroxide in solid form or as aqueous solution, sodium methylate, or alkali salts of fatty acids are used as catalysts for the reaction of the alkylene oxides with the fats, potassium hydroxide being preferred.

The reaction is carried out according to known processes at an elevated temperature. In order to achieve a rapid reaction of the alkylene oxides, a reaction temperature in the range of 130 to 200°C, preferably 160 to 180°C, particularly 160°C has proved to be expedient.

Depending on the consistency of the fats, 5 to 100%-wt. of alkylene oxide, preferably 10 to 25%-wt, relative to the quantity of fatty substance, is added.

If the alkoxylation is carried out with several 1,2-epoxides, the epoxides may be reacted with the starting fats one after the other, or the reaction may be carried out with a mixture of the epoxides.

According to an embodiment of the present invention the oxalkylation is carried out only with that fatty substance component whose the pour point or cloud point is to be reduced.

Subsequent to the alkoxylation the oxalkylated fatty substances or their mixture is sulfated with a liquid, low-viscous fatty substance according to methods known per se. The sulfation may be carried out with concentrated sulfuric acid at room temperature up to slightly increased temperatures (approximately 30°C) for a few hours. As an alternative, sulfonic acid groups may be introduced by treating with sodium disulfite in the presence of atmospheric oxygen. Continuous sulfation with a SO₃-air mixture in a falling-film reactor at room temperature is particularly advantageous.

Following sulfation the product obtained is suitably adjusted with aqueous alkali to a pH value near the neutral point (e.g., pH 6.5). For sulfation, the alkoxyated fatty substances or their mixtures obtained in the first process stage may be mixed further with hydrocarbons/or additional unsaturated fats or fatty components, e.g., olein.

Sulfation may be carried out immediately after oxalkylation; then it is not necessary to isolate the oxalkylation products. According to another embodiment of the invention, the oxalkylated fats are epoxidised prior to sulfation. This can take place in a known manner, e.g., with hydrogen peroxide in the presence of formic acid.

The oxalkylated products are advantageously freed from readily volatile components (e.g., by distillation, optionally in vacuum).

The great advantage of the process according to the present invention is that low-quality, dark-coloured fats may be used which are normally characterised by an increased fraction of free fatty

acids, e.g., 5 to 15%. Nevertheless relatively light-coloured, low-odour products are obtained.

Another advantage is that fatty acid esters of aliphatic monoalcohols may be used which are solid at room temperature or contain solid fractions.

According to alternative A or B, fatty substances having iodine numbers of below 100, preferably below 70 are advantageously used. The fat portion of the fatty substance mixture preferably has an iodine value of below 100, preferably below 60, the fraction of fatty acid alkyl ester of the fatty substance mixture advantageously has an iodine value of 0 to 135.

The fatty substance mixture used in alternative B may comprise 1 to 99%-wt. fatty acid alkyl ester, relative to the total fatty substance mixture, preferably 20 - 50%-wt.

The present invention will be illustrated by the following examples:

Abbreviations used:

Abbreviation	Name	Determination method
I.V.	iodine value	DGF C-V 11 d
H.V.	hydroxyl value	DGF C-V 17 a
A.V.	acid value	DGF C-V 2
	titre	DGF C-IV 3 c
S.V.	saponification value	DGF C-V 3
%	percent by weight	
	melting point	DGF C-IV 3 a
	cloud point	DGF D-III 3

DGF = Deutsche Gesellschaft für Fettwissenschaft [German Society of fat science and technology].

The cloud point was determined in clear oil after separation of the salt formed during neutralisation.

Example 1.1. Oxalkylation

1000 g of an animal fat which is paste-like at 20°C due to solid fractions (cloud point: 22.5°C; I.V.: 56) is mixed with 100 g oleic acid methyl ester (titre: -12°C, S.V.: 195, I.V.: 88) and heated to 30°C. On cooling to 20°C, the clear yellow oil precipitates white fat fractions which form a solid bottom sediment.

This inhomogeneous fatty substance mixture is placed in a pressure reactor, and 20 g 45%-potassium hydroxide solution is added, it is purged carefully with nitrogen and heated to 160°C. At a reaction temperature of 160-165°C, a total of 354 g propylene oxide is metered, so that a pressure of 6 bar is not exceeded. The reaction is terminated after 3 hours, including a post-reaction period of 1 hour. After cooling to about 30°C, neutralisation with 96%-sulfuric acid is carried out. A yellow oil which is clear at 20°C is obtained.

Viscosity at 20°C: 35 mPa.s (acc. to Brookfield RV 1/10 rpm)

H.V.:	43.7
S.V.:	168.4
I.V.:	58.2
A.V.:	3.1
Cloud point:	4.3°C

Example 1.2. Sulfonation/Sulfation (in the presence of hydrocarbons and unsaturated fatty acids)

560 g of the oxalkylate of Example 1.1. is mixed with 240 g of a C₁₀-C₃₀-hydrocarbon mixture and 200 g tall oil fatty acid and reacted under vigorous stirring at 30 - 32°C with 300 g 96%-sulfuric acid within 5 hours. After a secondary reaction period of 1 hour, neutralisation with 30%-sodium hydroxide solution and mixing with 1000 g 20% salt solution is effected. After phase separation, the salt solution is withdrawn, the pH is adjusted to 6.5 and the water content to 20%-wt.

org. bonded SO₃: 5.4%-wt.
melting point: 3.5°C

Example 1.3. Sulfonation/Sulfation (in the absence of hydrocarbons and unsaturated fatty acids)

1000 g oxalkylate of Example 1.1 is reacted in the absence of hydrocarbons with 300 g 96%-sulfuric acid under vigorous stirring at 30 - 32°C within 5 hours. After a secondary reaction time of 1 hour, neutralisation and processing is carried out as in Example 1.2. The oil which is clear at 20°C has a content of organically bonded SO₃ of 5.3%-wt.

Example 1.4. Oxidizing Sulfitation

A mixture of 700 g reaction product of Example 1.1 and 300 g of a hydrocarbon mixture of the chain length C₁₀-C₂₂ is oxidised at 90 - 110°C under passing through of air until the decrease in the iodine value amounts to 20. The oxidate is sulfited at 80°C by adding 9%-wt. of sodium disulfite in the form of a solution saturated at 50°C. The product set to pH 6.7 is an oil which is opaque at 20°C.

Example 2.1. Oxalkylation

A mixture of the raw materials according to Example 1.1 containing solid fractions at 20°C, consisting of 1600 g animal fat and 400 g oleic acid methyl ester is reacted with propylene oxide as in Example 1.1. An opaque yellow oil is obtained which is low-viscous at 20°C.

H.V.:	50.9
S.V.:	172.5
I.V.:	55.5
A.V.:	4.0
Cloud point:	4.4°C

Example 2.2. Sulfonation/Sulfation

The oxalkylation product is sulfonated/sulfated in the same manner as in Example 1.2; a product is obtained which has a content of organically bonded SO₃ of 5.4%-wt. and a melting point of 6.0°C

Example 3.1 Oxalkylation

1000 g animal fat of Example 1.1 and 1000 g stearic acid methyl ester (titre: app. 27°C, S.V.: 196) are reacted at 160°C in the presence of 20 g 45%-potassium hydroxide solution with 865 g propylene oxide. After neutralisation with 96%-sulfuric acid, a slightly opaque, yellow oil is obtained.

Cloud point:	12.5°C
Viscosity at 20°C:	70·mPa.s (acc. to Brookfield Sp. 1/10 rpm)
H.V.:	43.0
S.V.:	141.4

I.V.:	23.8
A.V.:	3.0

Example 3.2. Sulfonation/Sulfation

The oxalkylation product is sulfonated/sulfated in the same manner as in Example 1.2. A reaction product is obtained which has a content of organically bonded SO_3 of 3.9%-wt. and a melting point of 10.5°C.

Example 4.1 Oxalkylation

A mixture of 600 g beef tallow (S.V.: 198, I.V.: 42, titre: 36.2°C) and 1400 g oleic acid methyl ester (S.V.: 190, I.V.: 105) is reacted with propylene oxide as in Example 1.1.

Cloud point:	-0.6°C
Viscosity at 20°C:	32 mPa.s (acc. to Brookfield Sp. 1/10 rpm)
H.V.:	45.5
S.V.:	162.0
I.V.:	59.0
A.V.:	3.2

Example 4.2. Sulfonation/Sulfation

Sulfonation/sulfatization are carried out in the same manner as in Example 1.2; a product is obtained which has a content of organically bonded SO_3 of 5.2%-wt. and a melting point of 5.0°C.

Example 5.1 Oxalkylation

A mixture of 1400 g beef tallow and 600 g oleic acid methyl ester, raw materials as used in Example 4, is reacted with propylene oxide as in Example 1.1.

Cloud point:	10.4°C
Viscosity at 20°C:	52 mPa.s (acc. to Brookfield Sp. 1/10 rpm)
H.V.:	51.0
S.V.:	171.3
I.V.:	51.5
A.V.:	3.60

Example 5.2. Sulfonation/Sulfation

The oxalkylation product is sulfonated/sulfated in the same manner as in Example 1.2. A reaction product is obtained which has a content of organically bonded SO₃ of 5.5%-wt. and a melting point of 14.0°C

As to the use according to the present invention:

Examples 6 - 10

Chrome-tanned, dyed upper shoe leathers of cattle hides retanned with vegetable, synthetic and resin tannins and having a shaved substance of about 2 mm are fat-liquored at 40°C for 45 minutes with 100% float and 7% of the products obtained in Examples 1.2 to 5.2. The leathers are dried and finished in usual manner. Very soft leathers having excellent grain tightness and levelness of colour are obtained.

Example 11

Chrome-tanned, dyed cattle hides retanned with an anionic polymer tannin and having a shaved substance of 0.8 to 1.0 mm are fat-liquored at 50°C in 150% float during 60 minutes with 10% of the product obtained in Example 1.3 (relative to the shaved weight). After usual drying and finishing, very soft, supple leathers for clothes and upholstery are obtained which have a very level mill corn and a high light fastness.

Example 12

The oxalkylated fatty substances listed in Table 1 and their sulfonation or sulfation products are examined as to light fastness and heat-yellowing and compared with non-oxalkylated, liquid, sulfonated or sulfated fatty substances. The test for light fastness is carried out according to DIN 54004. To this end, the listed substances are applied at 20%-wt., relative to the paper weight, on chromatographic paper No. 2040a (Schleicher^R & Schüll) and exposed to light for 72 hours. The assessment is carried out with the help of the 8-grade cotton scale. The higher the light fastness of the oils, the higher the grade-number. In order to test the yellowing on heating, a sample is prepared as described above and stored at 100°C for 24 hours. The assessment of the yellowing is carried out following the method of DIN 54004.

Table 1:

Product	Time (h)	Light fastness	Heat-yellowing
		72	24
Capelin oil*		2 - 3	1
Lard oil		4	2 - 3
Example 1.3.		4	4

*Capelin oil is a special fish oil.

Example 13: Emulsifying Behaviour

In order to examine the emulsifying behaviour the oxalkylates of Examples 1.1. and 1.2. and, for comparison purposes, lard oil are sulfonated or sulfated as in Example 1.3. and mixed with a mineral oil. The emulsion stability of the mixtures after addition of tap water having a temperature of 60°C, in the ratio of 1 : 4, is assessed.

Table 2:

Sulfonate acc. to Example 1.3 of	Mixture of		Assessment of the emulsion after 1 hour
	Sulfonate %-wt.	Mineral oil* %-wt.	
Lard oil	20	80	not stable, 2 phases
Example 1.1.	20	80	stable
Example 2.1.	20	80	stable

*Boiling range: 200 - 350°C/0.266 bar

Viscosity 20°C: 65 cPs

Density 20°C: 0.893 g/cm³

Example 14:

Example 2.1 is repeated with the exception that instead of oleic acid methyl ester

a) oleic acid isopropyl ester

b) oleic acid butyl ester
are used.

800 g of the obtained oxalkylates which are liquid at room temperature is each mixed with 200 g tall oil fatty acid, and sulfated and processed with 300 g 96%-sulfuric acid as in Example 1.2.

Table 3

Product according to Example	Org. bonded SO ₃ %	Melting point °C	Light fast- ness after 72 hours	Heat- yellowing 100°C/24 h.
14a	5.3	12.7	4	3
14b	5.2	12.5	4	3



CLAIMS

1. A process for the production of liquid or flowable derivatives of C₈-C₂₄ fatty acid esters of aliphatic C₁-C₅ monoalcohols or mixtures of these fatty acid esters with natural fats or oils that are solid at room temperature or comprise solid fractions and/or their mixtures with free fatty acids and/or mono- and/or diglycerides by reaction with at least one alkylene oxide at elevated temperatures in the presence of alkaline catalysts, sulfonation or sulfation of the obtained reaction products, optionally after epoxidation, and optional neutralization of the reaction products, characterized in that as starting material either

A) at least one C₈-C₂₄ fatty acid ester of an aliphatic C₁-C₅ monoalcohol

or

B) a mixture of at least one C₈-C₂₄ fatty acid ester of an aliphatic C₁-C₅ monoalcohol in a mixture ratio of 1 to 99%-wt., relative to the total mixture, and the fats that are solid at room temperature or comprise solid fractions are used, the latter starting materials optionally comprising free fatty acids, mono- and/or diglycerides.

2. The process according to claim 1 characterized in that a mixture comprising 20 to 50%-wt. of C₁₈-C₂₄ fatty acid ester of an aliphatic C₁-C₅ monoalcohol is used as starting material.

3. The process according to any one of claims 1 to 2 characterized in that oxalkylation is carried out with 5 to 100%-wt. of alkylene oxide, preferably 10 to 25%-wt. of alkylene oxide, relative to the amount of the starting material used.

4. The process according to any one of claims 1 to 3 characterized in that one or several alkylene oxides are used for the



oxalkylation, and in case more than one alkylene oxide is used, the alkylene oxides are added either successively or as a mixture.

5. The process according to any one of claims 1 to 4 characterized in that the oxalkylation is carried out in the presence of alkaline catalysts, such as sodium or potassium hydroxide or alcoholate or alkali salts of fatty acids.
6. The process according to any one of claims 1 to 5 characterized in that the oxalkylation is carried out at temperatures ranging from 130 to 200°C, preferably 160 to 180°C.
7. The process according to any one of claims 1 to 6 characterized in that starting materials having iodine numbers of below 100, preferably below 70, are used.
8. The process according to any one of claims 1 to 7 characterized in that the methyl, ethyl, isopropyl, and/or isobutyl esters are used as fatty acid esters.
9. The process according to any one of claims 1 to 8 characterized in that the sulfation of the oxalkylation products is carried out in admixture with hydrocarbons and/or unsaturated fatty acids, and that the resulting reaction products are neutralized.
10. Liquid or flowable derivatives of natural fats and oils obtainable according to a process as defined in claims 1 to 9, characterized by a light fastness of at least 4, measured after 72 hours, and a heat-yellowing value of at least 3, measured after 24 hours, determined following the method of DIN 54004.
11. The use of the liquid or flowable derivatives of natural fats and oils according to claim 10 or of the product obtained according to the process of claims 1 to 9, optionally in combination with other



substances having lubricating properties and anionic and/or non-ionic emulsifiers for the fat-liquoring and greasing of leather.