

The present invention relates to a process for the production of derivatives of natural fats and oils that are liquid or free-flowing, respectively, at room temperature and to their use in the fat liquoring and greasing of leather.

Natural fats and oils of vegetable and animal origin are mainly used for human nutrition. However, ever greater quantities of these fats and oils are being used as reproductive raw materials in the most varied branches of industry. In this connection, the technological utility of these products depends specifically on the particular properties of the fats and oils. In their turn, these are determined mainly by their composition and molecular structure. Natural fats and oils are mainly composed of triglycerides (neutral fats) and - to a lesser extent - of phosphorus lipids and free fatty acids. The properties of this group of substances - and this particularly applies to the neutral fats - are determined by the type of fatty acids bonded to the glycerol molecule with regard to the 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, in the final analysis, the respective structure of the components of the natural fats and oils determines and very frequently limits their technological applicability to a great extent, if no changes can be or are made to the molecule - whether because such changes are restricted on the basis of cost or because the desired modifications

cannot be made conventionally by normal chemical practice.

Based on technologies used to date, natural fats and oils must be subjected to specific cleaning processes or separation steps, respectively, into the solid and the liquid phases or else undergo hardening. Ultimately, the desired "fat chemicals" result from the fat splitting or reaction products of the natural oils and fats: fatty acids, glycerol and fatty acid methyl esters - the actual oleochemical base materials - and the fatty alcohols and fatty amines that are important because of their significance for the most diverse derivatives.

Since the molecular structure of natural fats and oils is determined by their origin and fats and oils per se are nearly unuseable "fatty chemicals", "tailor-made" fats and oils must be produced by means of industrial processes. The processes required for this are characterized by the consumption of large amounts of energy and high investment costs. In addition, they are frequently of low-level specificity (danger of isomerization of the fatty acids, production of mixtures instead of uniform products, etc.).

Using examples taken from the leather auxiliaries industry, it will be apparent that only with specific compositions of the fat liquors and greases a technological usability considering specific demands will be possible:

- With regard to the technological processability of fats, it is important that they are present in a free flowing form. Animal carcass fats, the use of

which would be desirable in the production of fat liquors and greases for leather, are solid. In order to render them useful, they must be liquefied. This can take place by fractionation. However, this process is complicated, uses large quantities of energy, and is relatively costly.

- In the search for the cheapest possible substitute fats that are available in large quantity, their industrial suitability is diminished by the fact that in most instances these are fats in solid form and these, too, have to be liquefied by suitable processes.
- Fats and oils of high viscosity permit only superficial fat liquoring of leather, so that there is a danger of fat spotting on leather that is so treated. A high-quality leather must be fat liquored and greased with a low-viscosity fat and this, in turn, requires the adjustment of a specific viscosity.
- For the subsequent treatment of fats for the use as fat liquors and greases for leather, it is frequently required that there be double bonds in the fatty acid molecules (e.g., for carrying out sulphonation). Up to now, starting products of this kind have been available only in natural oils that are, moreover, relatively costly.
- On the other hand, multiply unsaturated, i.e., correspondingly thin-bodied oils are undesirable for use in the fat liquoring of leather, because there is a danger of resinification due to the high content of unsaturated double bonds.

For the above-cited technical reasons, the liquid sperm oil was the product of choice for the leather-processing industry for many years. Sperm oil makes finished leather exceptionally supple and has at all times been used in the production of very high quality leather. Furthermore, the properties of low-quality leather could be so improved by the treatment with sperm oil that it satisfied the high demands for quality.

As a consequence of efforts made to protect the sperm whale - the source of sperm oil - the use of sperm oil had been stopped in Europe to avoid extermination of the species. Synthetically produced triolein as well as lard oil (the liquid phase of lard) have been used as replacement products for sperm oil - particularly in the leather industry. Fat liquoring and greasing is usually carried out in oil/water emulsions with the help of fat liquors.

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

Sulphonated and sulphited native oils and fats comprise α -sulpho-fatty acids and hydroxysulphonates. Alkane-, α -olefin-, dialkylbenzene- and chlorinated

paraffin sulphonates as well as long-chain fatty alcohol sulphonates, the esters of phosphoric acid, citric acid, and alkylsuccinic acid are found in synthetic fat liquors.

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

The bonding of the emulsified fractions takes place by van der Waals forces via polar groups. The emulsifying fractions influence the bonding of the emulsified fractions insofar as they are responsible for their distribution within the leather and exert an anchoring effect by intermolecular forces.

Fat liquoring and greasing is a process that determines the quality in the production of leather. This is especially applicable to very soft types of leather. The following characteristics of leather are very greatly influenced by fat liquoring and greasing:

1. Softness
2. Mechanical properties such as resistance to tearing, tear growth resistance, elongation, grain elasticity, etc.
3. Fullness, tightness of grain, and "handle"
4. The properties of the leather surface for subsequent finishing processes.

It is known that softness is mainly based on the separation of the fibre bundles and fibriles during the drying process. Accordingly, the ability of a fat liquor to so alter the surface of the fibres and the fibriles that no adhesion takes place during drying is an essential criterion for the softening properties of the fat liquor and grease. This property is greatly affected 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 that have been "coated" with the lubricant have a greater ability to slide and thus, at the same time, exhibit reduced internal friction.

It is to be assumed that a marked spreadability of the emulsified fractions has a decisive effect on their lubricating effect. To clarify this, reference is made to the fact that spreadability is understood to be the property of a substance to spread over the surface of a solid or liquid substance in a mono-molecular layer. The greater the spreadability, the smaller the quantity of substance required in each instance. Unfortunately, up to now there has been a lack of test data concerning the influence of varying spreadability of the emulsified fractions of a fat liquor on the fat liquoring and greasing effect. One reason for this is the complicated and expensive measuring technique that is involved. Furthermore, there is the fact that the emulsifying fractions of a fat liquor can have a decisive effect on the spreadability of the emulsified fractions.

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

The filling effect of fat liquors and greases is particularly evident in the case of thin leather types up to a maximum of approximately 1.2 mm (for cattle hides). It is possible, by proper selection and, optionally, increased use of the product, to reduce the normally required amount of retanning material or even dispense with retanning altogether.

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

Very often, however, grain pipeyness is caused by incorrect selection of the fat liquor and grease or by an unsuitable fat liquoring and greasing technique. In order to avoid this fault in the leather, which reduces its quality, one has to strive for a fat distribution over the cross-section of the leather, which ensures that the mechanical properties, in particular the softness of the grain and the reticular layer, are roughly uniform in the critical boundary area between the two layers.

Ultimately, the "handle" of the leather is also dependent on the type, quantity, and characteristics of the fat liquor and grease used. This cannot be measured objectively and is extremely difficult to define. Softness and tightness of the grain are only parts of what the expert understands by the term. There is, for example, a "round" handle, or a "solid" handle, and only the specialist is in a position to assess the handle of a leather correctly.

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

The reaction of fish oil with ethylene oxide condensates and the subsequent sulphation is known from IN-A-146 476.

It is the object of the present invention to use as starting materials fatty raw materials, such as animal carcass fats, comprising solids or solid fractions, which are available in large quantities and for this reason are favourably priced, to convert these starting materials in an energy-efficient manner into

derivatives which, in addition to having a fat liquoring and greasing effect, simultaneously have an emulsifying action and a high spreadability and which, for this reason, are particularly suitable as fat liquors and greases for leather.

This object is achieved by the process according to claim 1.

Oxalkylation is a reaction known per se. The mechanism of the oxalkylation of a triglyceride that is practically free of active hydrogen atoms - i.e., which are 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 manner that washing agents, defoamers, emulsifiers, and the like are provided.

Surprisingly, the animal and/or vegetable fats used according to the present invention, which are solid or comprise solid fractions, respectively, at room temperature, not only retain the greasing character of the oxalkylation products, but the industrial application properties of these products as leather auxiliaries are even improved, if the fats that have been reacted with alkylene oxide are sulphited or sulphonated according to known methods. The products so obtained display fat liquoring properties that are at least equal to those of products based on fats which are liquid at room temperature - such as, for example, neat's-foot-oil or lard oil.

By alkoxylation that precedes the sulphation process fat liquors are obtained according to the present invention which provide completely uniform emulsions that are very productive and superior to conventional fat liquors and greases with added emulsifier (the expression "sulphation" is here understood to be a common generic term for the introduction of sulphate groups or sulphonic acid groups that are introduced into the fat molecule either by treatment with concentrated sulphuric acid or by oxidizing sulphitation).

Fundamentally, all triglycerides and their 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 practical importance is the conversion of fats or oils, respectively, which are solid at room temperature and have a cloud point above that of lard oil.

The following Table 1 indicates the gas chromatographically determined composition of two examples of fats that can be used according to the present invention (Fat 1 and Fat 2) in comparison to lard oil:

Table 1

C-distribution	According to present invention		Comparison lard oil (%)
	Fat 1 (%)	Fat 2 (%)	
C ₁₄	1.5	2.5	1.5
C _{14:1}	-	1.5	
*C ₁₅	0.5	0.5	0.5
C ₁₆	26.5	26.0	23
C _{16:1}	3.0	9.5	3.5
*C ₁₇	1.0	1.0	0.5
C ₁₈	28.5	3.0	2.5
C _{18:1}	31.0	52.0	56
C _{18:2}	4.5	2.0	9.0
C _{18:3}	0.5	1.0	0.5
*C ₁₉	0.5	0.5	0.5
C ₂₀	2.0	0.5	2.0
*C ₂₂	0.5	-	
Solidification point (°C)	24	23	
Cloud point (°C)	-	-	10

* With unsaturated fractions

It is not absolutely necessary to use fats of a specific origin, but, for example, Fat 1 and Fat 2 from Table 1 can be used in admixture. Or, for example, it is possible to use mixtures of bone fat and skin fat.

The useable fats may also be partially split, so that, in addition to mono- and diglycerides, there is also free fatty acid. The acid number of the fats is not

critical, as has been shown by oxalkylation experiments involving the addition of free fatty acid.

The oxalkylation may be carried out in the presence of small quantities of water as they occur in natural fats, or which are introduced by aqueous catalyst solution.

Ethylene oxide, propylene oxide, butylene oxide, styrene oxide, 1,2-epoxybutadiene, 1,2-epoxycyclohexene may be used as 1,2-epoxides. If more than one epoxide is used, then these can be reacted successively or as a mixture with the fats. Propylene oxide is preferred for the oxalkylation.

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

The reaction takes place by known processes at an elevated temperature. In order to achieve a rapid reaction of the alkylene oxides, a reaction temperature in the range of 150 to 170°C, e.g., of 160°C, has been shown to be expedient.

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

The alkoxylation is advantageously carried out at a normal pressure of up to 10 bar.

If the alkoxylation is carried out with a plurality of 1,2-epoxides, these may either be reacted one after the other with the starting fats, or the reaction may be carried out with a mixture of the epoxides. If the reaction is carried out with more than one 1,2-epoxide, then it is preferred that propylene oxide and ethylene oxide be used.

Subsequent to the alkoxylation, the oxalkylated fats are sulphated by methods known per se. The sulphation may be carried out with concentrated sulphuric acid at room temperature up to slightly increased temperatures (approximately 30°C) for a few hours. The quantity of concentrated sulphuric acid advantageously amounts to 15 to 35, preferably 20 to 30%-wt., relative to the oxalkylation product. Alternatively, sulphonic acid groups may be introduced by treatment with sodium disulphite in the presence of atmospheric oxygen. After the sulphatization or sulphitation, respectively, the product so obtained is adjusted to a pH value in the vicinity of the neutral point (e.g., pH 6.5), this is suitably effected with aqueous alkali. For sulphation, the alkoxyated fats obtained in the first step of the process may be mixed with hydrocarbons and/or further unsaturated fats of fatty components such as, for example, olein.

The sulphation may be carried out immediately after the oxalkylation, in which connection the oxalkylated products do not need to be isolated. According to a further embodiment of the present invention, the oxalkylated fats are epoxidized prior to sulphation. This can take place in a known manner, e.g., with hydrogen peroxide in the presence of formic acid.

It is preferred that the sulphation be carried out with an SO₃/air mixture with a content of up to 8% vol. SO₃ at temperatures of 20 to 50°C.

It is advantageous that the oxalkylation products be liberated from readily volatile components (e.g., by distillation, optionally in a vacuum).

The major advantage of the process according to the present invention lies in the fact that low-quality, dark coloured fats that are normally characterized by an increased fraction of free fatty acids, e.g., 5 to 15%, can be used. Despite this, relatively light coloured, low-odour products are obtained.

Example 1

20 g of 45% potassium hydroxide solution were added to 2000 g of bone fat with an acid value (A.V.) = 27; iodine value (I.V.) = 54; saponification value (S.V.) = 198; solidification point (s.p.) = 25°C contained in a heatable agitator autoclave, and carefully purged with nitrogen. After heating to 160°C, 354 g of propylene oxide was added little by little so as to maintain the reactor temperature in the range of 155 to 165°C and so that the pressure of 4 bar was not exceeded. Prior to each renewed addition of epoxide the reaction was allowed to settle down, which could be noted by a drop in pressure to normal. The time required for the gradual addition of the monomer amounted to 1.5 hours. Subsequently, the reaction was allowed to continue for 30 minutes at 160°C and the reaction mixture was stripped to remove highly volatile fractions. After neutralization at approximately 40°C with concentrated sulphuric acid, an oil was obtained which was slightly

cloudy at 20°C and which solidified at approximately 11°C. I.V. = 48.7.

Example 2

In a temperature controlled stirred autoclave, 40 g of 30% sodium methylate solution was added to 2000 g of dark brown animal carcass fat of low quality with the following characteristics: A.V. = 10; I.V. = 55; S.V. = 197; s.p. = 23°C and then freed from oxygen and volatile fractions during heating to 120°C by alternating evacuation to approximately 20 mbar and ventilation with nitrogen. At an internal reactor temperature of 160°C, 354 g of propylene oxide was added dropwise as described in Example 1. After neutralization of the reaction mixture with concentrated acetic acid, an opal-coloured oil that solidifies at approximately 12°C was discharged.

Example 3

Beef tallow with the following characteristics: A.V. = 2.0; I.V. = 45; S.V. = 198; s.p. = 34°C was processed as described in Example 1, but with the addition of 25%-wt. of propylene oxide. After neutralization with toluene-p-sulphonic acid, an oil that is cloudy at 20°C was obtained.

Example 4

2000 g of animal carcass fat with characteristics: water content = 0.58%, s.p. = 23°C; A.V. = 10; S.V. = 197; I.V. = 54.6 was reacted with 354 g of propylene oxide as in Example 1. After completion of the reaction - recognizable by the constant pressure within

the reactor - 176 g of ethylene oxide was added in portions at 155 to 160°C and a maximum reaction pressure of 4 bar. After completion of the reaction, highly volatile fractions were removed by a vacuum of approximately 20 mbar, the reaction product was cooled to approximately 40°C and neutralized with sulphuric acid.

Appearance at 20°C:	a light-coloured, slightly cloudy oil
pH value:	4.8
A.V.:	3.6
hydroxyl number:	49.4
I.V.:	43.6
S.V.:	159
viscosity:	780 mPas (25°C)

Example 5

The animal carcass fat as in Example 4 is reacted with propylene oxide and ethylene oxide as in Example 4, but with the difference that the alkylene oxides are not dosed one after the other, but are added to the reactor as a mixture little by little. After processing, an oil that is slightly cloudy at 20°C is obtained.

A.V.:	4.2
hydroxyl number:	50.2
I.V.:	43.4
S.V.:	158
viscosity:	910 mPas (25°C)

Example 6

20 g of 45% potassium hydroxide solution was added to 2000 g of the fat used in Example 1 in a pressure reactor. During heating this was carefully purged with highest-purity nitrogen. 354 g of ethylene oxide was added portionwise at a temperature of 160°C, so that the reaction temperature could be maintained and a pressure of a maximum of 6 bar was not exceeded. After reaction of the epoxide, the batch was cooled and the pH adjusted to 5 with sulphuric acid. A yellow cloudy oil was obtained.

A.V.:	4.2
hydroxyl value:	51.2
S.V.:	166.6
viscosity:	85 mPas (25°C)
I.V.:	45.5

Example 7

1000 g of the reaction product obtained in Example 1 was sulphonated at approximately 30°C with 300 g of concentrated sulphuric acid for 5 hours. After neutralization with 30% sodium hydroxide solution to a pH value of 6.5, the salt water was separated and a liquid red-brown clear sulphonate was obtained. The content of organically bonded SO_3 = 5.1%.

Chrome tanned, dyed shoe upper leather of approximately 2 mm shaved thickness from cattle hides, re-tanned with vegetable, synthetic and resin tanning agent was liquored at 50°C for 45 minutes with 100% float and 7% of the product obtained (relative to the shaved weight). The leathers were dried and finished

in the usual way. Very soft leathers with a high degree of grain tightness and of even colour were obtained.

Example 8

A mixture of 700 g of reaction product from Example 2 and 300 g of a hydrocarbon mixture of chain length C_{10} to C_{30} was oxidized at 90 to 120°C with air until the decrease in the iodine value amounted to 22 and the saponification value had increased by 16. The oxidation product was sulphited at 70 to 80°C by the addition of 9% sodium disulphite and then adjusted to pH 6.5 with ammonia. An oil having an opal colour at 20°C was obtained.

Chrome tanned and dyed cattle hide, retanned with anionic polymer tanning agent, with a fold thickness of 0.8 to 1.0 mm, was liquored at 50°C in 150% float for 60 minutes with 10% of the obtained product (relative to the shaved weight). After conventional drying and finishing, very soft flexible garment and furniture leathers having a very even grain and a high degree of light fastness were obtained.

Example 9

A mixture of 700 g of reaction product from Example 2 and 300 g of a hydrocarbon mixture of chain length C_{10} to C_{30} with an A.V. = 3 and I.V. = 56.1 was epoxidized with hydrogen peroxide in the presence of formic acid according to known processes (see Houben-Weyl, volume 14/2, page 548). After separation of the aqueous phase, the washed and dried sample displayed the following characteristics: A.V. = 5.0; I.V. = 14.5; ep-

oxide oxygen = 1.1%. Sulphation was carried out by careful introduction of 100 g of concentrated sulphuric acid at a maximum of 30°C over a period of 2 hours. For purposes of subsequent reaction, this was stirred for a further hour at 30°C and then adjusted to pH 5.5 with 30% sodium hydroxide solution. After washing with 1000 g of 20% sodium chloride solution, a yellow emulsifiable oil was obtained, the pH value of which was adjusted to 6.5 to 7.0 in order to improve shelf life.

White or dyed chrome tanned nappa leathers from sheep hide were retanned with synthetic and/or polymer and/or resin tanning agents and liquored at 50°C for 60 minutes with 200% liquor and 12% of the product obtained (relative to the shaved weight). After conventional finishing, soft nappa leathers with a round handle, good elongation, low grain pipeyness, and high light fastness was obtained.

Comparative Example 1

560 g of the bone fat used in Example 1 with a solidification point of 25°C was mixed as in Example 4 with 240 g of a hydrocarbon mixture of a chain length of C₁₀ to C₃₀ and 200 g of olein and then sulphonated. The product obtained after processing is non-homogeneous and not suitable for the production of liquid products that can be used as fat liquor and grease for leather.

Examples 10 to 12

A dark-brown fish oil with a strong sediment, a typical unpleasant odour of train oil, a cloudiness at

room temperature, and displaying the following characteristics, was used as starting material:

A.V. = 21.7; I.V. = 161; S.V. = 184;
 clarity point: not clear up to 100°C.

This product was reacted as in Example 1 so that 5, 10, and 15%-wt. of propoxyl groups were contained in the end product:

Ex.	PO content (%-wt.)	A.V.	hydroxyl number	I.V.	S.V.	Appearance		Odour
						20°C	10°C	
10	5	0.39	62.4	152	174	slightly cloudy, thin-bodied oil	cloudy	slight odour of train oil
11	10	0.33	76.1	138	163	clear, thin- bodied oil	clear	scarcely any train oil
12	15	0.36	82.6	124	153	clear, thin- bodied oil	clear	scarcely any train oil

Examples 13 to 18

800 g (750 g) of propoxylated fish oil of Examples 10 to 12 were accommodated in a controlled temperature sulphation column equipped with an anchor stirrer and a dropping funnel. At a temperature of 32°C, 160 g (225 g) 97% sulphuric acid was added drop by drop from the dropping funnel for 5 hours during intense agitation. Stirring was continued at 32°C for a further hour to allow the reaction to settle down. The pH value of the resulting emulsion was adjusted to 6.8 by the addition of 30% sodium hydroxide solution where-

upon the temperature rose to approximately 70°C. The separation into crude sulphonate and salt water resulted from the emulsion on standing at approximately 70°C. The aqueous phase was removed and the sulphation product was adjusted to pH 8.3 with 45% sodium hydroxide solution.

Ex.	Prop. fish oil from Example	97% H ₂ SO ₄ (%-wt.)	org.bond. SO ₃ (%-wt.)	Appearance 20°C	Water Cont. %-wt.
13	10	20	3.5	clear oil	22
14	10	30	5.0	cloudy oil	22.7
15	11	20	3.4	clear oil	20.7
16	11	30	4.9	" "	21.2
17	12	20	3.5	" "	20.1
18	12	30	4.7	" "	20.3

**Odour assessment of the products from
Examples 13 to 18:**

Scarcely perceptible odour of train oil at 20% H₂SO₄
Odour of train oil at 30% H₂SO₄, not detectable

Example 19

A chrome tanned upper leather retanned with an anionic polymer tanning agent was liquored at 50°C in 150% liquor for one hour with 10%-wt. (relative to the shaved weight) of a clear mixture consisting of 50%-wt. sulphated product from Example 18, 35%-wt. white oil, 2% emulsifier, and 13%-wt. water. After drying and finishing this resulted in a very soft and supple furniture leather of perfect odour.

Comparative Example 2

The fish oil used in Examples 10 to 12 was sulphated and processed with 97% sulphuric acid without being previously reacted with propylene oxide according to Examples 13 to 18:

Quantity of 97% H ₂ SO ₄ (%-wt.)	Org.bond. SO ₃ (%-wt.)	Water Content (%-wt.)	Appearance at 20°C
20	4.3	20.3	cloudy oil
30	4.9	19.9	ditto

Odour assessment: a distinct odour of train oil.

The mixture according to Example 19 did not result in a clear fat liquor and grease for leather.



C L A I M S

1. A process for the production of derivatives of natural fats and oils that are liquid or flowable, respectively, at room temperature, whereby fats that are solid or comprise solid fractions at room temperature, mixtures thereof 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 are sulphated, optionally after epoxidation, in a manner known per se.

2. The process according to claim 1, characterized in that the oxalkylation is carried out at temperatures in the range from 150 to 170, preferably 155 to 165°C.

3. The process according to any one of claims 1 to 2, characterized in that 5 to 100%-wt. of 1,2-epoxide, preferably 10 to 25%-wt. of 1,2-epoxide, relative to the quantity of fat used, are added.

4. The process according to any one of claims 1 to 3, characterized in that ethylene oxide, propylene oxide, butylene oxide, styrene oxide, 1,2-epoxy butadiene, and/or 1,2-epoxy cyclohexene are used as 1,2-epoxides.

5. The process according to any one of claims 1 to 4, characterized in that the oxalkylation is carried out in the presence of sodium hydroxide, potassium hydroxide, sodium methylate, or alkaline salts of fatty acids.

6. The process according to any one of claims 1 to 5, characterized in that the epoxides are reacted one



after the other or in admixture with the fats in case that the oxalkylation is effected with more than one epoxide.

7. The process according to any one of claims 1 to 6, characterized in that the oxalkylation is carried out with propylene oxide and/or ethylene oxide.

8. The process according to any one of claims 1 to 7, characterized in that the oxalkylation products, optionally in admixture with hydrocarbons and/or unsaturated fatty acids, are sulphated with concentrated sulphuric acid or sodium disulphite and atmospheric oxygen in a manner known per se and that the obtained reaction products are neutralized.

9. The process according to any one of claims 1 to 8, characterized in that the oxalkylation products are epoxidized prior to sulphation.

10. The process according to any one of claims 1 to 9, characterized in that solid fats or oils with a cloud point above the cloud point of lard oil are used as starting materials.

11. The process according to any one of claims 1 to 10, characterized in that the oxalkylation is carried out at pressures from 1 bar to 10 bar.

12. The process according to any one of claims 1 to 11, characterized in that the sulphation is carried out with concentrated sulphuric acid in quantities of 15 to 35, preferably 20 to 30%-wt., relative to the amount of oxalkylation product.



13. The process according to any one of claims 1 to 11, characterized in that the sulphation is carried out with a SO_3 /air mixture having a content of up to 8%-vol. of SO_3 in the temperature range of 20 to 50°C.

14. Liquid or free-flowing derivatives of natural fats and oils, obtainable by reaction of fats or fats comprising solid fractions, respectively, mixtures of these with free fatty acids, mono- and/or diglycerides at elevated temperatures in the presence of basic catalysts with at least 1,2-epoxide, optional epoxidation of the oxalkylation products obtained, and subsequent sulphation, optionally in admixture with hydrocarbons and/or unsaturated fatty acids, with concentrated sulphuric acid or sodium disulphite and atmospheric oxygen, and neutralization of the products obtained.

15. A process for the greasing of leather, in particular for fat liquoring, characterized in that the leather is treated with a product as claimed in claim 14.

16. The process according to claim 15, characterized in that the fat liquoring and greasing is carried out in aqueous float with 3 to 15%-wt. of fat liquors and greases, relative to the shaved weight of the leather to be fat liquored and greased.