The present invention relates to assistants for the textile and related industries.

We have found that valuable products are obtained by introducing into any water-insoluble organic compounds containing at least one reactive hydrogen atom, i.e., at least one hydroxyl, carboxyl or amino group, "polyglycol" radicles, having at least four ethenox (—O—C\(_2\)H\(_4\)—) groups, as for example the tetra-ethylene glycol radicle:

\[-O-\text{CH}_2\text{-O-CH}_2\text{-O-CH}_2\text{-O-CH}_2\text{-O-}\],

any free hydroxyl groups still present being neutralized with reactive compounds, if desired, as for example with carboxylic acids, polybasic mineral acids such as sulphuric acid or phosphoric acid, acid halides, alkyl or aryl halogen hydrazides or sulphonic acid esters or aldehydes. As initial materials may be mentioned all water-insoluble organic compounds which contain one or more equal or different groups of the said kind. For example water-insoluble carboxylic acids, alcohols, phenols, hydroxy carboxylic acids, carboxylic acid amides, amines containing at least one reactive hydrogen atom and any water-insoluble hydroxy-alkyl amines and their water-insoluble derivatives are suitable.

Specific examples of the said compounds containing a reactive hydrogen atom are aliphatic carboxylic acids insoluble in water such as those containing at least 6 carbon atoms and especially the saturated, unsaturated and/or hydroxylated carboxylic acids of vegetable, i.e., animal and vegetable, origin, and other mono- or poly-carboxylic acids containing from 6 to say 30 carbon atoms as for example caproic acid, lauric acid, oleic acid, ricinoleic acid, linoleic acid, palmitic acid, stearic acid, hydroxy stearic acid, montanic acid and naphthenic acids, as well as analogous synthetic mixtures, obtainable by the destructive oxidation of paraffin wax or paraffin oil or like non-aromatic high molecular hydrocarbons and fractions of such oxidation products, as for example the hydroxy-carboxylic acid fraction, insoluble in petroleum ether, and the acids of waxes of vegetable and mineral origin such as of beeswax or Montan wax which contain esters of carboxylic acids with up to about 30 carbon atoms. The products obtainable by introducing the said polyglycol radicles into the carboxylic acids correspond to the general formula

\[R\text{CO}(-O\text{-C}_2\text{H}_4\text{-})_x\text{-O-CH}_2\text{-CH}_2\text{-OH}\]

in which \(R\text{CO}\) is the acid radicle of the carboxylic acid and \(x\) is 3 or any integral number greater than 3. Instead of the acids their esters with polyhydric alcohols may be employed in which case a reesterification occurs, or the esters may be employed which still contain free hydroxyl groups in a polyhydric alcohol radicle of such ester, as for example mono- or di-glycerides. Instead of the said acids or esters the carboxylic halides of the aforesaid acids may be employed if an alkaline condensing agent be used, or an alkaline condensing agent capable of assisting the splitting off of halogen in the form of halogen hydracids may be employed in the case of employing ethylene halogenhydrides instead of ethylene oxide. Alcohols coming into consideration are those containing at least 6 carbon atoms and especially those corresponding to, or prepared by reduction from, the aforesaid vegetal carboxylic acids or their glycerol esters, as for example hexyl, octyl, decyl, undecyl, dodecyl, tetradecyl or octodecyl, cetyl or oleyl alcohols, cholesterol, and glycols of high molecular weight of the type of octodecandiol, such as octomethyl glycol or decamethyl glycol, as well as water-insoluble alkyl, or also cycloalkyl, aralkyl or aryl, ethers of the different polyhydric alcohols as for example the cresyl, phenyl, benzyl, cyclohexyl or naphthyl ethers of glycol or of glycerol. The products obtainable by introducing the said polyglycol radicles into the said alcohols correspond to the general formula

\[\text{C}_n\text{H}_{2n+1}(-O\text{-C}_2\text{H}_4\text{-})_x\text{-O-CH}_2\text{-CH}_2\text{-OH}\]

in which \(n\) is 6 or any integral number greater than 6 and \(x\) is 3 or any integral number greater than 3. Water-insoluble amines may also be employed as for example the isomeric xylenols and xylorins (dimethyl dihydroxy benzene). Amines may be chosen from any water-insoluble amines provided they contain at least one reactive hydrogen atom connected to a nitrogen or oxygen atom, as for example decylamine, undecylamine, dodecylamine, tetradecylamine, cetylamine, octodecylamine, pentadecylamine, di-heptylamine, dibutyl amine and diphenylamine. The products
obtainable by introducing the said polyglycol radicals into the said amines correspond to the general formula
\[
R.NH\left(\text{-O.C}_x\text{H}_y\text{-}\right)_z\text{-O.}\text{CH}_2\text{-CH}_2\text{-OH}
\]
in which \(R.NH\) is the radicle of the amine and \(x\) is 5 or an integral number greater than 3. The amines containing a reactive hydrogen atom may contain the latter connected to oxygen as is the case with the alkyl amines which therefore need not contain a hydrogen atom connected to nitrogen. Examples of this group are for example mono-N-cyclohexyl-N-mono- or di-alkylamines such as N-cyclohexyl-N-mono- or di-ethanol or propanol amines or the corresponding mono- or di-decyI, dodecyl, tetradecyl or octodecyl alkyl amines. Even water-insoluble amines can be rendered more useful by the conversion according to the present invention so far as they contain a reactive hydrogen atom connected either to nitrogen or to oxygen; these amides are preferably chosen from those of fatty acids containing at least 8 carbon atoms and advantageously from those of the above-mentioned acids of vegetable origin. The water-insoluble amides may be chosen from those prepared from ammonia or water-soluble primary amines and from alcohols of mono-, di- or tri-ethanol or -propanol amines or of mixtures thereof. Water-insoluble esters of these alkyl amines with the aforesaid high molecular acids may be employed provided they still contain a reactive hydrogen atom as is the case for example with esters of the type of tri-ethanol amine or di-ethanol amine estearic or palmitic esters, the former of which contain a free hydroxyl group and the latter of which contain a reactive hydrogen atom connected to the nitrogen atom.

The long chain polyglycol radicles may be added on to the said initial materials by treatment with corresponding quantities of ethylene oxide or substances forming the same, such as alkylenecyclohexylamines, if desired with the employment of condensation catalysts such as surface active substances as for example bleaching earths or active charcoal, strongly acid substances as for example sulphuric or phosphoric acids or sodium or potassium bisulphite, gums such as caustic soda or alkali metal alcoholumes and/or with the employment of increased pressure, if desired at elevated temperatures such as from about 80° to 200° C., preferably between 100° and 150° C. whereby the ethylene oxide molecules arrange themselves with the formation of long chain polyglycols. Depending on the amount of ethylene oxide employed it is possible to add on four or more \(-\text{CH}_2\text{-}\) groups to each other by means of ether linkages. On the other hand the quadruple polyglycol ethers or the ethers containing more than 4 polyglycol radicles may be first formed in known manner and then condensed in known manner with the compounds containing reactive hydrogen atoms to form therewith esters, ethers and/or amides or esters of the at least quadruple polyglycol ethers may be employed for this step so that a further conversion of the products with acids, acid halides, alkyl or aryl halides or polybasic mineral acids stated above may be dispensed with. The quantities of the polyglycol forming agents e. g. of ethylene oxide, or of an equivalent compound such as the glycol chlorhydrins, generally correspond to from one half molecular proportion of polyglycol forming agent per carbon atom of the water-insoluble compound, the quantity of polyglycol forming agent being, however, at least 4 molecular proportions of the water-insoluble initial material even if the latter should contain less than 8 carbon atoms so that products with at least quadruple polyglycol radicles are formed. In most cases, however, from 6 to 20 and up to 50 molecular proportions of the polyglycol forming agent are employed per molecular proportion of the water-insoluble initial material, or the corresponding polyglycols themselves. By employing initial materials containing hydrogen atoms such as glycols, for example octodecanol, octomethyl glycol, decamethyl glycol, or hydroxy carboxylic acids, for example hydroxy stearic acid and mono- and di-glycerol esters thereof, dicarboxylic acids such as sebacic acid or pimelic acids, or primary amines, products may be obtained containing not only one but several, at least quadruple, polyglycol radicles in the molecule.

The products obtainable by adding the polyglycol radicles on to water-insoluble organic compounds containing at least two of the said reactive groups usually contain one or two free hydroxy groups at the end of the chains and these may be converted as mentioned with reactive compounds, as for example with fatty acids, esters or aldehydes or ketones. As a further example may be mentioned in particular acids which react to form esters, as for example sulphuric, chlorosulphonic, phosphoric, phthalic or fatty acids for example with from 8 to 18 carbon atoms and their derivatives, such as chlorides, or halogenated paraffin waxes. Such products as contain a halogen at the end of the polyglycol ether chain as for example those prepared with ethylene oxide and halogen hydrids, or those prepared by substituting the hydroxyl group at the end of the chain by iodine or bromine according to the usual methods, may be brought into reaction with basic compounds, such as amines, acid amides, compounds containing hydroxyl groups and the like may be brought into reaction therewith.

The products obtained have especially valuable properties. They are capable of dissolving or dispersing in water and have in many cases excellent wetting, foaming and cleansing power so that they may find a wide field of employment for example in the textile industry, the leather tanning industry, the paper industry, the soap and detergent industries, as for example in carbonizing, mercerizing, dressing, bucking, washing, finishing, dying, printing or polishing. In dyeing and printing they exhibit excellent levelling action. For example the glycols in dyeing with vat dyestuffs, or with azo dyestuffs from \(\beta\)-naphthoic acid arylides on the fibre, the dyestuffs are rendered uniform or, respectively, fast to rubbing. A special advantage of the said products consists in the fact that they are generally speaking practically neutral so that the fibres are in no way attacked. Moreover, the formation of insoluble calcium or magnesium compounds such as is frequently the case in hard water with soaps or Turkey red oils does not take place with these products.

The compounds containing the at least quadruple polyglycol radicles are also suitable as dispersing agents and solvents for example for vegetable, i.e. vegetable and animal, fats and oils, natural and artificial resins and waxes, organic dyestuffs and above may be dispensed with. The quantities of the polyglycol forming agents e. g. of ethylene oxide, or of an equivalent compound such as the glycol chlorhydrins, generally correspond to from one half molecular proportion of polyglycol forming agent per carbon atom of the water-insoluble compound.
employed in the cosmetic, pharmaceutical and foodstuff industries employing wetting or emulsifying agents, or in enzymatic processes for example in the degradation of proteins, such as glue, and carbohydrates, for example for degumming raw silk, or desizing, in which process the employment of the said condensation products containing sulfonic groups is, however, not permitted. When the products containing polyglycol ether radicles of the said kind are viscous, they are suitable for the preparation of textile oils, lubricating oils and drilling oils. When insoluble compounds, such as azo dyesuffs, are prepared in the presence of the said products, the said insoluble compounds are much more finely divided than when produced in the absence of the said products.

For treatments of textiles in aqueous baths, such as dyeing, washing, scouring, stripping, vitifying or degumming, the amount of the said condensation products is usually from 0.05 to 10 grams per each litre of the bath.

The production of pastes, creams, cosmetic preparations, emulsions or suspensions, the amount of the said condensation products may be from about 5 to about 1000 per cent of the weight of the other ingredients, or more, according to the nature of the substances treated and the required consistency of the final mixture.

The products according to the present invention may be used alone or together with other agents, such as alkali metal, ammonia or amine oils or oil-lik substances, for example sulfonic acids of high molecular aliphatic or aromatic hydrocarbons, which may also contain hydroxy and/or carboxylic groups or sulfurous esters of high molecular alcohols, fatty, i. e. vegetable and animal, oils and fats, natural and synthetic waxes or cellulose esters and ethers. For example preparations from the said products and soaps, Turkey red oils, saponine, organic aliphatic or aromatic sulfonic acids, glue, vegetable mucilages, dextrin and other colloids, salts, such as common salt, Glauber's salt, magnesium sulphate or organic solvents, bleaching agents, such as perborates have very valuable properties.

The following examples will further illustrate how this invention may be carried out in practice but the invention is not restricted to these examples. The products are by weight, if not otherwise stated.

Example 1

200 parts of a mixture of higher alcohols, such as is obtained by the catalytic hydrogenation of vegetal, i. e. animal and vegetable, oils or fats by means of hydrogen at a temperature from about 250° to 300° C. In the presence of a finely divided nickel catalyst, consisting mainly of alcohols of the formula C₆H₄(OH)₂ to C₆H₄OH, whereby about 60 per cent of dodecyl alcohol is present, are heated to about 180° C. In an autoclave with about 400 parts of ethylene oxide which is introduced a little at a time. The ether prepared in this way has a foaming, washing and emulsifying action as well as protective colloid properties and is eminently suitable for washing suit wool and woolen piece goods. For example if 10 grams of suit wool are treated for ¾ hour at 45° C. In a bath containing 3 grams of the said condensation product per litre of water, a very well cleansed wool having an agreeable soft touch is obtained.

The product is also miscible with solvents, as for example ethylene glycol mono-cresyl ether, tetrahydrofuran, carbon tetrachloride and like organic water-insoluble solvents, and by the addition of water to the mixtures, very good emulsions of the said solvents are obtained. Likewise by adding the said products, as for example 10 per cent, to mineral lubricating oil, paraffin oil or another mineral or fatty oils which are insoluble in water, they may readily be rendered capable of being emulsified in water.

The wetting action of the product may be still further increased by the introduction of sulfonic groups for example by means of sulfonphonic acid. The product may also be advantageously employed, inter alia, in carbonizing baths.

Example 2

1.06 kilograms of diethylene glycol are heated to 150° C. In an autoclave and then 8.8 kilograms of ethylene oxide are added a little at a time. The pressure is about 10 atmospheres. After the whole of the ethylene oxide has been introduced, the autoclave is heated until the pressure has practically disappeared. A quantitative yield of a colourless water-soluble condensation product is obtained.

A mixture of 3 parts of the condensation product and 1 part of oleic or ricinoleic acid is heated to about 130° C. The resulting ester is soluble in water and is not precipitated from aqueous solutions by salts of calcium, aluminium, copper, zinc or by organic and mineral acids. It has a good foaming power and washing, wetting and emulsifying action. For example if the condensation product be mixed with olive oil, whereby the addition may be less than 10 per cent, a fine and stable emulsion is obtained after dilution with water.

The product has an excellent washing action and is especially suitable for washing suit wool or woolen piece goods. It may also be advantageously employed, inter alia, as an addition to distilling liquors. The usual desizing agents, as for example vegetable amyloses, such as malt amylose, for example that known in the trade under the registered trade-mark "Diastafon", or animal amyloses, such as an extract from the pancreas gland, for example that known in the trade under the registered trade-mark "Degomma", have an optimum effect in acid or neutral baths. Alkaline baths are disadvantageous, and it is only with a consequent injury to the desizing effect that alkaline washing agents such as soap can be added. The addition of a washing agent in addition to the ferment for degrading the starch is often desirable, however, when the material concerned contains fats and oils as well as starch and this requirement of a practice is met by the products according to the present invention, such as that described in the foregoing.

5 parts of the said product are added to a desizing bath which contains 1 part of an extract from the pancreas gland for example that known in the trade under the registered trade-mark "Degomma DL" for each 1000 parts of water and which has a pH value of from about 6 to 7. The washing action of the product is fully exerted without the starch-degrading action of the pancreas gland extract being checked.

When the same amount of soap is added to the bath it assumes a pH value of from 9.0 to 9.3 and the desizing effect is consequently considerably impaired.

Example 3

10 molecular proportions of ethylene oxide are added on to one molecular proportion 150
of the mono-ethyl ether of di-ethylene glycol (C₂H₅O.CH₂CH₂O.CH₂CH₂OH), obtainable by acting with ethylene oxide on the mono-ethyl ether of ethylene glycol in the manner as described in Example 2. 100 parts of the resulting ether are heated with 30 parts of palmitic acid for about 12 hours at 159° C. A reaction product of the consistency of ointment is obtained which is soluble in fats and water and which is the palmitic ester of the aforesaid ether. For example if 2 parts of Japan wax be fused with 1 part of the said palmitic ester of the corresponding stearic ester until a clear solution is formed, an emulsion is obtained by slowly adding about 15 parts of hot water while stirring or shaking, which contrasted with the emulsions prepared with the aid of soda and soaps has the advantage of being neutral. Moreover no saponification of the wax takes place.

**Example 4**

An acetate silk fabric is treated at room temperature for about 10 minutes with 2 parts of the substance specified in Example 3 and 1 part of 10 per cent of formic acid for each 1000 parts of water. The fabric is centrifuged or squeezed and dried at from about 45° to 60° C. The fabric acquires a soft, and at the same time crisp, silky touch by this treatment. Contrasted with the usual process for producing the crisp touch, which consists in treating the fabric in a soap bath with subsequent treatment in a bath of formic or lactic acid, the said method has the advantage of comprising only one operation.

**Example 5**

4 parts of the ester obtained according to Example 2 or the analogous ricinoleic ester, are added to a mixture of 30 parts of oleic and 10 parts of arachis oil. After the emulsifying agent has been well dissolved in the oil mixture, preferably by warming, the whole is poured into 80 parts of water which contains 4 parts of hydroxyethyl methyl cellulose dissolved therein while vigorously moving the bath, the whole then being diluted with water to form a 10 per cent emulsion. The emulsion is eminently suitable for example for greasing wool.

The said ester or the ether alcohol obtained according to Example 1 may be employed as such or in conjunction with for example petroleum, by reason of their fatty character, their solubility in water and their washing and emulsifying action, as a textile oil in the working up of artificial silk without giving rise to subsequent inconvenience during dyeing. Similarly, by reason of the said properties, they are eminently suitable as such or in conjunction with other oils as greasing agents for the working up of animal or vegetable fibres.

**Example 6**

3 parts of a condensation product from 1 molecular proportion of diethylene glycol and 10 molecular proportions of ethylene oxide are esterified with 1 part of oleic acid in the manner described in Example 2. 10 parts of the ester thus obtained are added to 100 parts of neal's-foot oil, the whole being made into a 30 per cent emulsion with water by means of a stirring apparatus. The emulsion which may be diluted to any desired extent, possesses very good properties and is suitable, inter alia, for greasing leather. The first-mentioned product may also be employed as such as a softening agent for leather.

In the preparation of the emulsion of neal's-foot oil, the inverse order may be followed by dissolving the emulsifying agent in water and dispersing the oil to flow into the solution while stirring continuously.

**Example 7**

Cotton yarn is mordanted in the usual manner with tannin and tartar emetic and dyed in the usual manner with 1.5 per cent of Auramine O (Schnurt, Farbstofftabellen, 6th Edition, No. 40), with an addition to each litre of the dye-bath of 1 gram of the ether obtained by the adding on of 15 molecular proportions of ethylene oxide to 1 molecular proportion of 7.18-octodecanediol in the presence of 1 per cent, by weight of the octodecanediol, of caustic soda, in the manner described in Example 2. The 7.18-octodecanediol may be obtained for example by catalytic reduction of castor oil. The addition of the wax-like water-soluble product obtained by the adding on of ethylene oxide imparts to the bath an excellent capacity for wetting and in no way injuriously affects the dyeing by reason of the formation of lakes with the dyestuff such as is usually the case with wetting agents containing sulfophenic groups, as for example alkylated naphthalene sulfonic acids.

The condensation product is eminently stable to lime and alumina. It may be added to indigo, zinc-lime vats or other indigo vats or to coupling baths for naphthols, for example to coupling bath which contain aluminium compounds in addition to the diazonium compounds, without the formation of precipitates. The resulting dyeing is considerably improved as regards its fastness to rubbing, so that the usual subsequent treatment with soap may be dispensed with. Likewise it remains in solution in acid baths, even in those of high concentration. The good stability of the product to all kinds of electrolytes allows of its employment not only in neutral, but also in acid or alkaline printing pastes and in dyeing with aniline black. Since the product does not form insoluble precipitates with basic dyestuffs, it may be added most advantageously to solutions of such dyestuffs.

**Example 8**

30 molecular proportions of ethylene oxide are added on to the mono-ethyl ether of di-ethylene glycol in the manner described in Example 3. 100 parts of the reaction product are heated with 30 parts of castor oil and 3.5 parts of the resulting oily ester are added to a solution of 7 parts of disodium salt of cotton (the solutions of which in organic solvents have a high viscosity) in 49 parts of butyl acetate, 20 parts of butanol, 20 parts of ethyl alcohol and 20 parts of benzene. The resulting solution is employed for pouring films, the resulting films having very good mechanical properties and very good fastness to light.

**Example 9**

10 parts of a colloid cotton which dissolves in organic solvents with the formation of solutions of low viscosity is dispersed in a mixture of 40 parts of butyl acetate, 10 parts of butanol and 30 parts of toluene. To this solution are added 5 parts of a conversion product from equal amounts of castor oil and the ester obtained from 1 molecular proportion of diethylene glycol and 15 molecular proportions of ethylene oxide in the manner described in Example 2, and 2.5 parts of an artificial resin obtained from methylocyclohexanone by polymerization with methylalco-
The solution may be employed as a lacquer for the production of lustrous firmly adherent coatings having a smooth and homogeneous surface.

Example 10

150 parts of water containing 30 parts of the ester obtained from equal parts of coconut fatty acids and the condensation product from 1 molecular proportion of diethylene glycol and 10 molecular proportions of ethylene oxide (obtainable as described in Example 2) and also containing 10 parts of ethylene glycol monononyl ether are introduced into a homogenizing apparatus such as a turbo-mixer of colloidal mill. A solution of 200 parts of an ethylene glycol ester of the acids of oxidation-bleached Montan wax (obtainable for example according to the U. S. application No. 247,454 filed January 17th, 1928) in 400 parts of oil of turpentine are added and the whole is emulsified for from 2 to 5 minutes while adding 450 parts of water, the temperature being kept near the melting point of the wax. A good emulsion is obtained which may be applied to leather, wood or other materials and yields a highly glossy coating on the said materials after polishing or brushing.

Example 11

100 parts of asphalt are dissolved in 250 parts of xylene, and the solution is emulsified by means of a homogenizing apparatus with 300 parts of water containing 20 parts of the reaction product described in Example 2, and then a further 200 parts of water are added. The resulting emulsion is suitable as a basis for intaglio printing inks. The emulsion may also be prepared by dissolving the emulsifying agent together with the asphalt in xylene and emulsifying the said solution with the necessary amount of water in a homogenizing apparatus.

Alternatively, a part of the emulsifying agent may be dissolved in the asphaltic xylene solution and the remainder in water.

Example 12

18 molecular proportions of ethylene oxide are added onto 1 molecular proportion of octodecylamine by heating in an autoclave to about 150°C. A water-soluble product having a very good wetting power is obtained, which possesses also a good levelling effect in dyeing with vat or acid dyes. In example an addition of from 0.1 to 0.2 gram to each litre of a dyebath from Indanthrene blue B furnishes uniform shades on bleached mercerized cotton fabrics, whereas without the addition bad dyeings are obtained.

Hydroxyethyl octodecylamine, obtainable for example by the conversion of the sulphuric ester of octodecyl alcohol with hydroxystearine, may also be used as the initial material and the salicylic salt of the product may be used as an example of another addition.

If one molecular proportion of the mono-oleic or -steary esters of triethanolamine or of oleic or naphthenic amides be brought into reaction with from 4 to 10 molecular proportions of ethylene oxide, water-soluble products are obtainable which may be employed as sizing or dressing agents or in bowking.

If about 12 molecular proportions of ethylene oxide are added on to example triethanol amine and the resulting product is esterified for example with oleic acid a product is obtained which may be added for example to machine oils as an emulsifier.

Example 13

From 6 to 9 molecular proportions of ethylene oxide are added on to 1 molecular proportion of octodecyl alcohol, the product being sulphonated with equimolecular proportions of chlorosulphonic acid while cooling to from 0° to 25° C. If 3 parts of one of the resulting acid sulphonic esters in the form of its neutral sodium salt be added to 1000 parts of water, an excellent washing effect is obtained with soiled wool when treating the same for 1/2 hour at from 45° to 50° C. in the said bath while keeping the ratio of wool to bath at 1:50. The same result is obtained even after using the bath several times. When artificial silk is treated with water containing from 1 to 2 parts of the said product per 1000 parts, it acquires a pleasant supple touch.

Example 14

10 parts of crude Milan tram silk are degummed at 65° C. with 0.5 part of papain, 1.5 parts of sodium thiosulphate, 0.5 part of hydro-sulphite and 1 part of the condensation product described in Examples 7 or 2 in 1000 parts of water. The addition of the wetting agent effects a more rapid wetting and dissolution of the difficultly soluble papain without checking, its action, such as is the case for example with Turkey red oils or naphthalene sulphonics acids or other wetting agents containing sulphonate groups.

Example 15

From 5 to 10 per cent of the reaction product obtainable according to Example 2 are dissolved in 100 parts of boiling linseed oil, which may also contain adductives, the solution being slowly diluted with warm water while stirring. The resulting emulsion is very stable and is eminently suitable for example for sizing or dressing artificial silk or for the preparation of coatings on wood and other materials.

Example 16

From 3 to 5 per cent of the product obtained according to Example 7 are added to a commercial Marseilles soap. The soap becomes stable to limes after this addition and is not precipitated even in water for example of 20° hardness (German scale).

Example 17

The reaction product obtainable by the action of 18 molecular proportions of ethylene oxide on one molecular proportion of octodecyl alcohol is heated with oleic acid whereby the hydroxyl group at the end of the chain is esterified. A water-soluble product is obtained which can be used with excellent results as a protective colloid and as an emulsifying agent especially for oleic acid.

Example 18

1 molecular proportion of oleic acid or ricinoleic acid is condensed with from 6 to 10 mol-ecular proportions of ethylene oxide in the manner described in Example 2. The ester obtained is a viscous neutral oil soluble in water which possesses good washing, emulsifying and wetting properties and which in view of its fatty character and its stability against the hardness of water is excellently suitable for use as textile oil for example for spinning and oiling. In the place...
of oleic acid, castor oil, ricinoleic acid or Montan wax carboxylic acids may be employed whereby waxy, from easily emulsifiable to water-soluble products are obtained.

Example 19

From 660 to 880 parts (from 15 to 20 molecular proportions) of ethylene oxide are led, while stirring at a temperature between 130° and 140° C., into 270 parts (1 molecular proportion) of octodecyl alcohol containing 2.7 parts of an aqueous caustic soda solution of 40° Bé. The ether thus prepared solidifies into a waxy mass on cooling; the product is soluble in most of the usual organic solvents and dissolves very readily in water.

The ether possesses an excellent leveling power in dyeing with vat dyes and particularly promotes the thorough dyeing of mercerized pearl yarn and of silk yarn for embroideries in dyeing the said materials with vat dyes. If, for example, mercerized pearl yarn or strongly twisted viscose yarns be dyed in the usual manner with 5.5 per cent, calculated with reference to the weight of the yarn, of Indanthren blue RS double paste (Schultz, Farbstofftabellen, 1931, No. 1219) with an addition of 5 grams of the said wax-like ether per each litre of the dyebath, very evenly and thoroughly dyed yarns are obtained.

If, for example, artificial silk, for example cupro-amanon sodium silk, be dyed in the usual manner with 0.5 per cent, by weight of the silk, of Indanthren brilliant violet RR double paste (Schultz, Farbstofftabellen, 1931, No. 1269), or with a combination of 0.5 per cent, by weight of the silk, of Indanthren blue RS double paste (Schultz, Farbstofftabellen, 1931, No. 1228) and of 0.5 per cent of Indanthren yellow 3 RT double paste (Schultz, Farbstofftabellen, 1931, No. 1242), with an addition of from 0.1 to 0.5 gram of the said ether per each litre of the dyebath, the quality of the dye-bath being moreover maintained through a long period of time.

If the said ether be added to diazo-solutions in fixing azo dyestuffs on fibres, the solidity to results of the dyed is considerably improved.

The said wax-like ether dissolves in warm oleic acid to form a limpid solution. If a solution of, say, 2 to 5 parts of the ether in 100 parts of oleic acid be slowly stirred into water, a stable emulsion is obtained which may be employed for example for oiling textiles. If from about 8 to 12 molecular proportions of ethylene oxide be added on, similarly as described above, to 1 molecular proportion of decanol or dodecanol or of a mixture of alcohols obtainable by catalytically reducing coconut oil or palm oil by means of hydrogen, colourless water-soluble oils or semi-solid masses are obtained, which possess a good wetting power in alkaline, neutral or acid aqueous baths and which are not precipitated from aqueous solutions by calcium, magnesium or heavy metal salts. The said oils or semi-solid masses may be employed whenever a wetting agent is needed; they may also be employed as additions to moistening preparations, for example for moistening cotton-yarn before weaving, or to preparations for combating pests. The said oils and masses act as protective colloids and possess a considerable dispersing power; if the said oils or masses be added to soap solutions in which calcium salts of the water have pre-cipitated calcium soaps, the said calcium soaps are completely dissolved.

By adding from 5 to 6 molecular proportions of ethylene oxide on to 1 molecular proportion of cetyl alcohol, products are obtained which may be usefully employed for imparting to artificial silk, such as that prepared from viscose, the crisp touch of natural silk. If the said products be heated at 120° C. for 2 to 3 hours in vacuo with their own weight of a wax-like product, obtained by polymerizing ethylene oxide at a temperature below 70° C., by means of an aqueous solution of caustic potash a product is obtained which possesses a very good leveling power in dyeing with vat dyes.

Example 20

1 part of the mixture of alcohols of high molecular weight, obtained by separating the unsaponifiable constituents of a product of the destructive oxidation of paraffin wax according to Example 1 of the British specification No. 303,291 is heated with 2 parts of ethylene oxide and 0.5 per cent, by weight of the alcohols, of the bleaching earth traded under the registered trade-mark "Tonsil 38" in an autoclave to from 80° to 90° C. until the product has become soluble in water. A thick oil is obtained which possesses a good wetting-out power.

Example 21

1 part of wool fat is heated for 3 hours with 2 parts of ethylene oxide and 0.5 per cent, by weight of the fat, of a powdered bleaching earth consisting of aluminium hydroxide which contains small amounts of calcium hydroxide in an autoclave to from 100° C. A saline-like, water-soluble product is obtained which may be used as an efficient dressing agent.

Example 22

1 part of gliceryl monoleic ester is heated at from 100° to 150° C. in a closed vessel with 2 parts of ethylene oxide. The resulting ether of the ester, which is a yellowish rather thick oil, forms a colloidal solution with water and may be employed in oiling textile materials of any kind in spinning, carding, weaving or other processes and as a lubricant. In the place of the oleic ester the corresponding ester mixture of the acids of Montan wax may be employed, masses resembling bees wax being thus obtained.

Example 23

88 parts of ethylene oxide are introduced at 130° C. into 51 parts of the mixture of alcohols obtained by the saponification of sperm oil and containing 1 per cent of caustic soda or of sodium ethylate. A product is obtained which possesses a high wetting and levelling power and which is capable of easily emulsifying waxes or waxy compounds as for example Japan wax or esters of the acids of crude or bleached Montan wax as for example the glycerol esters.

If 25 or 12 parts of the alcohol mixture be employed instead of 51 parts valuable products are equally obtained the solubility of which in water is still higher than that of the aforesaid product. Mixtures of the aforesaid products with natural waxes, paraffin wax or like waxy materials can be easily emulsified in water, especially in conjunction with organic solvents, such as turpentine oil or bensene. The emulsions obtained in this manner may be employed as spot or floor polishes or similar polishing preparations.
Example 24

20 molecular proportions of ethylene oxide are added on to 1 molecular proportion of octodecyl alcohol containing 0.5 per cent, by weight, of caustic soda. After leading 1 per cent of hydrochloric gas into the condensation product, 0.5 molecular proportion of acetaldehyde is dropped in for each molecular proportion of the condensation product in the course of about 4 to 6 hours, while stirring under a reflux condenser. The water formed by the reaction and any hydrochloric acid present are removed by distillation in vacuo, and the remaining product is neutralized, if necessary, by means of soda. An oil is obtained which is a good plasticizing agent for textiles.

Example 25

From 4 to 6 molecular proportions of ethylene oxide are added on to 1 molecular proportion of octodecyl alcohol in the presence of 1 per cent of caustic soda. The product obtained is very useful for the production of pastes and creams.

12 parts of the said condensation product are mixed at from 50° to 60° C. with 16 parts of vaseline and 10 parts of paraffin oil; 60 parts of water are slowly stirred into the mixture while cooling to room temperature. An excellent skin cream is thus obtained. A skin cream may also be prepared for example by mixing 10 parts of the said condensation product with 20 parts of paraffin oil, 3 parts of peanut oil and 87 parts of water.

Example 26

By acting with 1 molecular proportion of chlorosulphonic acid on 1 molecular proportion of the condensation product obtained according to Example 23 from 1 molecular proportion of octodecyl alcohol and 4 molecular proportions of ethylene oxide, the water-soluble, acid sulphuric ester is obtained which is neutralized with caustic soda or potash, ammonia or an alkylammonium, such as mono-ethanolamine. The salts are excellent scouring agents for wool.

What we claim is:

1. The process which comprises condensing a water-insoluble, monomeric, organic compound, selected from the group consisting of hydroxyl, carboxyl and amino compounds containing at least 6 carbon atoms and one reactive hydrogen atom, with a polyglycol compound containing at least four ethenoxy groups.

2. The process which comprises condensing a water-insoluble, monomeric, organic compound, selected from the group consisting of hydroxyl, carboxyl and amino compounds containing at least 6 carbon atoms and one reactive hydrogen atom, with a polyglycol compound containing from 6 to 50 ethenoxy groups.

3. From readily to difficulty water-soluble derivatives of water-insoluble, monomeric, organic compounds, selected from the group consisting of hydroxyl, carboxyl and amino compounds containing at least 6 carbon atoms, which derivatives contain a polyglycol radicle with at least four ethenoxy groups.

4. From readily to difficulty water-soluble derivatives of water-insoluble, monomeric, organic compounds, selected from the group consisting of hydroxyl, carboxyl and amino compounds containing at least 6 carbon atoms, which derivatives contain a reactive hydrogen atom, which derivatives contain the group \(\text{[O-CH}_2\text{H}_{n}\text{]}_n-\text{OX}\) in which \(n\) denotes an integral number above 3.

5. From readily to difficulty water-soluble derivatives of water-insoluble, monomeric, organic compounds, selected from the group consisting of water-insoluble alcohols, carboxylic acids and amino compounds containing at least 6 carbon atoms and one reactive hydrogen atom, which derivatives contain the group \(\text{[O-CH}_2\text{H}_{n}\text{]}_n-\text{OX}\) in which \(OX\) denotes either a hydroxyl group, an ether radicle or an ester radicle and \(n\) denotes an integral number above 3.

6. From readily to difficulty water-soluble derivatives of water-insoluble aliphatic organic compounds selected from the group consisting of water-insoluble alcohols, carboxylic acids and amino compounds containing at least 6 carbon atoms and one reactive hydrogen atom, which derivatives contain the group \(\text{[O-CH}_2\text{H}_{n}\text{]}_n-\text{OX}\) in which \(OX\) denotes either a hydroxyl group, an ether radicle or an ester radicle and \(n\) denotes an integral number above 3.

7. Readily water-soluble derivatives of water-insoluble aliphatic organic compounds selected from the group consisting of water-insoluble alcohols, carboxylic acids and amino compounds containing at least 6 carbon atoms and one reactive hydrogen atom, which derivatives contain the group \(\text{[O-CH}_2\text{H}_{n}\text{]}_n-\text{OX}\) in which \(X\) denotes a radicle of a polybasic mineral acid and \(n\) denotes an integral number above 3.

8. From readily to difficulty water-soluble derivatives of water-insoluble aliphatic organic compounds selected from the group consisting of water-insoluble alcohols, carboxylic acids and amino compounds containing at least 6 carbon atoms and one reactive hydrogen atom, which derivatives contain the group \(\text{[O-CH}_2\text{H}_{n}\text{]}_n-\text{OX}\) in which \(OX\) denotes either a hydroxyl group, an ether radicle or an ester radicle and \(n\) denotes an integral number above 3.

9. From readily to difficulty water-soluble ethers of water-insoluble, aliphatic alcohols containing at least 6 carbon atoms, which ethers contain the group \(\text{[O-CH}_2\text{H}_{n}\text{]}_n-\text{OX}\) in which \(OX\) denotes either a hydroxyl group, a monosiloxyl or aryloxir or ester radical and \(n\) denotes an integral number above 3.

10. From readily to difficulty water-soluble ethers of water-insoluble, aliphatic polyoxylic alcohols containing at least 6 carbon atoms, which ethers contain the group \(\text{[O-CH}_2\text{H}_{n}\text{]}_n-\text{OX}\) in which \(OX\) denotes either a hydroxyl group, a monosiloxyl or aryloxir or ester radical and \(n\) denotes an integral number above 3.

11. From readily to difficulty water-soluble ethers of water-insoluble aliphatic alcohols containing from 10 to 50 carbon atoms, which ethers contain the group \(\text{[O-CH}_2\text{H}_{n}\text{]}_n-\text{OX}\) in which \(OX\) denotes either a hydroxyl group, a monosiloxyl or aryloxir or ester radical and \(n\) denotes an integral number above 3.

12. From readily to difficulty water-soluble ethers of water-insoluble aliphatic alcohols containing from 10 to 50 carbon atoms, which ethers contain the group \(\text{[O-CH}_2\text{H}_{n}\text{]}_n-\text{OX}\) in which \(OX\) denotes either a hydroxyl group, a monosiloxyl or aryloxir or ester radical and \(n\) denotes an integral number above 3.

13. From readily to difficulty water-soluble ethers of water-insoluble aliphatic alcohols containing from 10 to 50 carbon atoms, which ethers contain the group \(\text{[O-CH}_2\text{H}_{n}\text{]}_n-\text{OX}\) in which \(OX\) denotes either a hydroxyl group, a monosiloxyl or aryloxir or ester radical and \(n\) denotes an integral number above 3.

14. From readily to difficulty water-soluble ethers of water-insoluble aliphatic alcohols containing from 10 to 50 carbon atoms, which ethers contain the group \(\text{[O-CH}_2\text{H}_{n}\text{]}_n-\text{OX}\) in which \(OX\) denotes either a hydroxyl group, a monosiloxyl or aryloxir or ester radical and \(n\) denotes an integral number above 3.
taining at least 6 carbon atoms, which ethers con- tain the group \((-\text{O-C}_2\text{H}_4)_n\text{-OH}\), in which \(n\) denotes an integral number from 6 to 50.

15. Neutralized water-soluble ethers of water-insoluble aliphatic alcohols containing at least 6 carbon atoms, which ethers contain the group \((-\text{O-C}_2\text{H}_4)_n\text{-OX}\), in which \(X\) denotes a radicle of an acid and \(n\) denotes an integral number from 6 to 50.

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