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2,867,585

DETERGENT COMPOSITION

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The present invention relates to detergent compositions having controlled foaming characteristics and more particularly it relates to such compositions which contain non-ionic detergents.

Having had many years' experience with the use of soap base detergent compositions for the washing of fabrics the public has generally come to associate foaming with washing power. However carboxylic acid soaps are not as satisfactory for use in hard water as are certain synthetic detergents which are resistant to the otherwise undesirable effects of hard water, and therefore most detergent compositions now used by the housewife employ such synthetic detergents. These synthetic detergents are generally employed in a composition designed to possess foaming and cleansing properties characteristic of the heavy duty soaps which they replaced. Since the volume of foam is generally considered by the housewife to be indicative of the cleansing power of the composition being employed, most modern heavy duty synthetic detergent compositions are designed to foam as generously as possible.

For most purposes such generously foaming detergent compositions are satisfactory. However, it has been found that when washing fabrics in tumbler type household automatic washing machines it is undesirable to employ generously foaming detergent compositions because of the prolific foam-producing action of these machines. Thus if too high a concentration of a generously foaming washing agent is employed in these machines "spill-over" results. That is, the volume of foam produced is such as to completely fill the machine, escape through the port normally provided at the top of the machine for supplying detergent or bleach or other material thereto, and spill over onto the floor on which the machine stands. This is inconvenient to clean up and may mar the floor.

A second consequence of the use of a generously foaming composition in such machines is a mechanical interference with the operation of the machine known as "suds-lock." Suds lock normally occurs when the machine reaches that portion of its cycle wherein the perforated basket or tumbler is rotated at a high velocity to expel by centrifugal force the liquid held by the clothes in the machine. If the liquid being expelled foams sufficiently, the foam fills the space between the outside of the rapidly rotating perforated tumbler and the surrounding stationary enclosure and frequently exerts such a retarding force or drag on the spinning tumbler as to overload the motor of the machine causing a fuse or an overload relay to act to stop the machine. In this case the clothes must be removed from the machine and be rung and rinsed by hand so as to lighten the load on the machine. In other instances the machine is not stopped, but the speed of the tumbler is so reduced by the drag of the foam as to insufficiently expel the liquid from the clothes being washed.

"Spill-over" and "suds-lock" are commonly experienced if the concentration of a generously foaming detergent is sufficient to do a satisfactory cleansing job on clothes which have a light soil load. Thus it has been found

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that in soft water it is not possible to use a sufficient concentration of a typical heavy duty commercial soap composition on a lightly soiled load of wash without experiencing "spill-over" and "suds-lock." These difficulties occur even more prevalently and with more heavily soiled loads when modern generously foaming synthetic detergent compositions are employed.

Similar difficulties are encountered by the production of excessive foam in modern dishwashing machines. Such machines are designed to operate with substantially non-foaming detergent compositions since the presence of foam in such a machine greatly retards the mechanical action of the fine water sprays employed to aid in the removal of soil particles from the surfaces being washed. "Spill-over" is also encountered in the case of these machines.

Thus there is a substantial need for detergents having controlled foaming properties in conjunction with a high degree of deterative power. In the case of automatic tumbler type household washing machines, since the housewife commonly associates foaming with washing, for aesthetic purposes it is desirable to provide washing compositions which will form a stable foam of minimum but sufficient volume to indicate the presence and approximate concentration of the detergent composition that is being employed in such machines but which will not spill over nor interfere with the mechanical action of these machines. In the case of household automatic dishwashers it is desirable to employ a substantially non-foaming detergent composition. These requirements have been met in the past by employing certain specific synthetic detergents which inherently possess the particular foaming properties desired. Naturally this narrowly restricted the selection of synthetic detergents which can thus be employed.

Now, however, it has been discovered that the higher aliphatic alcohols exhibit a remarkable foam depressing effect on foam-producing non-ionic detergents and thus it is now possible to prepare detergent compositions having controlled foaming characteristics. In accordance with the present invention such compositions consist essentially of a water soluble non-ionic polyoxyethylene detergent condensate containing at least about 5 ethenoxy groups and a higher aliphatic alcohol containing about 12 to 20 carbon atoms, the ratio of said non-ionic detergent to said aliphatic alcohol being from about 100:1 to 1:1 by weight. Depending on the original foaming properties of the non-ionic detergent and the relative amounts of non-ionic detergent and aliphatic alcohol employed, compositions of the present invention may be prepared which are characterized by the production of a relatively small volume of stable foam or by complete absence of foam under normal conditions of usage. For instance, the foaming properties of inexpensive polyethenoxy-type non-ionic detergents which normally foam excessively in a particular application may easily and flexibly be controlled over a broad range of restricted foaming characteristics, e. g. generously foaming non-ionic detergents may be adapted for use in automatic tumbler type washing machines, and relatively low foaming non-ionic detergents may be compounded so as to be substantially non-foaming and suitable for use in automatic dishwashers. Naturally, the present compositions may be employed in other applications where products having a high cleansing ability and reduced foaming power are desired.

The compositions of the present invention, which are excellent detergents may be prepared in liquid, paste or powdered form and may be associated with inorganic builder salts as well as other adjunct materials.

The water soluble non-ionic detergent of the present invention is in general a product produced by the introduction of a controlled number of hydrophilic ethenoxy

groups into an organic hydrophobic compound or group, usually of an aliphatic or aromatic structure. The degree or proportion of hydrophilic groups will vary with the specific hydrophobic group, but in general will be sufficient to confer the desired water-solubility and deter-
sive properties. These detergents are known in the art and the determination of a specific hydrophilic:hydrophobic relationship for each type is not the essential novelty of the present invention. Such detergents are generally the water-soluble non-ionic polyethylene oxide
10 condensates with a hydrophobic organic group, the latter containing usually at least about 8 carbons, and preferably 8 to 22 carbons. While the number of ethylene oxide groups is controlled so as to yield the desired water-solubility and deter-
sive properties and is dependent upon the character of the hydrophobic group, the types of detergents included in the present invention will possess about 5 and usually from about 5 to 30 or more ethenoxy groups.

Among the suitable non-ionic detergents are the polyethylene oxide condensates of alkyl phenol, such as the polyglycol ethers of alkyl phenols having an alkyl group of at least about 6, and usually about 8 to 20 carbons, and an ethylene oxide ratio (number of ethenoxy groups per mole of condensate) of about 6 to 30, e. g. 7.5, 8.5, 11.5, 20.5, 30, etc. The alkyl substituent on the aromatic nucleus may be di-isobutylene, diamyl, polymerized propylene, iso-octyl, nonyl, dimerized C_6-C_7 olefin, etc. Among other condensates with aromatic alcohols is the alkylated B-naphthol condensed with 8 moles of ethylene oxide, the alkyl group having 6 to 8 carbon atoms.

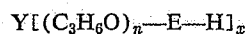
Further suitable detergents are the polyoxyethylene esters of organic acids, such as the higher fatty acids, rosin acids, tall oil, or acids from the oxidation of petroleum, etc. The polyglycol esters will usually contain from about 8 to about 30 moles of ethylene oxide and about 8 to 22 carbons in the acyl group. Suitable products are refined tall oil acids condensed with from 8 to 30, e. g. 16 or 20, ethylene oxide groups, or similar polyglycol esters of lauric, stearic, oleic acids, etc.

Additional non-ionic agents are the polyethylene oxide condensates with higher fatty acid amides, such as the higher fatty acid primary amides, mono- and diethanol-amides. Suitable agents are coconut fatty acid amide condensed with about 10 to 30 moles of ethylene oxide. The fatty acyl group will similarly have about 8 to 22 carbons, and usually about 10 to 18 carbon atoms in such products. The corresponding sulfonamides may also be used if desired.

Other suitable polyether non-ionic detergents are the polyethylene oxide ethers of higher aliphatic alcohols. Suitable alcohols are those having a hydrophobic character, and preferably 8 to 22 carbons. Examples thereof are iso-octyl, nonyl, decyl, dodecyl, tridecyl, tetradecyl, hexadecyl, octadecyl and oleyl alcohols which may be condensed with an appropriate amount of ethylene oxide, such as at least about 6, and preferably about 10-30 moles. A typical product is tridecyl alcohol, produced by the Oxo process, condensed with about 12, 15 or 20 moles of ethylene oxide. The corresponding higher alkyl mercaptans of thioalcohols condensed with ethylene oxide are suitable in the present invention also.

The water soluble polyoxyethylene condensates with polyoxypropylene glycols may be employed in the present invention also. The polypropylene glycol, which is prepared by condensing propylene oxide with an organic compound containing at least one reactive hydrogen, represents the hydrophobic portion of the molecule, exhibiting sufficient water insolubility per se at a molecular weight of at least about 900, such as about 900 to 2400, and preferably about 1200 to 1800. The increasing addition or condensation of ethylene oxide on a given water insoluble polypropylene glycol tends to increase its water solubility and raise the melting point such that the products may be water soluble, and normally liquid,

pasty or solid in physical form. The quantity of ethylene oxide varies with the molecular weight of the hydrophobic unit but will usually be from about 5 to about 200 moles, constituting at least about 20% and preferably at least about 40% by weight of the product. With an ethylene oxide content of about 40 up to 50%, there is usually obtained normally liquid products, above 50% soft wax-like products, and from about 70-90% normally solid products may be obtained which can be prepared in flake form if desired. These condensates may be designated by the following structure:



where

Y is the residue of an organic compound containing therein x active hydrogen atoms,

n is an integer,

x is an integer.

The values of n and x are such that the molecular weight of the compound, exclusive of E, is at least 900, as determined by hydroxyl number, and E is a polyoxyalkylene chain wherein the oxygen carbon atom ratio is at least 0.5, and E constitutes 20-90% by weight, of the compound.

It is desirable to use such products having a total molecular weight of at least about 1100, preferably within the range of about 2,000 to 10,000, and more preferably about 4,000 to 8,000. A suitable material is a condensate having a typical average molecular weight of about 7500, the hydrophobic polypropylene glycol being condensed with sufficient ethylene oxide until a normally solid water-soluble product is obtained which has an ethylene oxide content of about 80-90% and a melting point usually of about 51-54° C. Another material is a liquid condensate having an ethylene oxide content of 40-50% and a molecular weight of about 4500.

The higher aliphatic alcohols of the present invention are those of at least about 12 and preferably about 14 to about 18 to 20 carbon atoms. These aliphatic alcohols may be saturated or unsaturated in character. It is preferred to use the normal or straight chain, saturated primary alcohols. Examples of suitable alcohols falling within this preferred classification are dodecanol, tetradecanol, hexadecanol and octadecanol. It is also within the contemplation of the present invention to employ unsaturated higher aliphatic alcohols (e. g. oleyl alcohol), branched chain and secondary higher aliphatic alcohols, and higher aliphatic diols. It is not necessary to use the pure substances themselves as the commercial mixtures of these substances are also operable and are preferred from the viewpoint of economy. Thus, commercial mixtures of fatty alcohols containing predominantly the alcohols of 12 to 18 carbon atoms are included within the scope of this invention, even though such mixtures may contain minor amounts of fatty alcohols of different chain length.

The aliphatic alcohols may be derived either from natural or synthetic sources. Many naturally occurring wax esters are an important source of higher aliphatic alcohols. Certain animal oils, chiefly those of marine origin such as sperm oil, also contain a high proportion of recoverable alcohols occurring as esters. The most plentiful and economic sources for their production however are their preparation from fatty acids or aldehydes by reduction, or their recovery from oxidized petroleum stocks, etc., by processes known in the art, e. g. the Oxo process.

The amount of these added higher aliphatic alcohols to be employed depends upon the particular aliphatic alcohol and non-ionic detergent involved, and upon the characteristics desired of the final products. Thus by proper selection of these components and their propor-

tions it is possible to prepare substantially nonfoaming compositions or compositions having restricted foaming power of various degrees. The specific amount of these higher aliphatic alcohols to be employed is generally minor in proportion to the weight of the detergent employed and sufficient to bring about a marked reduction in the foaming power of the non-ionic detergent. Generally the ratio of the present non-ionic detergent to higher aliphatic alcohol is within the range of about 1:1 to 100:1 and preferably about 4:1 to 25:1 by weight.

It is one embodiment of the invention to utilize the higher aliphatic alcohol and a normally liquid polyoxyethylene type non-ionic detergent to prepare a liquid detergent composition. In such compositions it is usually desirable that the two essential ingredients be incorporated in a suitable solvent medium such as ethanol or isopropanol. Other suitable lower aliphatic alcohols may be employed if desired, and water may be used as a diluent in compatible amounts. The total concentration of the non-ionic detergent and the higher aliphatic alcohol in the liquid composition should usually be sufficient to produce a concentrated solution such as about 10 to 90% by weight.

It is another embodiment of the present invention to prepare dry detergent compositions, either by mixing the instant higher aliphatic alcohol with a normally solid polyoxyethylene type non-ionic detergent or by mixing such an alcohol and detergent in appropriate proportions with sufficient suitable inorganic salt to produce an apparently dry composition.

Other adjuvant materials may be employed also. The detergent compositions of the present invention may include any of those substances employed by the art in admixture with detergent compositions generally, provided the use of any such materials does not neutralize or remove the desired effects. These adjuvant builders, additives or like materials may be inorganic or organic in structure and may be mixed with the essential ingredients in any suitable manner. Such inorganic water soluble builder salts as the various alkali metal phosphates, particularly the molecularly-dehydrated polyphosphate salts, may be employed in a suitable manner. Examples of phosphate builders are pentasodium triphosphate, hexasodium hexametaphosphate, tetrasodium pyrophosphate, and the orthophosphates such as trisodium phosphate etc. Other water soluble inorganic builder salts are sodium silicate, sulfate, carbonate, etc. In the case of such built compositions it is preferred that the non-ionic detergent be about 2 to 90%, and usually 5 to 15% of the total composition, that the higher aliphatic alcohol be about 0.1 to 15% and usually 0.5 to 5% of the total composition, and that the water soluble inorganic builder salts be about 10 to 98% and usually about 80 to 95% of the total composition by weight. Suitable organic materials such as sodium carboxymethyl-cellulose or other suitable organic additives may also be employed as desired.

The controlled foaming power possessed by the present combination of essential ingredients may be illustrated by pour foam tests. The pour foam test is designed for comparative study of the relative foaming power of liquids and is described in U. S. Patent No. 2,315,983 to Ross and Miles. In such test, a portion of the solution to be tested is placed in a jacketed measuring cylinder. The foam is formed by allowing a second portion of solution to stream in from a fixed height through a standard orifice, resulting in a particular foam height generated by each test solution.

The pour foam test is conducted at 110° F. using distilled water as a solvent. The height of the foam generated by each composition is set forth in Tables I and II. The non-ionic detergent represented in Tables I and II is an ethylene oxide condensate of iso-octyl phenol containing about 10 ethylene oxide groups per molecule of condensate.

TABLE I

[Pour foam data, 0.25% solutions of detergent composition.]

Fatty alcohol	Weight ratio non-ionic detergent to fatty alcohol	Foam height, mm.
None.....	Infinite	180
n-Dodecanol.....	4:1	30
Do.....	8:1	57
Do.....	25:1	40
n-Tetradecanol.....	4:1	30
Do.....	8:1	41
Do.....	25:1	42
n-Hexadecanol.....	4:1	35
Do.....	8:1	35
Do.....	25:1	55

TABLE II

[Pour foam data, 0.75% solution of detergent composition.]

Fatty alcohol	Weight ratio non-ionic detergent to fatty alcohol	Foam height, mm.
None.....	Infinite	200
n-Dodecanol.....	4:1	30
Do.....	8:1	65
Do.....	25:1	58
n-Tetradecanol.....	4:1	25
Do.....	8:1	38
Do.....	25:1	95
n-Hexadecanol.....	4:1	35
Do.....	8:1	25
Do.....	25:1	175

The foam depressing effect of the fatty alcohols of the present invention on various of the present non-ionic detergents may be illustrated by the foam height results set forth in Table III below, which are obtained using the pour foam test at 0.25% concentration of each detergent solution in distilled water at 110° F. Where proportionate amounts of fatty alcohol are indicated such amounts indicate the ratio by weight of the non-ionic detergent to the fatty alcohol.

TABLE III

[Pour foam data.—Non-ionic detergents and mixtures thereof with n-hexadecanol.]

Non-ionic detergent	Weight ratio detergent: hexadecanol	Foam height, mm.
A.....	Infinite	65
A.....	100:1	45
A.....	25:1	0
B.....	Infinite	195
B.....	25:1	179
B.....	4:1	45
C.....	Infinite	60
C.....	25:1	40

A=ethylene oxide condensate of polypropylene glycol containing about 80-90% (about 135-150 mols) ethylene oxide and having a molecular weight of about 7500 (Pluronic F-68).

B=tridecyl alcohol condensed with about 12 moles of ethylene oxide (Renex 30).

C=tall oil (mixed resin and fatty acids) condensed with about 16 moles of ethylene oxide (Renex 20).

From the results in Tables I-III it will be observed that the higher fatty alcohols of the present invention exhibit a foam reducing effect on non-ionic detergents which is of considerable magnitude in most instances.

A similar effect may be observed in tests carried out in a tumbler type household automatic washing machine wherein clothes are washed in a rotating perforated cylindrical basket-line tumbler about 24 inches in diameter. The basket rotates on a horizontal axis, and access is had to it by means of a water tight door in the front of the machine, the door being located adjacent to the open end of the basket. An 8 inch di-

ameter glass observation port is centrally located in the door and in normal operation of the automatic machine the liquid level during the washing cycle is about at the base of the observation port. A composition is considered to have desirable foaming characteristics for use in such a machine if under normal conditions for satisfactory cleansing foam is produced during the washing cycle to a level approximately $\frac{1}{2}$ to 5 inches above the base of the port. The composition is considered unsatisfactory if during use it produces sufficient foam to completely fill the port, or if it produces substantially no foam whatsoever. To illustrate the utility of the compositions of the present invention in such an application the following composition is prepared:

	Parts by weight
Non-ionic detergent	15
Pentasodium tripolyphosphate	40
Sodium carbonate	3
Sodium sulfate	42

The non-ionic detergent is an ethylene oxide condensate of iso-octyl phenol and contains about 10 moles of ethylene oxide per mole of condensate. Similar compositions are prepared in which 1, 2, 3 and 4% of the sodium sulfate are replaced by n-hexadecanol. These five compositions are used in an automatic tumbler type washing machine as described above, and the height of the foam produced during the washing cycle is observed through the observation port at various time intervals after the detergent composition is added, as shown in Table IV below. In these runs 6 pounds of clothes are thoroughly soaked in water in the machine before the detergent composition to be tested is added thereto, a sufficient amount of the detergent composition being employed to constitute 0.2% by weight of the solution in the machine. The water used is tap water of about 50 parts per million hardness. The total washing cycle of the machine is a period of about 14 minutes in length.

TABLE IV

[Foam height above base of port, inches.]

Percent n-hexadecanol	Time interval, minutes					
	1	2	4	8	12	13
0	6	F	F	F	F	
0	1	6	F	F	F	
1	0	1	3	5	F	
1	0	1	3	4½	6½	F
2	0	½	1	2	4	
2	0	½	1	2½	4½	
3	0	0	0	0	2	
3	0	0	0	0	1	
4	0	0	0	0	½	
4	0	0	0	0	0	

An "F" indicates that the observation port is full of foam, that is that foam height is 8" or greater. Two runs are made with each composition.

The data of Table IV indicate that the composition which does not contain any fatty alcohol foams much too generously for use in automatic tumbler type washers, that the composition containing 2% n-hexadecanol has the most satisfactory foaming characteristics, and that those compositions containing 3 and 4% n-hexadecanol produce practically no foam during use.

While the foaming characteristics of the present detergent compositions are of paramount importance it is also essential that such compositions possess a high degree of detergent power. It has now been found that under certain conditions of concentration the present compositions show a markedly improved soil removal efficiency as compared to the same compositions to which no fatty alcohol has been added. Thus the data of Table V indicates the changes in washing power at various

concentrations in soft water of a detergent composition containing 23% ethylene oxide condensate of iso-octyl phenol (containing about 10 moles of ethylene oxide per mole of alkyl phenol) as the active ingredient, 2% of a 90:10 mixture of cetyl and stearyl alcohols, 50% tetrasodium pyrophosphate, 3% sodium silicate and 22% sodium sulfate.

The washing procedure involves the uniform soiling, washing at $110^{\circ}\text{F} \pm 2^{\circ}\text{F}$ and drying of a large number of cotton swatches. The whiteness of the various test swatches is measured by a Hunter Reflectometer. The units of soil removed may be calculated by subtracting the average reflectance of the unwashed control samples from the washed swatches. The number in Table V represent the increase in overall soil removal brought about by the use of the above detergent composition containing the aliphatic alcohol additive as compared to the same composition containing sodium sulfate in place of the additive. A + value indicates an increase in overall soil removal as contrasted to the composition not containing any fatty alcohol.

TABLE V

Percent concentration	Increase in overall soil removal, percent
0.15	+8
0.25	+4
0.4	+9
0.75	-5

The data of Table V illustrate that under washing conditions of about 0.4% concentration of detergent composition or less the compositions of the present invention possess markedly greater soil removal efficiency than the control. This is of considerable significance because it has been found that the housewife generally employs a solution containing from about 0.1% to about 0.3 to 0.4% detergent composition in automatic washing machines.

The usefulness of the present discovery in preparing compositions for use in automatic dishwashers is shown by a series of experiments in which progressively larger proportions of hexadecyl alcohol are used to replace a portion of the sodium sulfate in a composition consisting of:

	Percent by weight
Non-ionic detergent ¹	15
Pentasodium tripolyphosphate	40
Soda ash	3
Sodium sulfate	42

¹ The non-ionic detergent is an ethylene oxide condensate of polypropylene glycol containing about 80-90% ethylene oxide and having a molecular weight of about 7500.

The compositions prepared are tested by placing them in an empty automatic dishwashing machine, running the machine through its cycle which involves a wash and two rinses, and observing conditions inside the machine through a glass port in the door of the machine. The machine is of the top-opening type employing a water jet and having a motor-driven water jet deflector. Foam, if present in quantity, seriously impedes the washing and rinsing action of the water jets employed in such machines. On the other hand, the presence of a certain amount of foam is desirable during the wash cycle to indicate to the user the presence of sufficient washing agent. Therefore a product is considered satisfactory if it foams to a limited extent during the wash cycle and if no foaming occurs on rinsing. Table VI shows the results of such a test run using 0.25% solutions of each detergent composition in soft water at about 150°F .

TABLE VI.—AUTOMATIC DISHWASHER TEST

Per hexadecyl alcohol	Wash	First rinse	Second rinse
0-----	Unsatisfactory, too much foam.	Unsatisfactory—foam does not rinse out.	Unsatisfactory—foam remains at the end of the cycle.
1-----	do.	do.	Do.
2-----	do.	do.	Do.
3-----	Improvement but still unsatisfactorily large amount of foam.	do.	Improvement but some foam still remains at the end of the cycle.
5-----	Satisfactory amount of foam produced.	do.	Satisfactory—no foam is left at the end of the cycle.
7-----	do.	Satisfactory—foam rinses out.	Do.

The data of Table VI illustrate that the present discovery may be advantageously utilized in the preparation of washing compositions having foaming properties making them eminently satisfactory for use in automatic dishwashing machines.

In addition to the suitable compositions set forth previously, the following mixtures are additionally illustrative of the variations permissible both as to the type and concentrations of builders or additives in the detergent compositions referred to herein.

Example I

The following composition is useful in automatic washing machines of the tumbler type:

	Percent by weight
Nonyl phenol-ethylene oxide condensate containing about 8.5 ethenoxy groups per molecule of condensate	10.00
Hexadecyl alcohol	1.50
Pentasodium tripolyphosphate	25.00
Soda ash	10.00
Aqueous sodium silicate (43.5% solids, $\text{Na}_2\text{O}:\text{SiO}_2=1:2.35$)	6.00
Sodium carboxymethylcellulose	0.50
Fluorescent dye	0.06
Sodium sulfate	46.94

The composition may be prepared for use in any suitable manner, i. e. by simply mixing the components, or they may be slurried with water and spray dried, or the mixture may be agitated with a small amount of water so as to hydrate some of the hydratable inorganic salt present and cause agglomeration thereof and adsorption of the organic constituents.

The nonyl phenol-ethylene oxide condensate may be replaced by a condensate of tridecyl alcohol with about 12 moles of ethylene oxide, and the hexadecyl alcohol may be replaced by the fatty alcohols derived from coconut oil.

Example II

A suitable composition for use in automatic dishwashers comprises:

	Percent by weight
Ethylene oxide condensate of tall oil having about 16 ethenoxy groups per molecule	10
Tetradecyl alcohol	5
Tetrasodium pyrophosphate	55
Soda ash	3
Sodium silicate ($\text{Na}_2\text{O}:\text{SiO}_2=1:3.25$)	5
Sodium sulfate	22

The sodium sulfate of this example may be replaced by trisodium phosphate.

Example III

A low foaming liquid detergent comprises:

	Percent by weight
5 Ethylene oxide condensate of polypropylene glycol containing about 40-50% ethylene oxide and having a molecular weight of about 4500	16
Dodecyl alcohol	4
Ethanol	50
10 Water	30

Although the present invention has been described with reference to particular embodiments and examples, it will be apparent to those skilled in the art that variations and modifications of this invention can be made and that equivalents can be substituted therefor without departing from the principles and true spirit of the invention. This application is a continuation-in-part of co-pending application Serial No. 454,617, filed September 7, 1954, now abandoned.

Having thus described the invention, what is claimed is:

1. A detergent composition consisting essentially of a water soluble non-ionic polyoxyethylene detergent condensate containing at least about 5 ethenoxy groups and a higher aliphatic alcohol containing about 12 to 20 carbon atoms, the ratio of said non-ionic detergent to aliphatic alcohol being from about 25:1 to 4:1 by weight.

2. A detergent composition as set forth in claim 1 wherein said higher aliphatic alcohol is hexadecyl alcohol.

3. A detergent composition consisting essentially of a water soluble non-ionic polyoxyethylene detergent condensate containing at least about 5 ethenoxy groups and a straight chain, saturated higher aliphatic primary alcohol containing about 12 to 18 carbon atoms, the ratio of said non-ionic detergent to aliphatic alcohol being from about 25:1 to 4:1 by weight.

4. A liquid detergent composition consisting essentially of a water soluble non-ionic polyoxyethylene detergent condensate containing at least about 5 ethenoxy groups, a higher aliphatic alcohol containing about 12 to 20 carbon atoms, and a liquid solvent vehicle therefor, the ratio of said non-ionic detergent to fatty alcohol being from about 25:1 to 4:1 by weight.

5. A detergent composition consisting essentially of a water soluble polyoxyethylene ester of a higher fatty acid of about 8 to 22 carbon atoms, said ester containing from about 8 to 30 ethenoxy groups, and a higher aliphatic alcohol containing about 12 to 20 carbon atoms, the ratio of said ester to said alcohol being from about 25:1 to 4:1.

6. A detergent composition consisting essentially of a water soluble polyoxyethylene ester of tall oil acids, said ester containing about 8 to 30 ethenoxy groups, and a higher fatty alcohol containing from 12 to 20 carbon atoms, the ratio of said ester to said alcohol being from about 25:1 to 4:1.

7. A detergent composition consisting essentially of a water soluble polyoxyethylene condensate of an alkyl phenol containing about 6 to 20 carbon atoms in said alkyl group, said condensate containing about 5 to 30 ethenoxy groups, and a higher fatty alcohol containing from 12 to 20 carbon atoms, the ratio of said condensate to said alcohol being from about 25:1 to 4:1.

8. A detergent composition consisting essentially of a water soluble polyoxyethylene condensate with polyoxypropylene, said polyoxypropylene having a molecular weight of about from 900 to 2400 and containing from about 20% to 90% by weight of ethylene oxide, and a higher fatty alcohol containing from 12 to 20 carbon atoms, the ratio of said condensate to said alcohol being from about 25:1 to 4:1.

9. A powdered detergent composition consisting essentially of about 2 to 90% of a water soluble non-ionic polyethylene oxide detergent condensate containing at

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least about 5 ethenoxy groups, about 0.1 to 15% of a higher aliphatic alcohol containing 12 to 20 carbon atoms, and 10 to 98% of inorganic water soluble builder salts.

10. The powdered detergent composition of claim 9 5 wherein said inorganic water-soluble builder salts are phosphate salts.

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