This invention relates to nitrogen-containing polyoxyalkylene detergent compositions. In a more specific aspect, this invention relates to nitrogen-containing block polymers of propylene oxide and ethylene oxide which are outstandingly superior detergent compositions.

This application is a continuation-in-part of my application Serial No. 349,283, filed April 16, 1953, now abandoned. Application Serial No. 349,283 was a continuation-in-part of application Serial No. 316,984, filed October 27, 1952, which was refiled on October 19, 1953, as a continuation-in-part application Serial No. 386,945 and which has now issued as U.S. 2,674,619. Application Serial No. 316,984 was a continuation-in-part of my application Serial No. 153,946, filed April 4, 1950, now abandoned.

A basically new approach for the chemical structure of a polyoxyalkylene nonionic surface active agent is disclosed in U.S. 2,674,619. Prior to the disclosure of U.S. 2,674,619, polyoxyalkylene nonionic surface active agents were known which were composed of a long hydrocarbon chain or alkyl-substituted ring compound, e.g., nonylphenol, and a water-solubilizing polyoxyethylenyl chain. The compositions disclosed in U.S. 2,674,619 depart from the structure of such previously known nonionic surface active agents by employing a defined polyoxypropylene chain as the hydrophobic element of the surfactant. In the compositions of U.S. 2,674,619, a significant contribution is made to the art since properties of the compositions can be varied widely by varying the molecular weight of the polyoxypropylene chain and/or the weight percent of ethylene oxide condensed with the polyoxypropylene chain. The compositions of U.S. 2,674,619 are initially prepared by condensing the required amount of propylene oxide with a lower molecular weight reactive hydrogen compound, followed by condensation with ethylene oxide so as to produce water solubility and introduce surface active properties. The disclosure of U.S. 2,674,619 teaches that any of a broad group of reactive hydrogen compounds can be used which have at least two reactive hydrogen atoms and are relatively low molecular weight materials which are not hydrophobic in and of themselves. It is indicated that, ordinarily, the reactive hydrogen compound constitutes such a relatively small proportion of the block polymer surfactant composition that the reactive hydrogen compound has little or no material effect on the properties of the final detergent composition. Although such nonionic surface active agents have important and unique chemical and physical properties, many uses of these compounds are based on their effectiveness as detergents and in many cases the polyoxyalkylene nonionic surface active agents are in direct competition with other different synthetic detergents, such as the well-known alkylarylsulfonates. Thus, it is desirable that compositions be found which have the highest detergent effectiveness and, particularly, it is desirable that compositions be found which are not in competition with other synthetic detergents with respect to detergent effectiveness.

In industrial laundering practice, two general temperature ranges are employed depending on the type of fabric and dyes involved. For white cottons and fast-colored cotton, the temperature of the detergent solution is usually about 140-160°F. On the other hand, for woolens, delicate synthetic fabrics and fabrics containing dyes which tend to run at 140-160°F, the laundering process is usually carried out at about 90-95°F. It is under the latter condition that the compositions of this invention, as a special class, are unusually superior to those generally disclosed in U.S. 2,674,619.

An object of this invention is, therefore, to provide polyoxyalkylene nonionic surface active agents which have improved effectiveness as detergents.

A still further object is to provide a specific class of propylene oxide-ethylene oxide block polymer detergent compositions which is especially effective at 90°F and which is, therefore, a specific improvement over the general class of such detergents disclosed in U.S. 2,674,619.

I have found that the foregoing objectives and others to be indicated herein are attained by polyoxyalkylene nonionic surface active agents of the general class disclosed in U.S. 2,674,619 but where the reactive hydrogen compound employed is one of a specific class of reactive hydrogen compounds, i.e., nitrogen-containing reactive hydrogen compounds. The polyoxyalkylene nonionic detergent compositions of this invention constitute a superior class of detergents in several respects when compared to the polyoxyalkylene nonionic detergent compositions of U.S. 2,674,619 as exemplified by those prepared with propylene glycol as the reactive hydrogen compound. Specifically, nitrogen-containing polyoxyalkylene nonionic detergent compositions of this invention can be prepared which produce higher detergency effectiveness than that of other propylene glycol-based compositions disclosed in U.S. 2,674,619 regardless of the proportions of propylene oxide and ethylene oxide employed in preparing the latter. The nitrogen-containing compositions of this invention have unusually superior detergency effectiveness in relatively cold water, i.e., at 90°F. Thus, nitrogen-containing polyoxyalkylene compositions of this invention can be and have been prepared which are better detergents at 90°F than can be prepared using propylene glycol or other reactive hydrogen compounds disclosed in U.S. 2,674,619 regardless of the proportions of propylene oxide and ethylene oxide used in the latter. Furthermore, the compositions of this invention are at least as effective at 140°F, and usually more effective, detergents than are such compositions of U.S. 2,674,619.

Thus, the compositions of this invention constitute a specific class of compositions within the scope of the disclosure of U.S. 2,674,619 but possessing unusually superior detergency properties when compared to other compositions of the broad class disclosed in the patent.

The compositions of this invention possess a still further unique and characterizing feature when compared to the glycol-based surfactants disclosed in U.S. 2,674,619 and this is in the ability of the compositions of the invention to disperse lime scums formed by fatty acid soaps in hard water. Thus, fatty acid soap compositions can be formulated which contain the detergent compositions
of this invention and which greatly reduce undesirable lime soap formation by maintaining the lime soap curds in a suspension.

It will be recognized from the foregoing that the significant and characteristic feature of the compositions of this invention is the class of reactive hydrogen compounds that is employed. The reactive hydrogen compound must contain at least one nitrogen atom and contain at least one ethylene hydrogen atom and not more than about six reactive hydrogen atoms. Usually, at least one of the reactive hydrogen atoms is attached to a nitrogen atom. An exception is in the case where the reactive hydrogen compound is derived from a reactive hydrogen compound in which one or more reactive hydrogen atoms were attached to a nitrogen atom. Trispropoxynolamine, derived from ammonia and propylene oxide, is an example of the latter. The expression "reactive hydrogen atom" is well known to those skilled in the art of alkylene oxide chemistry. It may be stated, however, that the expression "reactive hydrogen atom" is used in this application to mean that the compound contains a hydrogen atom which is sufficiently labile to open the epoxide ring of 1,2-propylene oxide and will react with methyl magnesium iodide to liberate methane in the classical Zerewitinoff reaction (see Niedler and Niedler, Micromethods of Organic Analysis, page 263, John Wiley & Sons, New York City, 1946).

An equally important characteristic of the class of nitrogen-containing reactive hydrogen compounds is that the compounds used must be relatively lower molecular weight compounds which are not essentially hydrophobic in and of themselves. By this is meant that the condensation product of the reactive hydrogen compound with ethylene oxide alone would not yield a detergent having a carbon soil removal value of 100 by the procedure for determining the carbon soil removal value set forth in U.S. 2,674,619, col. 6, lines 11-17, and col. 7, lines 1-49. Thus, the nitrogen-containing reactive hydrogen compound used is one which is not sufficiently hydrophobic so that it could serve as the hydrophobic element of a nonionic surfactant and the latter must be provided by the defined oxypolypropylene chains in the composition. Generally, the nitrogen-containing reactive hydrogen compound has up to about six, inclusive, carbon atoms. When the nitrogen-containing reactive hydrogen compound is so defined, there still remains a reasonably broad group of such compounds which can be used. Ammonia, primary amines, alkylenepolymethyleneamines, polyamines, heterocyclic nitrogen-containing compounds are examples of the classes of nitrogen-containing reactive hydrogen compounds which can be used.

Thus, primary amines having not over six carbon atoms such as methyamine, ethylamine, propylamine, butylamine, amylamine, hexylamine and aniline are satisfactory. Alkylenepolymethyleneamines, especially aliphatic primary diamines, having not over six carbon atoms are the preferred reactive hydrogen compounds since the highest detergent values have been obtained when these were used. These include ethylenediamine, diethylenetriamine, triethylenetetramine, tetraethylenepentamine, hexamethylene diamine, phenylenediamine and the like. Alkanolamines having not over six carbon atoms can be used such as monoethanolamine, diethanolamine, triethanol amine, isopropanolamine, tri(2-propanol)amine, 2-amino-1-butanol, N-butyldi(2-propanol)amine and the like. Furthermore, heterocyclic nitrogen-containing a hetero N atom can be employed, such as piperezine, 2-methy1piperezine, 2,5-dimethylpiperezine, imidazidazole, pyrazolidine, pyrazolidone, hydantoin, dimethyl hydantoin and the like. Hydroxyl amine and the hydroxylamine derivatives and aminophenol and amino phenol derivatives can also be used.

The compositions of this invention are surface active mixtures of conjugated polyoxypropylene-polyoxyethylene compounds based on the nitrogen-containing reactive hydrogen compound wherein chains of oxypropylene groups having a defined molecular weight are attached to the nucleus of the reactive hydrogen compound and sites of the reactive hydrogen atoms and wherein chains of oxypolyethylene groups are attached to the ends of the oxypolyethylene chains. The compositions are prepared by condensing propylene oxide with the nitrogen-containing reactive hydrogen compound and subsequently condensing the oxypolyethylene oxide-reactive hydrogen compound condensate.

The collective molecular weight of the oxypolyethylene chains attached to the nitrogen-containing reactive hydro
gen compound must be at least about 900 and can range up to about 25,000 or higher. Since the reactive hydrogen compound employed is one in the ratio of about six carbon atoms, it is not sufficiently hydrophobic in and of itself so that a detergent would be obtained by simply condensing ethylene oxide with the reactive hydrogen compound. Therefore, the hydrophobic element of the surface active compositions of the invention necessarily is found in the defined oxypolyethylene chains. This significant feature distinguishes the compositions from those known in the art prior to U.S. 2,674,619 wherein propylene oxide and ethylene oxide were treated as comparable materials and condensed with long carbon chain reactive hydrogen compounds in order to introduce water solubility. The compositions of this invention rely on the hydrophobic oxypolyethylene chain just as do the compositions of U.S. 2,674,619, but distinguish over the general broad class of compositions disclosed in U.S. 2,674,619 by virtue of the specific class of reactive hydrogen compounds herein used. The advantages for the compositions of this invention set forth hereinafter are obtained when the compositions have oxypolyethylene chains having a molecular weight of at least about 900 and up to 25,000. The best detergent compositions are obtained, however, when the molecular weight of the oxypolyethylene chains is in the range of about 1000 to 15,000. The molecular weight stated and that reported in the examples to follow is for the molecular weight of the oxypolyethylene chains themselves and does not include the molecular weight of the particular reactive hydrogen compound employed.

It is to be noted that it is not necessary to use pure propylene oxide in producing the oxypolyethylene chains of the detergent compositions, although this is preferred. Small amounts, for example up to about 5 weight percent, of ethylene oxide can be included in the propylene oxide employed to prepare the hydrophobic reactive hydrogen compound-propylene oxide condensate without significant alteration of the detergent properties of the final composition. In this connection, the ethylene oxide subsequently condensed with the hydrophobic propylene oxide-reactive hydrogen compound condensate can also contain small amounts, such as up to about 5 weight percent, of propylene oxide without significant alteration of the detergent properties of the compositions of the invention.

It is further to be noted that when molecular weight is stated in this specification and claims, unless otherwise noted, there is meant the average theoretical molecular weight which equals the total of the grams of the propylene oxide employed per mol of reactive hydrogen compound. It is well recognized in the field of alkylene oxide chemistry that the polyoxyalkylene compositions one obtains by condensing an alkylene oxide with a reactive hydrogen compound are actually mixtures of compounds rather than a single molecular compound. The mixture contains closely related homologs. The statistical average number of oxalkylene groups equals the number of mols of the alkylene oxide employed and the individual members in the mixture contain varying numbers of oxalkylene groups. Thus, the compositions of this invention are "mixtures" of compounds which are
defined by molecular weight of the polyoxypropylene chains and weight percent of oxyethylene groups. As has been noted above, the composition of the invention contains of oxyethylene groups attached to the oxypropylene chains. The oxyethylene chains are formed by condensing ethylene oxide with the propylene oxide-reactive hydrogen compound condensate. The amount of ethylene oxide employed is such that the oxyethylene groups constitute about 20 to 90 weight percent of the final composition. Compositions having outstanding detergent properties are obtained when the weight percent of oxyethylene groups falls within this range. The very highest detergent values at 90°F have been obtained in compositions of the invention having from about 25 to 55 weight percent of oxyethylene groups.

The condensation of propylene oxide with the nitrogen-containing reactive hydrogen compound and the subsequent condensation of ethylene oxide therewith are carried out in the known manner for condensing allylic oxides with reactive hydrogen compounds. The process is normally carried out at elevated temperatures and pressures in the presence of alkaline catalysts, such as sodium hydroxide, potassium hydroxide, sodium alkoxide, quaternary ammonium bases, and the like. The condensation reactions can also be carried out in the presence of acid catalysts. The manipulative steps will vary to some extent depending on the normal physical state of the reactive hydrogen compound. Certain of these compounds are normally gaseous, e.g., ammonia and methylamine, and propylene oxide can be condensed with these compounds by carrying out the reaction under sufficient pressure to liquefy the nitrogen-containing reactive hydrogen compound, or the normally gaseous nitrogen-containing reactive hydrogen compound can be dissolved in an inert solvent. Similarly, if the reactive hydrogen compound is a solid at reaction temperatures, it is normally dissolved in an inert solvent. After a few mols of propylene oxide have been condensed with the reactive hydrogen compound, the adduct becomes a liquid and the inert solvent can be removed by distillation. Thereafter, it is preferred to simply add the propylene oxide to the liquid reaction mixture without the use of a solvent. Although the reaction of propylene oxide with the reactive hydrogen compound can be carried out by simply heating a mixture of the reactants under pressure at a sufficiently high temperature, this method is not ordinarily used as the temperatures and pressure required are excessive and control of the reaction is difficult. The preferred method is to add the propylene oxide to a stirred and heated mixture of the desired nitrogen-containing reactive hydrogen compound and an alkaline catalyst in a sealed reaction vessel. By adding the propylene oxide to the reaction vessel at such a rate that it reacts as rapidly as added, an excess of propylene oxide is avoided and control of the reaction is simplified. The condensation of ethylene oxide with the propylene oxide-reactive hydrogen compound condensate is carried out in an analogous manner.

**EXAMPLES**

A series of compositions according to this invention was prepared using exemplary nitrogen-containing reactive hydrogen compounds and varying amounts of propylene oxide and ethylene oxide. The procedure by which these compositions were made is that generally set forth in U.S. 2,674,619. The initial reaction of the nitrogen-containing reactive hydrogen compound with propylene oxide was carried out in two or three stages due to volume limitations imposed by the reactors employed. Due to the basic nature of the nitrogen-containing reactive hydrogen compounds, the first stage reaction with propylene oxide was carried out in the presence of about 10 weight percent of water and subsequent condensations with propylene oxide and ethylene oxide were carried out with added potassium or sodium hydroxide as the catalyst.

Each composition was thus prepared by condensing propylene oxide with the indicated reactive hydrogen compound and subsequently condensing ethylene oxide with the previously formed reactive hydrogen compound—propylene oxide condensate.

These compositions are summarized below in Table I together with the results of detergency tests in terms of carbon soil removal values at 90°F. The compositions are characterized by the molecular weight of the oxypropylene chains and weight percent of the oxyethylene chains. The molecular weight of the oxypropylene chains is the theoretical molecular weight based on the weight in grams of propylene oxide used per mol of reactive hydrogen compound and the weight percent of oxyethylene chains is based on the weight of the total composition.

The carbon soil removal values were obtained by the procedure set forth in U.S. 2,674,619, previously cited, except that the test solutions were 0.10% concentration instead of 0.25% concentration as set forth in U.S. 2,674,619.

**Table I - COMPOSITIONS OF INVENTION**

<table>
<thead>
<tr>
<th>Ex. No.</th>
<th>Reactive Hydrogen Compound</th>
<th>Molecular Weight of Oxypropylene Chains</th>
<th>Weight of Oxyethylene Chains</th>
<th>Weight Percent of Oxyethylene</th>
<th>Carbon Soil Removal Value at 90°F</th>
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<tbody>
<tr>
<td>10</td>
<td>Ethylene diamine</td>
<td>2,972</td>
<td>25</td>
<td>284</td>
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<tr>
<td>20</td>
<td>Triethylenediamine</td>
<td>2,972</td>
<td>25</td>
<td>284</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Triisopropanolamine</td>
<td>2,972</td>
<td>25</td>
<td>284</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>n-Diethanolamine</td>
<td>3,922</td>
<td>25</td>
<td>284</td>
<td></td>
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</tbody>
</table>

The foregoing results show how very effective the compositions of this invention are as detergents at 90°F. Higher carbon soil removal values at 90°F can be obtained when a nitrogen-containing reactive hydrogen compound is employed in accordance with this invention than can be obtained when other reactive hydrogen compounds of the classes disclosed in U.S. 2,674,619 are used. For example, when propylene glycol is employed as the reactive hydrogen compound, the highest carbon soil removal value at 90°F that has been obtained is reported in U.S. 2,674,619, column 8, Table II, run No. 4, where a propylene glycol-polyoxypropylene-polyoxyethylene condensate having a molecular weight, based on the hydroxy number test, in the oxypropylene chains of 2320 and having 44 weight percent of oxyethylene chains exhibited a carbon soil removal value of 210. This test in U.S. 2,674,619 was based on 0.25% solution concentrations, however, rather than the 0.10% solution concentrations employed in the test of the compositions of this invention, and so one would expect the carbon soil removal value of that propylene glycol-based composition of U.S. 2,674,619 to be lower than 210 when tested at 0.10% solution concentration. In fact, propylene glycol-based compositions of U.S. 2,674,619 do not exhibit carbon soil removal values at 90°F higher than about 155 regardless of the molecular weight of the oxypropylene chains or the weight percent of oxyethylene chains.
Particular attention is called to Examples 1, 2, 5, 6, 9, 10, 13, 14, 18, and 19 in Table I wherein compositions of this invention exhibited carbon soil removal values at 90°F, ranging from 251 to 335. It should be amply demonstrated that carbon soil removal values at 90°F can be obtained with the compositions of this invention employing a nitrogen-containing reactive hydrogen compound which far exceed the best that can be obtained at this temperature when other reactive hydrogen compounds, such as propylene glycol, are used. Furthermore, it will be observed that the highest carbon soil removal values at 90°F were obtained when the weight percent of oxylethylene chains was in the range of 25-55. Compositions of this invention having this proportion of oxylethylene chains are specially preferred, therefore.

Reactive hydrogen compounds of the general classes disclosed in U.S. 2,674,619 other than those of this invention and other than propylene glycol have shown similar carbon soil removal values at 90°F. Those which have been prepared and tested are set forth below in Table III.

It has been noted previously herein that, in addition to the outstanding detergency effectiveness of the compositions of the invention at 90°F, these compositions, surprisingly, are capable of dispersing lime scales formed by fatty acid soaps in hard water. A series of compositions of this invention was made according to the procedure previously described and tested in alkaline metal fatty acid soap compositions to determine their ability to disperse lime soap curds in hard water. The compositions of the invention which were tested are summarized below in Table IV.

---

### Table II

<table>
<thead>
<tr>
<th>Ex. No.</th>
<th>Reactive Hydrogen Compound</th>
<th>Molar Weight of Oxylethylene Chains</th>
<th>Weight Percent of Oxylethylene Chains</th>
<th>Carbon Soil Removal Value, 0.60% Concentration at 90°F</th>
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</thead>
<tbody>
<tr>
<td>25</td>
<td>Propane Glycol</td>
<td>2,835</td>
<td>29</td>
<td>154</td>
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<tr>
<td>26</td>
<td></td>
<td>2,835</td>
<td>46</td>
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<td>2,300</td>
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<tr>
<td>36</td>
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<td>2,300</td>
<td>73</td>
<td>73</td>
</tr>
<tr>
<td>37</td>
<td></td>
<td>2,300</td>
<td>80</td>
<td>77</td>
</tr>
</tbody>
</table>


In testing the compositions of the invention set forth in Table IV as Examples 42-69, dilute solutions (0.3%) of a formulated medium titer alkali metal fatty acid soap were prepared in 180 p.p.m. hard water (as CaCO₃) containing a 2:1 mol ratio of Cu to Mg. The formulated soap was a proprietary product comprising 60% medium titer soap, approximately 30% builders (phosphates, silicates and soda ash) and 10% moisture. The soap ingredient was a sodium soap, 38°C titer, having an acid number of 227 and being derived from a mixture of approximately 10 parts tallow and 1 part coconut oil. A small proportion (0.025%) of the lime soap dispersant was added to the above prepared soap solutions. This quantity of lime soap dispersant constituted 10 weight percent of the actual soap present in the proprietary formulation. One part of each of the soap solutions containing a lime soap dispersant was then diluted with nine parts of 180 p.p.m. hard water. The resulting solutions were maintained at 120°F for twenty minutes and were stirred with a mechanical stirrer at 80 r.p.m. After this period of time, the solutions were examined visually for the presence of lime soap curds.

All of the solutions containing the lime soap dispersant were essentially free of insoluble soap curds, or at most contained only a slight trace of flocculated material. Moreover, the solutions were opalescent, thus indicating that the lime soap was highly dispersed throughout the solution as a colloid. In contrast to these results, a control solution prepared as stated above but containing no lime soap dispersant contained copious quantities of lime soap curds.

Similar results were obtained when the proportion of lime soap dispersant was varied from 4 to 25 weight percent of the soap present in the proprietary formulation. Thus, the compositions of this invention have the significant property of dispersing lime soaps as well as outstanding detergency in relatively cold water, i.e., at 90°F.

1. A surface active mixture of conjugated polyoxyalkylene compounds consisting of oxypolypropylene groups, oxylethylene groups and the nucleus of a nitrogen-containing reactive hydrogen compound having no more than six carbon atoms per molecule and being selected from the group consisting of ammonia, primary alkyamines, alkylene polyamines, alkaliolamines, pip erazine
and carbon-substituted alkylpiperazines, hydroxylamine and aminophenol, the structure of the compounds being such that all of the oxypropylene groups are present in oxypropylene chains that are attached to the reactive hydrogen compound at the sites of the reactive hydrogen atoms, and all of the oxyethylene groups are present in oxyethylene chains that are attached to the ends of the oxypropylene chains, the average molecular weight of the oxypropylene chains being at least about 900 and to about 25,000, and the oxyethylene groups being present in an amount so as to constitute from 20 to 90 weight percent of the mixture of compounds.

2. A surface active mixture of conjugated polyoxyalkylene compounds according to claim 1 wherein said reactive hydrogen compound is ammonia.

3. A surface active mixture of conjugated polyoxyalkylene compounds according to claim 1 wherein said reactive hydrogen compound is a primary alkyl amine.

4. A surface active mixture of conjugated polyoxyalkylene compounds according to claim 1 wherein said reactive hydrogen compound is an alkylene polyamine.

5. A surface active mixture of conjugated polyoxyalkylene compounds according to claim 1 wherein said reactive hydrogen compound is an alkanolamine.

6. A surface active mixture of conjugated polyoxyalkylene compounds according to claim 1 wherein the molecular weight of the oxypropylene chains is in the range of 1000 to 10,000.

7. A surface active mixture of conjugated polyoxyalkylene compounds according to claim 1 wherein the weight percent of oxyethylene groups is in the range of 25-55.

8. A surface active mixture of conjugated polyoxyalkylene compounds consisting of oxypropylene groups, oxyethylene groups and the nucleus of ethylenediamine as a reactive hydrogen compound, the structure of the compounds being such that all of the oxypropylene groups are present in oxypropylene chains that are attached to the nucleus of the ethylenediamine at the sites of its reactive hydrogen atoms and all of the oxyethylene groups are present in oxyethylene chains that are attached to the ends of the oxypropylene chains, the molecular weight of the oxypropylene chains being at least about 900 and up to about 25,000 and the oxyethylene groups being present in an amount so as to constitute 20-90 weight percent of the mixture of compounds.

9. A surface active mixture of conjugated polyoxyalkylene compounds consisting of oxypropylene groups, oxyethylene groups and the nucleus of triethylenetetramine as a reactive hydrogen compound, the structure of the compounds being such that all of the oxypropylene groups are present in oxypropylene chains that are attached to the nucleus of the triethylenetetramine at the sites of its reactive hydrogen atoms and all of the oxyethylene groups are present in oxyethylene chains that are attached to the ends of the oxypropylene chains, the molecular weight of the oxypropylene chains being at least about 900 and up to about 25,000 and the oxyethylene groups being present in an amount so as to constitute 20-90 weight percent of the mixture of compounds.

10. A surface active mixture of conjugated polyoxyalkylene compounds consisting of oxypropylene groups, oxyethylene groups and the nucleus of n-butylamine as a reactive hydrogen compound, the structure of the compounds being such that all of the oxypropylene groups are present in oxypropylene chains that are attached to the nucleus of the n-butylamine at the sites of its reactive hydrogen atoms and all of the oxyethylene groups are present in oxyethylene chains that are attached to the ends of the oxypropylene chains, the molecular weight of the oxypropylene chains being at least about 900 and up to about 25,000 and the oxyethylene groups being present in an amount so as to constitute 20-90 weight percent of the mixture of compounds.

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