ANTI-STATIC COMPOSITIONS AND SYNTHETIC FIBER COMPOSITIONS

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No Drawing. Filed June 30, 1958, Ser. No. 745,322

Claims priority, application Germany June 28, 1957

11 Claims. (Cl. 117—139.5)

This invention relates to new and valuable anti-static agents for textile materials such as filaments, fibers, yarns and the like which have a tendency to accumulate static electricity charges during carding, weaving, spinning, knitting, and similar textile operations. The invention further relates to compositions which contain as the essential anti-static component one or more of the novel compounds disclosed herein and the method of applying the compounds to textile materials.

It is a known practice in the textile art to treat synthetic fibers with various active compounds of the cationic and anionic type which are relatively high molecular weight molecules and usually act as ionically active colloidal electrolytes. Where these compounds contain negatively charged groups, such as —SO₃H, —OSO₂H, and —PO₃H₂, they are essentially acyclic in nature, while compounds with positively charged groups are essentially basic. Depending upon their structure, these compounds may exhibit various properties as textile auxiliary or finishing agents. One desirable property in such agents is that of preventing static charges from accumulating static charge during mechanical textile operations such as spinning, stretching, carding, burling, weaving, or knitting of a yarn, thread, or similar material. However, the acidic and alkaline nature of the anionic and cationic surface active agents is disadvantageous because synthetic yarns or threads containing these agents tend to severely corrode metal elements or fittings on textile machinery in a very short period of time, thereby damaging these elements and tending to cause thread breakage and other difficulties.

One group of active agents which has not yet been found to have a very practical application to textile materials, i.e., synthetic fibers, is that of the so-called amphoteric or amphoteric electrolytes which can act simultaneously as an acid or a base. It is a particular object of the present invention to provide a new class of amphoteric substances which impart excellent anti-static properties to synthetic fabrics in their various textile forms and which have been found to be particularly useful when applied to polyethylene terephthalate and polyamide synthetic fibers.

Another object of the invention is to provide amphoteric compounds and compositions which are non-corrosive to textile machinery in order to avoid the difficulties encountered with acidic and basic yarn conditioning agents.

Still another object of the invention is to provide amphoteric anti-static agents which can be applied in relatively small quantities or proportions to synthetic fibers by comparison with prior art materials intended for this purpose.

Yet another object of the invention is to provide a new class of anti-static agents which are very heat-resistant or heat-stable and which are readily soluble in water and most organic solvents, such that they can be readily applied to or combined with synthetic fibers by a variety of methods and anti-static properties can be imparted to fibers at almost any point in the manufacture of textiles.

Another object of the invention is to provide compositions containing the new compounds as the essential anti-static ingredient compatible with other textile conditioning and finishing agents. In addition to their anti-static properties, the compounds of the invention also promote a pleasant feel or handle to the finished textile product, thereby providing new and improved treated textile articles.

These and other objects and advantages of the invention will become more apparent upon a consideration of the following detailed disclosure of the invention and the accompanying illustrative examples.

In accordance with the invention, it has now been found that very successful results can be accomplished in the production of synthetic fibers, yarns, threads and the like having anti-static properties when there is applied to the fibers an amphoteric reaction product of a polyalkylene glycol alkyl orthophosphoric acid ester with an alkyl or alkoxy amine. These amphoteric compounds have been discovered to be especially useful in their application to polyethylene terephthalate and polyamides such as nylon.

The starting materials which are employed to obtain the amphoteric surface active and anti-static agents of the invention include as one component the polyalkylene glycol alkyl orthophosphoric acid esters, preferably those obtained from polyalkylene glycols with a molecular weight of from about 100 to 2,000, including mixtures thereof, which have one of the following two possible structural formulas:

\[ (I) \quad OR \]
\[ O=P-\{(CH₂)ₙ\}→-OR \]
\[ OH \]

and

\[ (II) \quad OR \]
\[ O=P-\{(CH₂)ₙ\}→-O=P \]
\[ OH \]
\[ OH \]

wherein R is a lower alkyl radical, preferably containing from 1 to 6 carbon atoms, x is an integer of from 2 to 10, inclusive and y is an integer of from 2 to 20, inclusive. The other component reacted with either (I) or (II) above is a compound selected from the group consisting of alkyl and alkoxy amines, particularly those containing up to 20 carbon atoms, and most advantageously the so-called fatty acid amines having about 8 to 18 carbon atoms.

The polyalkylene glycol alkyl orthophosphoric acid esters can be readily obtained by conversion of a polyalkylene glycol with metaphosphoric acid alkyl esters. The latter compounds, in turn, can be readily produced according to several methods which have been described in the literature and which include:

1. Heating lower alkyl esters with phosphorous pentoxide;
2. Thermal decomposition of dialkyl phosphate chloride;
3. Thermal decomposition of trialkyl phosphates in trialkyl phosphate and alkyl metaphosphate; and
4. By conversion of trialkyl phosphates with phosphorous pentoxide.

It has been found to be particularly advantageous for the purposes of the invention to employ those metaphosphoric acid alkyl esters which are obtained by reaction of diethyl ether and phosphorous pentoxide. Both the ethyl and butyl esters lead to especially good anti-static effects when introduced into the novel compounds used as finishing agents, particularly with polyethylene terephthalate and polyamide synthetic fibers. In general,
the preferred metaphosphoric acid lower alkyl esters are those represented by the formula

\[ \text{RO} - \overset{\text{P}}{\text{O}} - \text{O} \]

wherein \( R \) is an alkyl radical containing from 1 to 6 carbon atoms.

As polyalkylene glycols to be used to produce the ampholytic reaction products of the invention, the poly-ethylen glycols are considered to be most effective and, in addition, are usually most available and economical. The polyalkylene glycols can be represented by the formula \( \text{HO} - \left( \text{CH}_2\right)_x\text{OH} \), and the preferred polyethylen glycol by the formula

\[ \text{HO} - \text{CH}_2 - \text{CH}_2 - \left( \text{O} - \text{CH}_2\right) - \text{OH} \]

where \( x, y \) and \( z \) are whole numbers chosen to provide molecular weights of between about 100 and 2,000, and preferably about 200 to 1,000.

It will be recognized that the polyalkylene glycols contain two terminal reactive hydroxy groups which are capable of combining with the metaphosphoric acid alkyl esters in order to produce a monosubstituted component as shown in Formula I above or a disubstituted component as shown in Formula II. The reaction proceeds readily with stirring or constant mixing and at normal or moderately elevated temperatures, e.g., on the order of 10-100° C. and preferably about 20-30° C., to give a polyethylene glycol alkyl orthophosphoric acid mono- or diester. For the monosubstituted product, the reactants are employed in equimolar proportions whereas the disubstituted product requires two moles of the metaphosphoric acid alkyl ester for each mole of polyalkylene glycol. In general, it is advisable to carry out the reaction within this 1:1 to 2:1 proportion in order to obtain a complete reaction and to avoid large excess quantities of unreacted materials which would tend to lead to other reaction products or produce undesirable acidic or basic conditions. Of course, it is permissible to obtain a mixture of the desired products between these proportions.

After preparing the polyalkylene glycol orthophosphoric acid esters, ampholytic products are obtained by subsequent reaction with an alkyl or alkylamine at about the same normal or moderately raised temperatures, e.g., about 20-90° C., and with constant mixing or stirring until an homogeneous product, generally almost colorless, is obtained. Although the fatty amine are preferred because of their availability and the excellent results obtained, any primary, secondary or tertiary alkyl amine or alkyl amine will give good results.

In addition to the long-chain primary alkyl amines, especially those with about 8 to 20 carbon atoms, e.g., oleylamine, stearyl amine, cetyl amine, myristylamine, and the like, the following compounds may also be named; secondary alkyl amines such as dioctyamine, di-n-octylaminoal, and didodecyamine; and alkylol amines such as ethanolamine, pentaethanolamine, hexanolamine, diethanolamine, dipentanolamine, dihexanolamine, triethanolamine, tripentaolamine and stearyldiethanolamine.

These alkyl and alkylol amines are capable of reacting with the acidic hydroxyl group of the alkyl orthophosphoric acid contained at one or both ends of the polyalkylene glycol group so as to produce ampholytic compounds containing both negative and positive groups, evidenced by the almost neutral pH of aqueous solutions of these compounds. The proportion of the alkyl or alkylamine should be about the same as the metaphosphoric acid alkyl ester in order to obtain a complete reaction and an homogeneous composition. The ampholytic reaction products will be liquid to semi-solid when using polyalkylene glycols having a molecular weight of about 200 to 500, while the use of polyglycols having molecular weights of above 500 up to 1,000 and higher leads to the formation of ampholytic products having a solid waxlike consistency. All of the products are very soluble in water and most organic solvents so that they can easily be incorporated both in spinning preparations and in liquid baths as finishes for application to fibers.

In order to provide a better understanding of the manner in which the anti-static and surface active agents are obtained, and the variety of ampholytic reaction products which can result depending upon the proportions of individual reactants, the following set of theoretical equations is given as an illustration of the reactions which are believed to take place in order to produce an ampholytic product. Although specific reactants are shown in the illustrative equations, those skilled in the art can readily substitute equivalent compounds in their place.

\[
\text{(A)}
\begin{align*}
\text{OC}_3\text{H}_7 & \quad \text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OC}_3\text{H}_7 \\
\text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OC}_3\text{H}_7 & \quad \text{OH} \\
\text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OH} & \quad \text{OC}_3\text{H}_7
\end{align*}
\]

\[
\text{(B)}
\begin{align*}
\text{OC}_3\text{H}_7 & \quad \text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OC}_3\text{H}_7 \\
\text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OH} & \quad \text{OC}_3\text{H}_7 \\
\text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OH} & \quad \text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OH}
\end{align*}
\]

\[
\text{(C)}
\begin{align*}
\text{OC}_3\text{H}_7 & \quad \text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OC}_3\text{H}_7 \\
\text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OH} & \quad \text{OC}_3\text{H}_7 \\
\text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OH} & \quad \text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OH}
\end{align*}
\]

\[
\text{(D)}
\begin{align*}
\text{OC}_3\text{H}_7 & \quad \text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OC}_3\text{H}_7 \\
\text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OH} & \quad \text{OC}_3\text{H}_7 \\
\text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OH} & \quad \text{O} - \overset{\text{P}}{\text{O}} - \text{O} - \text{OH}
\end{align*}
\]

In each of the above reactions, the initial reactant is metaphosphoric acid ethyl ester which reacts in the first stage with a polyethylene glycol or mixture of such glycols wherein \( z \) represents an integer of at least 1 and higher depending upon the molecular weight desired. In Equations A and C, only equimolar proportions are employed so that only one terminal hydroxy group of the glycol is reacted. In Equations B and D, two moles of the metaphosphoric acid ethyl ester are shown for each mole of glycol so that both terminal groups are reacted. In the second stage of the reaction, either an alkylamine (Equations A and B wherein \( R \) is an alkyl radical) or an alkylol amine (Equations C and D wherein \( m \) can be about 2 to 20) is then reacted with the acid hydroxy radical of the orthophosphoric substituent to
form an amphoteric electrolyte. The molar proportions of alkyl or alkylol amine correspond to the molar proportions of the metaphosphoric acid ethyl ester, and a complete reaction is indicated in each instance.

Of course, it is possible to use various mixtures of the different reactants and intermediate proportions in order to obtain a mixed reaction product. The anti-static properties of the amphoteric products are not particularly altered by such mixtures, although the physical form, i.e., liquid to solid, of the products can be altered for different applications by varying the molecular weight.

The above reactions should be accompanied with constant stirring, so long as complete dissolution and homogeneous mixtures, but in general the reaction conditions can be varied widely without serious difficulty. The reactions are preferably carried out within the preferred range of about 20° C. to 90° C., although the temperature is not particularly critical, the only precaution being an avoidance of such high temperatures as will cause the desired amphoteric products to decompose and become discolored.

The novel anti-static agents or surface active amphoteric reaction products of the invention can be applied to a variety of synthetic, highly linear polymers which are capable of being spun or extruded and then stretched for orientation into a synthetic fiber, filament thread or the like, these artificial fibers exhibiting poor anti-static properties when employed alone. Especially good anti-static properties have been obtained when applying the anti-static agents to filament-forming polyesters and polyamides, particularly polyethylene terephthalate and the various polyamide "nylons" such as polyhexamethylene diamine adipic acid and polyamino-caprolactam. The anti-static agents can also be suitably applied to other well-known commercial fibers such as those obtained from various cellulosic-containing polymers, polyacrylonitrile, polyvinyl chloride, polystyryl chloride, and polyethylene, as well as similar derivatives and copolymers.

Since the amphoteric products of the invention are soluble in water as well as most organic solvents, they can easily be applied to textile materials from liquid compositions or solutions and are usually compatible with other textile conditioning or treating agents. Of course, small quantities are required to impart anti-static properties to a textile material; for example, they can be employed in baths such as liquid aqueous compositions in a concentration of as little as about 0.1% by weight, and the actual quantity remaining on the fiber can be as low as 0.05% to about 0.5% by weight, with reference to the dry fiber. Although larger quantities could be employed, it is a particular advantage of the invention that anti-static properties are obtained with much smaller amounts of the essential agent as compared to prior additives.

In some cases, particularly with polyethylene and polyamide fibers, a very successful method of applying the anti-static agents is to incorporate them in a spinning composition of the molten polymer prior to extruding or spinning and stretching the polymer into oriented film. It has been found that the novel compounds of the invention are extremely stable to heat so that no decomposition takes place at spinning temperatures after they have been incorporated in the melt. Again only very small quantities of the anti-static agents are required, usually not more than about 1% and excellent results have been obtained with even 0.5% or less by weight based upon the polymer.

To some extent, the quantities of anti-static agent required to impart desirable properties are dependent upon the particular fiber being treated and the manner of treatment, but the optimum quantities can be readily determined by a few brief experiments. In general, quantities above 5% by weight with reference to the dry fiber are avoided because of the added expense without further improvement, regardless of the manner in which the compounds are applied.

Where coating or impregnating the spun filaments, the treatment may occur immediately after spinning or may be delayed until later in the operation. In general, it is preferred to effect the application by passing the filaments through a suitable, bath, which is predominantly water or an organic liquid capable of acting as a carrier or solvent for the anti-static compounds which can thereby be uniformly dispersed. The filaments when treated can be in the form of monofilaments, loose bundles of filaments, tow, yarn, threads, woven or knitted fibers, and the like, and the like, and the like, and the like, and the like.

Because the amphoteric agents have a practically neutral pH, i.e., of about 7, there is no tendency to corrode textile machinery which contacts the treated fibers. In this respect they are much superior to the more usual type of cationic or anionic surface active agents.

The following examples are given to illustrate certain preferred embodiments of the invention, but the invention is not limited to these examples.

**Example 1**

A mixture of two polyethylene glycols having molecular weights of 200 and 300, respectively, and in a weight ratio of 1:1.5, was first prepared, and then equimolar quantities of metaphosphoric acid ethyl ester gradually added to the glycol mixture with constant stirring at 40° C. The resulting reaction mixture was next heated at about 85° C. for approximately 7 hours, also with stirring, until an extremely viscous polyethylene glycol ethyl phosphoric acid was obtained which gave a pH value of 1.5 when dissolved in water. This mixture, then, was further heated for approximately 6 hours at 65-70° C., so as to yield a polyethylene glycol butyl phosphoric acid ester.
which was soluble in water and exhibited a pH of about 1.8. While this product was still hot, equivomolar amounts of stearylamine were added at about 60–70°C, with simultaneous cooling. After complete cooling, an homogeneous, almost colorless, ampholytic reaction product was obtained in the form of a finishing paste with a melting point of 42°C and a pH value of 6.9–7.0 in 1% aqueous solution.

The reaction product readily dissolves in water, benzene and alcohol and imparts a strong and efficient anti-static effect, particularly when applied to polyamide fibers such as polyhexamethylene diamine adipic acid and polyamincaprolactam.

Example 4

An ampholytic reaction product was first prepared as in the foregoing examples by first reacting metaphosphoric acid ethyl ester and polyethylene glycol (mol. wt. = 600) and subsequently reacting further with stearylamine in a molar ratio of 1:1:1. The resulting ampholytic product was then introduced as an anti-static agent into a spinning composition consisting of a molten condensate of polyethylene terephthalate maintained at a temperature of 250°C. The amount of anti-static agent was 0.4% by weight with reference to the molten polymer. The filaments and threads or fibers obtained after spinning and conventional processing showed excellent anti-static properties.

Example 5

A quantity of ε-aminocaprolactam containing 0.5% by weight thereof of an anti-static agent, obtained by reacting metaphosphoric acid butyl ester, polyethylene glycol (mol. wt. = 200), and subsequently oleamyl in a molar ratio of 1:1:1, was subjected to condensation polymerization into a spinnable polyamide mass and then further spun into filaments and collected as threads suitable for textile applications. The polyamide fibers obtained in this manner distinguished themselves in further textile processing by their excellent anti-static qualities.

Additional examples are given in the following table wherein ampholytic reaction products with good anti-static characteristics were obtained by reacting (a) an alkyl metaphosphoric acid with (b) a polyalkylene glycol to form the ester and subsequently reacting the ester with (c) an amine, (M.W.) representing the molecular weight of the glycol and the last column showing the proportions of each of the reactants.

| Example | (a)          | (b) Polyethylene glycol | (M.W.) | (c)              | Molar Proportion  \
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Ethyl metaphosphoric acid</td>
<td>Polyethylene glycol</td>
<td>200</td>
<td>Cetylamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>7</td>
<td>O</td>
<td>O</td>
<td>600</td>
<td>Oleamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>8</td>
<td>O</td>
<td>O</td>
<td>1,000</td>
<td>Cetylamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>9</td>
<td>O</td>
<td>O</td>
<td>200</td>
<td>Myristylamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>10</td>
<td>O</td>
<td>O</td>
<td>300</td>
<td>Myristylamine</td>
<td>2:1:2</td>
</tr>
<tr>
<td>11</td>
<td>O</td>
<td>O</td>
<td>100</td>
<td>Myristylamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>12</td>
<td>O</td>
<td>O</td>
<td>100</td>
<td>Oleamide</td>
<td>2:1:2</td>
</tr>
<tr>
<td>13</td>
<td>O</td>
<td>O</td>
<td>100</td>
<td>Oleamide</td>
<td>2:1:2</td>
</tr>
<tr>
<td>14</td>
<td>O</td>
<td>O</td>
<td>300</td>
<td>Myristylamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>15</td>
<td>O</td>
<td>O</td>
<td>100</td>
<td>Cetylamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>16</td>
<td>O</td>
<td>O</td>
<td>100</td>
<td>Cetylamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>17</td>
<td>O</td>
<td>O</td>
<td>200</td>
<td>Myristylamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>18</td>
<td>O</td>
<td>O</td>
<td>600</td>
<td>Cetylamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>19</td>
<td>O</td>
<td>O</td>
<td>200</td>
<td>Myristylamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>20</td>
<td>O</td>
<td>O</td>
<td>600</td>
<td>Myristylamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>21</td>
<td>O</td>
<td>O</td>
<td>1,000</td>
<td>Cetylamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>22</td>
<td>O</td>
<td>O</td>
<td>400</td>
<td>Myristylamine</td>
<td>1:1:1</td>
</tr>
<tr>
<td>23</td>
<td>O</td>
<td>O</td>
<td>1,400</td>
<td>Cetylamine</td>
<td>1:1:1</td>
</tr>
</tbody>
</table>

It will be readily observed from the foregoing disclosure and examples that the ampholytic compounds prepared according to the invention have remarkable and improved qualities as anti-static agents for textile applications, particularly in the many well-known synthetic fibers. In addition to their property of preventing the accumulation of static electricity charges on fibers and imparting a smoother handle to fabrics and the like, the novel compounds of the invention are particularly distinguished by their ampholytic properties which avoid serious corrosion problems in the textile industry.

The ampholytic compounds of the invention are further distinguished by their high heat stability and solubility in water and most of the common organic solvents so that advantage can be taken of the various different methods of applying the compounds to textile materials. Synthetic textile materials in all forms are greatly benefited by corporation of very small quantities of the compounds, thereby overcoming the natural static-producing characteristics of these fibers.

The raw materials required for preparing the anti-static agents are relatively economical and easily obtainable, and the ampholytic reaction products can be produced without difficulty in forms which range from liquid to semi-solid to waxy solids so that they can be easily handled, stored or transported.

The invention is hereby claimed as follows:

1. An ampholytic reaction product of a polyalkylene glycol alkyl orthophosphoric acid ester having a formula selected from the group consisting of

   \[
   \text{OR} = \text{P} = \{(\text{CH}_2)_{x} \text{O}\}_{y} - \text{H}
   \]

   \[
   \begin{align*}
   \text{OH} & \quad \text{OR} \\
   \text{OH} & \quad \text{OH}
   \end{align*}
   \]

2. An ampholytic reaction product of a polyalkylene glycol ethyl orthophosphoric acid ester and stearylamine.

3. An ampholytic reaction product of a polyethylene glycol ethyl orthophosphoric acid ester and triethanolamine.

4. An ampholytic reaction product of a polyethylene glycol butyl orthophosphoric acid ester and stearylamine.

5. An ampholytic reaction product of a polyethylene glycol butyl orthophosphoric acid ester and oleamide.

6. An ampholytic reaction product of a compound selected from the group consisting of alkyl and alkyloxides containing at least two carbon atoms.

wherein R is a lower alkyl group, x is an integer of from 2 to 10, inclusive, and y is an integer of from 2 to 20, inclusive, the molar ratio of said metaphosphoric acid alkyl ester and a polyalkylene glycol, said polyalkylene glycol alkyl orthophosphoric acid ester having a formula selected from the group consisting of

   \[
   \text{OR} = \text{P} = \{(\text{CH}_2)_{x} \text{O}\}_{y} - \text{H}
   \]

   \[
   \begin{align*}
   \text{OH} & \quad \text{OR} \\
   \text{OH} & \quad \text{OH}
   \end{align*}
   \]
sulfuric acid alkyloxyalkyl ester, said alkyl or alkyloxyalkylamine being present in equimolar proportions to the amount of metaphosphoric acid alkyl ester employed in the reaction, and said alkyl and alkyloxyalkyl amines containing at least two carbon atoms.

7. A textile conditioning composition containing as the essential anti-static component at least one surface active agent which is an ampholytic reaction product of a polyalkylene glycol alkyl orthophosphoric acid ester having a formula selected from the group consisting of

$$\text{(I)} \quad \begin{align*} & OR \\ & O=\frac{P}{\text{[(CH}_2\text{O)}_y\text{]}_x} \text{H} \\ & \text{OR} \quad \text{OR} \quad \text{OR} \quad \text{OH} \quad \text{OH} \end{align*}$$

and

$$\text{(II)} \quad \begin{align*} & OR \\ & O=\frac{P}{\text{[(CH}_2\text{O)}_y\text{]}_x} \text{OH} \text{OH} \end{align*}$$

wherein R is a lower alkyl group, x is an integer of from 2 to 10, inclusive, and y is an integer of from 2 to 20, inclusive, and a compound selected from the group consisting of alkyl and alkyloxyalkylamines, said alkyl and alkyloxyalkylamines containing at least two carbon atoms.

8. A textile material composed of synthetic fibers having combined therewith in a small quantity sufficient to impart anti-static properties to said fibers at least one surface active agent which is an ampholytic reaction product of a polyalkylene glycol alkyl orthophosphoric acid ester having a formula selected from the group consisting of

$$\text{(I)} \quad \begin{align*} & OR \\ & O=\frac{P}{\text{[(CH}_2\text{O)}_y\text{]}_x} \text{H} \\ & \text{OR} \quad \text{OR} \quad \text{OR} \quad \text{OH} \quad \text{OH} \end{align*}$$

and

$$\text{(II)} \quad \begin{align*} & OR \\ & O=\frac{P}{\text{[(CH}_2\text{O)}_y\text{]}_x} \text{OH} \text{OH} \end{align*}$$

wherein R is a lower alkyl group, x is an integer of from 2 to 10, inclusive, and y is an integer of from 2 to 20, inclusive, and a compound selected from the group consisting of alkyl and alkyloxyalkylamines, said alkyl and alkyloxyalkylamines containing at least two carbon atoms.

9. A textile material as claimed in claim 8 wherein the quantity of anti-static surface active agent is about 0.05 to 1% by weight with reference to the dry fiber.

10. A textile material as claimed in claim 8 which is composed of polyethylene terephthalate fibers.

11. A textile material as claimed in claim 8 which is composed of polyamide fibers.

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