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3,361,718 ANTISTATIC AGENTS FOR TEXTILE MATERIALS

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ABSTRACT OF THE DISCLOSURE

This invention relates to an antistatic and antiyellowing agent for textile materials which comprises a substantially water-insoluble compound consisting of a high molecular weight polymer compound having (1) a number of quaternary nitrogen atoms and (2) anionic groups in its molecular structure, in which the number of carbon atoms in each of the quaternary and anionic groups has at least 4 carbon atoms, said polymer further characterized in that it contains from 2 to 10 anionic functional groups.

The present invention relates to antistatic and antiyellowing agents for textile materials, methods of imparting antistatic and antiyellowing properties to textile materials therewith, and textile materials having both antistatic and antiyellowing properties. More particularly, it relates to an antistatic and antiyellowing agent for textile materials which contains a substantially water-insoluble compound consisting of a high molecular weight part and anionic parts, to a method of imparting antistatic and antiyellowing properties to textile materials by treating the same or covering their surfaces with the said compound, and to textile materials having a surface film containing the said compound.

In the present invention, the term "antiyellowing" means preventing the textile materials from yellowing due to the absorption or adsorption thereon of a trace of iron in water, and the term "substantially water-insoluble" means water-insoluble, or slightly water-soluble or partially water-soluble, i.e. being able to be in the state of aqueous colloidal solution, aqueous dispersion or aqueous emulsion with or without emulsifier.

There have been proposed several methods for imparting antistatic properties which are resistant to washing and dry cleaning to textile materials. Out of these methods, the most useful are apparently those described in U.S. Patents Nos. 2,694,688, 2,723,246, 2,723,256, 2,729,577 and 2,741,568, and British Patent No. 819,021. In these methods, textile materials are treated with a cationic high molecular weight compound and, then or simultaneously, with a certain anionic compound. However, these conventional methods have various drawbacks, for example, the textile materials treated in these manners tend to "yellow" as they are repeatedly worn and washed, for in the process of washing they absorb or adsorb a trace of iron in water. Furthermore, such textile materials

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would have too harsh "hand." Such antistatic agents or methods of imparting antistatic properties to textile materials as would cause the materials to yellow when repeatedly laundered can not safely be applied to synthetic textile products having wash-and-wear properties, and particularly, to clothes for which a high degree of whiteness is always a prime consideration.

It is therefore an object of the present invention to provide durable antistatic agents for textile materials, particularly synthetic fibers such as polyesters, nylons, polyacrylonitriles, acetates, and polyolefins which tend to accumulate electrostatic charge, woven and knitted articles made up therefrom, the resulting textile materials treated with said antistatic agents being substantially free from tendencies to yellow due to adsorption of a trace of iron in water as they are subjected to repeated cycles of wearing and washing.

It is another object of the present invention to provide methods of imparting antistatic and antiyellowing properties to textile materials.

It is a further object of the present invention to provide textile materials having excellent antistatic and antiyellowing properties.

Other objects and features of the present invention will be apparent from the following more detailed description.

We have found that the yellowing tendency due to adsorption of iron in water of textile materials which have been treated with a cationic high molecular weight compound and, then or simultaneously, with various type of anionic compounds relates to the kind of anionic compounds used, and we have also found that the disadvantages of the conventional methods may be eliminated without adversely affecting the advantages of such methods if a member of the class consisting of certain carefully selected anionic compounds, i.e. anionic compounds each having more than 4 carbon atoms and from 2 to 10 anionic functional groups per molecule, is employed.

In the methods disclosed in the aforementioned U.S. and British patents, those anionic compounds listed in Table 1 are utilized.

TABLE 1

Anionic compounds which are conventionally employed:

- Fatty acid salts—
 - Sodium and ammonium laurates
 - Sodium and ammonium myristates
 - Sodium behenate
 - Tallow fatty acid soap
- Sulfates—
 - Sodium octyl sulfate
 - Sodium, potassium, and ammonium dodecyl sulfates
 - Technical sodium dodecyl sulfate
 - Sodium tetradecyl sulfate
 - Sodium hexadecyl sulfate
 - Sodium salt of mixed C₁₀–C₂₀ alkenyl sulfates (alcohols derived from sodium reduction of sperm oil)
 - Sodium hexadecenyl sulfate
 - Sodium octadecenyl sulfate
 - Sodium alkyl sulfate having 20 carbon atoms
 - N-diethyl cyclohexyl ammonium dodecyl sulfate

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Sodium and ammonium salts of sulfates of mixed dodecyl-tetradecyl alcohols condensed with one mole of ethylene oxide

Phosphates—

Diethanolamine salt of lauryl phosphate (mono- or diesters)

Sulfonates—

Sodium salt of petroleum sulfonate having 12 to 14 carbon atoms

Sodium salt of petroleum sulfonate having 16–18 carbon atoms

Sodium dedecylbenzene sulfonate

Sodium dodecyltoluene sulfonate

High molecular weight anionic materials—

High molecular weight copolymer of styrene and maleic acid

Sodium polyacrylate (degree of polymerization: 3,000).

When such organic compounds, e.g. fatty acid salts, sulfates, phosphates, and sulfonates as respectively have only one anionic functional group per molecule are employed, the treated textile materials tend to adsorb the traces of iron in water, and consequently assume a yellowish cast. A similar drawback is incurred if organic compounds having a great many anionic functional groups per molecule, e.g. a high molecular weight copolymer of styrene and maleic acid, are employed. We have found that this undesirable result can be avoided, according to the invention, by using organic compounds having more than 4 carbon atoms and from 2 to 10 anionic functional groups per molecule.

Thus, the present invention consists in (1) an antistatic and antiyellowing agent for textile materials which contains a substantially water insoluble compound consisting of a high molecular weight part having a number of quaternary nitrogen atoms and anionic parts each having more than 4 carbon atoms and from 2 to 10 anionic functional groups, the cationic part and anionic parts being chemically combined, (2) a method of imparting antistatic and antiyellowing properties to textile materials by treating or covering surfaces of textile materials with the said compound, and (3) textile material having a surface film containing the said compound.

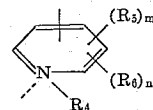
Any of the compounds consisting of the high molecular weight part having a number of quaternary nitrogen atoms and anionic parts each of which has more than 4 carbon atoms and from 2 to 10 anionic functional groups, the high molecular part and anionic parts being in the chemically combined form, may be used as the antistatic and antiyellowing compounds of the present invention. Typical and preferred compounds are those consisting of a high molecular weight part having a number of radicals selected from the class consisting of radicals having the following general Formula I or II, and anionic parts each having more than 4 carbon atoms and from 2 to 10 anionic functional groups selected from the class consisting of $-\text{COO}$, $-\text{SO}_3$, $-\text{OSO}_3$, $-\text{OPO}_3$, $-\text{OPO}_3\text{M}$, $=\text{O}_2\text{PO}_2$, $-\text{PO}_3$ and $-\text{PO}_3\text{M}$, wherein M is a member of the class consisting of hydrogen, metal atoms, ammonium radical and organic ammonium radicals:



wherein R_2 and R_3 are members of the class consisting of alkyl radicals having from 1 to 12 carbon atoms, alkenyl radicals having from 3 to 12 carbon atoms, hydroxyalkyl radicals having from 2 to 12 carbon atoms and alkoxyalkyl radicals having from 2 to 12 carbon atoms, or R_2 and R_3 represent a single group which forms a hetero-

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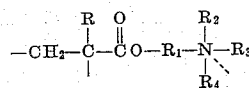
cyclic ring having 5 to 6 ring members including the N atom and may contain a second hetero atom of the class consisting of O, N and S as a ring member, and which may have alkyl side chains having from 1 to 6 carbon atoms, and R_4 is a member of the class consisting of alkyl radicals having from 1 to 18 carbon atoms, alkenyl radicals having from 3 to 18 carbon atoms, hydroxyalkyl radicals having from 2 to 18 carbon atoms, alkoxyalkyl radicals having from 2 to 18 carbon atoms, aralkyl radicals having from 7 to 20 carbon atoms, phenoxyalkyl radicals having from 7 to 20 carbon atoms and epoxyalkyl radicals containing from 3 to 18 carbon atoms.



(II)

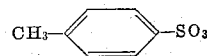
wherein R_5 and R_6 are members of the class consisting of hydrogen and alkyl radicals having from 1 to 6 carbon atoms, m and n are integers of 1 to 2, and R_4 is as defined above in general Formula I.

Among high molecular weight parts having a number of the radicals of the Formula I, those having at least 20% by weight of a structural unit having the following general Formula III are particularly preferable:

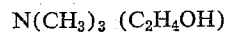


wherein R is a member of the class consisting of hydrogen and alkyl radicals having from 1 to 2 carbon atoms, R_1 is an alkylene radical having from 2 to 4 carbon atoms, R_2 and R_3 are members of the class consisting of alkyl radicals having from 1 to 4 carbon atoms and hydroxyalkyl radicals having from 2 to 4 carbon atoms, and R_4 is a member of the class consisting of alkyl radicals having from 1 to 4 carbon atoms, alkenyl radicals having from 3 to 4 carbon atoms, hydroxyalkyl radicals having from 2 to 4 carbon atoms, alkoxyalkyl radicals having from 2 to 5 carbon atoms, aralkyl radicals having from 7 to 8 carbon atoms and epoxyalkyl radicals having from 3 to 8 carbon atoms.

These compounds of this invention may be produced in any known manner. For example, they may be produced by reacting a compound (hereinafter referred to as cationic compound) consisting of a high molecular weight part having a number of the radicals shown by the above mentioned Formulas I, II or III and common counter-anions, e.g. Cl, Br, I, CH_3OSO_3 , $\text{C}_2\text{H}_5\text{OSO}_3$,



and NO_3 with a compound (hereinafter referred to as anionic compound) consisting of anionic part having more than 4 carbon atoms and from 2 to 10 anionic functional groups selected from the class consisting of $-\text{COO}$, $-\text{SO}_3$, $-\text{OSO}_3$, $-\text{OPO}_3$, $-\text{OPO}_3\text{M}$, $=\text{O}_2\text{PO}_2$, $-\text{PO}_3$ and $-\text{PO}_3\text{M}$ wherein M is a member of the class consisting of hydrogen, metal atoms, ammonium radical and organic ammonium radicals and common counter-anions, e.g. H, Na, K, Ca, NH_4 , CH_3NH_2 , $\text{NH}(\text{C}_2\text{H}_4\text{OH})_3$, $\text{N}(\text{CH}_3)_4$, $\text{N}(\text{C}_2\text{H}_5)_4$ and



The said cationic compound is produced by polymerizing a monomer having an ethylenic unsaturation or a polymerizable double bond and quaternary nitrogen atom (or copolymerizing the same with a suitable copolymerizable monomer), or by polymerizing a monomer having an ethylenic unsaturation or a polymerizable double bond and tertiary nitrogen atom (or copolymerizing the same with a suitable copolymerizable monomer) and then quaternizing the tertiary nitrogen atoms.

Alternatively, the compounds of this invention may be produced by reacting a monomer having an ethylenic unsaturation or a polymerizable double bond and quaternary nitrogen atom with the anionic compounds, and polymerizing the resulting monomer (or copolymerizing the same with a suitable copolymerizable monomer).

In the compound of the present invention, the preferred average molar ratio of the quaternary nitrogen atom and the anionic part is 1:0.3-1:1.

Some of the exemplary cationic compounds useful in producing the antistatic and antiyellowing compounds of the present invention are shown in Table 2.

TABLE 2

Examples of the cationic compounds useful in producing the compounds of the present invention:

Poly - beta - acryloyloxyethyltrimethyl ammonium methylsulfate
 Poly - beta - acryloyloxyethylemethyldiethyl ammonium ethylsulfate
 Poly - beta - methacryloyloxyethyldiethylmethyl ammonium methylsulfate
 Poly - beta - methacryloyloxyethyltrimethyl ammonium chloride
 Poly-beta-methacryloyloxyethyldiethylallyl ammonium chloride
 Poly - beta - methacryloyloxyethyldimethylhydroxyethyl ammonium chloride
 Poly - beta - methacryloyloxyethyldiethylmethoxymethyl ammonium chloride
 Poly - beta - acryloyloxyethyldiethylbenzyl ammonium chloride
 Poly - beta - acryloyloxyethyldimethylglycidyl ammonium chloride
 Poly - beta - acryloyloxyethyldimethylphenoxyethyl ammonium chloride
 Poly - beta - vinyloxyethyldiethylmethyl ammonium-methylsulfate
 Poly - beta - vinyloxyethyltrimethyl ammonium chloride
 Poly - beta - vinyloxyethyldimethylmethoxymethyl ammonium chloride
 Poly - beta - acrylamidoethyldiethylmethyl ammonium methylsulfate
 Poly - beta - acrylamidoethyldiethylglycidyl ammonium chloride
 Poly - acrylamidopropylmethylallyl ammonium chloride
 Poly - acrylamidopropylmethylbutoxymethyl ammonium chloride
 Polymer obtained by quaternarization of acrylamidoethyldiethylamine with methylol chloroacetamide
 Poly - acrylamidopropylmethyl morpholinium chloride
 Poly - acrylamidoethylbutoxymethyl morpholinium chloride
 Poly - beta - methacrylamidoethylmethyl piperidinium methylsulfate
 Poly - beta - vinyloxyethylallyl piperidinium chloride
 Poly - beta - vinyloxyethylmethyl piperidinium chloride
 Poly - N - methyl - 2 - vinyl pyridinium methylsulfate
 Poly - N - ethyl - 4 - vinyl pyridinium chloride
 Poly - N - methyl - 4 - methyl - 2 - vinyl pyridinium methylsulfate

Copolymer of beta - methacryloyloxyethyldiethylmethyl ammonium methylsulfate and vinyl acetate
 Copolymer of beta - acrylamidoethyldiethylmethoxymethyl ammonium chloride and acrylamide
 5 Copolymer of beta - vinyloxyethyldiethylmethyl ammonium chloride and methyl methacrylate.

Some of the exemplary anionic compounds useful in producing the antistatic and antiyellowing compounds of the present invention are those each of which has more than 4 carbon atoms and from 2 to 10 anionic functional groups selected from the class consisting of $-\text{COO}$, $-\text{SO}_3$, $-\text{OSO}_3$, $-\text{OPO}_3$, $-\text{OPO}_3\text{M}$, $=\text{O}_2\text{PO}_2$, $-\text{PO}_3$, and $-\text{PO}_3\text{M}$, wherein M is a member of the class consisting of hydrogen, metal atoms, ammonium radical and organic ammonium radicals. Among these compounds, those having a molecular weight between 100 and 2000 and from 2 to 6 anionic functional groups per molecule yield particularly satisfactory results in many instances.

Typical and preferred examples of the said anionic compounds are shown in Table 3.

TABLE 3

25 Examples of the anionic compounds useful in producing the compounds of the present invention (they are usually used in the form of salt):

Polycarboxylic acids—
 30 Pimelic acid
 Suberic acid
 Azelaic acid
 Sebacic acid
 Itaconic acid
 Nonylsuccinic acid
 35 Nonenylsuccinic acid
 Dodecylsuccinic acid
 Dodecenylsuccinic acid
 Octadecenylsuccinic acid
 Cyclohexanedicarboxylic acid
 40 Isophthalic acid
 Terephthalic acid
 Tetrahydrophthalic acid
 Tricarbarlyic acid
 Trimellitic acid
 45 Pyrromellitic acid
 Polysulfonic acids—
 Benzenedisulfonic acid
 Butylnaphthalenedisulfonic acid
 Methylnaphthalenedisulfonic acid
 50 Nonyldiphenyletherdisulfonic acid
 Dodecyldiphenyletherdisulfonic acid
 Diphenyletherdisulfonic acid
 Phenylphenolsulfonic acid
 Formalin condensate of naphthalenesulfonic acid
 55 Formalin condensate of phenylphenolsulfonic acid
 Formalin condensate of phenolsulfonic acid
 Polysulfates—
 Pentaerythritol-ethyleneoxide and propylene-oxide adduct polysulfate (acidic)
 60 Ethyleneglycol-propyleneoxide adduct disulfate (acidic)
 Polybutyleneglycoldisulfate (acidic)
 Polyphosphates—
 Glycerine-propyleneoxide adduct triphosphate (acidic)
 65 Ethyleneglycol-propyleneoxide adduct diphosphate (acidic)
 Polyphosphonic acids—
 Diphenyletherdiphosphonic acid
 70 Compounds having carboxylic and other acid groups—
 Sulfate of oleic acid (acidic)
 Sulfate of dioxysearic acid (acidic)
 Sulfonate of monoesterified maleic acid (acidic)
 α -Sulfonated fatty acid (acidic)
 75 Ricinoleic acid phosphate (acidic)

Typical examples of the monomer having an ethylenic unsaturation or a polymerizable double bond and quaternary nitrogen atom include methacryloyloxyalkyltrialkyl ammonium compounds, e.g. methacryloyloxyethyltrialkyl ammonium chloride and methacryloyloxyethylmethyl-diethyl ammonium methylsulfate; acryloyloxy-alkyltrialkyl ammonium compounds, e.g. acryloyloxyethyltrimethyl ammonium chloride; methacrylamido-alkyltrialkyl ammonium compounds, e.g. methacrylamidoethyl-diethylmethyl ammonium methylsulfate; vinyloxy-alkyltrialkyl ammonium compounds, e.g. vinyloxyethyltrimethyl ammonium chloride; N-vinyloxyalkyl-N-alkyl piperidinium compounds, e.g. N-vinyloxyethyl-N-methyl piperidinium chloride; N-vinyl-N-alkyl imidazolinium compounds, e.g. N-vinyl-N-methyl imidazolinium methylsulfate; N-alkyl-vinyl pyridinium compounds, e.g. N-methyl-2-vinyl pyridinium methylsulfate; and a mixture of two or more of these monomers.

Typical examples of the monomer having an ethylenic unsaturation or a polymerizable double bond and tertiary nitrogen atom include dialkylaminoalkyl acrylates, e.g. beta-diethylaminoethyl acrylate; dialkylaminoalkyl alkacrylates, e.g. beta-diethylaminoethyl methacrylate and beta-dimethylaminoethyl methacrylate; and vinyl pyridines, e.g. 4-vinyl pyridine, 2-methyl-5-vinyl pyridine and 2,4-diethyl-5-vinyl pyridine.

The copolymerizable monomers are those having at least one ethylenic unsaturation or polymerizable double bond, and may be exemplified by olefins, e.g. ethylene, propylene and butylene; acrylic compounds, e.g. acrylonitrile, acrylic acid and methyl acrylate; alkacrylic compounds, e.g. methacrylamide and methyl methacrylate; vinylidene compounds, e.g. vinylidene chloride; vinyl compounds, e.g. vinyl halides, vinyl acetate, styrene, methylvinyl ketones, vinylpyridines and vinyl isobutyl ethers; and dienes, e.g. butadiene and 2-chlorobutadiene.

The amount of copolymerizable monomer may vary from 0% to 80% by weight based on the monomers used. The choice depends on the economics and the desired physical properties of the polymer. If a copolymerizable monomer is used, its preferred amount is from 1% to 50% by weight.

The degree of polymerization of the cationic compound in the above-mentioned methods is greater than 10 (containing at least 20% by weight of the monomer having a polymerizable double bond and quaternary nitrogen atom), but the degree is not directly related to the desired antistatic and antiyellowing properties. Thus, within the range of degree of polymerization obtainable by conventional methods, the resulting compound shows satisfactory properties and can be easily applied to textile materials, e.g. poly-beta-methacryloyloxyethyl-diethylmethyl ammonium methylsulfate having a viscosity of 2,000-100,000 c.p.s. in the form of 30% aqueous solution at room temperature gives good results.

Methods of imparting antistatic and antiyellowing properties to textile materials according to the present invention may be classified into the following two major methods.

(1) Textile materials are treated with an emulsion or a solution containing the compound of the present invention.

(2) Textile materials are treated with the cationic compound and the anionic compound to form the antistatic and antiyellowing compound of this invention on the textile materials.

In the method (1), the antistatic and antiyellowing compound of the present invention is emulsified in water, or dissolved in water-organic solvent mixtures or organic solvents, e.g. mineral oils, alcohols, polyhydric alcohols, cellosolves, polyoxyalkylenepolyols, ketones, esters, ethers, dioxane, halogenated hydrocarbons, alicyclic hy-

drocarbons, and aromatic hydrocarbons, or any suitable mixtures of two or more thereof to form an antistatic and antiyellowing agent of this invention. If required, it is possible to add some emulsifiers such as nonionic surface active agents, textile softeners, optical brighteners, finishing resins, etc. The resulting solution or emulsion may be applied to textile materials by suitable methods, e.g. coating, padding, dipping, and spraying.

The second method may be further divided into two as follows:

(a) Textile materials are treated first with the cationic compound and then with the anionic compound (this procedure may be reversed) to form the compound of this invention in situ on the textile materials.

(b) Textile materials are immersed in a bath containing the cationic compound and then the anionic compound is added to the bath (this procedure may be reversed) to form the compound of this invention in situ on the textile materials.

According to the method (2-a), textile materials are treated first with a solution or an emulsion containing the cationic compound by way of, for example, dipping, padding or spraying, and then with a solution containing the anionic compound. The antistatic compound of the present invention is formed on the textile materials. It is the same as in the first method that various additives can be incorporated in the bath.

The method (2-b) comprises dipping textile materials in a bath containing the cationic compound and, while this bath is constantly stirred, adding a solution containing the anionic compound to the said bath to form the antistatic and antiyellowing compound of the present invention on the textile materials. This method is characterized in that textile materials can be caused to absorb the effective ingredients in the bath more economically, and in that textile materials such as knitted goods, rugs and threads are imparted antistatic and antiyellowing properties without squeezing them too tightly. Just as in the before-mentioned methods, it is possible to incorporate various additives in the bath.

While, in methods (2-a) and (2-b), the proportion of the cationic compound and the anionic compound is not so critical, it will prove beneficial to use about one or more equivalent amount of anionic compounds.

In any of the said methods, the concentration of the solution may vary over a wide range, but 0.1% to 5% (by weight) solution is particularly preferred. The treating temperature is not critical, no substantial difference in effect being observed if the treatment is conducted at high or low temperature. Textile materials are usually treated with an aqueous bath at a temperature from room temperature to about 50° C.

The antistatic and antiyellowing agent of the present invention may be advantageously applied to textile materials such as fibers, filaments, yarns, knitted and woven fabrics, and the like, made up wholly or partially, from nylons, polyacrylonitriles, polyesters, polyolefins, wool, etc. which are apt to be electrically charged and tend to yellow upon adsorption of the traces of iron in water as washing is repeated.

The amount of the antistatic and antiyellowing compound of the present invention to be deposited on the textile materials may vary over a wide range. Generally, 0.1 to 5 percent by weight of the compound of this invention based on the textile materials would yield a satisfactory result.

The antistatic and antiyellowing agent according to the present invention imparts good durable antistatic property to textile materials, and much better antiyellowing property to textile materials than conventional agents.

The effects of the antistatic and antiyellowing compounds of the present invention on plain-woven nylon cloths as compared with those of conventional antistatic agents are summarized in Tables 4, 5, 6 and 7.

TABLE 4

The results of a test in which plain-woven nylon cloths were treated with poly-beta-metacryloyloxyethylidimethyl compounds with their anionic parts varied.

No.	Anionic parts	Antistatic properties (electric resistances in ohm)			Whiteness (reflectances in percent)	
		Just treated	Washed 5 times	Dry-cleaned 5 times	Before iron-test	After iron-test
1	Methylsulfate	3×10^8	6×10^9	4×10^8	87.0	78.5
2	Tallow fatty acid	3×10^7	6×10^8	5×10^7	87.0	78.4
3	Octylsulfate	7×10^7	8×10^8	8×10^7	87.0	78.1
4	Octadecenylsulfate	3×10^7	5×10^8	6×10^7	87.0	77.3
5	Lauryl phosphate	2×10^7	6×10^9	1×10^8	86.4	75.3
6	Polyacrylate (degree of polymerization, 3,000)	2×10^7	8×10^8	2×10^8	87.0	77.2
7	Nonylsuccinate	2×10^7	4×10^8	3×10^7	87.0	85.4
8	Dodecenylsuccinate	3×10^7	4×10^8	4×10^7	87.0	86.0
9	Pyromellitate	6×10^7	5×10^8	4×10^7	87.0	85.4
10	Nonyldiphenylether disulfonate	3×10^7	2×10^8	3×10^7	87.0	86.0
11	Diphenylether diphosphonate	2×10^8	3×10^7	3×10^7	86.9	85.4
12	Sorbitol-propyleneoxide adduct phosphate	2×10^7	7×10^8	3×10^7	87.0	85.2
13	Polybutylene-glycoldisulfate	3×10^7	7×10^8	5×10^7	87.0	85.3
14	Control	1×10^{11}	-----	1×10^{11}	87.0	80.3

Notes:

Treatment.—Each test cloth was immersed in a 1% aqueous bath of the compound at 40° C., squeezed to 50% pick-up, and dried.

Test of antistatic properties.—Each test cloth was conditioned so as to be 20° C. and 65% RH (Relative Humidity), and the electric resistance in ohm between both sides of the cloth was measured with a supermegaohmmeter.

Washing test.—Each test cloth was washed with a 0.2% aqueous solution of a household synthetic detergent at 40° C. for 10 minutes in liquor ratio of 50 times with a Launder-Ometer, rinsed, and dried.

Dry-cleaning test.—Each test cloth was washed in petroleum-based dry-cleaning solvent at room tempera-

ture (25° C.) for 10 minutes in liquor ratio of 50 times with a Launder-Ometer, rinsed with fresh solvent, and dried.

Iron adsorption test.—A solution of ferric hydroxide (pH 7) containing 240 p.p.m. of iron was prepared from iron alum and sodium hydroxide. Each test cloth was treated with this solution at 40° C. for 60 minutes in liquor ratio of 100 times, followed by rinsing with water and drying. The reflectance of each test cloth in percent before and after the above treatment was measured at 450 mμ wave length by means of a photo electric colorimeter compared with the reflectance of MgO as 100%. These values, which will be referred to as whiteness, were compared with each other.

TABLE 5

The results of series of tests in which plain-woven nylon cloths were treated with polyacrylamidopropyltrimethyl ammonium compounds with their anionic parts varied. (The procedures of treatment and the methods of measurement are the same as in Table 4.)

No.	Anionic parts	Antistatic properties (electric resistances in ohm)			Whiteness (reflectances in percent)	
		Just treated	Washed 5 times	Dry-cleaned 5 times	Before iron-test	After iron-test
1	Chloride	5×10^8	7×10^9	1×10^9	87.0	77.2
2	Tallow fatty acid	3×10^7	6×10^8	5×10^7	87.0	78.2
3	Octadecenylsulfate	2×10^7	6×10^8	2×10^7	87.0	76.4
4	Lauryl phosphate	1×10^7	6×10^8	8×10^7	86.9	76.7
5	Polyacrylate (degree of polymerization, 3,000)	4×10^7	9×10^8	2×10^7	87.0	77.2
6	Nonylsuccinate	4×10^7	7×10^8	5×10^7	87.0	84.7
7	Dodecenylsuccinate	3×10^7	4×10^8	4×10^7	87.0	86.5
8	Nonyldiphenylether disulfonate	2×10^7	5×10^8	5×10^7	86.8	85.8
9	Diphenylether disulfonate	1×10^7	6×10^8	4×10^7	87.0	86.0
10	Control	1×10^{11}	-----	1×10^{11}	87.0	80.3

TABLE 6

The results of a series of tests in which plain-woven nylon cloths were treated with poly-N-methyl-2-vinyl pyridinium compounds with their anionic parts varied. (The procedures of treatment and the methods of measurement are the same as in Table 4.)

No.	Anionic parts	Antistatic properties (electric resistances in ohm)			Whiteness (reflectances in percent)	
		Just treated	Washed 5 times	Dry-cleaned 5 times	Before iron-test	After iron-test
1	Methylsulfate	8×10^8	4×10^{10}	4×10^9	86.4	71.5
2	Tallow fatty acid	5×10^8	3×10^9	7×10^8	86.4	72.1
3	Octadecenylsulfate	5×10^8	4×10^9	7×10^8	86.4	70.3
4	Lauryl phosphate	2×10^8	4×10^9	7×10^9	86.4	70.8
5	Dodecylbenzene sulfonate	4×10^8	3×10^9	6×10^8	86.3	70.8
6	Nonylsuccinate	5×10^8	4×10^9	6×10^8	86.3	84.5
7	Dodecenylsuccinate	2×10^8	3×10^9	4×10^8	86.4	86.0
8	Diphenylether-diphosphate	2×10^8	3×10^9	5×10^8	86.4	84.4
9	Nonyldiphenylether disulfonate	4×10^8	4×10^9	6×10^8	86.3	83.4
10	Control	1×10^{11}	-----	1×10^{11}	87.0	80.3

TABLE 7

The results of a series of tests in which plain-woven nylon cloths were treated with copolymers of beta-methacryloyloxyethyldiethylmethyl ammonium compound and vinyl acetate with their anionic parts varied. (The procedures of treatment and the methods of measurement are the same as in Table 4.)

No.	Anionic parts	Antistatic properties (electric resistances in ohm)			Whiteness (reflectances in percent)	
		Just treated	Washed 5 times	Dry-cleaned 5 times	Before iron-test	After iron-test
1	Methylsulfate	4×10^8	3×10^{10}	6×10^9	87.3	79.4
2	Tallow fatty acid	7×10^8	5×10^9	7×10^8	87.4	79.6
3	Octadecenylsulfate	6×10^8	5×10^9	7×10^8	87.3	78.2
4	Lauryl phosphate	3×10^8	6×10^9	5×10^8	87.3	77.6
5	Dodecylbenzene sulfonate	7×10^8	5×10^9	7×10^8	87.2	79.4
6	Nonylsuccinate	5×10^8	7×10^9	6×10^8	87.3	85.2
7	Dodecenylsuccinate	4×10^8	5×10^9	5×10^8	87.3	86.8
8	Dodecylidiphenylether disulfonate	6×10^8	5×10^9	7×10^8	87.3	86.4
9	Diphenylether diphosphate	4×10^8	5×10^9	6×10^8	87.3	86.0
10	Sorbitol-propyleneoxide adduct phosphate	5×10^8	7×10^9	7×10^8	87.2	85.1
11	Control	1×10^{11}	-----	1×10^{11}	87.0	80.3

It will be apparent from the Tables 4 to 7 that if the high molecular weight part remains the same, there are no substantial differences in both antistatic properties and resistance to washing and dry-cleaning among the cloths treated with the conventional antistatic compounds and the antistatic and antiyellowing compounds of the present invention. However, when comparisons are made with respect to the tendencies of textile materials to yellow upon adsorption of iron, there are marked differences in the degree of yellowing. Thus, the cloths treated with the compounds of the present invention, e.g. Nos. 7-13 of the Table 4, Nos. 6-9 of the Table 5, Nos. 6-9 of the Table 6, and Nos. 6-10 of the Table 7, adsorb much less of the iron in water than the cloths treated with the conventional antistatic compounds, e.g. Nos. 1-6 of the Table 4, Nos. 1-5 of the Table 5, Nos. 1-5 of the Table 6, and Nos. 1-5 of the Table 7.

Stated differently, the effect of the treatment on reduced adsorption of iron is attainable when the high molecular weight part is combined with anionic parts each having more than 4 carbon atoms and from 2 to 10 anionic functional groups, and no such effect can be expected when anionic parts each having only one anionic functional group is used. Conversely, it is likewise not possible to attain the satisfactory effect when the anionic part has an excessively great number of anionic functional groups, such as sodium polyacrylate (degree of polymerization: 3000; refer to No. 6 of the Table 4 and No. 5 of the Table 5).

The textile materials treated with the antistatic and antiyellowing compound of the present invention are less adsorptive of iron and less liable to yellow, even when compared with the controls which have not been treated.

The present invention will be further understood by the following examples, in which parts are by weight, although the scope of the present invention is by no means limited thereto.

Example 1

To 50 parts of a 30% aqueous solution of poly-beta-methacryloyloxyethyldiethyl methyl ammonium methylsulfate (30,000 c.p.s.) was gradually added at room temperature and with stirring a solution prepared by blending 27.3 parts of disodium nonylsuccinate, 7 parts of polypropyleneglycol (molecular weight 300) and 15.7 parts of water and heating the resulting mixture to about 50° C., to obtain a white paste (I) which could be readily dispersed in water. Textile materials were immersed in a 3% aqueous emulsion of (I) at room temperature for 5 to 10 minutes, then squeezed and dried.

The test results are summarized in Tables 8 and 9. From the tables, it is concluded that textile materials treated with (I) have excellent durable antistatic and better antiyellowing properties than those of the corresponding control and those treated with the conventional agent (II), which contains the same ingredients as (I) except that nonylsuccinate is replaced by a conventional anionic group, i.e., octadecenylsulfate.

TABLE 8

The results of a test on the antistatic properties. (The test procedure is the same as in Table 4.)

Agents	Plain-woven nylon cloth (Ω)		Plain-woven polyester cloth (Ω)		Polyester-cotton broadcloth (Ω)	
	Just treated	Washed 5 times	Just treated	Washed 5 times	Just treated	Washed 5 times
(I) The present invention.....	2×10^7	2×10^8	3×10^7	2×10^8	1×10^6	5×10^7
(II) Conventional.....	3×10^7	5×10^8	5×10^7	7×10^8	1×10^6	5×10^7
Control (none).....	1×10^{11}	-----	1×10^{11}	-----	3×10^8	-----

TABLE 9

The results of a test on the antiyellowing properties. (The test procedure is the same as in Table 4.)

Agents	Plain-woven nylon cloth (percent)		Plain-woven polyester cloth (percent)		Polyester ^a cotton broadcloth (percent)	
	Before iron-test	After iron-test	Before iron-test	After iron-test	Before iron-test	After iron-test
(I) The present invention.....	87.0	85.4	84.6	83.7	88.3	84.0
(II) Conventional.....	87.0	77.3	84.6	75.3	88.2	62.4
Control (none).....	87.0	80.3	84.5	81.5	88.5	77.8

Example 2

A white paste (III) which could be readily dispersed in water prepared from the following compounds according to Example 1, was used to treat textile materials by the procedure of Example 1.

30% aqueous solution of poly-beta-methacryloyloxyethyl-diethylmethyl ammonium methylsulfate (30,000 c.p.s.)	Parts
70% aqueous solution of monosodium dodecenylsuccinate	50
	33

Liquid hydrocarbon	Parts
2-methyl-2,4-pentanediol	15
Isopropanol	6
Water	1.5
	14.5

In Tables 10 and 11 are summarized the effects, in comparison, of (III), the corresponding control and the conventional agent (IV) which was prepared in the same manner as for (III) except that a conventional anionic group, i.e. octylsulfate, was used instead of dodecenylsuccinate.

TABLE 10

The results of a test on the antistatic properties. (The test procedure is the same as in Table 4.)

Agents	Plain-woven nylon cloth (Ω)		Plain-woven polyester cloth (Ω)		Plain-woven polypropylene cloth (Ω)	
	Just treated	Washed 5 times	Just treated	Washed 5 times	Just treated	Washed 5 times
(III) The present invention.....	3×10^7	4×10^8	2×10^7	3×10^8	2×10^8	2×10^8
(IV) Conventional.....	7×10^7	8×10^8	4×10^7	6×10^8	2×10^7	3×10^8
Control (none).....	1×10^{11}	-----	1×10^{11}	-----	1×10^{11}	-----

TABLE 11

The results of a test on the antiyellowing properties. (The test procedure is the same as in Table 4.)

Agents	Plain-woven nylon cloth (percent)		Plain-woven polyester cloth (percent)		Plain-woven polypropylene cloth (percent)	
	Before iron-test	After iron-test	Before iron-test	After iron-test	Before iron-test	After iron-test
(III) The present invention.....	87.0	86.0	84.6	84.1	78.3	76.2
(IV) Conventional.....	87.0	78.1	84.5	74.5	78.2	68.1
Control (none).....	87.0	87.3	84.5	81.5	78.4	72.3

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Example 3

A white paste (V) which could be dispersed in water was prepared from the following compounds according to Example 1, and plain-woven nylon cloths were treated with this agent by the procedure of Example 1.

	Parts
30% aqueous solution of polyacrylamidopropyltrimethyl ammonium chloride (20,000 c.p.s.)	50
50% aqueous solution of disodium butylnaphthalene disulfonate	38.2
Liquid hydrocarbon	5
2-methyl-2,4-pentanediol	5
Water	1.8

These treated cloths showed satisfactory antistatic and better antiyellowing properties than those of the control and the same cloths treated with conventional agent (VI) which contains the same ingredients as (V) except that butylnaphthalene disulfonate is replaced with a conventional anionic group, i.e., petroleum sulfonate.

Example 4

In a 3% aqueous solution of poly-N-methyl-2-vinylpyridinium methylsulfate (20,000 c.p.s.) were immersed plain-woven nylon cloths at room temperature for 10 minutes, squeezed and dried. Then, the cloth was further immersed in a 3% aqueous solution of sodium pyrromellitate at 40° C. for 10 minutes to form the antistatic and antiyellowing compound of the present invention thereon, rinsed and dried. When compared with the control (non-treated), and the cloth treated by the conventional method using poly-N-methyl-2-vinylpyridinium methylsulfate and a conventional anionic compound, i.e., sodium octadecenylsulfate, instead of sodium pyrromellitate, the cloth treated by the method of the present invention showed much better antiyellowing properties.

Example 5

When polyester cloths were treated by the procedure of Example 4 using poly-acrylamidopropylbutoxymethyl morpholinium chloride (15,000 c.p.s.) and sodium salt of sorbitol-propyleneoxide (12 moles) adduct phosphate, good results similar to Example 4 were obtained on the antistatic and antiyellowing test.

Example 6

When polyester-wool blended cloths were treated by the procedure of Example 4 using poly-N-vinyl-N-methyl imidazolinium methylsulfate (20,000 c.p.s.) and sodium salt of alpha-sulfonated stearic acid, good results similar

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to Example 4 were obtained on the antistatic and antiyellowing test.

Example 7

A polyester cloth was treated by the procedure of Example 4 using a copolymer of 70% by weight of beta-methacryloyloxyethyl-diethylmethyl ammonium methylsulfate and 30% by weight of methyl methacrylate (35,000 c.p.s.) and sodium nonyl-diphenylether disulfonate. The antistatic and antiyellowing properties of the cloth were greatly improved.

Example 8

A polyester-cotton blended cloth was treated by the procedure of Example 4 using a copolymer of 75% by weight of N-methyl-2-methyl-5-vinylpyridinium bromide and 25% by weight of acrylamide (45,000 c.p.s.) and disodium butylnaphthalenedisulfonate. The antistatic and antiyellowing properties of the cloth were greatly improved.

Example 9

A polypropylene cloth was treated by the procedure of Example 4 using poly-beta-vinyl-oxyethyl-diethylmethyl ammonium methylsulfate (40,000 c.p.s.) and disodium dodecylsuccinate. The antistatic and antiyellowing properties of the cloth were greatly improved.

Example 10

Five parts of a 30% aqueous solution of poly-beta-methacryloyloxyethyl-diethylmethyl ammonium methylsulfate (25,000 c.p.s.) and 5 parts of a cationic softener (Safanol NTQ made by Sanyo Chemical Industry Company, Kyoto, Japan) were dissolved in water to be 2000 parts, in which 100 parts of each kind of knitted goods made of synthetic fibers was immersed at 40° C. Then, 300 parts of a 1.5% aqueous solution of disodium dodecylsuccinate was gradually added to the bath. After the addition of disodium dodecylsuccinate, the goods were left standing for 30 minutes, rinsed and dried.

The test results are summarized in Tables 12 and 13. It is apparent from the tables that the knitted goods treated in this manner (A) have good antistatic properties resistant to washing, desirably soft handles and better antiyellowing properties than the control goods, the goods treated by a method using the anionic compound known to the prior art, i.e. sodium octylsulfate, instead of disodium dodecylsuccinate (B), and the goods treated with a 1% aqueous solution of poly-beta-methacryloyloxyethyl-diethylmethyl ammonium methylsulfate alone (C).

TABLE 12

The results of a test on the antistatic properties. (The test procedure is the same as in Table 4.)

Treating methods	Polyester (Ω)		Polyester-polyacrylonitrile (75/25) (Ω)		Polyacrylonitrile (Ω)	
	Just treated	Washed 5 times	Just treated	Washed 5 times	Just treated	Washed 5 times
The present invention (A)	4×10 ⁷	6×10 ⁸	3×10 ⁷	1×10 ⁸	6×10 ⁷	5×10 ⁸
The conventional method using sodium octylsulfate (B)	1×10 ⁸	8×10 ⁸	1×10 ⁸	9×10 ¹⁰	1×10 ⁸	2×10 ⁹
The conventional method not using anionic compound (C)	2×10 ⁸	1×10 ⁹	3×10 ⁸	2×10 ⁹	2×10 ⁸	2×10 ⁹
Control	3×10 ¹⁰	-----	2×10 ¹⁰	-----	2×10 ¹⁰	-----

TABLE 13

The results of a test on the antiyellowing properties. (The test procedure is the same as in Table 4.)

Treating methods	Polyester (percent)		Polyester-polyacrylonitrile (75/25) (percent)		Polyacrylonitrile (percent)	
	Before iron-test	After iron-test	Before iron-test	After iron-test	Before iron-test	After iron-test
The present invention (A).....	87.3	87.0	84.1	82.4	79.4	77.7
The conventional method using sodium octylsulfate (B).....	87.3	75.6	84.1	75.2	79.3	68.4
The conventional method not using anionic compound (C).....	87.3	77.5	84.2	76.3	79.3	68.8
Control.....	87.4	82.3	84.3	78.5	79.4	71.6

Example 11

Five parts of a 30% aqueous solution of poly-beta-methacryloyloxyethyl-diethylmethyl ammonium methyl-sulfate (25,000 c.p.s.) were dissolved in water to be 2,000 parts of a bath, in which 100 parts of a polyester cloth were immersed at 40° C. Then, while the solution was agitated, 300 parts of a 2% aqueous solution of disodium dodecyl sulfosuccinate was gradually added to the bath. After the addition of the disodium dodecyl sulfosuccinate, the cloth was left standing for 30 minutes, rinsed and dried.

The cloth treated as above showed much better anti-yellowing property than the control, the cloth treated by a method using the anionic compound known to the prior art, i.e. sodium lauryl sulfate, instead of disodium dodecyl sulfosuccinate and the cloth treated with a 1% solution of poly-beta-methacryloyloxyethyl-diethylmethyl ammonium methylsulfate alone at room temperature, and also showed good antistatic properties.

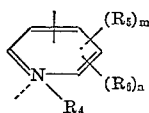
What we claim is:

1. An antistatic and antiyellowing agent for textile materials which comprises a substantially water-insoluble compound consisting of a high molecular weight polymer part having a number of quaternary nitrogen atoms and anionic parts each having more than 4 carbon atoms and from 2 to 10 anionic functional groups.

2. An antistatic and antiyellowing agent for textile materials as described in claim 1, wherein the high molecular weight polymer part has a number of radicals selected from the class consisting of radicals having the following general Formula I or II:

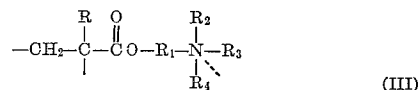


wherein R₂ and R₃ are members of the class consisting of alkyl radicals having from 1 to 12 carbon atoms, alkenyl radicals having from 3 to 12 carbon atoms, hydroxyalkyl radicals having from 2 to 12 carbon atoms and alkoxyalkyl radicals having from 2 to 12 carbon atoms, or R₂ and R₃ represent a single group which forms a heterocyclic ring having 5 to 6 ring members including the N atom and R₄ is a member of the class consisting of alkyl radicals having from 1 to 18 carbon atoms, alkenyl radicals having from 3 to 18 carbon atoms, hydroxyalkyl radicals having from 2 to 18 carbon atoms, alkoxyalkyl radicals having from 2 to 18 carbon atoms, aralkyl radicals having from 7 to 20 carbon atoms, phenoxyalkyl radicals having from 7 to 20 carbon atoms and epoxyalkyl radicals having from 3 to 18 carbon atoms;



wherein R₅ and R₆ are members of the class consisting of hydrogen and alkyl radicals having from 1 to 6 carbon atoms, m and n are integers of 1 to 2, and R₄ is as defined above in general Formula I.

3. An antistatic and antiyellowing agent for textile materials as described in claim 1 wherein the high molecular weight polymer part has at least 20% by weight of the radicals having the following general formula:



wherein R is a member of the class consisting of hydrogen and alkyl radicals having from 1 to 2 carbon atoms, R₁ is an alkylene radical having from 2 to 4 carbon atoms, R₂ and R₃ are members of the class consisting of alkyl radicals having from 1 to 4 carbon atoms and hydroxyalkyl radicals having from 2 to 4 carbon atoms, and R₄ is a member of the class consisting of alkyl radicals having from 1 to 4 carbon atoms, alkenyl radicals having from 3 to 4 carbon atoms, hydroxyalkyl radicals having from 2 to 4 carbon atoms, alkoxyalkyl radicals having from 2 to 5 carbon atoms, aralkyl radicals having from 7 to 8 carbon atoms and epoxyalkyl radicals having from 3 to 8 carbon atoms.

4. An antistatic and antiyellowing agent for textile materials as described in claim 1, wherein each of the anionic parts has from 2 to 10 anionic functional groups selected from the class consisting of —COO, —SO₃, —OSO₃, —OPO₃M, —O₂PO₃, —OPO₃, —PO₃ and —PO₃M, where M is a member of the class consisting of hydrogen, metal atoms, ammonium radical and organic ammonium radicals.

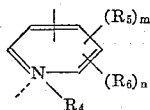
5. An antistatic and antiyellowing agent for textile materials as described in claim 1, wherein the anionic parts are the residues selected from the class consisting of alkyl succinic acid residues of which alkyl has from 9 to 18 carbon atoms, alkenyl succinic acid residues of which alkenyl has from 9 to 18 carbon atoms, alkyl-diphenylether disulfonic acid residues of which alkyl has from 3 to 18 carbon atoms, alkyl naphthalene-disulfonic acid residues of which alkyl has from 3 to 6 carbon atoms, polyalkyl-naphthalenedisulfonic acid residues of which alkyls respectively have from 3 to 6 carbon atoms and alkyl sulfosuccinic acid residues of which alkyl has from 8 to 18 carbon atoms.

6. An antistatic and antiyellowing agent for textile materials comprising a substantially water-insoluble compound consisting of high molecular weight polymer part which has a number of radicals selected from the class consisting of radicals having the following general Formula I or II:



wherein R₂ and R₃ are members of the class consisting of alkyl radicals having from 1 to 12 carbon atoms,

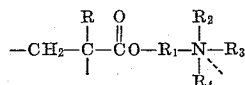
alkenyl radicals having from 3 to 12 carbon atoms, hydroxyalkyl radicals having from 2 to 12 carbon atoms and alkoxyalkyl radicals having from 2 to 12 carbon atoms, or R_2 and R_3 represent a single group which forms a heterocyclic ring having 5 to 6 ring members including the N atom and R_4 is a member of the class consisting of alkyl radicals having from 1 to 18 carbon atoms, alkenyl radicals having from 3 to 18 carbon atoms, hydroxyalkyl radicals having from 2 to 18 carbon atoms, alkoxyalkyl radicals having from 2 to 18 carbon atoms, aralkyl radicals having from 7 to 20 carbon atoms, phenoxyalkyl radicals having from 7 to 20 carbon atoms and epoxyalkyl radicals having from 3 to 18 carbon atoms;



(II)

wherein R_5 and R_6 are members of the class consisting of hydrogen and alkyl radicals having from 1 to 6 carbon atoms, m and n are integers of 1 to 2, and R_4 is as defined above in general Formula I, and anionic parts which have from 2 to 10 anionic functional groups selected from the class consisting of $-\text{COO}$, $-\text{SO}_3$, $-\text{OSO}_3$, $-\text{OPO}_3\text{M}$, $=\text{O}_2\text{PO}_2$, $-\text{OPO}_3$, $-\text{PO}_3$ and $-\text{PO}_3\text{M}$, wherein M is a member of the class consisting of hydrogen, metal atoms, ammonium radical and organic ammonium radicals.

7. An antistatic and antiyellowing agent for textile materials comprising a substantially water-insoluble compound consisting of the high molecular weight polymer part which has at least 20% by weight of the radicals having the following general formula:



(III)

wherein R is a member of the class consisting of hydrogen and alkyl radicals having from 1 to 2 carbon atoms, R_1 is an alkylene radical having from 2 to 4 carbon atoms, R_2 and R_3 are members of the class consisting of alkyl radicals having from 1 to 4 carbon atoms and hydroxyalkyl radicals having from 2 to 4 carbon atoms, and R_4 is a member of the class consisting of alkyl radicals having from 1 to 4 carbon atoms, alkenyl radicals having from 3 to 4 carbon atoms, hydroxyalkyl radicals having from 2 to 4 carbon atoms, alkoxyalkyl radicals having from 2 to 5 carbon atoms, aralkyl radicals having from 7 to 8 carbon atoms and epoxyalkyl radicals having from 3 to 8 carbon atoms, and anionic parts which have from 2 to 10 anionic functional groups selected from the class consisting of $-\text{COO}$, $-\text{SO}_3$, $-\text{OSO}_3$, $-\text{OPO}_3\text{M}$, $=\text{O}_2\text{PO}_2$, $-\text{OPO}_3$, $-\text{PO}_3$ and $-\text{PO}_3\text{M}$, where M is a member of the class consisting of hydrogen, metal atoms, ammonium radical and organic ammonium radicals.

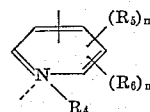
8. An antistatic and antiyellowing agent for textile materials comprising a substantially water-insoluble compound consisting of high molecular weight polymer part which has a number of radicals selected from the class consisting of radicals having the following general Formula I or II:



(I)

wherein R_2 and R_3 are members of the class consisting of alkyl radicals having from 1 to 12 carbon atoms, alkenyl radicals having from 3 to 12 carbon atoms, hydroxyalkyl radicals having from 2 to 12 carbon atoms and alkoxyalkyl radicals having from 2 to 12 carbon atoms, or R_2 and R_3 represent a single group which forms a heterocyclic ring having 5 to 6 ring members includ-

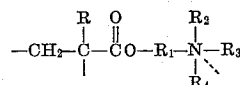
ing the N atom and R_4 is a member of the class consisting of alkyl radicals having from 1 to 18 carbon atoms, alkenyl radicals having from 3 to 18 carbon atoms, hydroxyalkyl radicals having from 2 to 18 carbon atoms, alkoxyalkyl radicals having from 2 to 18 carbon atoms, aralkyl radicals having from 7 to 20 carbon atoms, phenoxyalkyl radicals having from 7 to 20 carbon atoms and epoxyalkyl radicals having from 3 to 18 carbon atoms;



(II)

wherein R_5 and R_6 are members of the class consisting of hydrogen and alkyl radicals having from 1 to 6 carbon atoms, m and n are integers of 1 to 2, and R_4 is as defined above in general Formula I, and anionic parts which are the residues selected from the class consisting of alkyl succinic acid residues of which alkyl has from 9 to 18 carbon atoms, alkenyl succinic acid residues of which alkenyl has from 9 to 18 carbon atoms, alkyl-diphenylether disulfonic acid residues of which alkyl has from 3 to 18 carbon atoms, alkyl naphthalene-disulfonic acid residues of which alkyl has from 3 to 6 carbon atoms, polyalkylnaphthalenedisulfonic acid residues of which alkyls respectively have from 3 to 6 carbon atoms and alkyl sulfosuccinic acid residues of which alkyl has from 8 to 18 carbon atoms.

9. An antistatic and antiyellowing agent for textile materials comprising a substantially water-insoluble compound consisting of high molecular weight polymer part which has at least 20% by weight of the radicals having the following general formula:



(III)

wherein R is a member of the class consisting of hydrogen and alkyl radicals having from 1 to 2 carbon atoms, R_1 is an alkylene radical having from 2 to 4 carbon atoms, R_2 and R_3 are members of the class consisting of alkyl radicals having from 1 to 4 carbon atoms and hydroxyalkyl radicals having from 2 to 4 carbon atoms, and R_4 is a member of the class consisting of alkyl radicals having from 1 to 4 carbon atoms, alkenyl radicals having from 3 to 4 carbon atoms, hydroxyalkyl radicals having from 2 to 4 carbon atoms, alkoxyalkyl radicals having from 2 to 5 carbon atoms, aralkyl radicals having from 7 to 8 carbon atoms and epoxyalkyl radicals having from 3 to 8 carbon atoms, and anionic parts which are residues selected from the class consisting of alkyl succinic acid residues of which alkyl has from 9 to 18 carbon atoms, alkenyl succinic acid residues of which alkenyl has from 9 to 18 carbon atoms, alkyl-diphenylether disulfonic acid residues of which alkyl has from 3 to 18 carbon atoms, alkyl naphthalene-disulfonic acid residues of which alkyl has from 3 to 6 carbon atoms, polyalkylnaphthalenedisulfonic acid residues of which alkyls respectively have from 3 to 6 carbon atoms and alkyl sulfosuccinic acid residues of which alkyl has from 8 to 18 carbon atoms.

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