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POLYESTER AND POLYAMIDE COMPOSITIONS HAVING IMPROVED DYEING PROPERTIES AND PROCESSES FOR THE PRODUCTION OF SUCH COMPOSITIONS

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The invention relates to shaped linear polyester and linear polyamide compositions having improved dyeing properties. In a specific aspect, this invention relates to linear polyester fibers and linear polyamide fibers, having improved dyeing properties, containing a stable fatty acid salt of nickel, cobalt, copper and chromium which melts during the conditions typical of melt spinning of linear polyester fibers and linear polyamide fibers. The invention is also directed to an improved process for producing linear polyester fibers and linear polyamide fibers, such as polyethylene terephthalate and nylon fibers, dyed with a metallized dye. While the invention is directed to shaped linear polyester and linear polyamide compositions, it is particularly directed to the first-named compositions.

Linear polyester fibers, such as those prepared from polyethylene terephthalate, are difficult to dye. Such polyester fibers are ordinarily dyed at pressures above atmospheric with disperse cellulose acetate dyes or with a suitable dye in the presence of a dyeing assistant or swelling agent such as, for example, dichlorobenzene, phenol, m-cresol, benzoic acid, salicylic acid, o-phenylphenol, p-phenylphenol and n-butyl benzoate. The use of superatmospheric pressure procedures requires expensive pressure equipment in addition to a relatively long dyeing operation. The use of dyeing assistants or swelling agents sometimes results in a nonuniform application of the dye to the fibers because of nonuniform swelling of the fibers, and sometimes impairs the light fastness of the dye. Further, most of the dyeing assistants or swelling agents possess one or more objectionable features, such as toxicity and objectionable odor, for example, in addition to their expense.

For purposes of simplicity linear polyesters and linear polyester fibers will be referred to hereinafter as polyesters and polyester fibers, respectively. Similarly, linear polyamides and linear polyamide fibers will be referred to as polyamides and polyamide fibers, respectively.

It is known in the dyeing art that various compounds of metals, such as nickel, cobalt, copper and chromium, react with certain dyes to produce colored metal complexes known as metallized dyes. The incorporation of metallized dyes in polyester fibers or polyamide fibers during the spinning process presents special problems because of the high temperatures involved. Further, strictly anhydrous conditions must be maintained during the spinning process or decomposition of the polyester or polyamide will occur.

Polyester fibers and polyamide fibers are usually prepared by melting and spinning the polyester or polyamide at a temperature of about 240° C. to about 300° C. Under such conditions many of the commonly used metallized dyes decompose to produce dark, colored oxides. In some instances, the metallized dyes at these high temperatures actually lose their ability to function as mordants, and in other instances, the metallized dyes react with the polyester at these high temperatures to degrade the polyester.

Metal compounds cannot be satisfactorily incorporated in polyester fibers by treatment with aqueous solutions thereof because aqueous solutions of the metal compounds

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do not penetrate the polyester fiber sufficiently to give the desired adherent deposit.

The incorporation of an insoluble powder in polyester fibers or polyamide fibers during the spinning operation presents difficulties due to clogging of the spinnerettes and breaking of the filaments when large particles of the insoluble powder pass through the spinnerettes.

It is an object of this invention to provide polyester and polyamide fibers of improved affinity for metallizable dyes. Another object is to provide polyethylene terephthalate fibers of improved affinity for metallizable dyes. A further object is to provide nylon fibers of improved affinity for metallizable dyes. Another object is to provide a simple and economical process for producing dyed polyester and polyamide fibers, said dyeing having been effected with a metallized dye. A further object is to provide polyester and polyamide films having improved affinity for metallizable dyes. Another object is to provide dyed polyester and dyed polyamide materials having good fastness, for example, to light, gas, washing and sublimation.

Objects of this invention are accomplished by adding a suitable stable fatty acid salt of nickel, cobalt, copper or chromium to the polyester or polyamide prior to formation of the fiber or film. A single fatty acid salt of nickel, cobalt, copper or chromium, a mixture of such fatty acid salts or mixed fatty acid salts can be employed. The resulting fiber or film containing a stable fatty acid salt of nickel, cobalt, copper or chromium can be readily dyed with any of the known metallizable dyes that form metal complexes or metallized dyes with nickel, cobalt, copper and chromium.

The fatty acid salts of nickel, cobalt, copper and chromium employed in carrying out this invention melt during the spinning operation. Thus, it is not necessary to attrite or mill the fatty acid salt prior to its addition to the polyester or polyamide. Because the fatty acid salts employed in the practice of the invention are in melted condition as they pass through the spinnerettes clogging of the spinnerettes and breakage of the filaments due to large particles passing through the spinnerettes does not occur.

The temperature at which melt spinning or extrusion takes place depends on the particular polyester or polyamide being used. Ordinarily, temperatures of from about 240° C. to about 300° C. are employed. The fatty acid salts used with polyethylene terephthalate should melt below 255° C. to 260° C. However, when the polyester is poly-1,4-cyclohexylenedimethylene terephthalate, fatty acid salts melting as high as 290° C. are usable because of the higher melting points of the latter polyesters. Where the polyester or polyamide melts at about 240° C. the melting point of the fatty acid salt of nickel, cobalt, copper or chromium should not exceed about 230° C. to 240° C. Thus, in some cases the melting point of the fatty acid salt of nickel, cobalt, copper or chromium mixtures thereof or mixed salts thereof can be as high as about 300° C. whereas in other instances it cannot exceed about 240° C. In accordance with the invention the fatty acid salt must be stable and must be in melted condition and intimately dispersed throughout the polyester or polyamide during the melt spinning or extrusion operation. From the foregoing, it is apparent that the higher the melting point of the polyester or polyamide the higher the melting point of the fatty acid salt employed may be. The melting point of the fatty acid salt, mixtures thereof, or mixed salts thereof should not exceed the melting point of the polyester or polyamide being used.

The nickel, cobalt, copper and chromium salts of fatty acids having 4 to 20 carbon atoms can be used in preparing the polyester and polyamide compositions of the

invention. Preferably, the nickel, cobalt, copper and chromium salts of fatty acids having 6 to 18 carbon atoms are used. Nickelous butyrate, nickelous 2-ethylhexanoate, nickelous 2-ethylhexanoate pelargonate, cobaltous 2-ethylhexanoate, cobaltous 2-ethylhexanoate pelargonate, nickelous pelargonate, cupric pelargonate, nickelous 2-ethylbutyrate, cobaltous stearate, nickelous stearate, cupric stearate, cupric palmitate, cobaltous palmitate, nickelous palmitate, cobaltous oleate, nickelous oleate, cupric oleate, chromium pelargonate, chromium palmitate and chromium oleate, for example, are illustrative of the fatty acid salts of nickel, cobalt, copper and chromium that can be employed. Most of these compounds are known compounds. The preparation of those compounds which may not be described in the prior art is described hereinafter.

The fatty acid salt can be added to the polyester or polyamide at any time prior to their being shaped, for example, into a fiber or film. A convenient way is to add the fatty acid salt in powder form to the polyester or polyamide powder or pellets. Another convenient way is to add the fatty acid salt dissolved in a solvent to the polyester or polyamide powder. Alternatively, the fatty acid salt can be incorporated into the melted polyester or polyamide in a finely-divided state prior to formation, for example, of fiber or film from the melted polyester or polyamide. The fatty acid salt can also be added to the reaction mixture in which the polyester or polyamide is formed. Regardless of the manner of addition of the fatty acid salt to the polyester or polyamide the fatty acid salt should be intimately dispersed therein at the time of the spinning or extrusion operation. The chelating ability of the dispersed salt appears to increase with a decrease in particle size.

When the fatty acid salt is dissolved in a solvent and added to the polyester or polyamide the solvent should be removed prior to the spinning or extrusion operation. This can be conveniently done by a vacuum drying operation.

The amount of fatty acid salt employed should be such that the linear polyester or linear polyamide has a metallic content of 0.1 to 2%. These amounts permit one to obtain light to deep shades upon treatment of the polyester or polyamide composition with metallizable dyes. By means of the invention dyed polyesters or polyamides having good to excellent fastness to light, gas, washing and sublimation, for example, are readily obtained. Normally, the polyester or polyamide, is spun or extruded in the form of a fiber although it may have some other shape such as that of a film.

The fatty acid salts of nickel, cobalt, copper and chromium employed in carrying out the invention are soluble in solvents such as, for example, benzene, toluene, xylene, alcohols such as ethyl alcohol, n-propyl alcohol, n-butyl alcohol and n-amyl alcohol, carbon tetrachloride and chloroform.

The present invention is not restricted to the use of a particular linear polyester or linear polyamide material. The polyesters prepared from ethylene glycol and terephthalic acid (i.e., polyethylene terephthalate) or 1,4-cyclohexanedimethanol and terephthalic acid are illustrative of the polyesters employed. Other polyesters that can be employed are those obtained from 4,4'-sulfonyldibenzoic acid and the straight chain glycols such as 1,5-pentanediol and 1,5-hexanediol. The polyesters from which Kodol polyester fibers and Dacron polyester fibers are prepared and nylon are illustrative of the polyester and polyamide materials used in carrying out the invention.

Other polyesters are well known in the art and can be prepared from various dicarboxylic acids and diols including mixtures of either or both of the acid and diol components. Suitable acid and diol components which can be used to modify the aforementioned well known linear polyesters include isophthalic acid, succinic acid, adipic acid, 1,4-cyclohexanedicarboxylic acid, azelaic acid,

sebacic acid, 1,4-butanediol, neopentyl glycol, tetramethylcyclobutanediol, diethylene glycol, 4,4'-dihydroxydiphenyl-2,2-propane, etc.

Suitable linear polyamides are described in numerous prior art references. Carothers U.S. Patent 2,130,948, for example, discloses suitable polyamides. Bell, Kibler and Smith U.S. application Serial No. 617,931, filed October 24, 1956, now Patent No. 3,012,994, also discloses suitable polyamides. These two references are merely representative of the numerous references disclosing suitable polyamides.

The following examples illustrate the invention.

Example 1

A solution of 186.3 grams of nickelous pelargonate in 75 grams of benzene was mixed with 5,720 grams of a linear polyester (in powder or pellet form) prepared from 4,4'-sulfonyldibenzoic acid and 1,5-pentanediol. This gives a nickel content of 0.5%. The moist mixture was thoroughly mixed by mechanical agitation and then dried in a vacuum oven at 100° C. overnight. The resulting mixture was then melted extruded as a continuous filament. Microscopic examination of the filament disclosed that the nickel pelargonate was well dispersed in the filament in very finely divided state. The filament showed excellent chelation with metallizable dyes, and the dyed filament possessed excellent fastness to light, gas, washing and sublimation.

Example 2

Example 1 was repeated using a solution of 75 grams of nickelous pelargonate in 75 grams of benzene in place of the nickelous pelargonate solution of Example 1. The nickel content of the polyester composition obtained is 0.2%. The polyester was vacuum dried and spun into fibers. The fibers dyed well with metallizable dyes to deep shades.

Example 3

A solution of 125 grams of nickelous pelargonate in 100 cc. of benzene was mixed with 875 grams of a polyester (in finely divided condition) prepared from terephthalic acid and 1,4-cyclohexanedimethanol. The moist powder mixture was thoroughly mixed by mechanical agitation and then dried in a vacuum oven at 100° C. overnight. The resulting mixture was then melt extruded as a continuous wire about 1/4" in diameter and simultaneously chopped into pellets. These pellets had a nickel content of 2.0%. They were pulverized and thoroughly mixed with 9000 grams of untreated polymer (poly-1,4-cyclohexylenedimethylene terephthalate) prepared from terephthalic acid and 1,4-cyclohexanedimethanol to give a polymer with a nickel content of 0.2%. The mixture was melt extruded as continuous textile filaments. Microscopic examination of the fiber indicated a very fine and regular dispersion of the nickelous pelargonate in the fiber. The fiber showed excellent chelation with metallizable dyes and dyed to deep shades unattainable with the untreated polymer.

Example 4

Example 3 was repeated using a solution of 125 grams of cobaltous pelargonate in 100 cc. of benzene instead of a solution of 125 grams of nickelous pelargonate in 100 cc. of benzene. The fibers obtained had a cobalt content of 0.2%. Microscopic examination of the fiber indicated a very fine and regular dispersion of the cobaltous pelargonate in the fiber. The fiber showed excellent chelation with metallizable dyes and dyed to deep shades unattainable with the untreated polymer.

Example 5

A mixture of 5720 grams of poly-1,4-cyclohexylenedimethylene terephthalate and 76.2 grams of cupric pelargonate dissolved in 60 cc. of benzene was processed as described in Example 1. The fibers obtained had a copper content of 0.2%. A good dispersion of the

cupric pelargonate in the fibers was obtained. The fibers dyed well when treated with metallizable dyes.

Example 6

A solution of 104.5 grams of nickelous stearate in 104.5 grams of benzene was thoroughly mixed with 5000 grams of finely pulverized poly-1,4-cyclohexylenedimethylene terephthalate and processed as described in Example 1. The fibers obtained had a nickel content of 0.2%. A good dispersion of the nickelous stearate in the fibers was obtained. The fibers gave excellent dyeings when dyed with metallizable dyes.

Example 7

A solution of 62.1 grams of nickelous oleate in 62.1 grams of toluene was thoroughly mixed with 3000 grams of finely pulverized poly-1,4-cyclohexylenedimethylene terephthalate and processed as described in Example 1. The fibers obtained had a nickel content of 0.2%. A good dispersion of the nickelous oleate in the fibers was obtained. The fibers gave excellent dyeings when dyed with metallizable dyes.

Example 8

A mixture of 125 grams of nickelous 2-ethylhexanoate pelargonate in 125 cc. of ethyl alcohol and 9000 grams of the polyester of 4,4'-sulfonyldibenzoic acid and 1,5-pentanediol modified with 17 mole percent succinic acid was thoroughly agitated, dried in a vacuum oven at 100° C. and melt spun into fibers. The resulting fibers which contain 0.2% nickel were woven into cloth and dyed with metallizable dyes to excellent depth. The dyeings obtained had good fastness, for example, to light, gas, washing and sublimation.

Example 9

A mixture of 125 grams of nickelous 2-ethylhexanoate pelargonate dissolved in 125 cc. of benzene was thoroughly mixed with 3600 grams of granulated polyester prepared from 4,4'-sulfonyldibenzoic acid and 1,5-pentanediol and then dried in a vacuum oven at 100° C. The resulting mixture was then melt extruded as a rod 1/8" in diameter and chopped into pellets. The pellets were melted and melt spun into fibers containing 0.5% nickel. The fibers dyed well with metallizable dyes to deep shades. The dyeings obtained had good fastness, for example, to light, gas, washing and sublimation. The dispersion of the nickelous 2-ethylhexanoate pelargonate obtained by the double extrusion is somewhat better than that obtained by a single extrusion.

Example 10

An intimate mixture of 5000 grams of polyethylene terephthalate and 250 grams of nickelous stearate dissolved in 125 cc. of xylene was dried in a vacuum desiccator at 100° C. and then melt extruded as a continuous filament or fiber. The nickel content of the fiber obtained was 0.5%. The fiber dyed well with metallizable dyes to deep shades. Dyeings having good fastness to light, gas, washing and sublimation were obtained.

Example 11

A solution of 186.3 grams of nickelous pelargonate in 75 grams of benzene was mixed with 5,720 grams of a linear polyester (in powder form) prepared from 4,4'-sulfonyldibenzoic acid and 1,5-pentanediol. This gives a nickel content of 0.5%. The moist powder mixture was thoroughly mixed by mechanical agitation and then dried in a vacuum oven at 100° C. overnight. The resulting mixture was then melt extruded as a wire 1/8" in diameter. The resulting wire was then chopped into pellets and the pellets were melt spun into fibers. The fibers dyed well with metallizable dyes to deep shades. The dyeings obtained had good fastness to light, gas, washing and sublimation. The dispersion obtained by the procedure just described is slightly better than that obtained by simple mixing and spinning.

Example 12

1165 grams of a polyester of 4,4'-sulfonyldibenzoic acid and pentamethylene glycol which has been modified by replacing 17 mole percent of the 4,4'-sulfonyldibenzoic acid with succinic acid (see Caldwell U.S. Patents 2,744,089 and 2,744,088 for methods of preparation) were pulverized and thoroughly mixed with 75 grams of nickelous 2-ethylhexanoate pelargonate dissolved in 50 grams of benzene. This mixture was dried overnight in a vacuum desiccator at 100° C. The nickel content of the mixture was 1%. It was melt spun into fibers which dyed well with metallizable dyes to deep shades. The dyeings obtained had good fastness to light, gas, washing and sublimation.

Example 13

Example 12 was repeated using 15 grams of nickelous 2-ethylhexanoate pelargonate dissolved in 25 grams of benzene. The polyester fibers obtained had a nickel content of 0.2%. The fibers dyed well with metallizable dyes to a satisfactory density. The dyeings obtained had good fastness to light, gas, washing and sublimation.

Example 14

5720 grams of a granulated linear polyamide prepared from the polyamide salt of sebacic acid and 1,4-cyclohexanebismethylamine in accordance with the procedure described in Bell, Kibler and Smith U.S. application Serial No. 617,931, filed October 24, 1956, were thoroughly mixed with a solution of 186.3 grams of nickel pelargonate in 75 grams of benzene. A polymer with a nickel content of 0.5% was thus obtained. The well mixed moist powder was dried overnight in a vacuum oven at 100° C. The dried polymer was melted and extruded as a continuous filament. Microscopic examination of the filament disclosed an excellent dispersion of the nickel pelargonate therein. Upon dyeing the filament with metallizable dyes, metallized dyeings having good fastness to light, gas, washing and sublimation were obtained.

Example 15

1000 grams of polyhexamethylenedipamide (nylon 66) and 19 grams of nickel pelargonate dissolved in 25 cc. of ethyl alcohol were intimately admixed and then dried overnight in a vacuum desiccator at 100° C. The dried mixture was melt extruded to give a fiber containing 0.3% nickel which dyed well with metallizable dyes. Dyeings having good fastness to light, gas, washing and sublimation were obtained.

Example 16

A solution of 125 grams of nickelous 2-ethylhexanoate pelargonate in 125 cc. of ethyl alcohol was thoroughly mixed with 9000 grams of pulverized polyamide prepared from pimelic acid and trans-1,4-cyclohexanebismethylamine in accordance with the procedure described in Bell, Kibler and Smith U.S. application Serial No. 617,931, filed October 24, 1956. The moist powder was air dried and then dried in a vacuum at 100° C. The dry polymer mixture was then melt spun into fibers which had a nickel content of 0.2%. The fibers dyed well with metallizable dyes. Metallized dyeings having good fastness to light, gas, washing and sublimation were obtained.

Example 17

A solution of 122 grams of chromium pelargonate in 200 cc. of benzene was thoroughly mixed mechanically with 9000 grams of granulated poly-1,4-cyclohexylenedimethylene terephthalate and then dried in a vacuum desiccator. The dry polymer was then melt spun into fibers which had a chromium content of 0.2%. The fibers thus obtained dyed to deep shades with metallizable dyes. The metallized dyeings had good fastness, for example, to light, gas, washing and sublimation.

Chromium pelargonate can be prepared by the action of pelargonic acid on chromous carbonate in accordance with the general procedure set forth in Example 18 hereinafter.

The polyester used in Examples 1 and 11 was prepared according to the procedure described in Example 11 of U.S. Patent 2,744,089. The polyester used in Example 3 was prepared from dimethyl terephthalate and 1,4-cyclohexanedimethanol according to the procedure described in Example 1 of U.S. Patent 2,901,466. This polyester can also be prepared by the procedure set forth in Example 2 of U.S. Patent 2,901,466. The polyester of Example 12, polyethylene terephthalate, was prepared as described in U.S. Patent 2,465,319 but using potassium titanium alkoxide disclosed in Example 5 of Caldwell U.S. Patent 2,720,502 as a catalyst.

The fatty acid salts of nickel, cobalt, copper and chromium used in carrying out the invention are prepared by reacting the carbonate compounds of these metals with a fatty acid having 4 to 20 carbon atoms. As previously noted, many of these fatty acid metal salts are known compounds. Those not specifically described can be prepared in accordance with the procedures described in J. Am. Chem. Soc., vol. 36, page 956 (1914), J. Chem. Soc. (1912), pages 174 to 191, and J. Phys. Chem., volume 6, page 1 (1902). The preparation of a number of these fatty acid metal salts is described hereinafter.

Example 18

A mixture of 316 grams of pelargonic acid, 119 grams of nickelous carbonate and 100 cc. of ethyl alcohol was heated, with stirring, at 95° C. for about 6 hours. When the evolution of carbon dioxide ceased, the ethyl alcohol was distilled off and 200 grams of benzene were added to the residual oil. The nickelous pelargonate thus prepared had a melting range of about 200° C. to 260° C. The concentrated solution was used directly by mixing with the polyester or polyamide resin before spinning. Nickelous pelargonate is soluble, for example, in ethyl alcohol, n-amyl alcohol and other like alcohols, benzene, toluene, chloroform and carbon tetrachloride. It is slightly soluble in n-hexane.

The following fatty acid metal salts were prepared in accordance with the procedure described in Example 18 using the appropriate fatty acid and appropriate metal carbonate. They were used as a benzene or toluene solution.

- (1) Nickelous 2-ethylhexanoate
- (2) Nickelous 2-ethylhexanoate pelargonate
- (3) Cobaltous pelargonate
- (4) Cupric pelargonate
- (5) Nickelous stearate
- (6) Nickelous oleate
- (7) Nickelous 2-ethylbutyrate

Example 19.—Nickelous 2-ethylhexanoate

A mixture of 288 grams of 2-ethylhexanoic acid, 119 grams of nickelous carbonate and 150 cc. of ethyl alcohol was refluxed on a steam bath with stirring for 15 hours. The ethyl alcohol was removed by distillation and the thick syrup remaining was dissolved in 150 cc. of benzene. This benzene solution was used without further purification.

Example 20.—Nickelous 2-ethylhexanoate pelargonate

This compound was prepared in accordance with the procedure of Example 19 by reaction between 119 grams of nickelous carbonate, 144 grams of 2-ethylhexanoic acid and 158 grams of pelargonic acid.

Example 21.—Cobaltous 2-ethylhexanoate

This compound was prepared in accordance with the procedure of Example 19 by reaction between 119 grams of cobaltous carbonate and 316 grams of pelargonic acid.

Example 22.—Cupric pelargonate

This compound was prepared in accordance with the procedure of Example 19 by reaction between 221 grams of basic cupric carbonate $[\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2]$ and 632 grams of pelargonic acid in 400 cc. of ethyl alcohol.

Example 23.—Nickelous 2-ethylbutyrate

This compound was prepared in accordance with the procedure of Example 19 by reaction between 119 grams of nickelous carbonate and 232 grams of 2-ethylbutyric acid in 200 cc. of ethyl alcohol.

The polyester and polyamide compositions of this invention can be colored with the water-insoluble or substantially water-insoluble metallizable dyes which chelate or mordant with nickel, cobalt, copper and chromium salts. Many suitable metallizable dyes are known. Among the dyes that can be used are those described, for example, in U.S. Patents 2,641,602; 2,651,641; 2,843,580; 2,857,372; 2,865,909; 2,868,774; 2,868,775; 2,871,231; 2,875,190; 2,887,477; 2,895,967; 2,908,677 and 2,916,482.

The water-insoluble metallizable azo dye compounds can be applied to the polyester and polyamide compositions of the invention by methods well known to those skilled in the art to which this invention is directed. One satisfactory way is to apply them in the form of an aqueous suspension which can be prepared by grinding the dye to a paste in the presence of a sulfonated oil, soap, sodium lignin sulfonate, or other suitable dispersing agent and dispersing the resulting paste in water. Dyeing is ordinarily carried out at the boil or at a temperature approaching the boil. In the case of the polyester compositions a dyeing assistant is ordinarily employed. A typical dyeing procedure is set forth hereinafter.

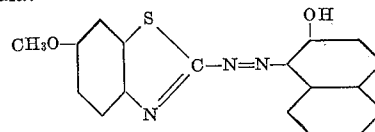
Example 24

0.1 gram of a dye composition (in finely divided condition) containing 1 part (by weight) of dye to 2 parts of sodium lignin sulfonate is added to 300 cc. of water. Then 5 cc. of a 2% Igepon T solution are added and 10 grams of fabric are entered. The dye bath is brought to the boil and held at the boil for 1 hour while stirring. The dyed fabric is removed, and soaped at 70° C. with a 0.5% aqueous soap solution for 20 minutes, then washed well with water and dried. If the depth of dyeing is not satisfactory, a dyeing assistant can be employed.

It is to be clearly understood that the dyeing procedure set forth in Example 24 is merely illustrative and not limitative. Thus, for example, larger or smaller amounts of dye can be employed.

Example 25

Polyester fibers obtained in accordance with Example 1 were woven into a fabric and dyed by the general procedure described in Example 24 using the dye having the formula:



and prepared by coupling diazotized 2-aminobenzothiazole with β -naphthol. The fabric was dyed a bright blue shade, having good fastness to light, gas, washing and sublimation. The above dye also has excellent affinity for cellulose acetate and dyes it orange shades (non-metallized).

Example 26

Polyester fibers obtained in accordance with Example 3 were woven into a fabric and dyed by the general procedure described in Example 24 using the dye compound of Example 7 of U.S. Patent 2,857,372. A red dyeing having good fastness to light, gas, washing and sublimation was obtained.

Example 27

Polyester fibers obtained in accordance with Example 9 were woven into a fabric and dyed by the general procedure described in Example 24 using the dye compound of Example 1 of U.S. Patent 2,832,761. A yellow dyeing having good fastness to light, gas, washing and sublimation was obtained. The metallized (chelated) dyeings obtained with this dye have greatly improved light stability over the corresponding nonchelated dyeing on polyester fabrics.

Although the invention has been described in considerable detail with reference to certain preferred embodiments thereof, variations and modifications can be effected within the spirit and scope of the invention as described hereinabove and as defined in the appended claims.

We claim:

1. A normally solid polymeric composition capable of being shaped into fibers having improved dyeing properties comprising a linear condensation polymer selected from the group consisting of linear polyesters and linear polyamides having uniformly dispersed therein from 0.1 to 2% by weight, calculated as metal, of a fatty acid salt of a metal selected from the group consisting of nickel, cobalt, and chromium; said fatty acid salt containing 4 to 20 carbon atoms and having a melting point no higher than the temperature at which the polymeric composition is spun into a fiber.

2. A normally solid polymeric composition capable of being shaped into fibers having improved dyeing properties comprising a linear polyester having uniformly dispersed therein from 0.1 to 2% by weight, calculated as metal, of a fatty acid salt of a metal selected from the group consisting of nickel, cobalt, and chromium; said fatty acid salt containing 4 to 20 carbon atoms and having a melting point no higher than the temperature at which the polymeric composition is spun into a fiber.

3. A composition according to claim 2 wherein the fatty acid metal salt has 6 to 18 carbon atoms.

4. A composition according to claim 3 wherein the polyester is a polyethylene terephthalate.

5. A composition according to claim 3 wherein the polyester is a poly-1,4-cyclohexylenedimethylene terephthalate.

6. A composition according to claim 3 wherein the polyester is prepared by condensation polymerization of 4,4'-sulfonyldibenzoic acid and 1,5-pentanediol.

7. A composition according to claim 1 wherein the fatty acid metal salt present is a pelargonate.

8. A composition according to claim 1 wherein the fatty acid metal salt present is nickelous 2-ethylhexanoate pelargonate.

9. A normally solid polymeric composition capable of being shaped into fibers having improved dyeing properties comprising a linear polyamide having uniformly dispersed therein from 0.1 to 2% by weight, calculated as metal, of a fatty acid salt of a metal selected from the group consisting of nickel, cobalt, and chromium; said fatty acid salt containing 4 to 20 carbon atoms and

having a melting point no higher than the temperature at which the polymeric composition is spun into a fiber.

10. A composition according to claim 9 wherein the fatty acid metal salt has 6 to 18 carbon atoms.

11. A process for producing a dye-receptive fiber melting above 200° C. comprising preparing a fiber-forming composition by intimately and uniformly dispersing from 0.1 to 2% by weight, calculated as metal, of a fatty acid salt of a metal selected from the group consisting of nickel, cobalt, and chromium in a fiber-forming linear condensation polymer selected from the group consisting of linear polyesters and linear polyamides, said fatty acid metal salt containing 4 to 20 carbon atoms and having a melting point no higher than the temperature at which the fiber-forming composition is spun into a fiber, and melt spinning said fiber-forming composition to obtain said dye-receptive fiber.

12. A process according to claim 11 wherein the fiber-forming material is a linear polyester.

13. A process according to claim 11 wherein the fiber-forming material is a linear polyamide.

14. A process according to claim 11 wherein the fiber-forming material is a polyethylene terephthalate.

15. A process according to claim 11 wherein the fiber-forming material is a poly-1,4-cyclohexylenedimethylene terephthalate.

16. A process according to claim 11 wherein the fiber-forming material is prepared by condensation polymerization of 4,4'-sulfonyldibenzoic acid and 1,5-pentanediol.

17. A process according to claim 11 wherein the fatty acid metal salt has 6 to 18 carbon atoms.

18. A process according to claim 11 wherein the fatty acid metal salt is a pelargonate.

19. A process according to claim 11 wherein the fatty acid metal salt is nickelous 2-ethylhexanoate pelargonate.

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