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3,594,447

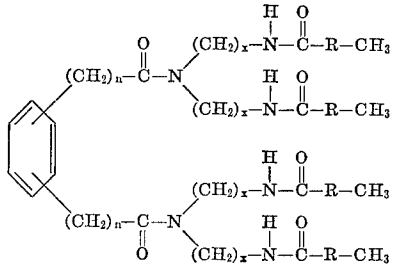
POLYAMIDES AND POLYESTERS CONTAINING ISOPHTHALATE AMIDES OF DIALKANOYL POLYALKYLENE POLYAMINES AS ANTISOILING AGENTS

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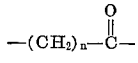
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Int. Cl. C08g 41/04
U.S. Cl. 260—857 13 Claims

ABSTRACT OF THE DISCLOSURE

A filament, having improved resistance to soiling, of a synthetic polymer having mixed therethrough about 0.02 to 5 weight percent, based on the weight of the synthetic polymer, of an amide having the general formula:



wherein the hexagon represents the benzene nucleus, R is a divalent radical containing up to about 30, preferably about 3 to 18, carbon atoms which can be linear or branched aliphatic, n is an integer from 0 to about 6 but preferably is 0, x is an integer from 1 to about 6 but preferably is about 2 to 3, and the



radicals connected to the benzene nucleus are relatively disposed in the ortho, meta, or para positions but preferably in the meta position.

BACKGROUND OF THE INVENTION

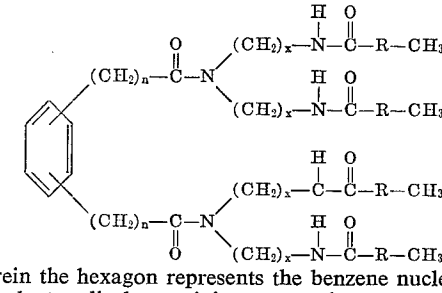
This invention relates to a filament of a synthetic polymer having improved resistance to soiling.

The soiling of synthetic fibers has always been a problem to the textile industry and various different chemical compounds have been used in the prior art to alleviate this problem. It has now been discovered that a novel amide has great utility in increasing the soil resistance of a synthetic fiber and is advantageous over prior art soil resistance compounds in that a smaller quantity of the soil resistance additive is needed. In addition, the amide does not interfere with fabric dyeing or dye lightfastness and the amide does not change the luster of the synthetic fiber. It has also been discovered that the amide acts in synergism with a poly(alkylene ether) to further improve the soil resistance of the filament of the synthetic polymer thereby reducing the amount of amide and poly(alkylene ether) required to attain a given degree of soil resistance.

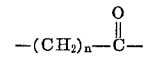
SUMMARY OF THE INVENTION

In accordance with the present invention, it is provided a filament, having improved resistance to soiling, of a synthetic polymer having mixed therethrough about 0.02 to 5, preferably about 0.1 to 2, weight percent, based on

the weight of the synthetic polymer, of an amide having the general formula:



wherein the hexagon represents the benzene nucleus, R is a divalent radical containing up to about 30, preferably about 3 to 18, carbon atoms which can be linear or branched aliphatic, n is an integer from 0 to about 6 but preferably is 0, x is an integer from 1 to about 6 but preferably is about 2 to 3, and the



radicals connected to the benzene nucleus are relatively disposed in the ortho, meta, or para positions but preferably in the meta position.

In another embodiment of the present invention, it is provided a filament, having improved resistance to soiling, of a synthetic polymer having mixed therethrough about 0.02 to 5, preferably about 0.1 to 2, weight percent, based on the weight of the synthetic polymer, of the amide having the general formula as described above and about 0.1 to 5, preferably about 0.3 to 3 weight percent, based on the weight of the synthetic polymer, of a poly(alkylene ether). The poly(alkylene ether) can have a molecular weight from about 600 to 3,000,000, preferably about 1,000 to 100,000. In this embodiment of the present invention the amide and the poly(alkylene ether) act in synergism to improve the soil resistance of the filament of the synthetic polymer thereby reducing the amount of amide and poly(alkylene ether) required to attain a given degree of soil resistance.

The filament-forming synthetic polymer can be a polyolefin, polysulfone, polyphenyl oxide, polycarbonate, polyacrylonitrile, polyamide, polyester and the like or polymer blends thereof. In a preferred embodiment of the present invention, the filament-forming synthetic polymer is a polyamide or a polyester. The filament of the present invention can be prepared from these polymers by known melt spinning techniques. An example of a suitable polymer blend as disclosed above is a dispersion of polyester in polyamide such as disclosed in U.S. Pat. 3,369,057 to Twilley. As disclosed in Twilley, supra, the proportion of end groups of the polyamide, especially amine groups, which are reactive in the melt with the polyester should be restricted to not over 40 percent of the polyamide and groups. In addition, other dispersions of polyester in polyamide are satisfactory for purposes of this invention, including those disclosed in U.S. Pats. 3,378,055; 3,378,056; and 3,378,602; British Pat. 1,097,068; Belgian Pat. 702,-813; and Netherlands Pat. 66,06838 and 66,12628, and the filament of the present invention can also be prepared from these dispersions by known melt spinning techniques.

Suitable polyamides for use in the present invention include, for example, those prepared by condensation of hexamethylene diamine and adipic acid, known as nylon 6,6 or by polymerization of epsilon-caprolactam known as nylon 6.

The polyesters useful in the practice of this invention can be prepared in general by condensation reactions between dicarboxylic acids or their derivatives and compounds containing two hydroxyl groups, or materials possessing both an alcohol group and a carboxylic acid

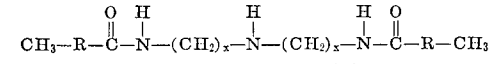
group or derivative thereof; or by polymerization of lactones. Dicarboxylic acid derivatives which can be employed include esters, salts, anhydrides and acid halides. The monomeric species employed in the preparation of the polyesters are preferably not more highly functional than difunctional in their reactivity so as to produce essentially linear, non-crosslinked polymer structures.

Suitable polyesters for use in the present invention include those polymers in which one of the recurring units in the polyester chain is the diacylaromatic radical from terephthalic acid, isophthalic acid, 5-t-butylisophthalic acid, a naphthalene dicarboxylic acid such as naphthalene 2,6 and 2,7 dicarboxylic acids, a diphenyl-dicarboxylic acid, a diphenyl ether dicarboxylic acid, a diphenyl alkylene dicarboxylic acid, a diphenyl sulphone dicarboxylic acid, an azo dibenzoic acid, a pyridine dicarboxylic acid, a quinoline dicarboxylic acid, and analogous aromatic species including the sulfonic acid analogues, diacyl radicals containing cyclopentane or cyclohexane rings between the acyl groups; and such radicals substituted in the ring, e.g., by alkyl or halo substituents.

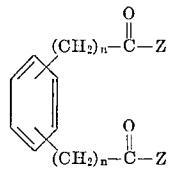
The dioxy radical representing the other principal recurring unit in the polyester chain can be an open chain aliphatic such as ethylene glycol or ether thereof, for example, the diether, or can contain rings such as those which form part of the above noted diacyl radicals. The carboxy and/or the oxy chain members can be directly attached to a ring or removed by one or more carbons therefrom, as in the 1,4 dioxymethyl cyclohexane radical.

The preferred polyester is polyethylene terephthalate.

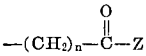
The amide as described above is prepared by reacting a diacyl derivative of a triaza alkane having the general formula:



wherein R is a divalent radical containing up to about 30, preferably about 3 to 18, carbon atoms which can be linear or branched aliphatic and x is an integer from 1 to about 6 but preferably is about 2 to 3 with a compound having the general formula:

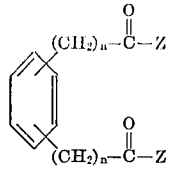


wherein the hexagon represents the benzene nucleus, n is an integer from 0 to about 6 but preferably is O, Z is hydroxyl or OR'' wherein R'' is lower alkyl or a halogen which can be chlorine, bromine, or iodine but preferably is chlorine, and the



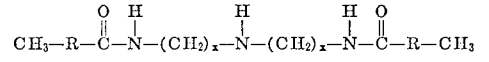
radicals are relatively disposed in the ortho, metal, or para positions but preferably in the meta position.

The amide can be prepared by adding the diacyl derivative of a triaza alkane as described above to an aqueous solution of an alkali metal hydroxide, such as sodium or potassium hydroxide, and stirring the resulting mixture with vigorous agitation means such as a Waring Blendor, while gradually adding the compound having the general formula:

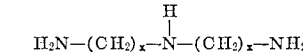


wherein n and Z are defined above. The above compound can be dissolved in a suitable inert solvent such as chloroform or methylene chloride if desired. After the addition of the above compound is completed, the reaction mass is usually stirred for about 0.5 to 24 additional hours. Room temperature is generally sufficient for the reaction to proceed, however, higher temperatures may be employed when desired or necessary. The reaction can suitably be conducted at atmospheric pressure. Liquid is separated from the crude reaction product and is discarded. It is then desirable to wash the crude reaction product with water. The crude reaction product can then be purified by repeatedly dissolving it in and repeatedly crystallizing it from a suitable inert solvent such as acetonitrile until a product having a constant melting point is obtained.

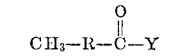
The diacyl derivative of a triaza alkane having the general formula:



wherein R and x are defined above can be prepared by charging into a flask, equipped with a stirrer and distillation condenser, a triaza alkane having the general formula:

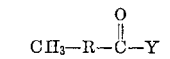


wherein x is an integer from 1 to about 6 but preferably about 2 to 3 and a compound having the general formula:



wherein R is a divalent radical containing up to about 30, preferably about 3 to 18, carbon atoms which can be linear or branched aliphatic, and Y is hydroxyl or —OR' wherein R' is lower alkyl, preferably lower alkyl containing about 1 to 4 carbon atoms, acyl containing up to about 31, preferably about 4 to 19, carbon atoms, or a halogen which can be chlorine, bromine, or iodine but preferably chlorine. Generally speaking, the reaction temperature can range from about room temperature to about 300, preferably about 50 to 180° C. depending upon the reactants used. The reaction can suitably be conducted at atmospheric pressure, however, a vacuum is often useful and desirable in the last stage of the reaction to remove any undesirable volatile materials. The reaction can, in many cases, be conducted without a catalyst, however, in some cases a catalyst may be either necessary or desirable and the preferred catalysts are those of strong acids such as p-toluene-sulfonic acid, benzene sulfonic acid, sulfuric acid, phosphoric acid and the like. The amount of catalyst when used is a catalytic amount, say about 0.01 to 1 wt. percent, based on the weight of the triaza alkane. When a volatile by-product is evolved from the reaction mass, such as an alcohol or water, it can be condensed in the distillation column and removed from the reaction mass. Similarly, when a hydrohalic acid is evolved from the reaction mass, it can be cooled in the distillation column, removed from the reaction mass and subsequently collected in a neutralizing medium or water.

Suitable triaza alkane reactants for producing the diacyl derivative of a triaza alkane include 1,4,7 triazaheptane; 1,5,8 triazaoctane; 1,5,9 triazanone; 1,8,15 triazapentadecane; and 1,4,11 triazaundecane. Suitable reactants having the general formula:

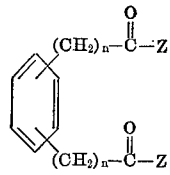


wherein R and Y are defined above which will react with the typical triaza alkanes as illustrated above to produce the diacyl derivative of the triaza alkane include iso-propyl octacosanoate, methyl octanoate, methyl 2-methylpentanoate, ethyl stearate, butyric anhydride, lauric acid, and palmitoyl chloride.

Typical diacyl derivatives of a triaza alkane include 1,9 dilauroyl 1,5,9 triazanonane; 1,7 di(n-octanoyl)1,4,7

triazaheptane; 1,13 dipentanoyl 1,7,13 triazatridecane; and 1,7 distearoyl 1,4,7 triazaheptane.

Suitable reactants having the general formula:



wherein *n* and Z are defined above which will react with the typical diacyl derivatives of a triaza alkane as illustrated above to produce the amide include dimethyl isophthalate; 1,3 dicarboxymethyl benzene; isophthaloyl chloride; terephthaloyl chloride; ortho phthaloyl chloride; and 3 carboxyethyl benzoic acid.

Typical amides include the isophthalamide of 1,7 dioctanoyl 1,4,7 triazaheptane; the terephthalamide of 1,9 dilauroyl 1,5,9 triazanonane; and the isophthalamide of 1,7 distearoyl 1,4,7 triazaheptane.

The poly(alkylene ethers) which can be incorporated along wih the amide in the synthetic polymers are either ethylene oxide, propylene oxide or ethylene oxide-propylene oxide condensation products including ethylene oxide-propylene oxide copolymers, that is, the products contain from two to three carbon atoms in the alkylene group with two of the carbon atoms being intralinear carbon atoms connecting intralinear ether-oxygen atoms. Preferably, the poly(alkylene ether) is an ethylene oxide polymer. The poly(alkylene ether) can be a glycol ether, and thus terminated or capped by hydroxyl groups, or it can be an oxyalkylated ether of a monohydric or polyhydric alcohol. Suitable alcohols are methanol, ethanol, i-octanol, decanol, laurol, tridecanol, glycerol, pentaerythritol, sorbitol, mannitol, their partial esters and the like. Other suitable terminating or capping agents are primary and secondary amines, mercaptans, and amides. Alternatively, the poly(alkylene ether) can be an oxyalkylated condensation product of a phenol. The preferred poly(alkylene ethers) are those which are substantially linear, and are terminated by hydroxy groups, or by one or two ether end groups of the formula —OR, wherein R is an alkyl, aryl or aralkyl, such as methyl, ethyl, i-octyl, decyl, lauryl, tridecyl, nonylphenyl, dodecylphenyl, phenyl, naphthyl and the like. They are preferably water soluble or readily water dispersible. Residues of coupling compounds or chain-initiating agents, such as bis-phenol, can be present. The poly(alkylene ether) can, as just mentioned, be a propylene oxide polymer or an ethylene oxide-propylene oxide copolymer. Indeed, when the specified number of ethylene oxide units are present, copolymer constituents in addition to those mentioned can be included in the polymer chain. Other elements or radicals may be introduced into the R groups proved they are not reactive with the hydrophobic polymer. The necessity for the absence of groups which are reactive with the synthetic polymer will be readily apparent since durability, molecular weight and other physical properties of the hydrophobic polymer are adversely affected by copolymerization with poly(alkylene ether).

The polyether compound employed should preferably be of high purity. In addition, it should be free from color forming compounds, particularly those of an aldehyde nature. This is especially important where the polyether compound is to be subjected to the high temperatures involved in melt spinning.

The poly(alkylene ethers) can have a molecular weight of about 600 to 3,000,000, preferably about 1,000 to 100,000. The preferred poly(alkylene ethers) are the polyethylene glycols having a molecular weight of about 1,000 to 30,000.

The amide or the amide and the poly(alkylene ether) can be mixed in the synthetic polymer during the polymerization or can be dry blended with the synthetic polymer

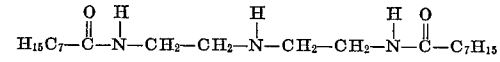
granules prior to the melting to the meeting of the polymer by conventional addition and dry mixing procedures. The amide or the amide and the poly(alkylene ether) can also be mixed in the molten polymer by, for example, injection into the mixing portion of the extruder prior to the melt extrusion of the filament.

PREFERRED EMBODIMENTS

The following examples illustrates the practice and principles of this invention and a mode of carrying out the invention.

EXAMPLE I

1,7 di(n-octanoyl) 1,4,7 triazaheptane as represented by the formula:

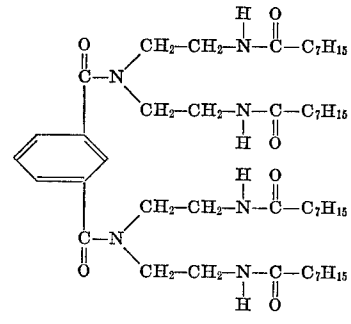


was prepared by charging 276 grams of methyl octanoate, 90 grams of 1,4,7 triazaheptane (diethylenetriamine) and 0.1 grams of p-toluenesulfonic acid into a flask equipped with a stirrer and distillation condenser. The temperature was raised gradually to 170° C. and methanol was evolved during the raising of temperature. When the evolution of methanol subsided, the reaction mass was allowed to cool to room temperature. The reaction product, crude 1,7 di(n-octanoyl) 1,4,7-triazaheptane, was repeatedly dissolved in and repeatedly crystallized from benzene until a constant melting point of 103° C. was obtained. The purified compound was analyzed and was found to contain the following:

Analysis	Percent Carbon	Hydrogen	Nitrogen
Actual	67.8	11.6	11.6
Theoretical, calculated as $C_{20}H_{41}N_3O_2$	67.56	11.62	11.82

EXAMPLE II

The isopthalamide of 1,7 di(n-octanoyl) 1,4,7 triazaheptane as represented by the formula:



was prepared by placing 100 grams of 1,7 di(n-octanoyl) 1,4,7-triazaheptane as prepared in Example I and a solution of 18.2 grams of potassium hydroxide in 350 ml. of water into a Waring Blender. The blender was started and 31.4 grams of isophthaloyl chloride were gradually added. After the addition of the isophthaloyl chloride was completed, the reaction mass was stirred for three additional hours. Liquid was separated from the crude reaction product and discarded. The crude reaction product was repeatedly washed in the blender with water. A white, solid material was obtained which was repeatedly dissolved in and repeatedly crystallized from acetonitrile until a constant melting point of 80° C. was obtained. The purified compound was analyzed and was found to contain the following.

Analysis	Percent Carbon	Hydrogen	Nitrogen
Actual	68.3	10.6	10.1
Theoretical, calculated as $C_{48}H_{84}N_6O_6$	68.53	10.07	9.99

EXAMPLE III

Synthetic multifilament yarn was produced in the following manner. 0.5 weight percent of the isophthalamide of 1,7 di(n-octanoyl)1,4,7-triazaheptane prepared in Example II was added to nylon 6 (polycaproamide) pellets or granules and the mixture was blended in a double cone blender for one hour. The granular blend was then melted at 260° C. and melt extruded under a pressure of 3,000 p.s.i.g. through a 14-orifice spinnerette, each of the orifices having a diameter of $^{28}/_{1000}$ inch to produce a 840 denier yarn. The yarn was collected at about 800 feet per minute and was drawn about 4 times in its extruded length to produce a 210 denier yarn. The yarn had a relative viscosity of 55, as determined at a concentration of 11 grams of polymer in 100 ml. of 90 percent formic acid at 25° C. (ASTM D-789-62T), and a tenacity of 3.8 grams per denier. The yarn was texturized and a carpet sample was prepared. The carpet sample was then mock-dyed and tested for soiling at ambient temperature and 15–20 percent relative humidity. The apparent soiling, $\Delta(K/S)$, of the carpet sample was calculated according to the Kubelka-Munk equation:

$$\frac{K}{S}=\frac{(1-R)^2}{2R}$$

wherein:

K=light absorption coefficient
S=light scattering coefficient
R=reflectance

and was found to be 1.27 as compared to a $\Delta(K/S)$ value of 1.49 for a carpet of nylon 6 yarn produced under the same conditions but containing none of the isophthalamide of 1,7 di(n-octanoyl)1,4,7-triazaheptane prepared in Example II. The Accelerated Soiling Test as stated above measures the variation in reflectance before and after soiling. In the Accelerated Soiling Test, carpet samples are mounted on the periphery of a drum, tumbled with felt cubes loaded with artificial soil for 30 minutes, removed from the drum, and measured for reflectance on a Hunter Color Difference Meter.

EXAMPLE IV

Synthetic multifilament yarn was produced in the same manner as in Example III except that 1.0 weight percent of the isophthalamide of 1,7 di(n-octanoyl)1,4,7-triazaheptane prepared in Example II was blended with the nylon 6 (polycaproamide) pellets or granules. The resulting 210 denier yarn was processed into a mock-dyed carpet sample in the same manner as in Example III. The apparent soiling $\Delta(K/S)$ was calculated and was found to be 1.29 as compared to a $\Delta(K/S)$ value of 1.49 for a carpet of nylon 6 yarn produced under the same conditions but containing none of the isophthalamide of 1,7 di(n-octanoyl) 1,4,7 triazaheptane prepared in Example II. The data contained in Examples III and IV clearly indicate that the incorporation of the isophthalamide of 1,7 di(n-octanoyl) 1,4,7 triazaheptane as prepared in Example II in nylon 6 (polycaproamide) significantly improves the soil resistance of carpets in nylon 6.

EXAMPLE V

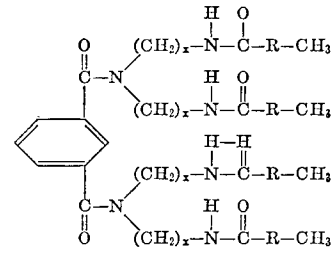
Synthetic multifilament yarn was produced in the same manner as in Example III except that 3.0 weight percent of a polyethylene glycol having a molecular weight of about 15,000 and a softening point of about 50 to 55° C. (marketed by Union Carbide Corporation under the tradename of Carbowax 20M or Polyethylene Glycol Compound 20M) was blended with the nylon 6 (polycaproamide) pellets or granules in place of the isophthalamide of 1,7 di(n-octanoyl) 1,4,7-triazaheptane blended with the nylon 6 pellets in Example III. The resulting 210 denier yarn was processed into a mock-dyed carpet sample in the same manner as in Example III. The apparent soiling, $\Delta(K/S)$, was calculated and was found to be 1.02 as compared to a $\Delta(K/S)$ value of 1.49 for a carpet of nylon 6 yarn produced under the same conditions but containing none of the polyethylene glycol.

EXAMPLE VI

Synthetic multifilament yarn was produced in the same manner as in Example III except that 0.9 weight percent of a polyethylene glycol having a molecular weight of about 15,000 and a softening point of about 50 to 55° C. (marketed by Union Carbide Corporation under the tradename of Carbowax 20M or Polyethylene Glycol Compound 20M) was blended with the nylon 6 (polycaproamide) pellets or granules along with 0.5 weight percent of the isophthalamide of 1,7 di(n-octanoyl)1,4,7-triazaheptane prepared in Example II. The resulting 210 denier yarn was processed into a mock-dyed carpet sample in the same manner as in Example III. The apparent soiling, $\Delta(K/S)$, was calculated and was found to be 0.98 as compared to apparent soiling, $\Delta(K/S)$, values of 1.29, 1.27, and 1.49 for carpets of nylon 6 produced under the same conditions but containing only amounts of 1.0, 0.5, or no weight percent, respectively, of the isophthalamide of 1,7 di(n-octanoyl) 1,4,7 triazaheptane as prepared in Example II. Furthermore, the data contained in this example indicate that there is a synergistic effect created with the use of the polyethylene glycol along with the isophthalamide of 1,7 di(n-octanoyl)1,4,7 triazaheptane which further improves the soil resistance of carpets of nylon 6 when this data is compared to the data contained in Example V. 0.9 weight percent of the polyethylene glycol and 0.5 weight percent of the isophthalamide of 1,7 di(n-octanoyl) 1,4,7 triazaheptane used together produced an apparent soiling, $\Delta(K/S)$, value of 0.98 in this example whereas 3.0 weight percent of the polyethylene glycol used alone in Example V only produced an apparent soiling, $\Delta(K/S)$, value of 1.02.

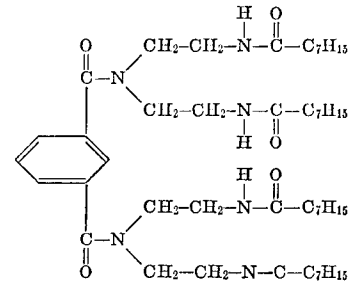
It is claimed:

1. A filament, having improved resistance to soiling, of a synthetic polymer selected from the group consisting of polyamide and polyester having mixed therethrough about 0.02 to 5.0 percent, based on the weight of the synthetic polymer, of an amide having the general formula:



wherein R is a divalent radical containing about 3 to 18 carbon atoms selected from the group consisting of linear and branched aliphatic, and x is an integer from about 2 to 3.

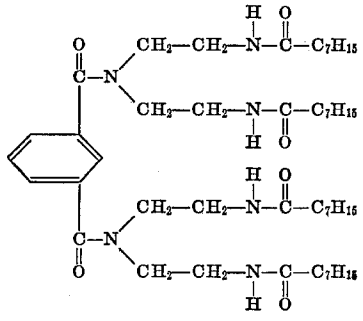
2. The filament of claim **1**, wherein the synthetic polymer is a polyamide and wherein the amide mixed therethrough is the isophthalic amide of 1,7 di-(n-octanoyl) 1,4,7 triazaheptane as represented by the formula:



and is present in said polymer in an amount from about 0.1 to 2.0 percent by weight.

3. The filament of claim 1 wherein the synethetic polymer is polyethylene terephthalate.

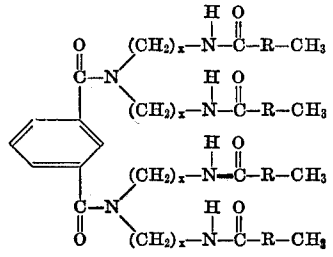
4. The filament, having improved resistance to soiling, of polycaproamide having mixed therethrough about 0.02 to 5.0 percent by weight, based on the weight of the polycaproamide, of the isophthalate amide of 1,7 di(n-octanoyl) 1,4,7 triazaheptane as represented by the formula:



and is present in said polymer in an amount from about 0.1 to 2.0 percent by weight.

5. The filament of claim 1, wherein the synthetic polymer is a polymer blend of polyethylene terephthalate dispersed in polycaproamide.

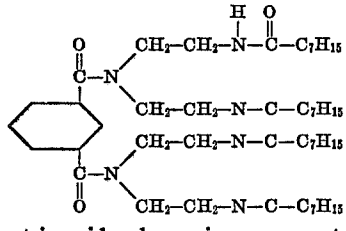
6. A filament, having improved resistance to soiling, of a synthetic polymer selected from the group consisting of polyamide and polyester, having mixed therethrough about 0.02 to 5.0 percent, based on the weight of the synthetic polymer, of an amide having the general formula:



where R is a divalent radical containing about 3 to 18 carbon atoms selected from the group consisting of linear and branched aliphatics, x is an integer from about 2 to 3, and about 0.1 to 5.0 weight percent based on the weight of a polymer of a poly(alkylene ether) said poly(alkylene ether) having a molecular weight from about 600 to about 3,000,000.

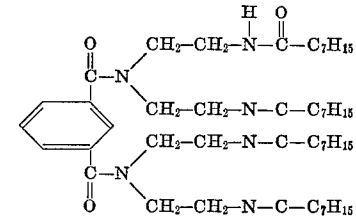
7. The filament of claim 6 wherein the poly(alkylene ether) has a molecular weight of from about 1,000 to about 100,000.

8. The filament of claim 6 wherein the amide mixed therethrough is the isophthalate amide of 1,7 di(n-octanoyl) 1,4,7 triazaheptane as represented by the formula:



and is present in said polymer in an amount from about 0.1 to 2.0 percent by weight and the poly(alkylene glycol) dispersed therethrough is a polyethylene glycol having a molecular weight from about 1,000 to 30,000 and is present in an amount from about 0.3 to 3.0 percent by weight.

9. The filament, having improved resistance to soiling, of a polycaproamide having mixed therethrough the isophthalate amide of 1,7 di(n-octanoyl) 1,4,7 triazaheptane as represented by the formula:

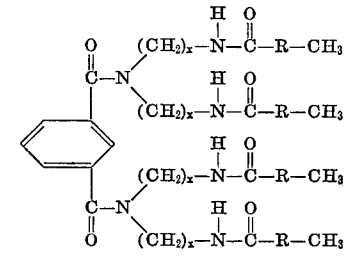


and is present in said polymer in an amount of from about 0.1 to 2.0 percent by weight and the poly(alkylene glycol) dispersed therethrough is a polyethylene glycol having a molecular weight from about 1,000 to 30,000 and is present in an amount from about 0.3 to 3.0 percent by weight.

10. The filament of claim 6 wherein the synthetic polymer is polyethylene terephthalate.

11. The filament of claim 6 wherein the synthetic polymer is a polymer blend of polyethylene terephthalate dispersed in polycaproamide.

12. A process for producing a filament, having improved resistance to soiling, extruded from a synthetic polymer selected from the group consisting of polyamide and polyester which comprises mixing in the synthetic polymer prior to extrusion thereof about 0.2 to 5.0 weight percent, based on the weight of the synthetic polymer, of an amide having the general formula:



wherein R is a divalent radical containing about 3 to 18 carbon atoms selected from the group consisting of linear and branched aliphatic, x is an integer from about 2 to about 3, and melt extruding the mixture of synthetic polymer and amide to form a filament having improved resistance to soiling.

13. The process of claim 12 wherein about 0.1 to 5.0 weight percent based on the weight of the synthetic polymer of a poly(alkylene ether) said poly(alkylene ether having a molecular weight from about 600 to 3,000,000 is also added to the synthetic polymer, and melt extruded with it.

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PAUL LIEBERMAN, Primary Examiner

U.S. Cl. X.R.

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