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PROCESS OF DECREASING THE SENSITIVENESS TO WATER OF FORMED MATERIALS FROM INTERPOLYAMIDES

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Our instant invention relates to the decreasing of the sensitiveness to water of formed materials from interpolyamides, and more particularly to a new process of decreasing the sensitiveness to water of films, foils, fibers, and threads derived from interpolyamides.

It is known to form interpolyamides, for instance such as are prepared from hexamethylenediamine adipate and ε-aminocaproclactam from mixtures of solvents into films or foils. It has already been proposed to use as the solvents alcohols with an addition of water, chloroalcohols, and mixtures of solvents containing such alcohols. The films are formed by casting the mass of interpolyamide on machines generally used in the manufacture of film and subsequently dried in the usual manner. A film of this kind produced from interpolyamides soluble in alcohols, however, is not resistant to boiling water but it becomes soft, hence loses its original shape, greatly creases, and becomes adhesive.

Our instant invention has for an object to provide a process of producing a film resistant to boiling water.

A further object of the invention is the provision of a process of producing a film resistant to boiling water by subjecting the foils already dried to an after-heating advantageously at above 120° C.

Other objects will be apparent from the detailed specification following hereinafter.

The duration of the heating depends upon the temperature and amounts to about 30 minutes at about 160° C and to one to several hours at a temperature lower than 160° C.

After the heating carried through in accordance with our invention is finished the foils are resistant to water of 100° C, crease no longer and are also non-adhesive. The foil retains this property even after it has again absorbed a certain amount of water from the moist air. In our opinion the disclosed process, therefore, is not a simple drying procedure but it probably effects a change of structure of the foil. The foil seems to have got a horny surface.

Films which have been rendered resistant to boiling water according to our invention are especially suitable to be substituted for foils of cellulosehydrate owing to their good mechanical properties. Moreover, the high extensibility and the great resistance to tearing make the films useful as packing material, for instance for foodstuffs, as substitute of guts or the like. The foils can furthermore be employed as protective layers against the influence of the weather if desired coated or impregnated with other materials as just the high resistance to creasing together with the strength and the good extensibility produce a favorable effect. By drawing the films advantageously warmed in one or both directions the degree of the resistance is essentially increased without perceptibly influencing the extensibility. This drawing can be carried out before as well as after the heating treatment.

The films may also be subjected to a tanning or hardening treatment as described in the U.S. application corresponding with the German application 165,767 IVc/8k before or after the heating. An additional effect is obtained as to the strength and resistance for instance to steam of the surface of the film.

Where desirable the improved polyamides when applied to any of the above uses may be admixed with plasticizers, pigments, dyes, filling materials or the like without losing their good properties.

In place of using the polyamides above mentioned many other mixed condensates may be worked up into films and after-treated according to our invention, especially alcohol-soluble interpolymers derived from at least four polyamide-forming reactants and in which at least two dicarboxylic acids are condensed with at least two diamines, for instance the polyamide from hexamethylenediamine sebacate and pentamethylenediamine adipate.

The following examples serve to illustrate our invention but they are not intended to limit it thereto.

Example I

A 60μ thick film of the mixed condensate from 60 parts of hexamethylenediamine adipate and 40 parts of ε-aminocaprolactam is formed by casting a solution in methanol-water 9:1 of containing 20 per cent of the condensate and subsequently drying the film at 80° C. The practically dry film is then subjected to a further heating treatment:

(*a*) The film is heated at 140° C for three hours. Owing to this procedure the film is light yellow colored and feels parchmentlike whereas it has shown a soft feel before the treatment. The film when immersed in boiling water remains unconverted.

(*b*) The film is heated at 160° C for thirty minutes. The properties of the film thus treated are similar to those described in Example I*a*; the film is, however, colored rather stronger than in the above example.

(*c*) The film is heated at 125° C for six hours.

The surface of the film is moderately hardened and colorless as before the treatment.

Example II

A 30μ thick film prepared from an interpolyamide which is produced from equally great parts of hexamethylenediamine adipate and ϵ-aminocaprolactam is formed by casting. A mixture of ethylenechlorohydrin, methanol, and water 80:15:5 serves as a solvent. After the film has been dried at 70° C, it is subjected to a heating treatment at 122° C for 8 hours. The film thus obtained becomes only slightly soft in boiling water whereas the film not after-treated immediately melts in the water.

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