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3,699,082

**METHOD OF PROCESSING PREFORMED POLYESTER RESINS AND CONVERTING TO COATING MATERIALS**

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18 Claims

**ABSTRACT OF THE DISCLOSURE**

A method of processing preformed polyester resin material, said method including the steps of reacting said resin material and selectively exchanging a portion of the ester groups of said resin material for other groups, including amide and/or imide groups and/or reacting said resin material to cause either cross-linking and/or transesterification of said material. Specifically, in accordance with the method of this invention, a preformed thermoplastic linear poly (ethylene terephthalate) polyester resin material can be transformed into a thermosettable polyester resin material or polyamide-ester, polyimide-ester or polyamide-imide-ester resin materials, which may be either thermoplastic or thermosettable resin materials.

**BACKGROUND OF THE INVENTION**

Field of the invention

This invention relates to a method of processing polyester resins, and more specifically, a method of manufacturing thermosettable polyester resin materials or polyamide-ester, polyimide-ester or polyamide-imide-ester materials from preformed essentially linear polyester materials. This invention also relates to a method of improving the chemical, physical and electrical properties of preformed essentially linear polyester resin materials and the application of polyamide-ester, polyimide-ester and polyamide-imide-ester resin materials, or other modified polyester resin materials to articles, for example, electrical conductors, as a coating thereon.

Description of the prior art

Thermoplastic, essentially linear polyester resin materials have long been available. Such resin materials have heretofore been used as coatings on articles, for example, electrical conductors (see U.S. Pat. No. 3,022,200). Also, such polyester resin materials have heretofore been modified to produce thermosettable polyester resin materials and polyester resin materials in which a portion of the ester groups have been replaced by other groups. These resin materials are referred to herein as "modified polyester resin materials." Such materials have heretofore been disclosed as suitable for application to articles as coatings, for example, magnet wire insulation (see U.S. Pat. No. 3,342,780 and Canadian Pat. No. 771,126). These modified polyester resin materials include those materials referred to herein as "thermosettable polyester resin materials," "polyamide-ester resin materials," "polyimide-ester resin materials" and "polyamide-imide-ester resin materials."

For the most part such polyester resin materials have been manufactured from (1) either terephthalic or isophthalic acid, (2) a diol, for example, ethylene glycol, and (3) a polyhydric alcohol having at least three hydroxyl groups, for example, glycerine. The patents above-mentioned disclose various modified polyester materials. However, for the most part, those too have been manufactured from monomers including those above-listed.

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Other methods for preparing polyester resin materials are not widely used.

One method of manufacturing polyester resin materials of the thermosettable type above-described is to process preformed thermoplastic linear polyester resin material with glycerin. Such a method is disclosed in Russian Pat. No. 125,382. This method is highly advantageous since it may utilize polyester resin material such as that sold under the trademarks "Dacron" and "Mylar" by the Du Pont de Nemours Company and that identified as VFR-700A polyester resin material by The Goodyear Tire and Rubber Company, Inc. which has been classified as scrap or off-grade material. Such material is inexpensive and plentiful. However, certain modified polyester resin materials, including thermosettable polyester resin material cross-linked with isocyanates or isocyanurates, and polyamide-ester resin, polyimide-ester resin and polyamide-imide-ester resin materials cannot be manufactured from preformed polyester resin materials by the method disclosed in Russian Pat. No. 125,382. It is therefore highly desirable to provide a method of manufacturing such modified polyester resin materials from preformed polyester resin materials.

**SUMMARY OF THE INVENTION**

It is therefore the primary object of this invention to provide an improved method of processing polyester resin materials.

Another object of this invention is to provide an improved method of manufacturing modified polyester resin materials.

Another object of this invention is to provide an improved method of manufacturing magnet wire enamels comprising polyester resin materials.

Another object of this invention is to provide an improved method of processing polyester resin materials to improve the properties thereof.

Yet another object of this invention is to provide an improved method of modifying preformed essentially linear polyester resin materials to form thermosettable polyester resin materials or polyamide-ester resin, polyimide-ester resin or polyamide-imide-ester resin materials.

A further object of this invention is to provide an improved method of making modified polyester resin materials including thermosettable resin materials and polyamide-ester resin, polyimide-ester resin and polyamide-imide-ester resin materials from preformed thermoplastic essentially linear polyester resin materials, for example, poly(ethylene terephthalate).

Still further an object of this invention is to provide an improved method of making modified polyester resin materials including thermosettable resin materials and polyamide-ester resin, polyimide-ester resin and polyamide-imide ester resin materials from preformed thermoplastic essentially linear polyester resin materials, for example poly(ethylene terephthalate), forming a solution thereof and applying a coat of the same to an article, for example, a copper conductor, thereby forming a coated article, for example, a magnet wire.

In the broader aspects of this invention there is provided a method comprising the steps of reacting a preformed thermoplastic essentially linear polyester resin material with a diol thereby forming a reaction product having ester groups and hydroxyl groups therein, and either (1) exchanging a portion of said ester groups for groups selected from the group consisting of amide and imide containing groups and groups containing amide and imide precursors or (2) reacting said reaction product with a compound having at least three reactive groups thereby forming a thermosettable polyester resin.