

TITLE OF THE INVENTION

LIQUID CRYSTAL POLYESTER RESIN BLEND

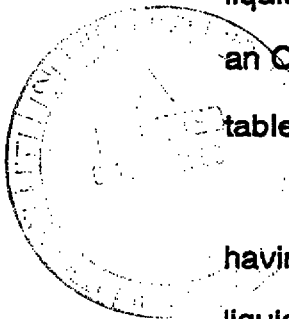
FIELD OF THE INVENTION

The present invention relates to a liquid crystal polyester resin blend in which a liquid crystal polyester material is stably plasticized during a molding process, which can be stably molded and which gives a molded product having excellent mechanical properties and thermal stability. The present invention also relates to a method for molding a liquid crystal polyester material wherein said liquid crystal polyester resin blend is used as the liquid crystal polyester material.

RELATED ART

A liquid crystal polyester is generally referred to as a thermotropic liquid crystal polymer, since it has a rigid molecule which has no intertwist during a melted state, it forms a polydomain having a liquid crystal state and it exhibits a behavior that a molecular chain is remarkably oriented in a flow direction at a low-shear rate. The liquid crystal polyester has an extremely excellent melt flowability due to said unique behavior and has the thermal deformation resistance at a temperature of at least 300°C depending on a structure. The liquid crystal polyester is used as a molded product such as an electronic part, an OA (office automation) part, an AV (audiovisual) part, a thermal resistant tableware and the like.

A method for obtaining the molded product generally uses an extruder having a screw as in an injection molding and an extrusion. In this case, the liquid crystal polyester often has a problem of non-stability during a plasticizing process. Namely, the plasticization time is not constant and



stable. In the case of the injection molding, a plasticization does not sometimes come to an end during a cooling time so that the molding cannot be completed at a constant cycle and the productivity and quality of the molded product are often adversely affected.

The reasons why the plasticization time of the liquid crystal polyester is unstable are unclear. One of the reasons is believed to be that, since the liquid crystal polyester has a high dependency of a melt viscosity of the liquid crystal polyester itself on the shear rate and the temperature, only a particle surface of the liquid crystal polyester is selectively plasticized so that the cohesion easily occurs.

In order to prevent such phenomenon, Japanese Patent Kokai Publication No. 125259/1993 discloses the use of a composition in which a higher fatty acid and a metal salt of higher fatty acid are mixed with the thermotropic liquid crystal polymer. Japanese Patent Kokai Publication No. 125258/1993 discloses that the use of a particle mixture comprising thermotropic liquid crystal polymer particles and a metal salt of higher fatty acid gives a stable plasticization.

However, in every case, the higher fatty acid or the metal salt thereof having a decomposition at a high temperature is used together with the liquid crystal polymer having the high thermal resistance. When the molded product of the liquid crystal polymer is obtained, a large amount of gas evolves in a molding machine so that it is difficult to conduct the stable molding and the thermal stability of the molded product is decreased, whereby sometimes resulting in the insufficiency for an advanced application.

SUMMARY OF THE INVENTION

An object of the present invention is to solve the above problems and to provide a liquid crystal polyester resin blend which is stably plasticized during a molding process, which can be stably molded and which gives a molded product having excellent mechanical properties and thermal stability.

Another object of the present invention is to provide a method for molding a liquid crystal polyester material wherein the above liquid crystal polyester resin blend is used as the liquid crystal polyester material.

The present inventors have intensively studied a solution of the above problems and then found that a liquid crystal polyester resin composition comprising a liquid polyester, or the liquid crystal polyester and a filler, as the main components is mixed with a specific amount of at least one compound selected from a phosphorus-containing compound, a fluorocarbon surfactant and a higher fatty acid ester to give a liquid crystal polyester resin blend achieving the above objects and that a liquid crystal polyester material can be stably plasticized during the molding process by the use of said liquid crystal polyester resin blend.

That is, the present invention provides the followings.

(1) A liquid crystal resin blend comprising 100 parts by weight of a liquid crystal polyester resin composition and 0.001 to 5 parts by weight of at least one compound selected from a phosphorus-containing compound, a fluorocarbon surfactant and a higher fatty acid ester, which are blended at the temperature lower than a flow temperature of the liquid polyester resin composition,
wherein the liquid crystal resin composition comprises 100 parts by weight of a liquid crystal polyester and 0 to 150 parts by weight of a filler, and

wherein the flow temperature is a temperature at which a resin shows a melt viscosity of 48,000 poise when the resin heated at a heating rate of 4°C/min is extruded from a nozzle having an internal diameter of 1 mm and a length of 10 mm under a load of 100 kgf/cm².

(2) The liquid crystal polyester resin blend according to claim (1), comprising 100 parts by weight of the liquid crystal polyester resin composition and 0.001 to 5 parts by weight of the phosphorus-containing compound, which are blended.

(3) A liquid crystal polyester resin blend, further comprising at least 0.001 parts by weight of a higher fatty acid in addition to the liquid crystal polyester resin blend of claim (2), wherein the total amount of the phosphorus-containing compound and the higher fatty acid is 0.002 to 5 parts by weight.

(4) A liquid crystal polyester resin blend, further comprising at least 0.001 parts by weight of at least one compound selected from an oxide, a peroxide, a double oxide and a carbonate of a metal belonging to IA or IIA group of the periodic table in addition to the liquid crystal polyester resin blend of claim (3), wherein the total amount of the phosphorus-containing compound, the higher fatty acid and at least one compound selected from the oxide, peroxide, double oxide and carbonate of a metal belonging to IA or IIA group is 0.003 to 5 parts by weight.

(5) A liquid crystal polyester resin blend, further comprising at least 0.001 parts by weight of a higher fatty acid metal salt in addition to the liquid crystal polyester resin blend of claim (2), wherein the total amount of the phosphorus-containing compound and the higher fatty acid metal salt is 0.002 to 5 parts by weight.

(6) The liquid crystal polyester resin blend according to claim (1), comprising 100 parts by weight of the liquid crystal polyester resin composition and 0.001 to 5 parts by weight of the fluorocarbon surfactant, which are blended.

(7) The liquid crystal polyester resin blend according to claim (1), comprising 100 parts by weight of the liquid crystal polyester resin composition and 0.001 to 5 parts by weight of the higher fatty acid ester, which are blended.

(8) The liquid crystal polyester resin blend according to any one of claims (1), (2), (3), (4), (5), (6) and (7), wherein the liquid crystal polyester comprises at least 30% by mole, based on the liquid crystal polyester, of a repeating unit of the formula (A₁):



(9) A method for molding a liquid crystal polyester material, wherein a liquid crystal resin blend according to any one of claims (1), (2), (3), (4), (5), (6) and (7) is used as the liquid crystal polyester material.

DETAILED DESCRIPTION OF THE INVENTION

The liquid crystal polyester used in the present invention is a polyester referred to as a thermotropic liquid crystal polymer. Specific examples of the liquid crystal polyester are

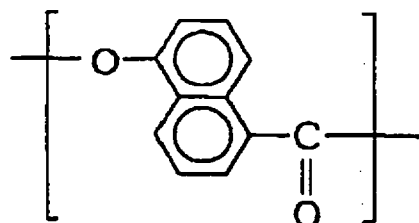
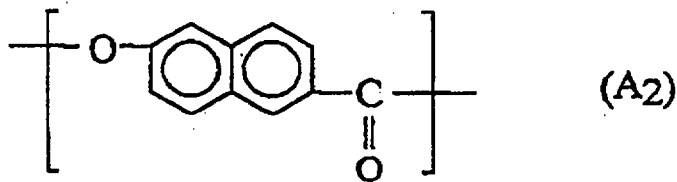
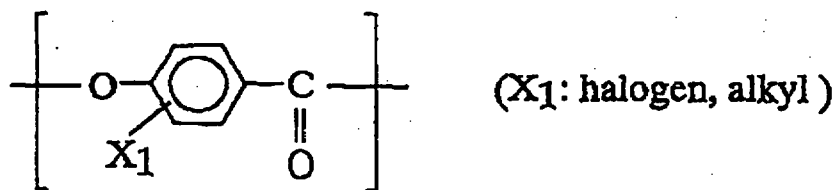
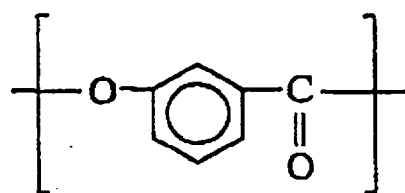
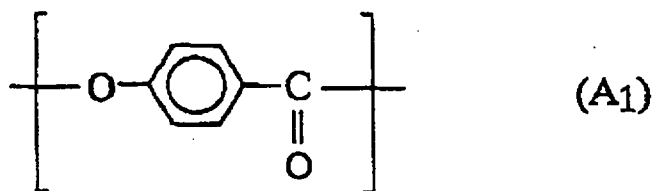
- (1) a combination of an aromatic dicarboxylic acid, an aromatic diol and an aromatic hydroxycarboxylic acid;
- (2) a combination of different aromatic hydroxycarboxylic acids;
- (3) a combination of an aromatic dicarboxylic acid and an aromatic

diol; and

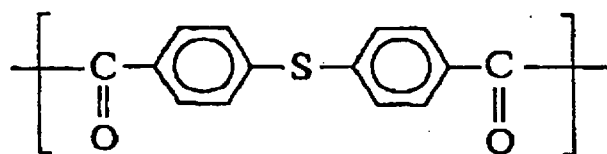
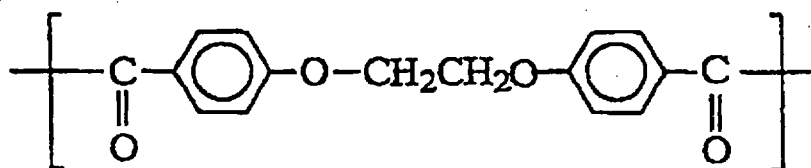
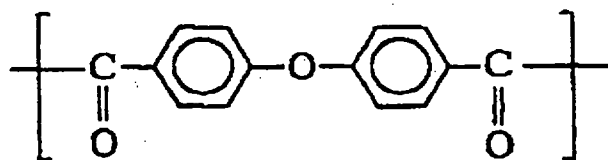
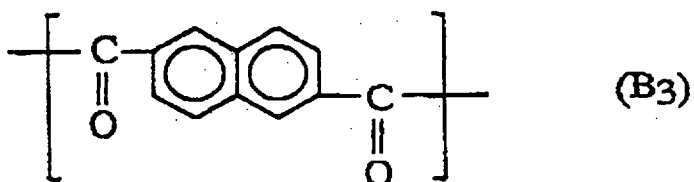
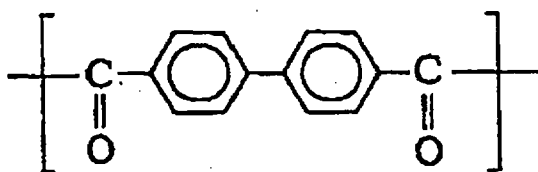
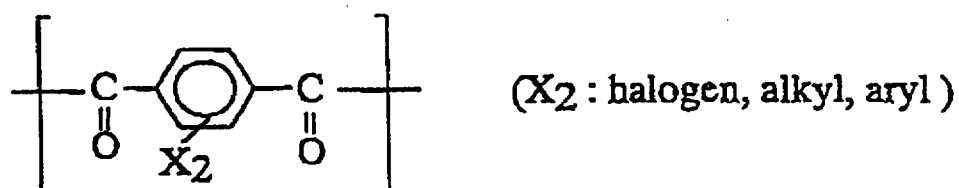
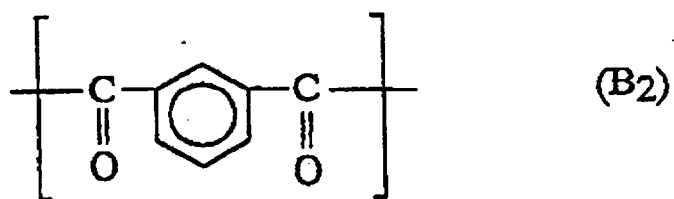
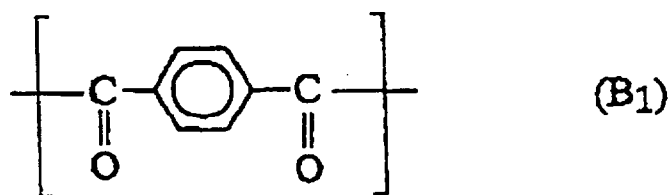
(4) a product of the reaction between an aromatic hydroxycarboxylic acid and a polyester such as polyethylene terephthalate and form an anisotropic melted material melting at a temperature of at most 400°C. Instead of the aromatic dicarboxylic acid, aromatic diol and aromatic hydroxycarboxylic acid, an ester-forming derivative thereof may be used.

Specific non-limiting examples of the repeating unit of the liquid crystal polyester are as follows:

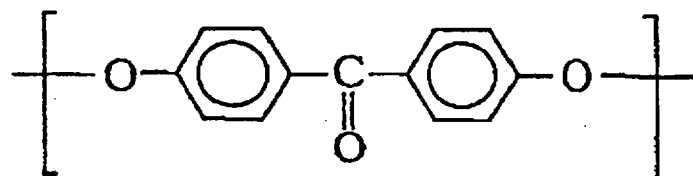
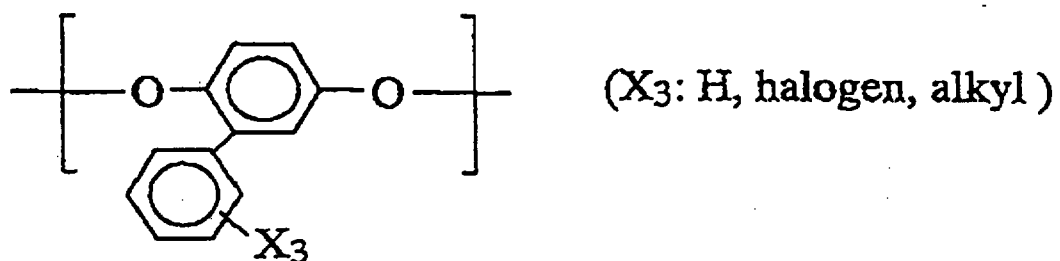
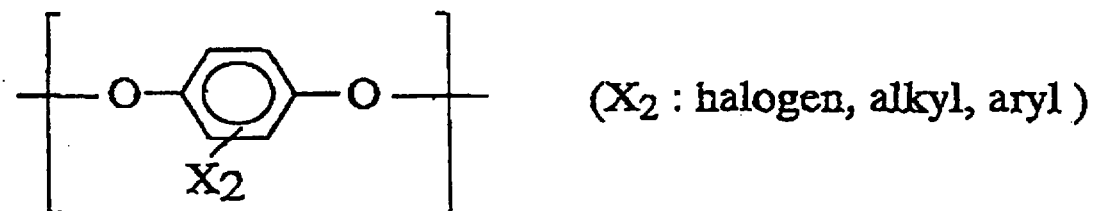
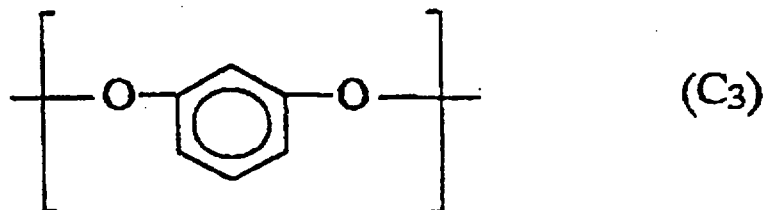
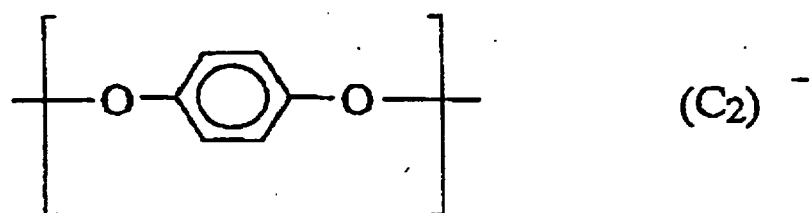
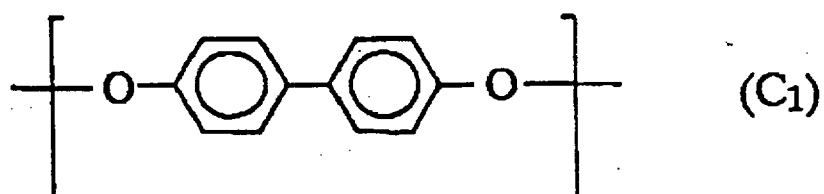
The repeating units derived from the aromatic hydroxycarboxylic acid:

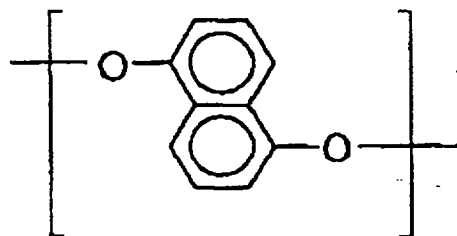
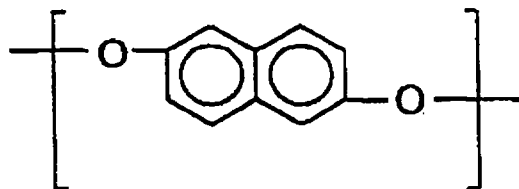
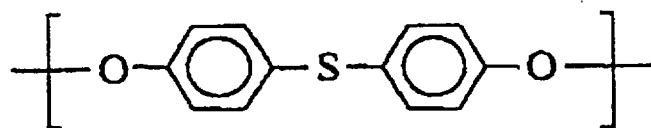
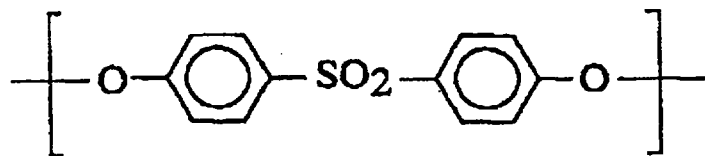
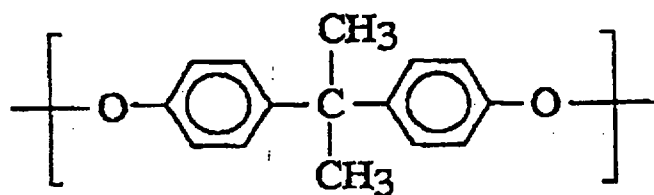
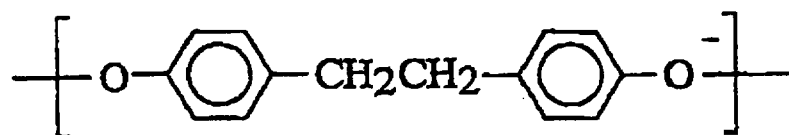
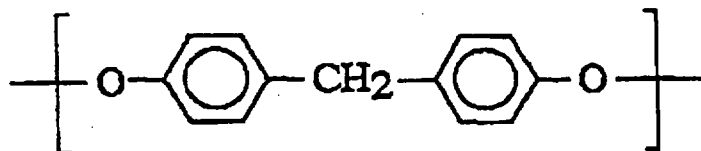
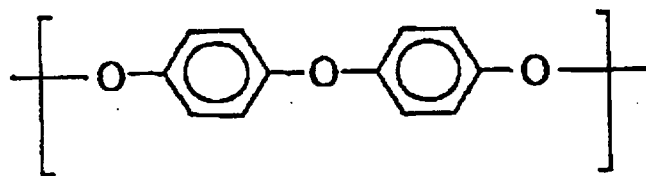


Repeating units derived from the aromatic dicarboxylic acid:



Repeating units derived from the aromatic diol:





In view of the balance of a thermal resistance, mechanical properties and a processability, a particularly preferred liquid crystal polyester is a liquid crystal polyester containing at least 30 % by mole, based on the liquid crystal polyester, of the repeating unit of the formula (A₁).

The following combinations (a)-(f) of the repeating units are preferable:

- (a): (A₁), (B₁) or a combination of (B₁) and (B₂), and (C₁); -
- (b): (A₁) and (A₂);
- (c): in the combination (a), a part of (A₁) is replaced with (A₂);
- (d): in the combination (a), a part of (B₁) is replaced with (B₃);
- (e): in the combination (a), a part of (C₁) is replaced with (C₃);
- (f): the repeating units (B₁) and (C₁) are added to the combination (b).

The liquid crystal polyesters having the basic structure combinations (a) and (b) are described in, for example, Japanese Patent Kokoku Publication Nos. 47870/1972 and 3888/1988, respectively.

In the present invention, the filler is optionally added to the liquid crystal polyester. When the filler is added, an amount of the added filler is at most 150 parts by weight, preferably 20 to 100 parts by weight per 100 parts by weight of the liquid crystal polyester. If the amount of the added filler is larger than 150 parts by weight, the composition has a high melt viscosity to give the decreases of granulating ability and moldability, so that the effect of stabilizing the plasticization during the molding process is decreased in the liquid crystal polyester resin blend of the present invention.

The liquid crystal polyester resin composition used in the present invention is generally in a particulate form such as a pellet or a chip form. The

preferable form of the liquid crystal resin composition is a cylinder or sphere having an average particle size of 1 mm to 10 mm. When the average particle size is smaller than 1 mm, the resultant product undesirably has a bad surface state, since a gas is easily caught in the product when the resin is plasticized by a screw during the molding process. On the other hand, when the average particle size is larger than 10 mm, the plasticizing during the molding process is difficult and a rotation torque of screw undesirably increases.

A procedure for obtaining the particle or chip of the liquid crystal polyester resin composition is not specifically limited. Generally, it is a method comprising mixing the liquid crystal polyester with a filler, optionally a mold release modifier, a thermally stabilizing agent, a colorant and the like in a Henschel mixer, a tumbler or the like, conducting the melt mixing by an extruder, and cutting the melted resin extruded from a hole of die with a rotating blade to give particles; or a method comprising cooling and solidifying a strand of resin extruded from a hole of die and cutting the strand with a rotating blade to give particles.

In addition, an extruder may be directly connected with a down stream of a reactor for the polymerized liquid crystal polyester to give crystal polyester particles or chips.

The filler used in the present invention includes a fibrous or acicular reinforcing material such as a glass fiber, a silica-alumina fiber, wollastonite, a carbon fiber, a potassium titanate whisker, an aluminum borate whisker and a titanium oxide whisker; and an inorganic filler such as calcium carbonate, dolomite, talc, mica, clay and a glass bead, and the combination thereof can be used.

The phosphorus-containing compound used in the present invention is not specifically limited, and a trivalent or pentavalent phosphorus-containing compound is preferable. Examples of the trivalent phosphorus-containing compound include distearyl pentaerythritol diphosphite, bis(2,6-di-*t*-butyl-4-methylphenyl) pentaerythritol diphosphite, tris(2,4-di-*t*-butylphenyl)phosphite, 2,2-methylenebis(4,6-di-*t*-butylphenyl)octylphosphite, tetrakis(2,4-di-*tert*-butylphenol)4,4'-biphenylene diphosponite, etc.

The higher fatty acid used in the present invention means a fatty acid having at least 10 carbon atoms. Examples of the higher fatty acid include capric acid, lauric acid, myristic acid, palmitic acid, stearic acid, arachic acid, behenic acid, lignoceric acid, montanic acid, etc. Among them, stearic acid is particularly preferable.

The oxide or peroxide of the metal belonging to IA or IIA group of the periodic table used in the present invention is represented by the general formula: M_2O , $M'O$ or $M'O_2$ (wherein M is a metal element belonging to IA group and M' is a metal element belonging to IIA group). It is preferable that M is selected from Na and K. It is preferable that M' is selected from Mg, Ca and Ba. Examples thereof include calcium oxide (99.9%), magnesium oxide (ground, guaranteed reagent), barium oxide (for chemistry) and barium peroxide (Wako-primary) (commercially available from WAKO JUNYAKU CO., LTD.), Micromag 3-30 (trade name, commercially available from KYOWA KAGAKU KOGYO CO., LTD.), etc., but are not limited thereto.

The double oxide containing the metal belonging to IA or IIA group used in the present invention is represented by the general formula $M_2O \cdot mM''O_2 \cdot xH_2O$, $M'O \cdot mM''O_2 \cdot xH_2O$, $M_2O \cdot pM'''_2O_3 \cdot mM''O_2 \cdot xH_2O$ or

$M_2O \cdot pM'O \cdot mM''O_3 \cdot nM''O_2 \cdot xH_2O$ (wherein M is a metal element belonging to IA group, M' is a metal element belonging to IIA group, M'' is a tetravalent metal element, M''' is a trivalent metal element, p, m and n indicate an positive number of at least 1, and x is a positive number of at least 0). It is preferable that M is K. It is preferable that M' is selected from Mg, Ca and Ba. Examples thereof include wolastonite, atapalgitite, sericite, mica, potassium titanate, barium titanate, etc., but are not limited thereto.

The carbonate salt containing the metal belonging to IA or IIA group used in the present invention is represented by the general formula M_2CO_3 , $M'CO_3$ or $M'M''(CO_3)_2$ (wherein M is a metal element belonging to IA group, and M' and M'' indicate a metal element belonging to IIA group). It is preferable that M is K. It is preferable that M' and M'' are those selected from Mg, Ca and Ba. Examples thereof include potassium carbonate, calcium carbonate, dolomite, etc., but are not limited thereto.

The higher fatty acid metal salt used in the present invention means a metal salt of a fatty acid having at least 10 carbon atoms. Examples of the higher fatty acid metal salt include metal salts of capric acid, lauric acid, myristic acid, palmitic acid, stearic acid, arachic acid, behenic acid, lignoceric acid, montanic acid, etc. As the metal in these higher fatty acid metal salts, metals of IA, IB, IIA and IIB groups can be preferably used. Examples of the preferable metal include lithium, sodium, potassium, magnesium, calcium, barium, etc. Examples of the particularly preferable higher fatty acid metal salt include calcium stearate, barium stearate, etc.

The phosphorus-containing compound, the higher fatty acid, and the higher fatty acid metal salt, which are used in the present invention, may

be preferably in a powder or particulate form so as to facilitate the mixing with the liquid crystal polyester resin composition.

The average particle size of the phosphorus-containing compound, the higher fatty acid, at least one compound selected from the oxide, peroxide, double oxide and carbonate of the metal belonging to IA or IIA group and higher fatty acid metal salt is preferably smaller than 100 μm , more preferably smaller than 50 μm . When the particle size is 100 μm or more, the effect of stable plasticization during the molding process undesirably becomes insufficient.

In the liquid crystal polyester resin blend of the present invention, the amount of the phosphorus-containing compound is preferably 0.001 to 5 parts by weight, more preferably 0.003 to 1 parts by weight, based on 100 parts by weight of the liquid crystal polyester or total amount (100 parts by weight) of the liquid crystal polyester and the filler. When the amount of the phosphorus-containing compound exceeds 5 parts by weight, a gas is evolved by decomposition of the phosphorus-containing compound during the molding process. Therefore, a blister is liable to arise in the molded product and the amount of the gas evolving from the molded product undesirably becomes large. On the other hand, when the amount of the phosphorus-containing compound is smaller than 0.001 parts by weight, the objective effect of stable plasticization during the molding process undesirably becomes insufficient.

In the liquid crystal polyester resin blend of the present invention, the total amount of the phosphorus-containing compound and the higher fatty acid or the higher fatty acid metal salt is preferably 0.002 to 5 parts by weight,

more preferably 0.003 to 1 parts by weight, based on 100 parts by weight of the liquid crystal polyester or total amount (100 parts by weight) of the liquid crystal polyester and the filler. When the total amount of the phosphorus-containing compound and higher fatty acid or higher fatty acid metal salt exceeds 5 parts by weight, a gas is evolved by decomposition of the phosphorus-containing compound and the higher fatty acid during the molding process. Therefore, a blister is liable to arise in the molded product and the amount of the gas evolving from the molded product undesirably becomes large. On the other hand, when the total amount of the phosphorus-containing compound and higher fatty acid or higher fatty acid metal salt is smaller than 0.002 parts by weight, the objective effect of stable plasticization during the molding process undesirably becomes insufficient.

In the liquid crystal polyester resin blend of the present invention, the total amount of the phosphorus-containing compound, the higher fatty acid, and at least one compound selected from the oxide, peroxide, double oxide and carbonate of the metal belonging to IA or IIA group is preferably 0.003 to 5 parts by weight, more preferably 0.005 to 1 parts by weight, based on 100 parts by weight of the liquid crystal polyester or total amount (100 parts by weight) of the liquid crystal polyester and the filler. When the total amount of the phosphorus-containing compound, the higher fatty acid, and at least one compound selected from the oxide, peroxide, double oxide and carbonate of the metal belonging to IA or IIA group exceeds 5 parts by weight, a gas is evolved by decomposition of the phosphorus-containing compound and higher fatty acid during the molding process. Therefore, a blister is liable to arise in the molded product and the amount of the gas evolving from the

molded product undesirably becomes large. On the other hand, when the total amount is smaller than 0.003 parts by weight, the objective effect of stable plasticization during the molding process undesirably becomes insufficient.

As the fluorocarbon surfactant used in the present invention, those comprising a fluorocarbon group as a base skeleton, and a hydrophilic group are popular. Generally, a straight-chain or branched perfluoroalkyl group (C_nF_{2n+1}) having 6 to 10 carbon atoms is used as the hydrophobic skeleton, and a sulfonate salt, a carboxylate salt, an ammonium salt, an aminosulfonate salt, etc. are used as the hydrophilic group.

As the fluorocarbon surfactant, those having a particle size which can pass through 80 mesh are preferable. Examples of the commercially available product include Fluorad FC-95, FC-93 (trade name, manufactured by 3M CO.) and Megafac F-110 (trade name, manufactured by DAINIPPON INK CHEMICAL INDUSTRIES CO., LTD.) as a potassium salt of perfluoroalkylsulfonic acid; Fluorad FC-124 (trade name, manufactured by 3M CO.) as a lithium salt of trifluoromethanesulfonic acid; Ftergent 100 and 110 (trade name, manufactured by NEOS CO., LTD.) as a sulfonate salt of highly branched perfluorocarbon, etc.

In the liquid crystal polyester resin blend of the present invention, the amount of the fluorocarbon surfactant is preferably 0.001 to 5 parts by weight, more preferably 0.003 to 3 parts by weight, based on 100 parts by weight of the liquid crystal polyester or total amount (100 parts by weight) of the liquid crystal polyester and filler. When the amount of the fluorocarbon surfactant exceeds 5 parts by weight, the plasticizing time becomes long

during the molding process and, at the same time, scatter in plasticizing time at every shot becomes large. As a result, the molded product is colored and mechanical strength thereof is decreased and, further, the amount of the gas evolving from the molded product is undesirably increased. On the other hand, when the amount of the fluorocarbon surfactant is smaller than 0.001 parts by weight, the objective effect of stable plasticization during the molding process undesirably becomes insufficient.

The higher fatty acid as the raw material of the higher fatty acid ester used in the present invention is a fatty acid having at least 10 carbon atoms. Examples of the higher fatty acid include capric acid, lauric acid, myristic acid, palmitic acid, stearic acid, arachic acid, behenic acid, lignoceric acid, montanic acid, etc. Among them, stearic acid and montanic acid are particularly preferable. Examples of the alcohol as the raw material of the ester include stearyl alcohol, behenyl alcohol, glycerin, sorbitan, propylene glycol, pentaerythritol, polyoxyethylene bisphenol A, etc. Among them, glycerin and sorbitan are preferable. The melting point of the higher fatty acid ester is preferably at least 30°C, more preferably at least 50°C. When using the higher fatty acid ester having the melting point of lower than 30°C, a part of the higher fatty acid ester is volatilized when the liquid crystal polyester resin blend is subjected to the preliminary drying before the molding. Therefore, the objective effect of stable plasticization during the molding process undesirably becomes insufficient.

The higher fatty acid ester used in the present invention may be preferably in a powder or particulate form so as to facilitate the mixing with the liquid crystal polyester resin composition.

The average particle size of the higher fatty acid ester is preferably smaller than 100 μm , more preferably smaller than 50 μm . When the particle size is 100 μm or more, the effect of stable plasticization during the molding process undesirably becomes insufficient.

In the liquid crystal polyester resin blend of the present invention, the amount of the higher fatty acid ester is preferably 0.001 to 5 parts by weight, more preferably 0.003 to 1 parts by weight, based on 100 parts by weight of the liquid crystal polyester or total amount (100 parts by weight) of the liquid crystal polyester and the filler. When the amount of the higher fatty acid ester exceeds 5 parts by weight, a gas is evolved by decomposition of the higher fatty acid ester during the molding process. Therefore, a blister is liable to arise in the molded product, and the amount of the gas evolving from the molded product undesirably becomes large. On the other hand, when the amount of the higher fatty acid ester is smaller than 0.001 parts by weight, the objective effect of stable plasticization during the molding process undesirably becomes insufficient.

In the liquid crystal polyester resin blend of the present invention, those having an external lubrication effect such as the higher fatty acid, at least one compound selected from the oxide, peroxide, double oxide and carbonate of the metal belonging to IA or IIA group, the higher fatty acid metal salt, fluororesin, etc. can also be mixed with the liquid crystal polyester resin composition, together with the fluorocarbon surfactant or the higher fatty acid ester.

As far as the object of the present invention is not adversely affected, at least one usual additive, for example, a colorant such as a dye and

a pigment; an antioxidant; a thermal stabilizing agent; a UV absorber; an antistatic agent; and a surfactant may be added to the liquid crystal polyester resin composition or the liquid crystal polyester resin blend according to the present invention.

A small amount of a thermoplastic resin, for example, a polyamide, a polyester, a polyphenylenesulfide, a polyetherketone, a polycarbonate, a polyphenyleneether and a modified product thereof, a polysulfone, a polyethersulfone and a polyetherimide; and a small amount of a thermosetting resin, for example, a phenol resin, an epoxy resin, a polyimide resin may be added alone or in combination.

The mixing procedure for preparing the liquid crystal polyester resin blend is not specifically limited, as far as the liquid crystal polyester resin composition comprising the liquid crystal polyester or liquid crystal polyester and filler as the main component is mixed with at least one compound selected from the phosphorus-containing compound, the fluorocarbon surfactant and the higher fatty acid ester at the temperature lower than the flow temperature of the liquid crystal polyester. For example, the liquid crystal polyester resin blend of the present invention can be obtained by mixing particles of the liquid crystal polyester resin composition with powder or particles of at least one compound selected from the phosphorus-containing compound, the fluorocarbon surfactant and the higher fatty acid ester in the solid state at room temperature or in a heated atmosphere, using a Henschel mixer or tumbler.

PREFERRED EMBODIMENT OF THE INVENTION

The present invention will be illustrated by the following Examples

which do not limit the present invention. The measurement of various properties and the test used in the Examples are conducted as follows:

(1) Meterage property during the injection molding

An average meterage time for continuous 50 shots and a standard deviation thereof are calculated.

(2) Tensile properties

An ASTM No. 4 tensile dumbbell is molded, and tensile properties are measured according to ASTM D638.

(3) Relative amount of low-boiling point gas evolving from the molded product

A JIS 1 (1/2) dumbbell (thickness: 0.8 mm) is molded, and the resultant molded product is cut into chips having a length of 5 mm, a width of 5 mm and a thickness of 0.8 mm. Four grams of the chips are precisely weighted and washed with the distilled water. The chips are placed in a vacuum-dried 25 cc vial and the vial is sealed with a packing of polytetrafluoroethylene. The vial is heated in a hot air dryer adjusted at 120°C for 20 hours so that a gas evolves from the molded product. The vial is mounted in a head space gas chromatography (GC-15A/HSS-3A) manufactured by SHIMADZU CORPORATION, and a gas is injected in a column having a length of 15 m and filled with a filler DB-WAX (manufactured by J & W SCIENTIFIC) while keeping the vial at 120°C. A column temperature is increased from 80°C at a rate of 2°C/min simultaneously with the injection, and a total amount of the gas is detected by a detector until a retention time of 25 minutes. The detector is FID type one, and a carrier gas is helium.

A relative amount of the gas is indicated by a value of a total area of

various gases. The relative amount of gas evolving from the molded product is compared by the use of said value. When the sample is not placed in the vial, namely for the empty vial, the measured value is 3,000. The larger the measured value is, the larger the amount of the low-boiling point gas evolving from the molded product is. A gas chromatography mass analysis revealed that the gas until the retention time of 25 minutes includes an aromatic hydrocarbon, an aliphatic hydrocarbon, acetic acid, a phenol analogue and the like.

Examples 1 to 4 and Comparative Examples 1 to 3

A liquid crystal polyester having the above repeating units A_1 , B_1 , B_2 and C_1 wherein a molar ratio of $A_1:B_1:B_2:C_1$ is 60:15:5:20 and having a flow temperature of 323°C was mixed with a milled glass fiber (EFH 75-01, manufactured by CENTRAL GLASS CO., LTD.) in a ratio shown in Table 1 in a Henschel mixer. This admixture was converted into particles by the use of a biaxial extruder (PCM-30, manufactured by IKEGAI CORPORATION) at a cylinder temperature of 340°C to give a liquid crystal polyester resin composition. The resultant liquid crystal polyester resin composition was cylinder particles having an average diameter of 2 mm and an average length of 2.5 mm.

The resultant liquid crystal polyester resin composition was mixed with a phosphorus-containing compound (distearyl pentaerythritol diphosphite) in a ratio shown in Table 1 at a room temperature by the use of a tumbler to give a liquid crystal polyester resin blend.

After the liquid crystal polyester resin blend was dried at a temperature shown in Table 2 for 3 hours, JIS 1 (1/2) dumbbells were

prepared at a cylinder temperature of 350°C and a mold temperature of 130°C by the use of an injection molding machine (PS40E5ASE, manufactured by NISSEI PLASTIC CO., LTD.). Meterage times for 50 continuous shots were measured to evaluate the stability thereof. The tensile properties and the evolved gas were measured by the use of the resultant dumbbell.

In the similar manner, the stability of the meterage time, the tensile properties and the amount of the evolved gas were measured as to a liquid crystal polyester resin blend containing no phosphorus-containing compound (Comparative Example 1). The results are shown in Table 2.

As shown in Table 2, the blend (Examples 1 to 4) comprising the liquid crystal polyester resin composition and the phosphorus-containing compound has a smaller difference of the meterage time among the shots and a smaller meterage time than the blend (Comparative Example 1) comprising no phosphorus-containing compound, is stably plasticized, has excellent mechanical properties and gives a low amount of gas evolving from the molded product.

The blend (Comparative Example 2) in which the amount of the phosphorus-containing compound mixed with the liquid crystal polyester resin composition was 0.0005 parts by weight had an insufficient effect of stable plasticization during the molding process. On the other hand, the blend (Comparative Example 3) in which 10 parts by weight of the phosphorus-containing compound was mixed with the liquid crystal polyester resin composition had the discoloring of the molded product and the significantly decreased tensile properties, and gave a considerably large amount of gas evolving from the molded product.

Comparative Example 4

The same manner as in Example 1 was repeated, except that the phosphorus-containing compound together with the milled glass fibers was premixed with the liquid crystal polyester, and the particles were formed by the use of the biaxial extruder. The results are shown in Tables 1 and 2. The blend (Comparative Example 4) in which the phosphorus-containing compound was previously incorporated in the liquid crystal polyester resin at the molten state had a large value of the meterage time and a large change among the shots to give an unstable plasticization during the molding process.

Examples 5 to 9

The same manner as in Example 1 was repeated, except that a admixture of a phosphorus-containing compound and a higher fatty acid or a higher fatty acid metal salt was used instead of the phosphorus-containing compound alone. The results are shown in Table 2. The blend in which the phosphorus-containing compound and the higher fatty acid or the higher fatty acid metal salt was mixed with the liquid crystal polyester resin composition. also has a small difference of the meterage time among the shots and a small meterage time, is stably plasticized, has excellent mechanical properties and gives a low amount of gas evolving from the molded product, in the manner similar to the blend in which the phosphorus-containing compound is mixed with the liquid crystal polyester resin composition.

Comparative Examples 5 and 6

The same manner as in Example 1 was repeated, except that the admixture of the phosphorus-containing compound and the higher fatty acid

or the higher fatty acid metal salt together with the milled glass fibers was premixed with the liquid crystal polyester, and the particles were formed by the use of the biaxial extruder. The results are shown in Tables 1 and 2. The blend in which the admixture of the phosphorus-containing compound and higher fatty acid or higher fatty acid metal salt was previously incorporated in the liquid crystal polyester resin at the molten state had a large value of the meterage time and a large change among the shots to give an-unstable plasticization during the molding process.

Examples 10 to 13

10 The same manner as in Example 1 was repeated, except that various phosphorus-containing compounds Nos. 2 to 5 shown in Table 2 were used as the phosphorus-containing compound instead of distearyl-pentaerythritol diphosphite. The results are shown in Tables 1 and 2. The blends in which various phosphorus-containing compounds Nos. 2 to 5 were mixed with the liquid crystal polyester resin composition have a small difference of the meterage time among the shots and a small meterage time, are stably plasticized, have excellent mechanical properties and give a low amount of gas evolving from the molded product, in the manner similar to the blend in which distearyl-pentaerythritol diphosphite is mixed with the liquid crystal polyester resin composition.

Examples 14 to 16

 The same manner as in Example 1 was repeated, except that a admixture of a phosphorus-containing compound, a higher fatty acid and calcium oxide (trade name: VESTA PP) (manufactured by INOUE SEKKAI KOGYO CO., LTD, average particle size: 9.6 μ m) was used instead of the

phosphorus-containing compound alone. The results are shown in Tables 1 and 2. The blend in which the admixture of the phosphorus-containing compound, the higher fatty acid and calcium oxide was mixed with the liquid crystal polyester resin composition has a small difference of the meterage time among the shots and a small meterage time, is stably plasticized, has excellent mechanical properties and gives a low amount of gas evolving from the molded product, in the manner similar to the blend in which the phosphorus-containing compound alone is mixed with the liquid crystal polyester resin composition.

Furthermore, regarding liquid crystal polyester resin blends of Examples 14 to 16, the effect of stabilizing the meterage time was not deteriorated even when the preliminary drying before molding was conducted at 150°C.

Comparative Examples 7 and 8

The blend (Comparative Example 7) in which the amount of each of the phosphorus-containing compound, the higher fatty acid and calcium oxide mixed with the liquid crystal polyester resin composition was 0.0005 parts by weight had an insufficient effect of stable plasticization during the molding process. On the other hand, the blend (Comparative Example 8) in which 10 parts by weight of each of the phosphorus-containing compound, the higher fatty acid and calcium oxide mixed with the liquid crystal polyester resin composition had the discoloring of the molded product and the significantly decreased tensile properties, and gave a considerably large amount of gas evolving from the molded product (Tables 1 and 2).

Table 1

	Liquid crystal polyester resin blend								
	Liquid crystal polyester resin composition					Mixed with tumbler			
	Liquid crystal polyester (parts by weight)	Glass fiber (parts by weight)	Phosphorus-containing compound (parts by weight)	Higher fatty acid (parts by weight)	Higher fatty acid metal salt (parts by weight)	Phosphorus-containing compound (parts by weight)	Higher fatty acid (parts by weight)	Metal oxide (calcium oxide) (parts by weight)	Higher fatty acid metal salt (parts by weight)
Example 1	60	40	_____	_____	_____	No. 1 (0.005)	_____	_____	_____
Example 2	60	40	_____	_____	_____	No. 1 (0.01)	_____	_____	_____
Example 3	60	40	_____	_____	_____	No. 1 (0.03)	_____	_____	_____
Example 4	60	40	_____	_____	_____	No. 1 (0.05)	_____	_____	_____
Example 5	60	40	_____	_____	_____	No. 1 (0.015)	No. 6 (0.015)	_____	_____
Example 6	60	40	_____	_____	_____	No. 1 (0.015)	_____	_____	No. 8 (0.015)
Example 7	60	40	_____	_____	_____	No. 1 (0.015)	No. 7 (0.015)	_____	_____
Example 8	60	40	_____	_____	_____	No. 1 (0.015)	_____	_____	No. 9 (0.015)
Example 9	60	40	_____	_____	_____	No. 1 (0.015)	_____	_____	No. 10 (0.015)
Example 10	60	40	_____	_____	_____	No. 2 (0.03)	_____	_____	_____
Example 11	60	40	_____	_____	_____	No. 3 (0.03)	_____	_____	_____
Example 12	60	40	_____	_____	_____	No. 4 (0.03)	_____	_____	_____
Example 13	60	40	_____	_____	_____	No. 5 (0.03)	_____	_____	_____
Example 14	60	40	_____	_____	_____	No. 1 (0.01)	No. 6 (0.005)	0.005	_____
Example 15	60	40	_____	_____	_____	No. 1 (0.01)	No. 6 (0.01)	0.01	_____
Example 16	60	40	_____	_____	_____	No. 1 (0.04)	No. 6 (0.02)	0.02	_____
Comparative Example 1	60	40	_____	_____	_____	_____	_____	_____	_____
Comparative Example 2	60	40	_____	_____	_____	No. 1 (0.0005)	_____	_____	_____
Comparative Example 3	60	40	_____	_____	_____	No. 1 (10)	_____	_____	_____
Comparative Example 4	60	40	No. 1 (0.03)	_____	_____	_____	_____	_____	_____
Comparative Example 5	60	40	No. 1 (0.015)	No. 6 (0.015)	_____	_____	_____	_____	_____
Comparative Example 6	60	40	No. 1 (0.015)	_____	No. 8 (0.015)	_____	_____	_____	_____
Comparative Example 7	60	40	_____	_____	_____	No. 1 (0.0005)	No. 6 (0.0005)	0.0005	_____
Comparative Example 8	60	40	_____	_____	_____	No. 1 (10)	No. 6 (10)	10	_____

Table 2

	Meterage property				Tensile properties		Relative amount of evolved gas	Remarks
	Preliminary drying at 120°C		Preliminary drying at 150°C					
	Average meterage time (sec)	Standard deviation (sec)	Average meterage time (sec)	Standard deviation (sec)	Strength (kg/cm ²)	Elastic modulus (kg/cm ²)		
Example 1	7.3	0.4	_____	_____	1510	143000	53000	
Example 2	6.8	0.5	8.8	1.8	1520	141000	55000	
Example 3	5.3	0.2	7.0	1.2	1530	139000	57000	
Example 4	5.5	0.3	_____	_____	1490	139000	81000	
Example 5	5.3	0.4	7.6	1.6	1510	141000	56000	
Example 6	5.4	0.2	_____	_____	1540	138000	55000	
Example 7	5.8	0.4	_____	_____	1520	139000	54000	
Example 8	6.1	0.4	8.1	0.9	1550	138000	53000	
Example 9	6.3	0.5	_____	_____	1500	141000	58000	
Example 10	5.9	0.6	_____	_____	1490	139000	60000	
Example 11	6.3	0.5	_____	_____	1510	139000	61000	
Example 12	6.2	0.4	_____	_____	1530	138000	57000	
Example 13	6.4	0.5	_____	_____	1530	140000	58000	
Example 14	6.5	0.3	6.7	0.5	1520	140000	54000	
Example 15	4.9	0.2	6.1	0.3	1530	139000	55000	
Example 16	5.1	0.2	5.8	0.3	1530	141000	58000	
Comparative Example 1	18.2	11.6	17.5	11.3	1540	140000	53000	
Comparative Example 2	17.0	9.8	_____	_____	1550	138000	53000	
Comparative Example 3	10.5	0.5	_____	_____	840	89000	340000	Discoloring of molded product
Comparative Example 4	17.5	11.3	_____	_____	1520	138000	59000	
Comparative Example 5	16.8	10.9	_____	_____	1530	138000	57000	
Comparative Example 6	18.4	11.5	_____	_____	1530	138000	58000	
Comparative Example 7	19.1	10.9	_____	_____	1540	140000	53000	
Comparative Example 8	7.8	0.3	8.0	0.3	790	67000	410000	Discoloring of molded product

Table 3

	No. in Table 1	Name of compound
Phosphorus-containing compound	No. 1	Distearyl pentaerythritol diphosphite
	No. 2	Bis(2,6-di-t-butyl-4-methylphenyl) pentaerythritol diphosphite
	No. 3	Tris(2,4-di-t-butylphenyl) phosphite
	No. 4	2,2-Methylenebis(4,6-di-t-butylphenyl) octyl phosphite
	No. 5	Tetrakis(2,4-di-t-butylphenyl) 4,4'-biphenylene diphosphonite
Higher fatty acid	No. 6	Stearic acid
	No. 7	Lauric acid
Higher fatty acid metal salt	No. 8	Calcium stearate
	No. 9	Barium stearate
	No. 10	Calcium laurate

Examples 17 to 20 and Comparative Examples 9 to 11

A liquid crystal polyester having the above repeating units A₁, B₁, B₂ and C₁ wherein a molar ratio of A₁:B₁:B₂:C₁ is 60:15:5:20 and having a flow temperature of 323°C was mixed with a milled glass fiber (EFH 75-01, manufactured by CENTRAL GLASS CO., LTD.) in a ratio shown in Table 4 in a Henschel mixer. This admixture was converted into particles by the use of a biaxial extruder (PCM-30, manufactured by IKEGAI CORPORATION) at a cylinder temperature of 340°C to give a liquid crystal polyester resin composition. The resultant liquid crystal polyester resin composition was cylinder particles having an average diameter of 2 mm and an average length of 2.5 mm. The resultant liquid crystal polyester resin composition was mixed with a potassium salt of perfluoroalkylsulfonic acid (Fluorad FC-95, manufactured by 3M CO.) in a ratio shown in Table 4 at a room temperature by the use of a tumbler to give a liquid crystal polyester resin blend.

After the liquid crystal polyester resin blend was dried at 120°C for 3

hours, JIS 1 (1/2) dumbbells were prepared at a cylinder temperature of 350°C and a mold temperature of 130°C by the use of an injection molding machine (PS40E5ASE, manufactured by NISSEI PLASTIC CO., LTD.). Meterage times for 50 continuous shots were measured to evaluate the stability thereof. The tensile properties and the evolved gas were measured by the use of the resultant dumbbell.

In the similar manner, the stability of the meterage time, the tensile properties and the amount of the evolved gas were measured as to a liquid crystal polyester resin blend containing no fluorocarbon surfactant (Comparative Example 9). The results are shown in Table 4.

As shown in Table 4, the blend (Examples 17 to 20) comprising the liquid crystal polyester resin composition and the fluorocarbon surfactant has a smaller difference of the meterage time among the shots and a smaller meterage time than the blend (Comparative Example 9) comprising no fluorocarbon surfactant, is stably plasticized, has excellent mechanical properties and gives a low amount of gas evolving from the molded product.

The blend (Comparative Example 10) in which the amount of the fluorocarbon surfactant mixed with the liquid crystal polyester resin composition was 0.0005 parts by weight had an insufficient effect of stable plasticization during the molding process. On the other hand, the blend (Comparative Example 11) in which 10 parts by weight of the fluorocarbon surfactant was mixed with the liquid crystal polyester resin composition has the discoloring of the molded product and the significantly decreased tensile properties.

Comparative Example 12

The same manner as in Example 17 was repeated, except that the fluorocarbon surfactant together with the milled glass fibers was premixed with the liquid crystal polyester, and the particles were formed by the use of the biaxial extruder. The results are shown in Table 4. The blend (Comparative Example 12) in which the fluorocarbon surfactant was previously incorporated in the liquid crystal polyester resin at the molten state had a large value of the meterage time and a large change among the shots to give an unstable plasticization during the molding process.

Comparative Example 13

The same manner as in Example 17 was repeated, except that a sodium salt of 2-ethylhexylalkylsulfate ester was used instead of the fluorocarbon surfactant. The results are shown in Table 4. The blend (Comparative Example 13) in which the sodium salt of 2-ethylhexylalkylsulfate ester was mixed with the liquid crystal polyester resin composition had an insufficient effect of stable plasticization during the molding process, and gave a considerably large amount of gas evolving from the molded product.

Table 4

	Liquid crystal polyester resin blend					Meterage property		Tensile properties		Relative amount of evolved gas
	Liquid crystal polyester resin composition			Mixed with tumbler						
	Liquid crystal polyester (parts by weight)	Glass fiber (parts by weight)	Fluorocarbon surfactant (parts by weight)	Fluorocarbon surfactant (parts by weight)	Sodium salt of alkyl sulfate ester (parts by weight)	Average meterage time (sec)	Standard deviation (sec)	Strength (kg/cm ²)	Elastic modulus (kg/cm ²)	
Example 17	60	40	-	0.005	-	7.2	0.8	1520	143000	54000
Example 18	60	40	-	0.01	-	5.6	0.5	1530	142000	53000
Example 19	60	40	-	0.03	-	6.0	0.2	1510	141000	54000
Example 20	60	40	-	0.05	-	6.1	0.2	1520	142000	53000
Comparative Example 9	60	40	-	-	-	16.9	11.3	1530	141000	53000
Comparative Example 10	60	40	-	0.0005	-	15.0	8.5	1530	140000	52000
Comparative Example 11	60	40	-	10	-	31.0	18.6	1130	106000	95000
Comparative Example 12	60	40	0.03	-	-	15.9	10.7	1520	139000	55000
Comparative Example 13	60	40	-	-	0.03	20.5	11.9	1490	138000	86000

Examples 21 to 24 and Comparative Examples 14 to 16

A liquid crystal polyester having the above repeating units A_1 , B_1 , B_2 and C_1 wherein a molar ratio of $A_1:B_1:B_2:C_1$ is 60:15:5:20 and having a flow temperature of 323°C was mixed with a milled glass fiber (EFH 75-01, manufactured by CENTRAL GLASS CO., LTD.) in a ratio shown in Table 5 in a Henschel mixer. This admixture was converted into particles by the use of a biaxial extruder (PCM-30, manufactured by IKEGAI CORPORATION) at a cylinder temperature of 340°C to give a liquid crystal polyester resin composition. The resultant liquid crystal polyester resin composition was mixed with a higher fatty acid ester (stearic acid monodiglyceride) in a ratio shown in Table 5 at a room temperature by the use of a tumbler to give a liquid crystal polyester resin blend.

After the liquid crystal polyester resin blend was dried at a temperature shown in Table 5 for 3 hours, JIS 1 (1/2) dumbbells were prepared at a cylinder temperature of 350°C and a mold temperature of 130°C by the use of an injection molding machine (PS40E5ASE, manufactured by NISSEI PLASTIC CO., LTD.). Meterage times for 50 continuous shots were measured to evaluate the stability. The tensile properties and the evolved gas were measured by the use of the resultant dumbbell.

In the similar manner, the stability of the meterage time, the tensile properties and the amount of the evolved gas were measured as to a liquid crystal polyester resin blend containing no higher fatty acid ester

(Comparative Example 14). The results are shown in Table 5.

As shown in Table 5, the blend (Examples 21 to 24) comprising the liquid crystal polyester resin composition and the higher fatty acid ester has a smaller difference of the meterage time among the shots and a smaller meterage time than the blend (Comparative Example 14) comprising no fatty acid ester, is stably plasticized, has excellent mechanical properties and gives a low amount of gas evolving from the molded product. —

The blend (Comparative Example 15) in which the amount of the higher fatty acid ester mixed with the liquid crystal polyester resin composition was 0.0005 parts by weight had an insufficient effect of stable plasticization during the molding process. On the other hand, the blend (Comparative Example 16) in which 10 parts by weight of the higher fatty acid ester was mixed with the liquid crystal polyester resin composition has the discoloring of the molded product and the significantly decreased tensile properties and gives a considerably large amount of gas evolving from the molded product.

Comparative Example 17

The same manner as in Example 21 was repeated, except that the higher fatty acid ester together with the milled glass fibers was premixed with the liquid crystal polyester, and the particles were formed by the use of the biaxial extruder. The results are shown in Table 5. The blend (Comparative Example 17) in which the higher fatty acid ester was previously incorporated in the liquid crystal polyester resin at the molten state had a large value of the meterage time and a large change among the shots to give an unstable plasticization during the molding process. —

Examples 25 to 27

The same manner as in Example 21 was repeated, except that Nos. 2 to 4 shown in Table 6 were used as the higher fatty acid ester. The results are shown in Table 5. The blends (Examples 25 to 27) in which the higher fatty acid esters of Nos. 2 to 4 were mixed with the liquid crystal polyester resin composition have a small difference of the meterage time among the shots and a small meterage time, are stably plasticized, have excellent mechanical properties and give a low amount of gas evolving from the molded product, in the manner similar to the blend in which stearic acid monodiglyceride is mixed with the liquid crystal polyester resin composition.

Comparative Example 18

The same manner as in Example 21 was repeated, except that stearic acid (higher fatty acid) was used instead of the higher fatty acid ester. The results are shown in Table 5. The liquid crystal polyester resin blend (Comparative Example 18) in which stearic acid was mixed had a large value of the meterage time during molding after subjecting to preliminary drying at 150°C and a large change among the shots to give an unstable plasticization during the molding process.

Table 5

	Liquid crystal polyester resin blend					Meterage property				Tensile properties		Relative amount of evolved gas	Remarks
	Liquid crystal polyester resin composition			Mixed with tumbler		Preliminary drying at 120°C		Preliminary drying at 150°C					
	Liquid crystal polyester (parts by weight)	Glass fiber (parts by weight)	Higher fatty acid ester (parts by weight)	Higher fatty acid ester (parts by weight)	Stearic acid (parts by weight)	Average meterage time (sec)	Standard deviation (sec)	Average meterage time (sec)	Standard deviation (sec)	Strength kg/cm ²	Elastic modulus kg/cm ²		
Example 21	60	40	————	No. 1 (0.005)	————	7.6	0.5	7.3	0.5	1530	138000	55000	
Example 22	60	40	————	No. 1 (0.01)	————	6.1	0.5	5.3	0.4	1530	137000	55000	
Example 23	60	40	————	No. 1 (0.03)	————	5.8	0.3	5.5	0.3	1510	139000	56000	
Example 24	60	40	————	No. 1 (0.05)	————	5.8	0.2	5.1	0.3	1500	141000	54000	
Example 25	60	40	————	No. 2 (0.03)	————	6.2	0.4	6.9	0.4	1490	138000	57000	
Example 26	60	40	————	No. 3 (0.03)	————	6.5	0.4	6.9	0.3	1540	137000	58000	
Example 27	60	40	————	No. 4 (0.03)	————	6.2	0.3	6.0	0.2	1530	136000	58000	
Comparative Example 14	60	40	————	————	————	18.5	12.1	18.1	11.8	1530	141000	53000	
Comparative Example 15	60	40	————	No. 1 (0.005)	————	16.5	9.7	16.8	9.4	1510	140000	55000	
Comparative Example 16	60	40	————	No. 1 (10)	————	10.5	0.6	9.8	0.7	860	78000	243000	Discoloring of molded product
Comparative Example 17	60	40	No. 1 (0.03)	————	————	17.6	11.5	18.2	10.9	1540	139000	56000	
Comparative Example 18	60	40	————	————	0.03	8.1	0.7	16.4	9.3	1500	140000	57000	

Table 6

No. in Table 5	Name of compound	Melting point (°C)
No. 1	Stearic acid monodiglyceride	59 - 62
No. 2	Stearic acid monoglyceride	63 - 68
No. 3	Montanic acid monoglyceride	-
No. 4	Sorbitan tristearate	54

The liquid crystal polyester resin blend of the present invention has a stability of plasticizing the liquid crystal polyester material during the molding process, can be stably molded and gives a molded product having a excellent mechanical properties and thermal stability. The method for molding the liquid polyester resin blend of the present invention is useful in a molding process using an extruder having a screw, such as an injection molding process and an extrusion process.



What is claimed is:

1. A liquid crystal resin blend comprising 100 parts by weight of a liquid crystal polyester resin composition and 0.001 to 5 parts by weight of at least one compound selected from a phosphorus-containing compound, a fluorocarbon surfactant and a higher fatty acid ester, which are blended at the temperature lower than a flow temperature of the liquid polyester resin composition,

wherein the liquid crystal resin composition comprises 100 parts by weight of a liquid crystal polyester and 0 to 150 parts by weight of a filler, and wherein the flow temperature is a temperature at which a resin shows a melt viscosity of 48,000 poise when the resin heated at a heating rate of 4°C/min is extruded from a nozzle having an internal diameter of 1 mm and a length of 10 mm under a load of 100 kgf/cm².

2. The liquid crystal polyester resin blend according to claim 1, comprising 100 parts by weight of the liquid crystal polyester resin composition and 0.001 to 5 parts by weight of the phosphorus-containing compound, which are blended.

3. A liquid crystal polyester resin blend, further comprising at least 0.001 parts by weight of a higher fatty acid in addition to the liquid crystal polyester resin blend of claim 2, wherein the total amount of the phosphorus-containing compound and the higher fatty acid is 0.002 to 5 parts by weight.

4. A liquid crystal polyester resin blend, further comprising at least 0.001 parts by weight of at least one compound selected from an oxide, a peroxide, a double oxide and a carbonate of a metal belonging to IA or IIA group of the periodic table in addition to the liquid crystal polyester resin blend



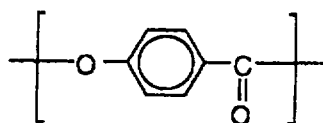
of claim 3, wherein the total amount of the phosphorus-containing compound, the higher fatty acid and at least one compound selected from the oxide, peroxide, double oxide and carbonate of the metal belonging to IA or IIA group is 0.003 to 5 parts by weight.

5. A liquid crystal polyester resin blend, further comprising at least 0.001 parts by weight of a higher fatty acid metal salt in addition to the liquid crystal polyester resin blend of claim 2, wherein the total amount of the phosphorus-containing compound and the higher fatty acid metal salt is 0.002 to 5 parts by weight.

6. The liquid crystal polyester resin blend according to claim 1, comprising 100 parts by weight of the liquid crystal polyester resin composition and 0.001 to 5 parts by weight of the fluorocarbon surfactant, which are blended.

7. The liquid crystal polyester resin blend according to claim 1, comprising 100 parts by weight of the liquid crystal polyester resin composition and 0.001 to 5 parts by weight of the higher fatty acid ester, which are blended.

8. The liquid crystal polyester resin blend according to any one of claims 1, 2, 3, 4, 5, 6 and 7, wherein the liquid crystal polyester comprises at least 30% by mole, based on the liquid crystal polyester, of a repeating unit of the formula (A₁):



(A₁)

9. A method for molding a liquid crystal polyester material, wherein a



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liquid crystal resin blend according to any one of claims 1, 2, 3, 4, 5, 6 and 7 is used as the liquid crystal polyester material.