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(54) Blends of phenolphthalein polycarbonates with rubber-modified monovinylidene aromatic copolymers.

(57) Blends of ar,ar'-dihydroxytrityl polycarbonates, such as a copolycarbonate of phenolphthalein and bisphenol-A, with a rubber-modified monovinylidene aromatic copolymer, such as an ABS resin, exhibit improved impact strength, melt flow properties, resistance to stress cracking and heat resistance. Such blends are particularly useful in the manufacture of molded parts which must be exposed to high temperatures during manufacture and/or use.

Croydon Printing Company Ltd.

BLENDS OF PHENOLPHTHALEIN
POLYCARBONATES WITH RUBBER-MODIFIED
MONOVINYLIDENE AROMATIC COPOLYMERS

This invention is directed to a heterogenous blend comprising 10 to 90 percent by weight of a polycarbonate and 90 to 10 percent by weight of a rubber modified copolymer of a monovinylidene aromatic monomer and an α,β-ethylenically unsaturated comonomer having a pendent polar group, said rubber-modified copolymer containing (a) a rubber, (b) a random copolymer of the monovinylidene aromatic monomer and the polar comonomer and (c) a graft copolymer containing the rubber grafted or blocked with a copolymerized mixture of the monovinylidene aromatic monomer and the polar comonomer, said random copolymer having a solubility parameter within the range from 9.2 to 11.2, characterized in that the polycarbonate comprises an ar,ar'-dihydroxytrityl compound.

U.S. Patent No. 3,873,641 teaches molding compositions containing polycarbonates of bisphenol-A and rubber-modified copolymers. The blends of this reference, while showing improved heat distortion, suffer from reduced impact resistance. The blends of the present invention provide economical polycarbonate compositions which exhibit improved processibility while retaining or exceeding the desirable properties characteristic of polycarbonates such as impact strength, heat resistance and resistance to stress cracking.

The polycarbonate blends of this invention are suitably employed in most of the applications in which polycarbonates and rubber modified polymers have previously been utilized. Applications of particular interest for these polycarbonate blends are housings for electrical appliances, radio and television cabinets, automotive equipment including ornaments and lawn equipment including lawn furniture and the like.

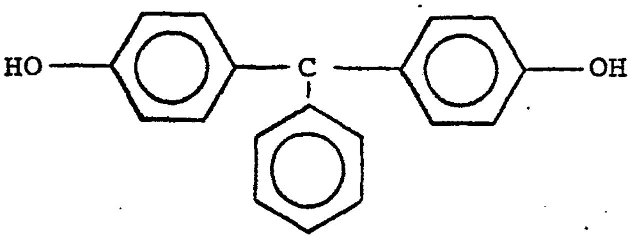
The polycarbonate compositions of the present invention are heterogeneous blends wherein the essential components, i.e., the polycarbonate and rubber-modified copolymer, exist as at least two separate and distinct phases. The proportions of the blend components are not particularly critical and each component can generally vary from about 10 to about 90 weight percent based on the total blend weight. So long as there is sufficient of each component to provide the impact resistance described hereinafter, proportions of the blend components within the aforementioned range of proportions are suitable. Preferably, however, the blend comprises from 40 to 90 weight percent of the trityl diol polycarbonate, most preferably from 50 to 80 weight percent, and from 60 to 10 weight percent of the rubber-modified monovinylidene aromatic copolymer, most preferably from 50 to 20 weight percent.

The blends of the present invention are normally solid thermoplastic materials, preferably having melt flow viscosities as determined by ASTM D-1238-65T (Condition I) in the range from 0.1 to 5 decigrams per minute (dg/min), more preferably from 0.3 to 2 dg/min, most preferably from 0.5 to 2 dg/min.

While the blends of this invention exhibit improved flow properties as might be expected, they exhibit heat and impact resistances which are unusually high in view of the heat and impact resistances of the blend components. Most surprisingly, in some preferred embodiments, the impact resistance of the blend actually exceeds the impact resistance of the polycarbonate component. In other embodiments, the notched Izod impact resistance of injection molded samples of the blend exceeds 4 foot-pounds/inch of notch (214 Newton-meters/-meter of notch), and often exceeds 5 foot-pounds/inch of notch (267 Newton-meters/meter of notch) as determined by ASTM D-256.

The trityl diol polycarbonates suitably employed in the practice of this invention are polymers of trityl diols including copolymers thereof with other aromatic diols wherein the diols are linked together through carbonate linkages. In this polycarbonate, the proportion of trityl diol is such that the polycarbonate has a Vicat softening temperature of at least 160°C, preferably at least 175°C. Generally the Vicat softening point of the polycarbonate is no greater than 270°C, preferably less than 210°C. Preferably such proportions of the trityl diol ranges from 10 to 100 mole percent, more preferably from 10 to 60 mole percent and most preferably from 20 to 40 mole percent based on the total diol content of the polycarbonate. While the molecular weight of the polycarbonate is not particularly critical, it is advantageously sufficient to provide the polycarbonate with the desired Vicat softening point. Preferably the weight average molecular weight of the polycarbonate is from 15,000 to 75,000, more preferably from 20,000 to 40,000 and most preferably from 25,000 to 35,000.

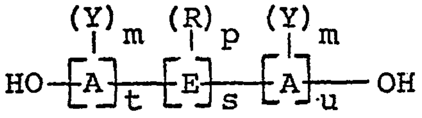
The trityl diols as used herein include those compounds having an ar,ar'-dihydroxytrityl nucleus represented by the formula:



I

wherein the aromatic ring bear, in addition to the hydroxy substituents such substituents as, for example, H, F, Cl, Br, I, $-NO_2$, -O-, alkyl, acyl, carboxylate ester, and sulfonate ester. Representative trityl diols include phenolphthalein type compounds as described in U.S. Patent No. 3,036,036; phenolsulfonephthalein compounds as described in U.S. Patent No. 3,036,037; phthalidene compounds as described in U.S. Patent No. 3,036,038; fluorescein compounds as described in U.S. Patent No. 3,036,039; and phenolphthalimidene compounds corresponding to the phenolphthalein compounds described in U.S. Patent No. 3,036,036. Of the foregoing trityl diol compounds, phenolphthalein and substituted phenolphthalein wherein the substituents are chlorine and bromine are preferred, with phenolphthalein being the most preferred. All of the foreging trityl diols may be prepared by known methods as exemplified in the aforementioned patents.

In addition to the aforementioned trityl diol, the polycarbonate may contain residues of other diols, preferably aromatic diols such as the dihydric phenols represented by the formula:



$$HO-\left[\overset{(Y)_m}{\overset{|}{A}}\right]_t-\left[\overset{(R)_p}{\overset{|}{E}}\right]_s-\left[\overset{(Y)_m}{\overset{|}{A}}\right]_u-OH$$

II

wherein A is an aromatic group such as, for example, phenylene, biphenylene, naphthylene, and anthrylene; E is alkylene or alkylidene such as, for example, methylene, ethylene, ethylidene, propylene, propylidene, isopropylidene, butylene, butylidene, isobutylidene, and amylidene or E may be cycloalkylene such as, for example, cyclopentylene or cyclohexylene, a sulfur containing linkage such as sulfide, sulfoxide or sulfone, an ether linkage, a carbonyl group, or a tertiary nitrogen group; R is hydrogen or a monovalent hydrocarbon group such as, for example, alkyl, aryl, arylalkyl, or cycloaliphatic; Y is chlorine, bromine, fluorine or R wherein R is defined as above; m is any whole number from and including 0 through the number of positions on A available for substitution; p is any whole number and including 0 through the number of positions available on E; t is any whole number which is 1 or more; s is 0 or 1 and u is any whole number including 0.

Examples of such dihydric phenols include the bis(hydroxyphenyl) alkylidenes such as 2,2-bis-(4--hydroxyphenyl)propane [bisphenol-A], 2,4'-dihydroxydiphenylmethane, bis-(2-hydroxyphenyl)methane, 1,1--bis(4-hydroxyphenyl)ethane and other bisphenol-A type diols as described in U.S. Patent No. 3,028,365 as well as the corresponding aromatically substituted or aliphatically substituted dihydric phenols wherein the substituents are halogens such as, for example, Cl, F, Br, I, and other substituents such as, for example, $-NO_2$, -O-, alkyl, acyl, carboxylate ester, and sulfonate ester. Of the foregoing dihydric phenols, bisphenol-A and substituted bisphenol-A are preferred, with bisphenol-A being most preferred.

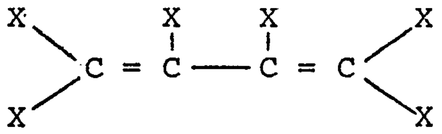
In the polycarbonate, these diols, other than the trityl diol, constitute the remaining diol proportion of the polycarbonate. Preferably, they constitute from 0 to 90 mole percent, more preferably from 40 to 90 mole percent, and most preferably from 20 to 40 mole percent based on the total diol content of the polycarbonate. For the purposes of this invention, it should be understood that the aforementioned mole percentages of the trityl diol as well as the other diol are based on the total diol residue of the polycarbonate and do not include the linking carbonyl groups.

The trityl diol polycarbonate is readily prepared by phosgenating the trityl diol or a mixture of the trityl diol with the other diol under the conditions described for preparing the trityl diol polycarbonates of U.S. Patent No. 3,036,036. Alternatively, the trityl diol can be reacted with the bischloroformate derivatives of one or more of the other diols.

The rubber-modified monovinylidene aromatic copolymer utilized in the practice of this invention is a normally solid polymeric material having a rubber polymer portion containing polymerized monomeric rubber precursor such as conjugated diene, a random copolymer portion containing copolymerized monovinylidene aromatic monomer and copolymerized ethylenically unsaturated polar comonomer such as ethylenically unsaturated nitrile, and a graft copolymer portion containing a rubber portion grafted or blocked with a copolymerized mixture of the monovinylidene aromatic monomer and the polar monomer. The relative proportions of the aforementioned rubber, random and graft copolymer portions are not particularly critical.

Preferably, however, the weight ratio of total rubber including the rubber portion of the graft copolymer to total copolymerized monovinylidene aromatic/polar monomer including that present in the graft copolymer is from 50:1 to 0.01:1, more preferably from 10:1 to 0.05:1, and most preferably from 1:1 to 0.1 to 1. The weight ratio of the graft copolymer to the total rubber-modified copolymer is preferably from 0.98:1 to 0.01:1, more preferably from 0.5:1 to 0.01:1, and most preferably from 0.15:1 to 0.03:1. In the graft copolymer, the weight ratio of the rubber to the copolymerized mixture is preferably from 9:1 to 0.2:1 more preferably from 4:1 to 0.5:1 and most preferably from 2.5:1 to 0.8:1. Also in the graft copolymer the ratio of the monovinylidene aromatic monomer to the polar comonomer is generally within the range specified for the random copolymer hereinafter. The molecular weight of the rubber-modified copolymer is not particularly critical so long as its melt flow viscosity is such that it can be melt blended with the aforementioned polycarbonate. Preferably, however, the melt flow viscosity of the rubber-modified copolymer as determined by ASTM D-1238-65T(I) is from 0.01 to 10, more preferably from 0.1 to 5, and most preferably from 2 to 3, deciliters per minute.

The chemical composition of the rubber portion is not particularly critical so long as it can impart the desired elastomeric character to the rubber-modified copolymer and can form a graft or block copolymer containing the random monovinylidene aromatic copolymer. Preferably the rubber portion is a rubber polymer of a conjugated diene represented by the formula:



III

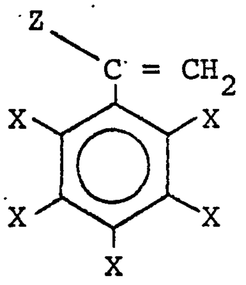
wherein X is individually hydrogen, alkyl having from 1 to 5 carbon atoms, chloro or bromo. Examples of suitable dienes include butadiene, isoprene, 1,2-hexadiene, methyl-1,3-pentadiene, 2,3-dimethyl-1,3-butadiene, 1,3-pentadiene, 2-methyl-3-ethyl-1, 3-butadiene, 2-ethyl-1,3-pentadiene, 1,3- and 2,4-hexadienes, chloro- and bromo-substituted butadienes such as dichlorobutadiene, bromobutadiene, chloroprene, dibromobutadiene, and mixtures thereof. Of the foregoing dienes, butadiene and isoprene are prefered, with butadiene being especially preferred. Examples of diene rubbers suitably employed in the practice of this invention are homopolymers of butadiene and isoprene, copolymers of butadiene or isoprene and styrene, copolymers of butadiene and acrylonitrile, and copolymers of styrene, butadiene and acrylonitrile.

In the preferred diene rubbers, the amount of diene is sufficient to provide the desired elastomeric character. An especially preferred group of diene rubbers are those containing from 50 to 100 weight percent of butadiene and/or isoprene polymerized or copolymerized form and up to 50 weight percent of monovinylidene aromatic hydrocarbon polymerized or copolymerized form, such as styrene and/or an unsaturated nitrile such as acrylonitrile. Particularly advantageous are the homopolymers of butadiene and copolymers of butadiene with up to 50 weight percent of styrene. These preferred diene rubbers exhibit glass transition temperatures (T_g) generally less than 0°C, more preferably less than -30°C and most preferably from -110°C to -50°C as determined by ASTM D-746-56T. In the rubber-modified copolymer, the diene rubber advantageously has an average particle size of 10 micrometers or less, preferably in the range from 0.2 to 5 micrometers. Such preferred diene rubbers also exhibit intrinsic viscosities as determined at 25°C in toluene of from 0.1 to 5.

In addition to the aforementioned monomeric components, it should be understood that the rubber portion may also contain relatively small amounts, usually less than 2 weight percent based on the rubber, of a crosslinking agent such as, for example, divinylbenzene, diallylmaleate, and ethylene glycol dimethacrylate provided that such crosslinking does not eliminate the desired elastomeric character of the rubber.

The random copolymer portion of the rubber-modified copolymer including the graft copolymer is suitably any normally solid random copolymer of at least one monovinylidene aromatic monomer and at least one copolymerizable ethylenically unsaturated monomer having a pendent polar group (a so-called polar comonomer). The type and amount of the polar comonomer in the random copolymer are such that the solubility parameter of the random copolymer is from 9.2 to 11.2, preferably from 9.3 to 10.8. Preferably the random copolymer contains polymerized therein from 50 to 95, most preferably from 65 to 85 weight percent of the monovinylidene aromatic monomer, which is preferably styrene, and from 5 to 50, most preferably from 15 to 35 weight percent of the polar comonomer, which is preferably an α,β-ethylenically unsaturated nitrile, particularly acrylonitrile.

The monovinylidene aromatic monomer is suitably one represented by the formula:



IV

wherein X is as defined hereinbefore and Z is hydrogen or methyl. Examples of monovinylidene aromatic compounds include styrene, α-methylstyrene, ar-chlorostyrene, ar-methylstyrene, ar-bromostyrene, ar-(t-butyl)styrene with styrene being preferred.

Suitable polar comonomers include the α,β-ethylenically unsaturated nitriles such as acrylonitrile, methacrylonitrile, fumaronitrile as well as mixtures thereof with other polar comonomers that are copolymerizable with the saturated nitrile or the aromatic monomer. Examples of such other polar comonomers include α,β-ethylenically unsaturated carboxylic acids and their anhydrides and alkyl, aminoalkyl and hydroxyalkyl esters such as acrylic acid, methacrylic acid, itaconic acid, maleic anhydride, ethyl acrylate, butyl acrylate, methyl methacrylate, hydroxyethyl and hydroxypropyl acrylates, or aminoethyl acrylate. When the polar comonomer is a mixture of unsaturated nitrile and another polar comonomer, the concentration of the nitrile comonomer in the mixture is such that the random copolymer contains at least 5 weight percent of the nitrile comonomer. Of the foregoing polar comonomers, the ethylenically unsaturated nitriles are preferably employed alone, with acrylonitrile being the most preferred nitrile.

Of the aforementioned rubber-modified graft copolymers, the so-called ABS resins, particularly those that are mixtures of styrene/acrylonitrile copolymer with a graft of the same copolymer on a diene rubber, are especially preferred.

In general, the method employed in preparing the rubber-modified copolymer is not particularly critical since the impact strength of the resultant polycarbonate composition is suitable when any aforementioned rubber-modified copolymer (regardless of method of preparation) is employed therein. However, it is found that the most improvement in impact resistance is obtained when preformed diene rubber is dissolved or dispersed in the monovinylidene aromatic monomer and the polar comonomer and thereafter heated to polymerize the monomers. Polymerization can be effected by heating the solution of rubber and monomer in mass, in emulsion, or while dispersed as droplets in an inert aqueous medium and at temperatures between 50° and 180°C and pressures ranging from subatmospheric to superatmospheric. Although not required, it is sometimes desirable to employ a polymerization initiator such as benzoyl peroxide, di-t-butyl peroxide, dicumyl peroxide, t-butyl hydroperoxide, cumyl hydroperoxide, t-butyl peracetate or other similar free-radical generating peroxygen catalysts. The preferred rubber-modified copolymers are prepared by conventional ABS polymerization methods, e.g., those described in U.S. Patent Nos. 2,769,804; 3,168,593; 3,243,481; 3,426,103; 3,442,981; 3,499,059; and 3,660,535.

In addition to the aforementioned polycarbonate and rubber-modified copolymer, it is sometimes desirable to include a random block or graft copolymer of a monovinylidene aromatic monomer and a polar comonomer, other than the polar comonomer of the aforementioned random copolymer, as a third component in the blend. This third component copolymer may also be modified with a rubber as defined hereinbefore. This other or third component copolymer is normally employed in concentrations from 1 to 25, preferably from 5 to 20, weight percent based on the total blend. This third component copolymer preferably has a solubility parameter from 9.8 to 10.8.

Exemplary third component copolymers include copolymers of monovinylidene aromatic monomers as defined hereinbefore, preferably styrene, and polar monomers other than the aforementioned nitriles, preferably the α,β-

-ethylenically unsaturated carboxylic acids or anhydrides, most preferably maleic anhydride. In the third component copolymer, the monovinylidene aromatic monomer constitutes from 50 to 95, preferably from 67 to 90, weight percent and the polar comonomer constitutes from 50 to 5, preferably from 33 to 10, weight percent. In addition, this third component advantageously contains up to 40, preferably from 5 to 40, weight percent of a rubber, preferably a diene rubber as defined hereinbefore.

In the preparation of the polycarbonate blend of the present invention, the polymeric components are combined by conventional mixing techniques such as admixing of granular or particulate polymeric components and subsequent malaxation of components at temperatures sufficient to cause heat plastification thereof. Alternatively, the blends may be prepared by heat plastifying the higher melting polymeric components and adding the other components thereto either in granular or heat plastified form. When a third component monovinylidene aromatic copolymer such as a styrene/maleic anhydric copolymer is to be employed, it is generally desirable to combine the rubber-modified copolymer and the third component copolymer into a uniform mixture prior to combining with the polycarbonate.

One particularly convenient method for preparing the polycarbonate blend in accordance with the present invention is to dry blend a particulate of the polycarbonate with a particulate of the rubber-modified copolymer or a mixture thereof with the third component copolymer and directly feed this dry blend into a heat fabricating apparatus such as a screw extruder or a reciprocating screw injection molding machine. The particular manner of mixing these components in heat plastified form is not critical but sufficient working should be employed to insure a uniform distribution of each of the components throughout the resulting polycarbonate composition. In addition to the foregoing mixing procedures, other conventional mixing procedures may be employed including hot roll milling or kneading.

The following examples are given to illustrate the invention but should not be construed as limiting its scope. Unless otherwise indicated, all parts and percentages are by weight.

Example 1

A 500-gm portion of granular bisphenol-A/-phenolphthalein copolycarbonate having a weight average molecular weight of 26,000 and containing the monomeric species in a 3:1 weight ratio wherein the granules have a major dimension of about 1/8 inch (about 3 mm) is dry blended with a 500-gm portion of ABS resin granules (major dimensions of about 1/8 inch (about 3 mm)) by tumbling for one-half hour. The ABS resin contains a graft copolymer having a butadiene rubber backbone and graft portion of random styrene/acrylonitrile copolymer, an ungrafted butadiene rubber and a random styrene/acrylonitrile copolymer. The rubber particles in the ABS resin have diameters in the range of 0.5 to 2 micrometers. The random copolymer in the ABS resin contains 73 weight percent copolymerized styrene and 27 weight percent copolymerized acrylonitrile and has a solubility parameter of 9.8. The ABS resin is prepared by mass polymerizing 64 weight parts of styrene and 25 weight parts of acrylonitrile in the presence of about 11 weight parts of butadiene rubber.

The resulting dry blended granules of polycarbonate and ABS resin are charged to an 0.8 inch (20 mm) twin-screw mixing extruder (Welding Engineers) having a barrel temperature (feed to die) profile of 475°F (246°C), 500°F (260°C), 550°F (288°C), 550°F (288°C), 525°F (274°C) and 500°F (260°C). The dry blend is thereby heat plastified, extruded, granulated and molded into bars for testing for impact resistance and heat resistance as reported in Table I. Residence time of the blended material in the extruder is about 90 seconds and the extruder is operated at 190 to 250 rpm.

For the purpose of comparison, several other phenolphthalein copolycarbonates and ABS resins are combined at different portions to form blends and are tested for impact and heat resistance. The results of these tests are also reported in Table IA.

As an illustration of the unusual character of the blends of the present invention, several blends are prepared using a bisphenol-A homopolymer having a weight average molecular weight of 30,000 (sold under the trademark LEXAN® 101 by General Electric) and various of the aforementioned ABS resins are similarly prepared and tested for impact and heat resistance. The results of these tests are similarly recorded in Table IB. As points of reference, the impact and heat resistance of the various individual components employed in the aforementioned blends are also reported in Table IB.

TABLE IA

Sample No.	Polycarbonate (1) Type	Polycarbonate (1) Amount wt %	Rubber Modified Type	Rubber Modified Amount wt %	Third Component Type	Third Component Amount wt %	Vicat Softening Point(4) °C	Notched Izod(5) ft-lbs/in notch (N-m/m notch)
1	BPA/PP(a)	40	ABS(f)	60	--	--	128	11.6 (619)
2	"	50	"	50	--	--	143	15.9 (849)
3	"	60	"	40	--	--	152	13.5 (721)
4	"	40	ABS(g)	60	--	--	123	9.5 (507)
5	"	50	"	50	--	--	136	13.9 (742)
6	"	60	"	40	--	--	147	15.2 (811)
7	"	70	"	30	--	--	152	18.4 (982)
8	BPA/PP(b)	40	"	60	--	--	129	5.3 (283)
9	"	50	"	50	--	--	136	13.0 (694)
10	"	60	"	40	--	--	157	13.0 (694)
11	"	70	"	30	--	--	175	12.5 (667)
12	BPA/PP(a)	50	ABS(h)	50	--	--	134	13.1 (669)
13	"	50	ABS(i)	50	--	--	138	14.2 (758)
14	"	50	ABS(g)	33	SMA(j)	17	145	20.8 (1110)

NOTES (1) - (5) SEE CORRESPONDING NOTES FOR TABLE IB

TABLE IB

Sample No.	Polycarbonate (1) Type	Polycarbonate (1) Amount wt %	Rubber Modified Type	Rubber Modified Amount wt %	Third Component Type	Third Component Amount wt %	Vicat Softening Point (4) °C	Notched Izod(5) ft-lbs/in notch (N-m/m notch)
C_1*	BPA(c)	50	ABS(f)	50	--	--	120	15.2 (811)
C_2*	"	50	ABS(g)	50	--	--	132	10.2 (544)
C_3*	"	100	--	--	--	--	154	16.5 (881)
C_4*	BPA/PP(a)	100	--	--	--	--	182	10.0 (534)
C_5*	BPA/PP(b)	100	--	--	--	--	210	2.5 (133)
C_6*	--	--	ABS(f)	100	--	--	102	4.0 (214)
C_7*	--	--	ABS(g)	100	--	--	104	5.5 (294)
C_8*	--	--	ABS(h)	100	--	--	103	4.0 (214)
C_9*	--	--	ABS(i)	100	--	--	103	8.1 (432)
C_{10}*	--	--	--	--	SMA(j)	100	149	2.8 (149)

*Not an example of the invention

TABLE IB (Cont.)

(1) BPA/PP(a) -- 75/25 (pbw) bisphenol-A/phenolphthalein copolycarbonate having a molecular weight Mw of 29,400.

BPA/PP(b) -- 50/50 (pbw) bisphenol-A/phenolphthalein copolycarbonate having a molecular weight Mw of 31,100.

BPA(c) -- commerical bisphenol-A polycarbonate sold under the tradename LEXAN^{R} 101-111 by General Electric.

(2) ABS(f) -- commercial medium impact ABS as described hereinbefore in this Example.

ABS(g) -- similar to ABS(f) except that the rubber content is approximately twice the rubber content of ABS(f).

ABS(h) -- commercial medium impact ABS sold under the tradename LUSTRAN^{R} 440 by Monsanto.

ABS(i) -- commercial high impact ABS sold under the tradename LUSTRAN^{R} 780 by Monsanto.

(3) SMA(j) -- a rubber modified styrene/maleic anhydride copolymer as described in U.S. Patent No. 3,966,842.

(4) ASTM D-1525.

(5) ASTM d-256, injection molded samples.

1. A heterogeneous blend comprising 10 to 90 percent by weight of a polycarbonate and 90 to 10 percent by weight of a rubber-modified copolymer of a monovinylidene aromatic monomer and an α,β-ethylenically unsaturated comonomer having a pendent polar group, said rubber-modified copolymer containing (a) a rubber, (b) a random copolymer of the monovinylidene aromatic monomer and the polar comonomer and (c) a graft copolymer containing the rubber grafted or blocked with a copolymerized mixture of the monovinylidene aromatic monomer and the polar comonomer, said random copolymer having a solubility parameter within the range from 9.2 to 11.2, characterized in that the polycarbonate comprises an ar,ar'-dihydroxytrityl compound.

2. The blend of Claim 1 characterized in that the polycarbonate has a Vicat softening point about 160°C.

3. The blend of Claim 2 characterized in that the polycarbonate is a copolycarbonate of from 10 to 60 mole percent of phenolphthalein and from 90 to 40 mole percent of another dihydric phenol, said mole percentages based upon the total diol content of the copolycarbonate.

4. The blend of Claim 3 characterized in that the other dihydric phenol is a bis(hydroxyphenyl)alkylidene.

European Patent Office

EUROPEAN SEARCH REPORT

Application number
EP 78 10 0158

0000146

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.²)
X	FR - A - 2 187 841 (UNIROYAL) * Page 3, lines 20-37; page 4, lines 1-14; pages 13-14 *	1-4	C 08 L 69/00 C 08 L 55/02 C 08 L 51/04
A	FR - A - 1 604 656 (BORG-WARNER CORP) * Pages 18-20 *		

TECHNICAL FIELDS SEARCHED (Int.Cl.²)

C 08 L 69/00
C 08 L 55/02
C 08 L 51/04

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	02-10-1978	GIROUD