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(12) (19) (CA) **Demande-Application**

(21) (A1) **2,340,231**

(86) 1999/07/20
(87) 2000/02/24

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(51) Int.Cl.^{7} C08L 25/06, D01F 6/44, C08J 5/18, C08L 51/00, B29C 45/00
(30) 1998/08/13 (198 36 621.3) DE

(54) MATIERES MOULABLES THERMOPLASTIQUES A RESISTANCE ELEVEE AUX CHOCS CONSTITUEES DE POLYSTYRENE SYNDIOTACTIQUE ET D'UN MODIFICATEUR ACRYLATE

(54) SHOCK-RESISTANT THERMOPLASTIC MOULDING MATERIALS MADE OF SYNDIOTACTIC POLYSTYRENE AND AN ACRYLATE MODIFIER

(57) Thermoplastic moulding materials containing (A) 30 - 99. 9 wt. % vinyl aromatic polymers with a syndiotactic structure, (B) 0.1 - 70 wt. % rubber elastic particle-shaped graft polymers with (C) 0 - 69.9 wt. % rubber elastic particle-shaped styrene/diene block copolymers, whereby the proportion of diene can be fully or partially hydrogenated and the particles of constituent (B) have a D (50) value ranging from 0.1-10 μm and constituent (B) is different from constituent (C).

PCT

WELTORGANISATION FÜR GEISTIGES EIGENTUM
Internationales Büro

INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

(51) Internationale Patentklassifikation 7 :
C08L 25/06, B29C 45/00, D01F 6/44, C08J 5/18 // (C08L 25/06, 51:00)

A1

(11) Internationale Veröffentlichungsnummer: **WO 00/09608**

(43) Internationales Veröffentlichungsdatum: 24. Februar 2000 (24.02.00)

(21) Internationales Aktenzeichen: PCT/EP99/05163

(22) Internationales Anmeldedatum: 20. Juli 1999 (20.07.99)

(30) Prioritätsdaten:
198 36 621.3 13. August 1998 (13.08.98) DE

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(81) Bestimmungsstaaten: AL, AU, BG, BR, BY, CA, CN, CZ, GE, HR, HU, ID, IL, IN, JP, KR, KZ, LT, LV, MK, MX, NO, NZ, PL, RO, RU, SG, SI, SK, TR, UA, US, ZA, eurasisches Patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Veröffentlicht
Mit internationalem Recherchenbericht.

(54) Title: SHOCK-RESISTANT THERMOPLASTIC MOULDING MATERIALS MADE OF SYNDIOTACTIC POLYSTYRENE AND AN ACRYLATE MODIFIER

(54) Bezeichnung: SCHLAGZÄHE THERMOPLASTISCHE FORMMASSEN AUS SYNDIOTAKTISCHEM POLYSTYROL UND ACRYLATMODIFIER

(57) Abstract

Thermoplastic moulding materials containing (A) 30 - 99. 9 wt. % vinyl aromatic polymers with a syndiotactic structure, (B) 0.1 - 70 wt. % rubber elastic particle-shaped graft polymers with (C) 0 - 69.9 wt. % rubber elastic particle-shaped styrene/diene block copolymers, whereby the proportion of diene can be fully or partially hydrogenated and the particles of constituent (B) have a D (50) value ranging from 0.1-10 μm and constituent (B) is different from constituent (C).

(57) Zusammenfassung

Thermoplastische Formmassen enthaltend A) 30 bis 99,9 Gew.-% eines vinylaromatischen Polymeren syndiotaktischer Struktur, B) 0,1 bis 70 Gew.-% eines kautschukelastischen, teilchenförmigen Pfropfpolymeren mit C) 0 bis 69,9 Gew.-% eines kautschukelastischen teilchenförmigen Styrol-/Dienblockcopolymeren, deren Dienteil vollständig oder teilweise hydriert sein kann, wobei die Teilchen der Komponente B) einen D(50)-Wert im Bereich von 0,1 bis 10 μm haben und die Komponente B) unterschiedlich zur Komponente C) ist.

SHOCK-RESISTANT THERMOPLASTIC MOULDING MATERIALS MADE OF SYNDIOTACTIC POLYSTYRENE AND AN ACRYLATE MODIFIER

The invention relates to thermoplastic molding compositions comprising

A) from 30 to 99.9 % by weight of a vinylaromatic polymer having a syndiotactic structure,

B) from 0.1 to 70 % by weight of an elastomeric, particulate graft polymer, and

C) from 0 to 69.9 % by weight of an elastomeric, particulate styrene-diene block copolymer whose diene fraction may have been partially or completely hydrogenated.

The invention also relates to the use of the thermoplastic molding compositions for producing fibers, films or moldings, and also to the resultant fibers, films and moldings.

The crystallinity of syndiotactic polystyrene gives it a very high melting point of about 270°C, high stiffness and tensile strength, dimensional stability, a low dielectric constant and high chemicals resistance. The mechanical property profile is retained even at temperatures above the glass transition temperature. The preparation of syndiotactic polystyrene in the presence of metallocene catalyst systems is known and is described in detail, for example, in EP-A 0 535 582.

The field of application of syndiotactic polystyrene is severely restricted by its brittleness.

It has therefore been desirable to reduce the brittleness of syndiotactic polystyrene, also termed SPS below, and at the same time to improve its impact strength.

EP-A 755 972 describes SPS which has been impact-modified with, on the one hand, a mixture made from a block copolymer of styrene and hydrogenated butadiene and, on the other hand, a core-shell polymer with a butadiene polymer core. However, modifiers of this type are not resistant to heat or weathering. Their impact strength remains inadequate and for these reasons inter alia they are not the ideal solution to the problem.

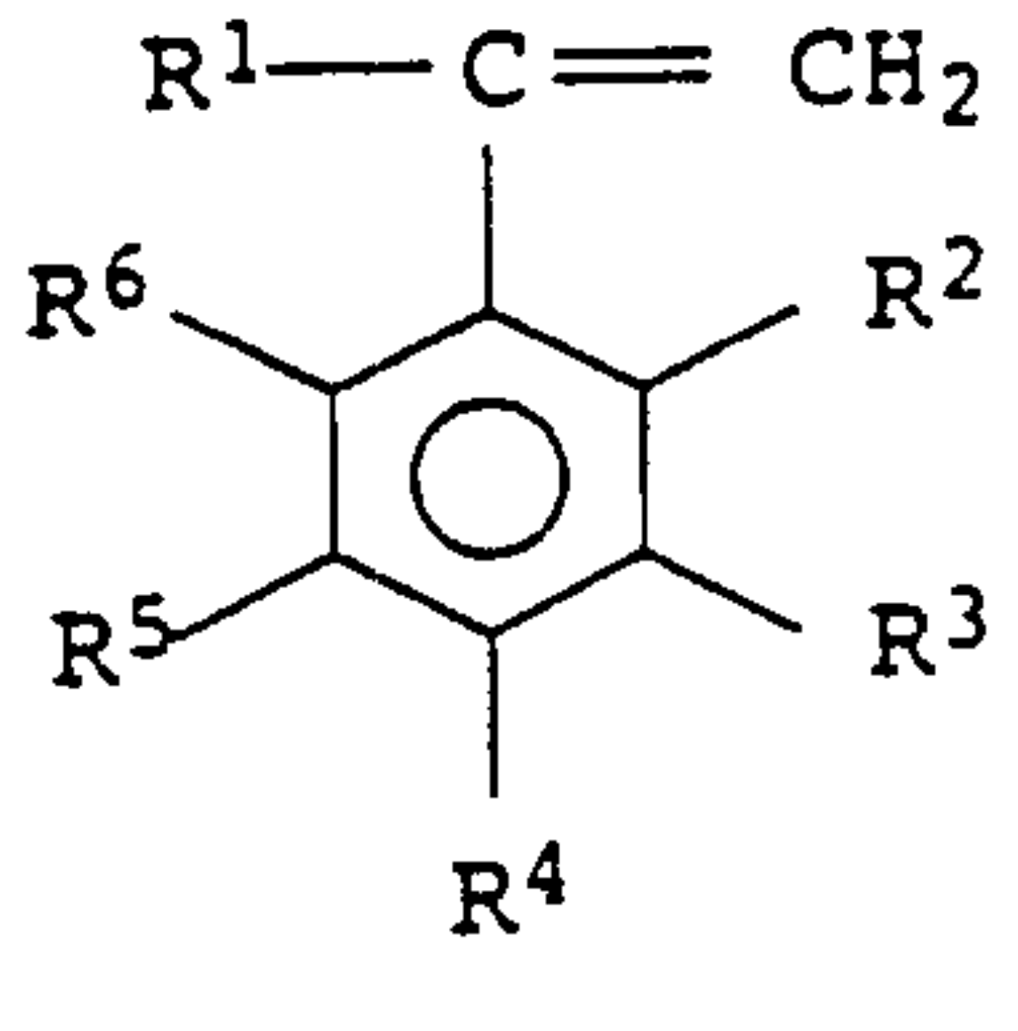
It is an object of the present invention to prepare an SPS-based thermoplastic molding composition which combines high impact strength, high stiffness (modulus of elasticity) and good flowability (MVR, processability), but nevertheless remains weathering-resistant.

We have found that this object is achieved by means of the thermoplastic molding compositions defined at the outset.

The use of the thermoplastic molding compositions for producing fibers, films or moldings has also been found, as have the resultant fibers, films and moldings.

The novel thermoplastic molding compositions comprise, as component A) from 30 to 99.9 % by weight, preferably from 40 to 99 % by weight, in particular from 50 to 95 % by weight, of a vinylaromatic polymer with a syndiotactic structure. For the purposes of the invention, the expression "with a syndiotactic structure" means that the polymers are essentially syndiotactic, i.e. the syndiotactic fraction determined by ^{13}C NMR is greater than 50 %, preferably greater than 60 %, of mmmm pentads.

Component A) has preferably been built up from compounds of the general formula I



(I),

where:

R^1	is hydrogen or C_1-C_4-alkyl,
R^2 to R^6	independently of one another are hydrogen, C_1-C_{12}-alkyl, C_6-C_{18}-aryl or halogen, or where two adjacent radicals together are a cyclic group having from 4 to 15 carbon atoms, for example C_4-C_8-cycloalkyl or annellated ring systems.

Preference is given to the use of vinylaromatic compounds of the formula I in which

R^1 is hydrogen.

Particularly suitable substituents R^2 to R^6 are hydrogen, C_1-C_4-alkyl, chlorine, phenyl, biphenyl, naphthalene and anthracene. Two adjacent radicals may also together be a cyclic group having from 4 to 12 carbon atoms, and therefore naphthalene derivatives and anthracene derivatives are examples of compounds of the formula I.

Examples of preferred compounds of this type are:

Styrene, p-methylstyrene, p-chlorostyrene, 2,4-dimethylstyrene, 4-vinylbiphenyl, vinylnaphthalene and vinylanthracene.

It is also possible to use mixtures of various vinylaromatic compounds, but the use of only one vinylaromatic compound is preferred.

Particularly preferred vinylaromatic compounds are styrene and p-methylstyrene.

The component A) used may also be a mixture of various vinylaromatic polymers having a syndiotactic structure, but the use of only one vinylaromatic polymer is preferred, in particular syndiotactic polystyrene (SPS).

Vinylaromatic polymers (A) having a syndiotactic structure, and also processes for their preparation are known per se and are described, for example, in EP-A 535 582. The preparation procedure is preferably to react compounds of the formula I in the presence of a metallocene complex and of a cocatalyst. The metallocene complexes used are in particular pentamethylcyclopentadienyltitanium trichloride, pentamethylcyclopentadienyl(trimethyl)titanium und pentamethylcyclopentadienyltitanium trimethylate.

The vinylaromatic polymers having a syndiotactic structure generally have a molar mass M_w (weight average) of 5000 to 10,000,000 g/mol, in particular from 10,000 to 2,000,000 g/mol. The molar mass distributions M_w/M_n are generally in the range from 1.1 to 30, preferably from 1.4 to 10.

Other possible vinylaromatic polymers A) having a syndiotactic structure are syndiotactic star polymers based on vinylaromatic monomers. These star polymers are described, for example, in the earlier German Patent Application 196 34 375.5-44, in particular on page 2, line 21 to page 6, line 25, and in the Examples.

The graft polymers B) whose core polymers have not been built up by polymerizing butadiene monomer, other than in small amounts as a crosslinking agent, but preferably by polymerizing α-β-unsaturated carboxylic acids, α-β-unsaturated carboxylic esters or α-β-unsaturated nitriles, for example acrylic acid, methacrylic acid, acrylates, methacrylates, acrylonitrile, methacrylonitrile or mixtures of these, also if desired with addition of crosslinking agents, are preferably obtained as follows: the liquid monomer or liquid monomer mixture M_K, which is to be polymerized to give the core polymer P_K is mixed with water and a protective colloid. The polymerization initiator is added either also at this time or not until the monomer has been dispersed, or else after the dispersion has been heated. Intensive high-speed stirring is used to prepare, from the heterogeneous mixture, a dispersion of very small monomer droplets in water. Any design of intensive mixer is suitable for this. The desired particle size within the defined range can be determined, for example, by preparing optical micrographs and counting the number of particles of a particular diameter.

The polymerization is initiated by heating the dispersion. The reaction, which is then carried out with moderate stirring which does not further divide the droplets, is continued until conversion, based on M_K, is more than 50 %, preferably more than 85 %.

Once the polymerization of the graft core has finished, the reaction is continued in a manner known per se with the monomers M_S from which the corresponding shells S, composed of the polymer P_S are produced. Possible monomers M_S are styrene or its derivatives, and acrylates, methacrylates, α-methylstyrene, acrylonitrile and methacrylonitrile. The monomers M_S used are preferably 100 % of the vinylaromatic monomers, preferably styrene, or mixtures made from more than 80 % by weight, preferably from 85 to 95 % by weight, of styrene and upto 20 % by weight, preferably from 5 to 15 % by weight, of acrylonitrile. The grafting may also be begun while the conversion of the monomer M_K in the polymerization is not yet complete but is greater than 50 %, preferably greater than 85 %. In this case, the transition from shell to core is more gradual, contrasting with the relatively sharp delineation of core and shell polymer if the conversion of the core monomers is completed first.

If the graft polymer has only a single shell, this being generally sufficient, this is composed of the material P_S. In some cases, especially if the graft cores are relatively small and if it is desired to introduce a relatively large amount of the core polymer P_K into the particles, multishell graft polymers of structure P_K-P_S-P_K-P_S are to be recommended, where the inner shells may also be composed of other polymers P_X in order to modify, and thereby improve, the properties of the graft polymers.

The monomers M_K are generally dispersed at from 0 to 100°C, preferably at room temperature, and from 0.4 to 10 kg of water is generally used per kilogram of the monomers.

The protective colloids suitable for stabilizing the dispersion are water-soluble polymers which encapsulate the monomer droplets and the polymer particles formed therefrom, and thus inhibit their coagulation.

Suitable protective colloids are cellulose derivatives, such as carboxymethylcellulose and hydroxymethylcellulose, poly-N-vinylpyrrolidone, polyvinyl alcohol and polyethylene oxide, anionic polymers such as polyacrylic acid, and cationic polymers, such as poly-N-vinylimidazole. The amount of these protective colloids is preferably from 0.1 to 5 % by weight, based on the total weight of the monomers M_K. Low-molecular-weight surface-active compounds, such as those related to anionic or cationic soaps, are generally not suitable for use on their own when preparing the graft polymers according to the invention, since they give lower-diameter polymer particles as those obtained in emulsion polymerization. However, the use of a mixture made from protective colloid and soap can be advantageous for achieving a lower particle size than can usually be achieved when protective colloids are used alone.

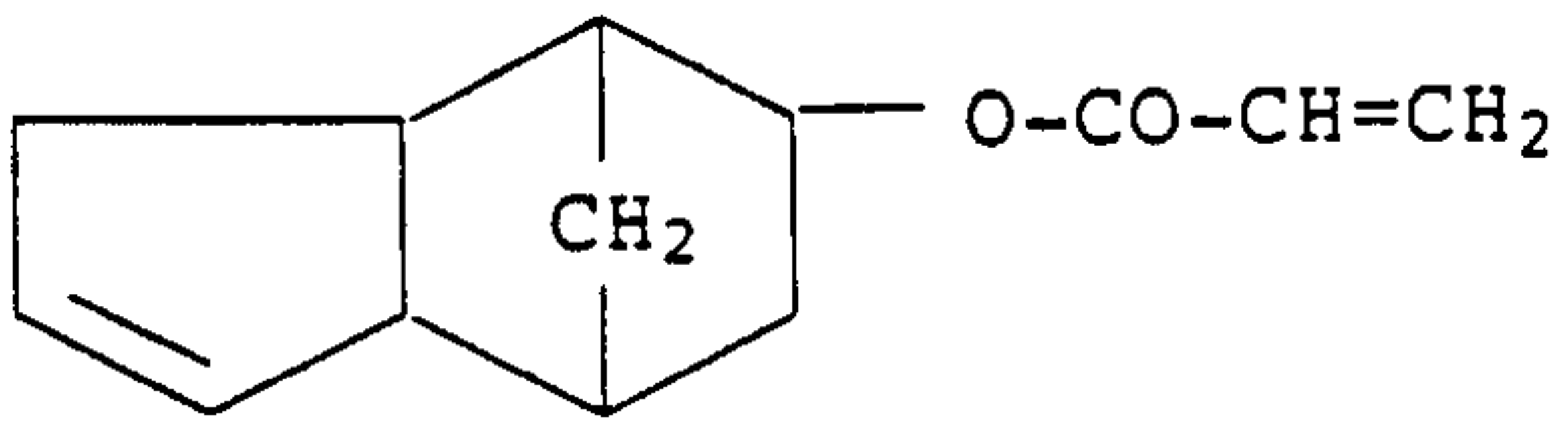
Suitable polymerization initiators are free-radical generators, in particular those which have marked solubility in the monomers and preferably have a half-life of 10 hours at from 25 to 150°C ("10-hour half-life at from 25 to 150°C"). Examples of possible initiators are peroxides, such as lauroyl peroxide, peroxosulfates, tert-butyl perpivalate and azo compounds, such as azodiisobutyronitrile. Different initiators may be used for preparing the graft core and the graft shells. The amount of the initiators is generally from 0.1 to 2.5 % by weight, based on the amount of the monomers.

The reaction mixture also preferably comprises buffer substances, such as Na_2HPO_4/NaH_2PO_4 or Na citrate/citric acid, to set a pH which remains essentially constant. Molecular weight regulators, such as ethylhexyl thioglycolate or tert-dodecyl mercaptan, are generally also added during the polymerization, in particular that of the monomers M_S building up the shells.

The temperature for polymerizing the monomers M_K to give the core made from P_K is generally from 25 to 150°C, preferably from 40 to 120°C. The grafting of the shells onto the core is generally carried out at from 25 to 150°C, preferably from 50 to 120°C. The lower limits of these ranges correspond to the decomposition temperatures of the respective polymerization initiators used.

The graft polymers B) comprise a phase with a glass transition temperature of below 0°C, preferably below -10°C, and in particular below -20°C. Possible polymers with glass transition temperatures of this type are especially those where from 50 to 100% by weight has been built up from C_2-C_{36}-alkyl acrylates such as ethyl acrylate, n-propyl acrylate or isopropyl acrylate, or preferably n-butyl acrylate and/or 2-ethylhexyl acrylate. Besides these "soft" monomers, "hard" monomers, such as methyl acrylate, the CC_1-C_{12}-alkyl methacrylates, styrene and α-methylstyrene, acrylonitrile and methacrylonitrile, are also suitable in proportions of upto 50 % by weight. These polymers generally form the core of the polymer, but may also form a shell.

Polymers of this type, which are generally core polymers, are obtained with upto 10 % by weight, preferably from about 0.1 to 10 % by weight, of bifunctional or polyfunctional comonomers, e.g. butadiene or isoprene, divinyl esters of dicarboxylic acids, such as succinic acid or adipic acid, diallyl or divinyl ethers of dihydric alcohols, such as ethylene glycol or 1,4-butanediol, diesters of acrylic acid or methacrylic acid with the dihydric alcohols mentioned, 1,4-divinylbenzene or triallyl cyanurate. Particular preference is given to the tricyclodecenyl acrylate (dihydrodicyclopentadienyl acrylate) of the formula I



I

and also to allyl acrylate and allyl methacrylate.

In the graft polymers B), the weight ratio of the total of all of the shells to the core is from about 0.05:1 to 2.5:1. The average diameter of the particles, which are preferably prepared by microsuspension polymerization as described in DE 19702733.4, in particular on page 9, line 25 to page 18, line 6, is from about 0.1 to about 10 µm, preferably from 0.2 to 9 µm, particularly preferably from 0.3 to 7 µm. The average diameter is the D_{50}, where 50 % by weight of all of the particles have a smaller, and 50 % by weight a larger, diameter than the diameter corresponding to D_{50}. To characterize the particle size distribution, in particular its breadth, D_{10} and D_{90} are frequently given in addition to D_{50}. 10 % by weight of all of the particles are smaller, and 90 % by weight are larger, than the D_{10} diameter. Similarly, 90 % by weight of all of the particles have a smaller, and 10 % by weight a larger, diameter than that corresponding to D_{90}.

Component B) preferably has a shell which is compatible or partially compatible with the base polymer, i.e. with the SPS (derivative).

The amount of component B) in the novel molding compositions is in the range from 0.1 to 70 % by weight, preferably from 1 to 60 % by weight and in particular from 5 to 50 % by weight, based on the molding composition.

The elastomeric component C) made from a styrene-diene block copolymer whose diene fraction may have been partially or completely hydrogenated is known, for example, from EP-A 755 972, and can be purchased in, for example, from Shell under the name Kraton® G 1651. Other examples are the Cariflex®-TR grades from Shell, the Finaprene® grades from Fina and the Europrene® grades from Enichem.

Components A), B) and C) always give a total of 100 % by weight.

If desired, additives or processing aids, or mixtures of these, may be added in the usual amounts to the novel thermoplastic molding compositions.

Examples of these are nucleating agents, such as salts of carboxylic acids, organic sulfonic acids or organic phosphoric acids, preferably sodium benzoate, aluminum tris(p-tert-butyl benzoate), aluminum trisbenzoate, aluminum tris(p-carboxymethylbenzoate) and aluminum triscaproate; antioxidants such as phenolic antioxidants, phosphites or phosphonites, in particular trisnonylphenyl phosphite; stabilizers, such as sterically hindered phenols and hydroquinones. It is also possible to use lubricants and mold-release agents, dyes, pigments and plasticizers.

Organophosphorus compounds, such as phosphates or phosphine oxides, may be used as flame retardants.

Examples of phosphine oxides are triphenylphosphine oxidee, tritolylphosphine oxide, trisnonylphenylphosphine oxide, tricyclohexylphosphine oxide, tris(n-butyl)phosphine oxide, tris(n-hexyl)phosphine oxide, tris(n-octyl)phosphine oxide, tris(cyanoethyl)phosphine oxide, benzylbis(cyclohexyl)phosphine oxide, benzylbisphenylphosphine oxide and phenylbis(n-hexyl)phosphine oxide. Particular preference is given to the use of triphenylphosphine oxide, tricyclohexylphosphine oxide, tris(n-octyl)phosphine oxide or tris(cyanoethyl)phosphine oxide.

Possible phosphates are especially alkyl- or aryl-substituted phosphates. Examples of these are phenyl bisdodecyl phosphate, phenyl bisneopentyl phosphate, phenyl ethyl hydrogenphosphate, phenyl bis(3,5,5-trimethylhexyl) phosphate, ethyl diphenyl phosphate, bis(2-ethylhexyl) p-tolyl phosphate, tritolyl phosphate, trixylyl phosphate, trimesityl phosphate, bis(2-ethylhexyl) phenyl phosphate, tris(nonylphenyl) phosphate, bis(dodecyl) p-(tolyl) phosphate, tricresyl phosphate, triphenyl phosphate, dibutyl phenyl phosphate, p-tolyl bis(2,5,5-trimethylhexyl) phosphate and 2-ethylhexyl diphenyl phosphate. Particularly suitable phosphorus compounds are those in which each R is aryl. Triphenyl phosphate, trixylyl phosphate and trimesityl phosphate are very particularly suitable. It is also possible to use cyclic phosphates: diphenyl pentaerythritol diphosphate is particularly suitable here, and preference is also given to resorcinol diphosphate.

It is also possible to use mixtures of different phosphorus compounds.

The novel thermoplastic molding compositions may moreover comprise fibrous or particulate fillers or mixtures of these.

Examples of these are carbon fibers, glass fibers, glass mats, glass filament rovings and glass beads, and also potassium titanate whiskers and aramid fibers, preferably glass fibers. Glass fibers may have been equipped with a size and a coupling agent. These glass fibers may be incorporated either as short glass fibers or as continuous-filament strands (rovings). Preferred glass fibers comprise an aminosilane size.

Use may also be made of amorphous silica, magnesium carbonate, powdered quartz, mica, talc, feldspar, calcium silicates or phyllosilicates.

The novel thermoplastic molding compositions may be obtained by mixing the individual components, generally at from 270 to 330°C, in conventional mixing equipment, such as kneaders, Banbury mixers or single-screw extruders, but preferably using a twin-screw extruder. To obtain a very homogeneous molding composition, intensive and thorough mixing is needed. The sequence of blending the components may be varied, and therefore two, or, if desired, even more components may be premixed, but it is also possible for all of the components to be mixed together.

The novel thermoplastic molding compositions may also be blended, generally as described above, with other polymers, such as atactic or isotactic homopolystyrene, styrene copolymers with, for example, acrylonitrile, methacrylates and/or diphenylethylene as comonomers, or with polyamides, polyesters or polyphenylene ethers or mixtures of the polymers.

The novel thermoplastic molding compositions have high impact strength, high stiffness and good flowability (processability). They are suitable for producing fibers, films or moldings.

Examples

Preparation of SPS

Preparation of syndiotactic polystyrene (SPS)

9.2 mol of styrene (1000 g) were charged to a round bottomed flask in which inert conditions had been created using nitrogen. The solution was heated to 60°C and mixed with 78.3 ml of methylaluminoxane (MAO) from Witco (1.53 M in toluene) and 20 ml of diisobutylaluminum hydride DIBAH (1.0 M in cyclohexane) from Aldrich. The mixture was then mixed with 91.2 mg of

$[C_5(CH_3)_5]TiMe_3$. The internal temperature was held at 60°C and the mixture allowed to polymerize for 2 h, after which polymerization was terminated by adding methanol. The resultant polymer was washed with methanol and dried at 50°C in vacuo. Molecular weights and their distribution were determined by high-temperature GPC at 135°C with 1,2,4-trichlorobenzene as solvent. Calibration was with narrowly distributed polystyrene standards. The molecular weight was M_w = 322,100 with a breadth of distribution M_w/M_n = 2.1. The syndiotactic fraction, determined by ^{13}C-NMR, was > 96 %. Conversion was 84 %, based on the styrene monomer used.

Preparation of graft rubbers

The following starting materials were used:
styrene (St), acrylonitrile (AN), butyl acrylate (BA) and dihydrodicyclopentadienyl acrylate (DCPA) from BASF, used without further purification.

Mowiol 8/88 from Hoechst is a polyvinyl alcohol whose viscosity, measured in accordance with DIN 53015 in the form of a 4 % strength solution in water at 20°C is 8 mPa/s (first figure). Its degree of hydrolysis is 88 mol% (last two figures).

Polybutyl acrylate rubber grafted with styrene (described as MS-1) and styrene and acrylonitrile (95:5) (described as MS-2) with the formulations:

Description	Shell	Core
MS-1	40(100St)	60(98BA + 2DCPA)
MS-2	40(95St + 5AN)	60(98BA + 2DCPA)

was prepared as described below.
For the graft shell made from styrene and acrylonitrile the graft monomer composition was altered correspondingly.

Graft rubber preparation

The following mixture was stirred under nitrogen using a Dispermat for 20 minutes at 7000 rpm. The Dispermat was manufactured by VMA-Getzman and was provided with a 5 cm toothed disk.

Mixture:

1174.2 g of water
220.5 g of a 10 % strength Mowiol 8/88 solution in water
11.0 g of a 40 % strength solution of the emulsifier in water
1080.5 g of n-butyl acrylate
22.1 g of dihydrodicyclopentadienyl acrylate and
5.5 g of dilauryl peroxide

100 g of a mixture of this emulsion mixture were charged to a glass flask under nitrogen at 67°C with moderate stirring (250 rpm) and polymerization was begun. The addition of the remainder of the emulsion took place over a period of 180 minutes. The polymerization was continued for 60 minutes. 2492.7 g of water and 454.7 g of a 10 % strength Mowiol 8/88 solution in water were then added to the mixture, followed by 1515.7 g of styrene, the monomer being run in as feed within a period of 150 minutes. The polymerization was completed over a further 150 minutes at 67°C followed by 210 minutes at 70°C.

The particle size distributions of the dispersions were determined with Microtac UPA 150 laser light scattering equipment, manufactured by Leeds and Northrup.

Results:

Rubber MS-1 (shell made from 100 % of styrene)

D(10):	0.6 µm
D(50):	1.0 µm
D(90):	2.6 µm

Rubber MS-2 (shell made from 95 % of styrene and 5 % of acrylonitrile)

D(10):	0.3 µm
D(50):	0.7 µm
D(90):	1.2 µm

Kraton G 1651

Kraton G 1651 is a block copolymer from Shell with the following structure:

Styrene-hydrogenated butadiene-styrene block copolymer. The styrene:rubber ratio is 32:68

Preparation of blends

SPS, and where appropriate, Kraton G 1651 were melted in a ZSK 30 extruder, and the MS dispersion (MS-1, MS-2) was pumped directly into the polymer melt using a mono pump. The water was drawn off along the extruder via ancillary screws and the finished polymer melt was discharged from the extruder, cooled and pelletized.

Results
The results are given in the Table attached.

Comment

As can be seen, the use of MSP rubber (MS-1, MS-2) gives a better combination of properties, such as notched impact strength, MVR, modulus of elasticity, yield stress and breaking stress, than does Kraton by itself.

Properties of rubber-modified SPS compositions

Experiment			1 [2]	2	3	4	5
Formulation							
SPS (% by weight)			65	65	65	65	65
Kraton G1651 (% by wt.)			35			15	15
MS-1 (% by weight)				35		20	
MS-2 (% by weight)					35		20
Modulus of elasticity	mPa		1596	2113	-	1990	1869
Yield stress	mPa		25.2	30.5	-	34.1	30.9
Breaking stress	mPa		22.3	24.3	-	30.4	26.9
Elongation	%		2.1	1.8	-	2.3	2.2
Elongation at break	%		0	0	-	0	0
MVR 290/5	cm^3 /10 min		48.5	71.6	80.5	65.2	75.3
Notched impact strength[1]	kJ/m^2	4x10x80 mm test specimen mold temperature: 80°C	6.0	4.4	2.4	6.5	4.9
Notched impact strength[1]	kJ/m^2	4x10x80 mm test specimen mold temperature: 140°C	3.6	3.4	2.7	4.0	2.6

1) In accordance with DIN 53453 at a polymer melt temperature of 290°C

2) Not according to the invention

We claim:

1. A thermoplastic molding composition comprising

   A) from 30 to 99.9 % by weight of a vinylaromatic polymer having a syndiotactic structure,

   B) from 0.1 to 70 % by weight of an elastomeric, particulate graft polymer, with the proviso that the graft polymers are prepared by microsuspension polymerization, and

   C) from 0 to 69.9 % by weight of an elastomeric, particulate styrene-diene block copolymer whose diene fraction may have been partially or completely hydrogenated, where the particles of component B) have D(50) in the range from 0.1 to 10 μm and component B) differs from component C).

2. A thermoplastic molding composition as claimed in claim 1, where more than 50 % by number of component B) are present in the molding composition in non- agglomerated form.

3. A thermoplastic molding composition as claimed in claim 1 or 2, where the amount of component C) is in the range from 0 to 30 % by weight, based on the molding composition.

4. The use of thermoplastic molding compositions as claimed in any of claims 1 to 3 for producing fibers, films or moldings.

5. A fiber, a film or a molding obtainable from the thermoplastic molding composition as claimed in any of claims 1 to 3.