Abstract

Provided is a polycarbonate thermoplastic resin composition with improved resistance to contamination from dirt/dust for molded articles without losing flame retardancy and mechanical strength, as well as molded articles thereof. Means of solving the problem: a flame retardant thermoplastic resin composition containing 100 parts by weight of a polycarbonate resin (A), from 0.5 to 30 parts by weight of a phosphoric ester (B), and from 0.0001 to 10 parts by weight of a phosphonium sulfonate (C), and molded articles thereof.
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FLAME RETARDANT THERMOPLASTIC RESIN COMPOSITION
AND MOLDED ARTICLES THEREOF

DETAILED DESCRIPTION OF THE INVENTION

This invention relates to polycarbonate flame retardant thermoplastic
resin compositions and to molded articles thereof. More specifically, it relates
to the aforementioned resin composition and molded articles thereof that are
well suited for use in applications where dust and dirt readily adhere, causing
contamination such as exterior cover plastic components, etc., i.e., housings
for electrical and electronic machines, office machines, etc., such as copy
machines, fax machines, printers, televisions, computer monitors, etc.

RELATED ART

Polycarbonates and alloy resins thereof are widely used in a variety of
fields because of their superior moldability, heat resistance and mechanical
strength. Applications such as covers and lenses for various types of lighting
instruments, films and sheets, case materials for storage and transport, etc.,
various components of computers and other electronic office equipment,
consumer electronic equipment and home appliances, etc., can be cited as
examples. In particular, in applications such as exterior cover plastic
components, etc., problems occur in which product value is lost when the
appearance of the exterior surface is poor. The situation in which
contamination occurs as a result of dirt and dust adhesion can be cited as a
cause of defects in the appearance of the exterior surface, and this is becoming
a major problem. This results from dust particles in the external environment
contaminating the molded article while the molded article is in use. The way
this contamination occurs is not that the whole body becomes contaminated
uniformly. Rather, in articles molded non-uniformly in amorphous patterns
(round patterns or zigzag patterns), there will be places where contaminants readily adhere and places where contaminants tend not to adhere. Over the course of time, the contaminated areas become conspicuous and product value is lost. Accordingly, [manufacturers] are demanding flame retardant polycarbonate resin materials that have superior dust repellent characteristics.

A wide variety of anti-static agents have been proposed to improve the anti-static properties of polycarbonate resins. But almost all anti-static agents have problems in that their addition causes a loss of flame retardancy. For example, adding common anti-static agents (polyethers, etc.) cause a deterioration in flame retardancy when used together with flame retardants such as phosphoric esters, etc., and in addition, adding metallic salts of sulfonic acid such as sodium sulfonate, lithium sulfonate, etc., causes a similar deterioration in flame retardancy.

PROBLEMS THE INVENTION IS TO SOLVE

The object of this invention is to provide a polycarbonate thermoplastic resin composition having improved resistance to contamination of molded articles by dust and dirt without losing flame retardancy and mechanical strength.

MEANS OF SOLVING THE PROBLEM

This invention provides a flame retardant thermoplastic resin composition containing 100 parts by weight of a polycarbonate resin (A), 0.5 to 30 parts by weight of a phosphoric ester compound (B), and 0.0001 to 10 parts by weight of a phosphonium sulfonate (C).

In contrast to the metallic salts of sulfonic acid such as sodium sulfonate, lithium sulfonate, etc., which cause a deterioration in flame retardancy, [the inventors] discovered that this invention is able to achieve an
anti-static effect without losing flame retardancy if phosphonium salts of sulfonic acid are used in combination with phosphoric ester flame retardants. Blending phosphonium sulfonates into polycarbonate resins as anti-static agents is well known (Publication of Examined Patent Application H7-39537), but it is surprising that, unlike metallic sulfonic acid salts, they do not have a detrimental effect on fire retardancy when used in combination with phosphoric ester flame retardants.

MODE FOR CARRYING OUT THE CLAIMED INVENTION

In this invention, aromatic polycarbonates prepared using well-known phosgene or melt methods can be used as the polycarbonate resin (A) (see, for example, Publication of Unexamined Patent Application S63-215763 and Publication of Unexamined Patent Application H2-124934). Polycarbonate resins consist of a carbonate constituent and a diphenol constituent. Phosgene, diphenyl carbonate, etc., can be cited as examples of a precursor substance to introduce the carbonate constituent. In addition, as appropriate diphenols,

2,2-bis(4-hydroxyphenyl)propane (known as bisphenol A),
2,2-bis-(3,5-dibromo-4-hydroxyphenyl)propane,
2,2-bis-(3,5-dimethyl-4-hydroxyphenyl)propane,
1,1-bis(4-hydroxyphenyl)cyclohexane,
1,1-bis(3,5-dimethyl-4-hydroxyphenyl)cyclohexane,
1,1-bis(4-hydroxyphenyl)decane,
1,4-bis(4-hydroxyphenyl)propane,
1,1-bis(4-hydroxyphenyl)cyclodecane,
1,1-bis(3,5-dimethyl-4-hydroxyphenyl)cyclodecane,

4,4'-dihydroxydiphenyl ether,

4,4'-thiodiphenol,

4,4'-dihydroxy-3,3-dichlorophenyl ether, and,

4,4'-dihydroxy-2,5-dihydroxyphenyl ether, etc.,

can be cited as examples. These can be used alone or in combination. In addition, other than these, it is possible to use compounds having three or more phenolic hydroxyl groups.

Alternately, constituent (A) may also be a polyester carbonate. In addition to carbonate units derived from well-known aromatic diols, this has ester units derived from an aromatic diol and an aliphatic dicarboxylic acid having from 6 to 18 carbon atoms. In preparing this, well-known phosgene methods and melt methods can be used as the preparation method for the aromatic polycarbonate (see U.S. Patents 4,238,596; 4,238,597 and 3,169,121).

Next, phosphoric ester compounds represented by the following general formula (I) can be cited as the phosphoric ester compound constituent (B) used in this invention:

COMPOUND I

(wherein, R¹, R², R³ and R⁴ represent, independent of one another, hydrogen or an organic group, except for the case of R¹ = R² = R³ = R⁴ = H. X represents a divalent or greater organic group, and p is 0 or 1, q is an integer greater than or equal to 1 and, for example, less than 30, and r represents an integer greater than 0.).
However, it is not limited to this.

In formula (I) mentioned above, alkyl groups, cycloalkyl groups, aryl groups, etc., which may be substituted or unsubstituted, can be cited as examples of organic groups. In addition, alkyl groups, alkoxy groups, alkylthio groups, halogens, aryl groups, aryloxy groups, halogenated aryl groups, etc., can be cited as examples of substituents in the case in which it is substituted. In addition, groups in which substituents thereof, etc. are combined (for example, aryloalkoxyalkyl groups, etc.), or groups in which substituents are combined by being linked by oxygen, sulfur, nitrogen, etc., are also acceptable as substituents (for example, arylsulfonylaryl groups, etc.). In addition, a divalent or greater organic group means a group having a valence of 2 or more in which one or more hydrogens bonded to carbon atoms can be removed. Alkylene groups and/or (substituted) phenylene groups, polynucleated phenols such as derivatives of bisphenols, etc., can be cited as examples, and the relative positions of the two or more free valencies is arbitrary. Bisphenol A, hydroxyquinone, resorcinol, diphenylolethyl methane, diphenylolethyl methyl methane, $p,p'$-dihydroxydiphenylsulfone, dihydroxynaphthalene, etc., can be cited as particularly desirable.

As examples of specific phosphoric ester compounds,

trimethyl phosphate,

triethyl phosphate,

tributyl phosphate,

triocetyl phosphate,

tributoxyethyl phosphate,
tri phenyl phosphate,
tricresyl phosphate,
tricresylphenyl phosphate,
diisopropylphenyl phosphate,
5  tris-(chloroethyl) phosphate,
tris-(dichloropropyl) phosphate,
tris-(chloropropyl) phosphate,
bis-(2,3-dibromopropyl)-2,3-dichloropropyl phosphate
tris-(2,3-dibromopropyl) phosphate, and,
10  bis-(chloropropyl)-monooctyl phosphate,
as well as polyphosphates such as
bisphenol A bisphosphate,
hydroquinone bisphosphate,
resorcin bisphosphate,
15  tri oxybenzene triphosphate, etc.,
in which the OR¹, OR², OR³ and OR⁴ are an alkoxy, for example, a methoxy,
ethoxy, propoxy, or preferably a (substituted) phenoxy, for example, a
phenoxy or methyl (substituted) phenoxy, can be cited, with triphenyl
phosphate and various types of aromatic polyphosphates (in particular,
20  resorcin polyphosphates or bisphenol A polyphosphates) being preferable.
In the case when constituent (B) is in the liquid state, it can be added during processing using a method such as liquid injection, etc.

The amount the aforementioned constituent (B) to be used per 100 parts by weight of constituent (A) is preferably at least 0.5 parts by weight, and more preferably at least 5 parts by weight; and further, less than 30 parts by weight, preferably less than 25 parts by weight, and more preferably, less than 20 parts by weight. If the amount of constituent (B) is lower than the aforementioned lower limit, the desired flame retardancy will not be achieved, and if it is above the aforementioned upper limit, heat resistance will be lost.

The phosphonium sulfonate (C) used in this invention is represented by the following formula (II), for example,

COMPOUND 2

(wherein, \( R^a \) is an alkyl group of from 1 to 40 carbon atoms or an aryl group having from 6 to 40 carbon atoms, and \( R^b, R^c, R^d \) and \( R^e \) are selected, independently of one another, from hydrogen, an alkyl group having from 1 to 10 carbon atoms, and an aryl group having from 6 to 10 carbon atoms). However, it is not limited to this.

Here, the alkyl group comprises a straight chain, branched or cyclic alkyl group. The aryl group comprises alkylaryl groups and arylalkyl groups. It should also be noted that the alkyl group and aryl group can be substituted using arbitrary substituents.

Dodecyl groups, decyl groups, butyl groups, etc., can be cited as examples of the alkyl group at \( R^a \). Dodecylphenyl groups, phenyl groups, benzyl groups, benzyl groups [sic], phenethyl groups, tolyl groups, xylyl
groups, etc., can be cited as examples of the aryl group. \( R^a \) is preferably an aryl group.

Methyl, propyl, butyl, etc., groups can be cited as examples of the alkyl groups at \( R^b \) to \( R^e \). Phenyl groups, benzyl groups, phenethyl groups, tolyl groups, xylyl groups, etc., can be cited as examples of the aryl groups.

Tetraalkylphosphonium salts of dodecylsulfonic acid or tetraalkylphosphonium salts of dodecylbenzenesulphonic acid, etc., can be cited as examples of preferred phosphonium sulfonates.

The amount the aforementioned constituent (C) to be used per 100 parts by weight of constituent (A) is at least 0.0001 parts by weight, preferably at least 0.0005 parts by weight, and more preferably at least 0.001 parts by weight; and further, is less than 10 parts by weight and preferably less than 5 parts by weight. If the amount of constituent (C) is too small, the anti-dust adhesion effect will not be manifested adequately, and if too much is used, it will cause discoloration and mechanical properties will deteriorate, leading to the external appearance of the molded article being unacceptable.

The preferred combination of the aforementioned constituents (B) and (C) is one in which the phosphoric ester compound (B) is an aromatic polyphosphate and the phosphonium sulfonate (C) is a tetraalkylphosphonium salt of dodecylsulfonic acid or a tetraalkylphosphonium salt of dodecylbenzenesulfonic acid, and in particular, a tetraalkylphosphonium salt of dodecylbenzenesulfonic acid.

The resin composition of this invention can contain (D) a thermoplastic resin other than the aforementioned polycarbonate constituent. There are no particular constraints on the thermoplastic resin other than the polycarbonate provided it is a thermoplastic resin. It is preferably selected from the group of
styrene resins, aromatic vinyl/diene/vinyl-cyanide copolymers, acrylic resins, polyester resins, polyolefin resins, polyphenylene oxide (PPO) resins, polyester carbonate resins, polyether imide resins and methyl methacrylate butadiene styrene terpolymers (MBS resins). These can be used as a single resin or in combinations of two or more.

Poly-a-methylstyrene, styrene-acrylonitrile copolymer (SAN resins), etc., can be cited as examples of styrene resins.

Styrene-butadiene-acrylonitrile terpolymer (ABS resin), etc., can be cited as examples of aromatic vinyl-diene-vinyl cyanide copolymers.

Polymethyl methacrylate, etc., can be cited as examples of acrylic resins.

Polyethylene terephthalate, polybutylene terephthalate, etc., can be cited as examples of polyester resins.

Polyethylene, polypropylene, polybutylene, polymethylpentane, ethylene-propylene copolymers, ethylene-propylene-diene copolymers, etc., can be cited as examples of polyolefin resins.

Polyphenylene oxide resin can be cited as a polyphenylene oxide (PPO) resin, and the coupling hydrogens in its benzene nucleus may be substituted (for example, with an alkyl, halogen, etc.).

The optional constituent (D) can be mixed in amounts of preferably less than 200 parts by weight per 100 parts by weight of constituent (A) and more preferably less than 100 parts by weight. When the amount mixed exceeds 200 parts by weight, the properties of the polycarbonate resin can no longer be exploited.
The resin composition of this invention can also contain the constituents given below in addition to the aforementioned constituents.

**Ultraviolet absorbers**: Any ultraviolet absorber customarily used in polycarbonate resin compositions can be used as an ultraviolet absorber. Benzotriazole ultraviolet absorbers, benzophenone ultraviolet absorbers, salicylate ultraviolet absorbers, etc., can be cited as examples. As examples of benzotriazole ultraviolet absorbers,

- 2-(2'-hydroxy-5'-methylphenyl)-benzotriazole,
- 2-(2'-hydroxy-5'-t-butylphenyl)-benzotriazole,
- 2-(2'-hydroxy-5'-t-octylphenyl)-benzotriazole,
- 2-(2'-hydroxy-3',5'-di-t-butylphenyl)-benzotriazole,
- 2-(2'-hydroxy-3',5'-di-amylphenyl)-benzotriazole,
- 2-(2'-hydroxy-3'-dodecyl-5'-di-methylphenyl)-benzotriazole,
- 2-(2'-hydroxy-3',5'-dicumylphenyl)-benzotriazole,
- 2,2'-methylene-bis-[4-(1,1,3,3-tetramethylbutyl)-6-(2H-benzotriazole-2-yl)-phenol], etc.,

can be cited. Benzotriazole ultraviolet absorbers are commercially available, for example, UV5411 from American Cyanamid Co. Benzophenone ultraviolet absorbers are commercially available, for example, as UV531 from American Cyanamid Co. Phenyl salicylate, p-t-butylphenyl salicylate, p-octylphenyl salicylate, etc., can be cited as examples of salicylate ultraviolet absorbers.
Preferably, at least 0.01 parts by weight of ultraviolet absorber is used per 100 parts by weight of polycarbonate resin, and more preferably at least 0.05 parts by weight; and further, preferably less than 10 parts by weight, and more preferably, less than 5 parts by weight.

5 Phosphorus-based stabilizers: Any phosphorus-based stabilizer available commercially from various stabilizer manufacturers can be used, for example, as an anti-oxidant. More specifically,

- triphenyl phosphite,
- diphenylmethyl phosphite,
- tris-(2,4-di-t-butylphenyl)-phosphite,
- trisnonylphenyl phosphite,
- diphenylisooctyl phosphite,
- 2,2'-methylene-bis-(4,6-di-t-butylphenyl)-octyl phosphite
- diphenylisodecyl phosphite,
- diphenyl-mono-(tridecyl) phosphite,
- 2,2'-ethyldene-bis-(4,6-di-t-butylphenol) fluorophosphite,
- phenyl-diisodecyl phosphite,
- phenyl-di-(tridecyl) phosphite,
- tris-(2-ethylhexyl) phosphite,
- tris-(isodecyl) phosphite,
- tris-(tridecyl) phosphite,
dibutyl hydrogen phosphite,

trilauryl trithiophosphate,

tetrakis-(2,4-di-t-butylphenyl)-4,4'-biphenylene phosphite,

4,4'-isopropylidene-diphenol-alkyl (C\textsubscript{12} to C\textsubscript{15}) phosphites,

4,4'-butylidene-bis-(3-methyl-6-t-butylphenyl)-ditridecyl phosphite,

bis-(2,4-di-t-butylphenyl)-pentaerythritol diphosphate,

bis-(2,6-di-t-butyl-4-methylphenyl)-pentaerythritol diphosphate,

bis-(nonylphenyl)-pentaerythritol diphosphate,

distearyl-pentaerythritol diphosphate,

phenyl-bisphenol A-pentaerythritol diphosphate,

tetraphenyl-dipropyleneglycol diphosphate,

1,1,3-tris-(2-methyl-4-di-tridecylphosphite-5-t-butylphenyl)-butane,

3,4,5,6-dibienzo-1,2-oxaphosphine-2-oxide, etc.,

can be used.

As examples of available products,

ADK-STAB PEP-36, PEP-24, PEP-4C and PEP-8 (all trademarks; manufactured by Asahi Denka Kogyo, K.K.);

Irgafos 168 (trademark; manufactured by Ciba-Geigy Corporation);

Sandstab P-EPQ (trademark; manufactured by Sandoz, Inc.);
Chelex L (trademark; manufactured by Sakai Chemical Industry Co., Ltd.);

3P2S (trademark; manufactured by Ihara Chemical Industry Co., Ltd.);

Mark 329K and Mark P (both trademarks; manufactured by Asahi Denka Kogyo, K.K.); and,

Weston 618 (trademark; manufactured by Sanko Kagaku, K.K.), etc.,

can be cited.

Phosphorus-based stabilizers are preferably mixed in [amounts of] 0.0001 to 1 part by weight and more preferably from 0.001 to 0.5 parts by weight per 100 parts by weight of polycarbonate resin.

**Hindered phenol anti-oxidants:**

As examples,

n-octadecyl-3-(4-hydroxy-3',5'-di-t-butyl-4-hydroxyphenyl)-propionate,

2,6-di-t-butyl-4-hydroxymethylphenol,

2,2'-methylene-bis-(4-methyl-6-t-butylphenol),

pentaerythrityl-tetrakis-[3-(3,5-di-t-butyl-4-hydroxyphenyl)-propionate],

can be cited.

**Epoxy stabilizers:**

As examples,
epoxidized soybean oil,
epoxidized linseed oil,
phenylglycidyl ether,
allylglycidyl ether,

3,4-epoxycyclohexylmethyl-3',4'-epoxycyclohexane carboxylate, etc.,
can be cited.

**Sulfur-based stabilizers.**

*Mold-release agents:* Preferred mold release agents are silicone-based mold release agents such as methylphenylsilicone oil, ester-based mold release agents or olefin-based mold release agents such as pentaerythritol tetrastearate, glycerin monostearate, lignite wax, poly-a-olefin, etc.

In addition, during mixing of the resins [and/or] during molding, other commonly used additives, for example, colorants (pigments, dyes), reinforcing materials (glass fibers, carbon fibers, talc, clay, mica, glass flakes, milled glass, glass beads, etc.), fillers (carbon black, silica, titanium oxide, etc.), heat resisting agents, anti-oxidants, weathering agents, slip agents, mold release agents, nucleators, plasticizers, flame retardants (other than phosphoric ester-based compounds), flowability modifiers, etc., can be added to the resin composition of this invention in accord with its object to the extent that its physical properties are not impaired.

In addition, polytetrafluoroethylene (Teflon), etc., can be mixed in as a drip prevention agent.

There are no particular constraints on the methods to prepare the resin composition of this invention, and methods in common use can be employed,
but in general, melt mixing is desirable. Small amounts of a solvent can also be used, but this is ordinarily unnecessary. Banbury mixers, rollers, kneaders, and in particular, extruders, can be cited as examples of equipment, and these are run batch-wise or continuously. There are no particular constraints on the order of mixing the constituents.

This invention also provides molded articles of the aforementioned resin composition. Any molding method in common use can be used to mold the polycarbonate resin, for example, injection molding, extrusion molding, compression molding, etc.

The resin composition of this invention and molded articles thereof can be appropriately used in applications that demand flame retardancy and, moreover, where dust and dirt readily adhere, causing contamination, such as exterior cover plastic components, etc., i.e., housing materials for electrical and electronic machines, office machines, etc., such as copy machines, fax machines, printers, televisions, computer monitors, etc. Naturally, applications are not limited to those mentioned above, and it can be widely used in fields which have problems resulting from the adhesion of dust and dirt (for example, defects in exterior appearance, defects during painting/coating, etc.).

WORKING EXAMPLES

This invention will be explained in more detail using the working examples below, but this invention is not limited to these.

Note that the following substances were used in the Working Examples and Comparative Examples.
Constituent (A)

PC: Polycarbonate, GE Plastics Japan, Ltd., trademark: Lexan (intrinsic viscosity of 0.50 dl/g measured at 25°C in methylene chloride)

Constituent (B)

RDP: Resorcin polyphosphate, trademark: CR733S, manufactured by Oya Chemicals, K.K.

BPADP: Bisphenol A polyphosphate, trademark: CR741S, manufactured by Oya Chemicals, K.K.

Constituent (C)


Comparative Constituents (C')

C'-1: Dodecylbenzenesulfonic acid sodium salt, trademark: EPA219, manufactured by Takemoto Oil & Fat Co., Ltd.

C'-2: Dodecylbenzenesulfonic acid lithium salt, trademark: EPA220, manufactured by Takemoto Oil & Fat Co., Ltd.

C'-3: Polyether ester amide, trademark: Prestat 6321, manufactured by Sanyo Chemical Industries, Ltd.

Optional Constituents (D)

MB: Methyl methacrylate (MMA)/butadiene rubber, trademark: EXL 2602, manufactured by Kureha Chemical Industry Co., Ltd.
ABS: Acrylonitrile-butadiene styrene terpolymer, trademark: UX050, manufactured by Ube Chemical Industries, Ltd.

Si-A: Silicone-acryl rubber, trademark: S2001, manufactured by Mitsubishi Rayon Co., Ltd.


Other optional constituents

PTFE: Anti-drip agent, polytetrafluoroethylene (Teflon), trademark: Teflon D2C, manufactured by Daikin Industries, Ltd.

MK2112: Tris-(2,4-di-t-butylphenyl) phosphite, trademark: Mark 2112, manufactured by Asahi Denka Kogyo K.K.

MKA50: Hindered phenol anti-oxidant, octadecyl-3-(3,5-di-t-butyl-4-hydroxyphenyl) propionate, trademark: Mark AO 50, manufactured by Asahi Denka Kogyo K.K.

In addition, the various tests and evaluations conducted using the Working Examples and Comparative Examples are as follows:

(1) Izod impact strength

Izod impact strength (with 1/8-inch notch) measured in conformance with ASTM D256.

(2) Flame retardancy

Measured according to Bulletin 94, "Ignition Test for Materials Classification" (known as UL-94), of Underwriters Laboratories, Inc. Tests was performed using a test specimen thickness of 1.6 mm. Average ignition
time and total ignition time was measured, and the presence or absence of drips was checked.

(3) Existence of dust/dirt adhesion

A box-shaped molded article (85 H x 200 W x 15 D mm; wall thickness: 3 mm) was allowed to stand undisturbed indoors for a one-month period (30 days), and visually inspected for surface contamination.

Working Examples 1 to 2 and Comparative Examples 1 to 5

[Table 1] The various constituents were compounded in the proportions given in Table 1, and pellets were prepared using a biaxial extruder (50 mm) set at a rotational speed of 250 rpm at 240°C. Using the pellets so obtained, a molded article was obtained by injection molding under conditions of a set temperature of 240°C and a mold temperature of 60°C. The various tests were performed on the molded article so obtained. The results are given in Table 1.

[Advantageous Effects of the Invention]

Resistance to contamination by dust/dirt of molded articles of the polycarbonate resin composition of this invention was improved without losing flame retardancy and mechanical strength.
Document describing chemical formulas, etc.

[Compound 1]

\[
\begin{align*}
O & \overset{\text{R}^1}{\longrightarrow} P \overset{\text{O} - \text{X}}{\longrightarrow} \overset{\text{O} - \text{P}}{\longrightarrow} \overset{\text{OR}^3}{\longrightarrow} \overset{\text{OR}^4}{\longrightarrow} O \\
\end{align*}
\]

(1)

[Compound 2]

\[
\begin{align*}
\text{R}^a - \text{SO}_3^- + \overset{\text{R}^b}{\longrightarrow} \overset{\text{R}^c}{\longrightarrow} \overset{\text{R}^d}{\longrightarrow} \overset{\text{R}^e}{\longrightarrow} P \\
\end{align*}
\]

(II)
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WHAT IS CLAIMED IS:

1. A flame retardant thermoplastic resin composition containing 100 parts by weight of a polycarbonate resin (A), from 0.5 to 30 parts by weight of a phosphoric ester compound (B), and from 0.0001 to 10 parts by weight of a phosphonium sulfonate (C).

2. A resin composition according to Claim 1 further containing less than 200 parts by weight of a thermoplastic resin other than a polycarbonate resin (D).

3. A resin composition according to Claim 2 wherein the thermoplastic resin other than a polycarbonate resin (D) is at least one type of resin selected from the group comprising

- styrene resins,
- aromatic vinyl/diene/vinyl cyanide copolymers,
- acrylic resins,
- polyester resins,
- polyolefin resins,
- polyphenylene oxide resins,
- polyester carbonate resins,
- polyetherimide resins, and
- methyl methacrylate butadiene styrene copolymers.

4. A resin composition according to any of Claims 1 to 3 wherein the phosphoric ester compound (B) is an aromatic polyphosphate, and
further, the phosphonium sulfonate (C) is a tetraalkylphosphonium salt of
dodecylbenzenesulfonic acid.

5. A molded article of the resin composition of any one of Claims 1 to 4.

6. A molded article according to Claim 5 which is an exterior cover plastic component of a machine.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C08K5/523 C08K5/50

According to International Patent Classification (IPC) or to both national classification and IPC.

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 C08K C08L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>EP 0 637 609 A (TEIJIN CHEMICALS LTD) 8 February 1995 (1995-02-08) page 2, line 8; claims 1,7 page 3, line 3 - line 6 page 4, line 13 - line 35 page 5, line 1,2 ---</td>
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Other documents are listed in the continuation of box C.

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

Date of the actual completion of the international search 16 August 1999

Date of mailing of the international search report 24/08/1999

Name and mailing address of the ISA European Patent Office, P.B. 5018 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx 31 651 epc nl, Fax (+31-70) 340-3016

Authorized officer Bergmans, K

Form PCT/ISA/210 (second sheet) (July 1992)
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