



Office de la Propriété
Intellectuelle
du Canada

Un organisme
d'Industrie Canada

Canadian
Intellectual Property
Office

An agency of
Industry Canada

CA 2065914 C 2002/10/01

(11)(21) **2 065 914**

(12) **BREVET CANADIEN
CANADIAN PATENT**

(13) **C**

(22) Date de dépôt/Filing Date: 1992/04/13

(41) Mise à la disp. pub./Open to Public Insp.: 1992/10/31

(45) Date de délivrance/Issue Date: 2002/10/01

(30) Priorité/Priority: 1991/04/30 (07/693,869) US

(51) Cl.Int.⁵/Int.Cl.⁵ C08L 51/06, C08L 27/18, C08L 69/00

(72) Inventeurs/Inventors:
Price, Ronald L. (deceased), US;
Lundy, Charles E., US;
Krishnan, Sivaram, US

(73) Propriétaire/Owner:
BAYER CORPORATION, US

(74) Agent: OGILVY RENAULT

(54) Titre : COMPOSITION DE POLYCARBONATE IGNIFUGE A RESISTANCE ELEVEE AUX CHOCS

(54) Title: FLAME RETARDANT POLYCARBONATE COMPOSITION HAVING IMPROVED IMPACT STRENGTH

(57) Abrégé/Abstract:

A thermoplastic molding composition is disclosed which contains a homogeneous blend of a polycarbonate resin, a graft-modified olefin rubber and, a particular flame retardant package containing a salt, halogenated phthalimine, polytetrafluoroethylene and an oligomeric carbonate. The composition was found to be suitable for preparing molded articles having an excellent level of flame resistance and impact properties.



Mo-3575

MD90-44

FLAME RETARDANT POLYCARBONATE COMPOSITION
HAVING IMPROVED IMPACT STRENGTH
ABSTRACT OF THE DISCLOSURE

A thermoplastic molding composition is disclosed which contains a homogeneous blend of a polycarbonate resin, a graft-modified olefin rubber and, a particular flame retardant package containing a salt, halogenated phthalimine, polytetrafluoroethylene and an oligomeric carbonate. The composition was found to be suitable for preparing molded articles having an excellent level of flame resistance and impact properties.

FLAME RETARDANT POLYCARBONATE COMPOSITION
HAVING IMPROVED IMPACT STRENGTH

FIELD OF THE INVENTION

The invention relates to thermoplastic molding compositions and more particularly to compositions based on polycarbonate resins which are rendered flame retardant and impact resistant.

SUMMARY OF THE INVENTION

A thermoplastic molding composition is disclosed which contains a homogeneous blend of a polycarbonate resin, a graft-modified olefin rubber and, a particular flame retardant package containing a salt, halogenated phthalimide, polytetrafluoroethylene and an oligomeric halogenated carbonate. The composition was found to be suitable for preparing molded articles having an excellent level of flame resistance and impact properties.

BACKGROUND OF THE INVENTION

Aromatic polycarbonate resins are well known and have long been used in molding compositions for the preparation of tough, dimensionally stable articles. The chemistry synthesis, properties and applications of polycarbonates are extensively discussed in the manuscript Chemistry and Physics of Polycarbonates, by Schnell, Interscience, 1964 and Polycarbonates by Christopher and Fox, Reinhold, 1962.

Although polycarbonates have some inherent flame resistance, increasingly more stringent requirements for improved flame resistance are reflected in issuance of the large number of patents relating to this technology. Among the methods to improve flame retardance mention may be made of the addition or incorporation of large amounts of halogen (U.S. Patents 3,751,400; 3,382,207 and 3,334,154). In U.S. Patent

3,775,367 there is taught adding of an organic and/or an inorganic metal salt to the polycarbonate resin.

5 Additions of alkali salts of perfluoroalkane sulfonic acids and organic alkali salts of organic carboxylic acids have been disclosed in U.S. Patent 3,836,490 and in U.S. Patent 3,775,367. Also noted is German Published Patent No. 2,149,311 which discloses the use of insoluble alkali metal salts, particularly salts of inorganic acids such as phosphonic acids and sulphonic acids. Flame retardant polycarbonate
10 compositions containing alkali metal salts or an inorganic acid are disclosed in U.S. Patent 4,223,100. U.S. Patent 3,535,300 discloses the use of small amounts of specified metal salts (which do not include alkali metal salts) in combination with halogen carried on the polymeric backbone or on an additive. U.S. Patent 4,110,299 teaches adding of alkali or alkaline
15 earth metal salts of organic acids in combination with additives such as inorganic halide and an organic monomeric or polymeric aromatic or heterocyclic halide improve the flame retardance of an aromatic polycarbonate.

20 Also noted are the teaching in regard to the drip suppression of the compositions when they are exposed to a flame. In German Patent No. 2,535,262 there is a teaching to add fluorinated polyolefins such as polytetrafluoroethylene (PTFE) to a polycarbonate containing organic alkali metal salt
25 to retard dripping. U.S. Patent 4,110,299 discloses adding to a polycarbonate resin fluorinated polyolefin, fibrous glass or a siloxane, in combination with certain salts and an inorganic halide to diminish tendency to drip. In PCT application
30 WO 80/00084 there is disclosed -in Example 13 -a blend of aromatic polycarbonate and a block copolymer of polycarbonate and polydimethylsiloxane (57%/43%) and including sodium salt of trichlorobenzene sulfonic acid. The blend was noted to have improved resistance to stress crazing. The document generally
35 discloses improved ductility, solvent resistance and flame

retardance characteristic of blends of polycarbonates and a block copolymer of polycarbonate and polydiorganosiloxane.

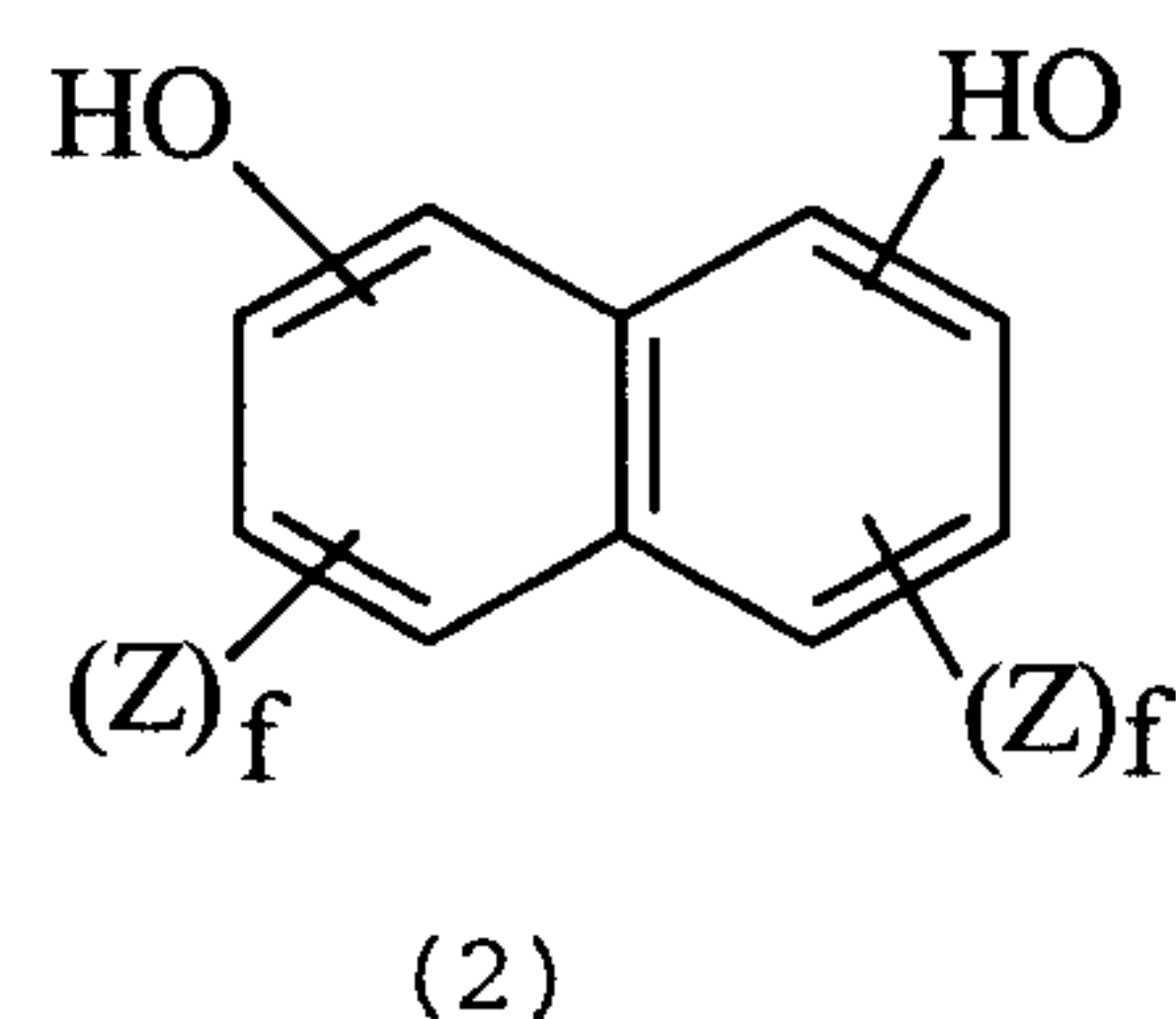
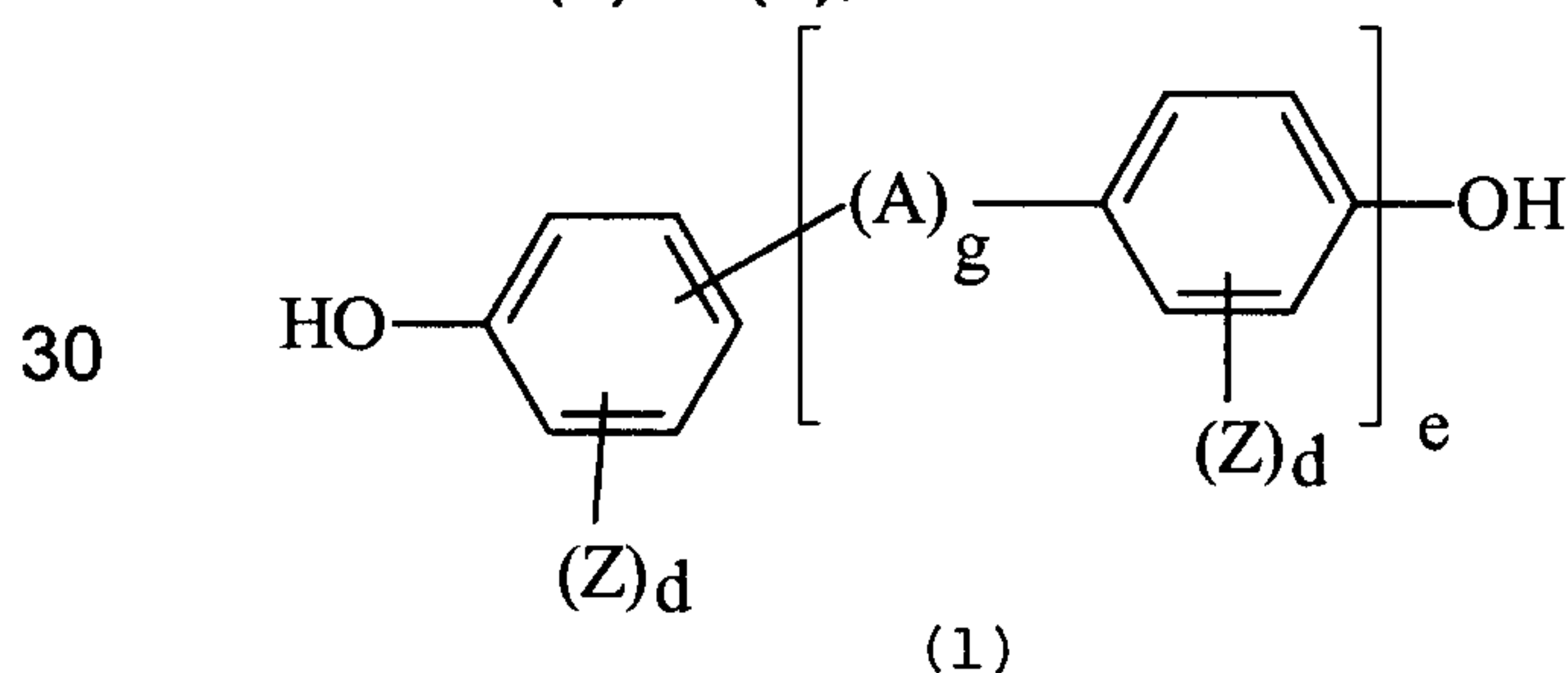
Also relevant in this context is U.S. Patent 4,880,864 which
 5 disclosed adding a metal salt of an inorganic acid to a polydiorgano-
 siloxane copolycarbonate for improving the flame retardance of the resin.
 A flame resistant, impact modified polycarbonate resin was disclosed in
 U.S. Patent 4,786,686. The improved composition is said to include a
 10 rubbery polymer containing residual ethylenic unsaturation and a fluorine
 containing polymer of the fibril forming type as additions to the
 polycarbonate resin.

DETAILED DESCRIPTION OF THE INVENTION

Aromatic polycarbonates within the scope of the present invention
 are homopolycarbonates and copolycarbonates and mixtures thereof.

15 The polycarbonates generally have a weight average molecular
 weight of 10,000-200,000, preferably 20,000-80,000 and their melt flow
 rate, per ASTM D-1238 at 300°C, is about 1 to about 65 gm/10 min.,
 preferably about 2-15 gm/10 min. They may be prepared, for example, by
 the known diphasic interface process from a carbonic acid derivative such
 20 as phosgene and dihydroxy compounds by polycondensation (see
 German Offenlegungsschriften 2,063,050; 2,063,052; 1,570,703;
 2,211,956; 2,211,957 and 2,248,817; French Patent 1,561,518; and the
 monograph H. Schnell, "Chemistry and Physics of Polycarbonates",
 Interscience Publishers, New York, New York, 1964).

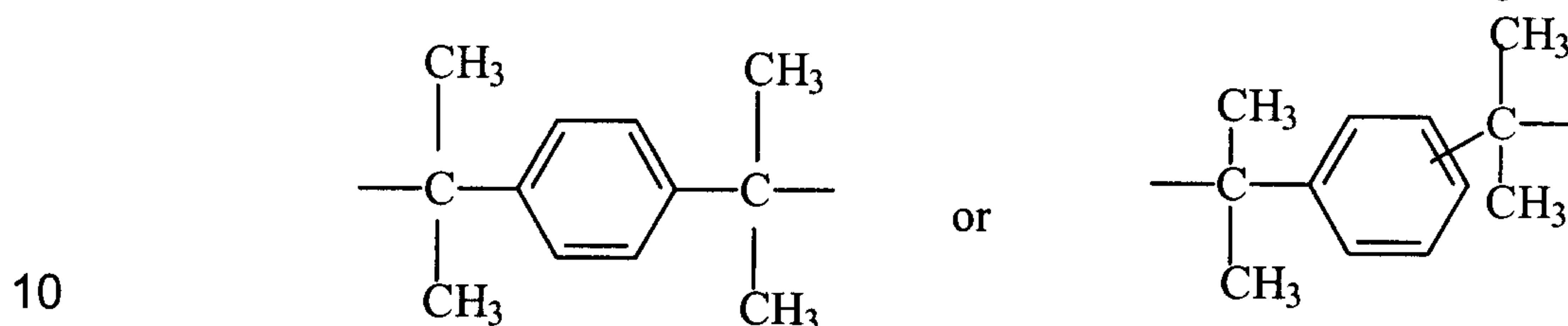
25 In the present context, dihydroxy compounds suitable for the
 preparation of the polycarbonates of the inventor conform to the structural
 formulae (1) or (2),



Mo-3575

wherein

A denotes an alkylene group with 1 to 8 carbon atoms, an alkylidene group with 2 to 8 carbon atoms, a cycloalkylene group with 5 to 15 carbon atoms, a cycloalkylidene group with 5 to 15 carbon atoms, a carbonyl group, an oxygen atom, a sulfur atom, -SO- or -SO₂- or a radical conforming to



e and g both denote the number 0 to 1;

Z denotes F, Cl, Br or C₁-C₄-alkyl and if several Z radicals are substituents in one aryl radical, they may be identical or different from one another;

d denotes an integer of from 0 to 4; and

15 f denotes an integer of from 0 to 3

Among the dihydroxy compounds useful in the practice of the invention are hydroquinone, resorcinol, bis-(hydroxyphenyl) alkanes, bis-(hydroxyphenyl) ethers, bis-(hydroxyphenyl)-ketones, bis-(hydroxyphenyl)-sulfoxides, bis-(hydroxyphenyl)-sulfides, bis-(hydroxyphenyl)-sulfones, and α,α -bis-(hydroxyphenyl)-diisopropyl-benzenes, as well as their nuclear-alkylated compounds. These and further suitable aromatic dihydroxy compounds are described, for example, in U.S. Patents 3,028,356; 2,999,835; 3,148,172; 2,991,273; 3,271,367; and 2,999,846. Further examples of suitable bisphenols are 2,2-bis-(4-hydroxyphenyl)-propane (bisphenol A), 2,4-bis-(4-hydroxyphenyl)-2-methyl-butane, 1,1-bis-(4-hydroxyphenyl)-cyclohexane, α,α' -bis-(4-hydroxyphenyl)-p-diisopropylbenzene, 2,2-bis-(3-methyl-4-hydroxyphenyl)-propane, 2,2-bis-(3-chloro-4-hydroxyphenyl)-propane, bis-(3-5-dimethyl-4-hydroxyphenyl)-methane, 2,2-bis-(3,5-dimethyl-4-

20

25

30 Mo-3575

hydroxyphenyl)-propane, bis-(3,5-dimethyl-4-hydroxyphenyl)-sulfide, bis-(3,5-dimethyl-4-hydroxyphenyl)-sulfoxide, bis-(3,5-dimethyl-4-hydroxyphenyl)-sulfone, hydroxy-benzophenone, 2,4-bis-(3,5-dimethyl-4-hydroxyphenyl)-cyclohexane, α,α' -bis-(3,5-dimethyl-4-hydroxyphenyl)-p-diisopropylbenzene and 4,4'-sulfonyl diphenol.

Examples of particularly preferred aromatic bisphenols are 2,2-bis-(4-hydroxyphenyl)-propane, 2,2-bis-(3,5-dimethyl-4-hydroxyphenyl)-propane and 1,1-bis-(4-hydroxyphenyl)-cyclohexane.

The most preferred bisphenol is 2,2-bis-(4-hydroxyphenyl)-propane (bisphenol A).

The polycarbonates of the invention may entail in their structure units derived from one or more of the suitable bisphenols.

Among the resins suitable in the practice of the invention are included phenolphthalein-based polycarbonate, copolycarbonates and terpolycarbonates such as are described in U.S. Patents 3,036,036 and 4,210,741.

The polycarbonates of the invention may also be branched by condensing therein small quantities, e.g., 0.05-2.0 mol % (relative to the bisphenols) of polyhydroxy compound. Polycarbonates of this type have been described, for example, in German Offenlegungsschriften 1,570,533; 2,116,974 and 2,113,374; British Patents 885,442 and 1,079,821 and U.S. Patent 3,544,514. The following are some examples of polyhydroxyl compounds which may be used for this purpose; phloroglucinol; 4,6-dimethyl-2,4,6-tri-(4-hydroxyphenyl)-heptane; 1,3,5-tri-(4-hydroxyphenyl)-benzene; 1,1,1-tri-(4-hydroxyphenyl)-ethane; tri-(4-hydroxyphenyl)-phenylmethane; 2,4-bis-(4-hydroxy-1-isopropylidene)-phenol; 2,6-bis-(2'-dihydroxy-5'-methylbenzyl)-4-methylphenol; 2,4-dihydroxy-benzoic acid; 2-(4-hydroxyphenyl)-2-(2,4-dihydroxyphenyl)-propane and 1,4-bis-(4,4'-dihydroxytriphenylmethyl)-benzene. Some of the other polyfunctional compounds are 2,4-dihydroxy-benzoic acid, trimesic acid, cyanuric chloride and 3,3-bis-(4-hydroxyphenyl) 2-oxo-2,3-dihydroindole.

Mo-3575

In addition to the polycondensation process mentioned above, other processes for the preparation of the polycarbonates of the invention are polycondensation in a homogeneous phase and transesterification. The
5 suitable processes are disclosed in U.S. Patents 3,028,365; 2,999,846; 3,153,008; and 2,991,273.

The preferred process for the preparation of polycarbonates is the interfacial polycondensation process.

Other methods of synthesis in forming the polycarbonates of the
10 invention such as disclosed in U.S. Patent 3,912,688 may be used.

Suitable polycarbonate resins available in commerce, for instance Makrolon* FCR, Makrlon* 2600, Makrolon* 2800 and Makrolon* 3100, all of which are bisphenol A-based homopolycarbonate resins differing in terms of their respective molecular weights and characterized in that their
15 melt flow indices (MFR) per ASTM D-1238 are about 16.5-24, 13-16, 7.5-13.0 and 3.5-6.5 g/10 min., respectively. These are products of Bayer Corporation of Pittsburgh, Pennsylvania.

Other polycarbonate resins suitable in the practice of the invention have been disclosed in U.S. Patents 3,030,331; 3,169,121; 3,395,119;
20 3,729,447; 4,255,556; 4,260,731; 4,369,303 and 4,714,746.

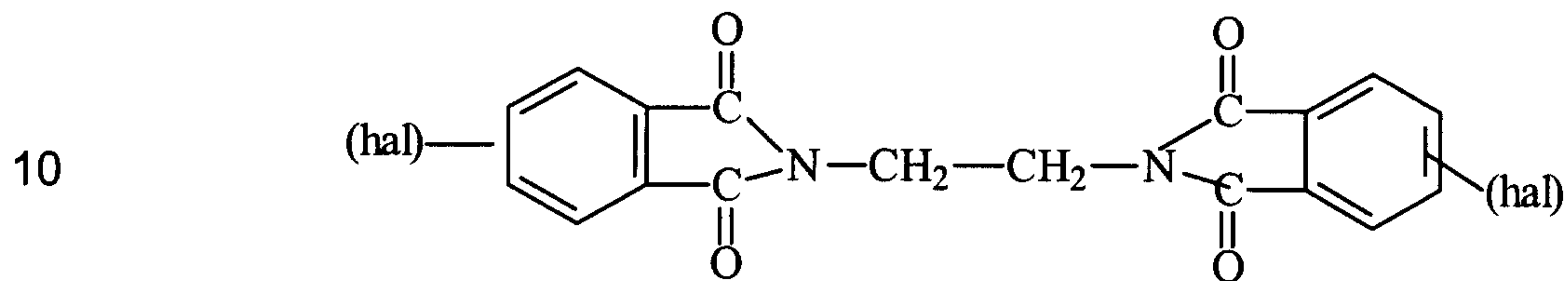
The polytetrafluoroethylene - herein PTFE - suitable for use in the present invention is a well known, commercially available product. Characteristically, the PTFE of the invention forms fibrils when subjected to shear. Among the suitable PTFE compounds are those described in
25 U.S. Patent Nos. 3,005,795 and 3,671,487 and in German Published Patent No. 2,535,262. A particularly preferred form of PTFE is available from DuPont as TEFLON* Type 6 and is designated by the ASTM as Type 3.

* trade-mark

30 Mo-3575

The PTFE compound may conveniently be used in amounts up to about 2 wt. % based on the weight of the total composition.

5 The halogenated phthalimide suitable in the present context is characterized in that it contains at least 50, preferably at least 60 weight percent of halogen. The preferred halogen is bromine. The preferred phthalimide conforms structurally to



the most preferred halogenated phthalimide is 1,2-bis-(tetrabromo-phthalimido)-ethane which is available under the trade name
15 Saytex* BT 93 from Ethyl Chemicals.

The salts - herein salt - useful in the present invention include those formed between an alkali metal or alkaline earth metal and an inorganic acid.

20 Lithium sodium, potassium, magnesium, calcium and barium salts are preferred. Inorganic acids in the present context include any compound which meets the traditional tests of acidity and contains a complex ion. Preferred acids contain oxo-anion or fluoro-anion complexes.

25 The most preferred salts are the alkali or alkaline-earth metal complex fluoro-anion salts or complex oxo-anion salts. This terminology being derived from the discussion of fluorine compounds contained in the text "Advanced Inorganic Chemistry" by F.A. Cotton and G. Wilkinson, Interscience Publishers, 1962. Suitable inorganic alkali metal complex fluoro-anion salts include KBF_4 , K_3AlF_6 , KAlF_4 , K_2SiF_6 , Na_3AlF_6 , KPF_6 ,

30 *trade-mark

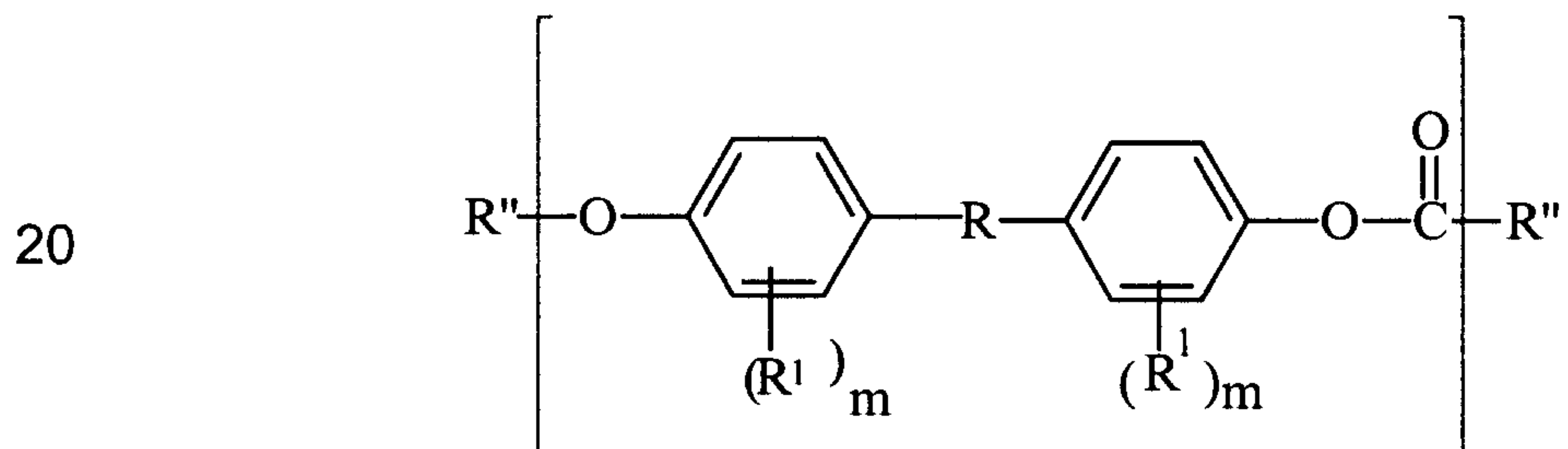
Mo-3575

NaSbF₆, Na₃FeF₆, NaPF₆, Na₂SiF₆, Na₂TiF₆, NaBF₄, K₂TaF₇, K₂NbF₇, KSbF₆, K₂NiF₆, K₂TiF₆, LiBF₄, LiPF₆, Li₂BeF₄, Li₃AlF₆, MgSiF₆, and BaSiF₆,

- 5 Li₃AlF₆, BaSiF₆, KBF₄, K₃AlF₆, KAlF₄, K₂SiF₆ and Na₃AlF₆, are the preferred metal complex fluoro-anion salts and Na₃AlF₆ (cyrolite) is the most preferred complex fluoro-anion salt. Among the suitable complex oxo-anion salts are the alkali and alkaline-earth salts of carbonic acid, such as Na₂CO₃, K₂CO₃, MgCO₃, CaCO₃, BaCO₃, and BaVO₃. Other
10 suitable salts are sulfates, phosphates and tungstenates. The most preferred salts of oxo-anion complex acids are BaCO₃ and BaVO₃.

- The salts may be used in any effective amount up to about 1 wt.% based on the total weight of the copolymer. It is preferred to use no less than about 0.1 wt. % and more preferably to use no more than about
15 1.0%.

The halogenated oligomeric carbonate of the invention conforms structurally to



wherein R is a C₁-C₁₀ divalent hydrocarbon radical, or a -O-, -S- or -SO₂ -radical, preferably alkylidene, most preferably propylidene;

- 25 R' independently denotes a halogen atom, preferably chlorine or bromine, most preferably bromine;

R'' denotes phenyl including substituted phenyl,

n is 5-15 and m is 1 to 4, preferably 2.

- 30 Mo-3575

The grafted olefinic copolymer in the context of the present invention is a graft polymer of one or more unsaturated dicarboxylic acids or an acid anhydride on an olefinic copolymer backbone having a weight
5 average molecular weight of about 25,000 to 500,000, preferably 30,000 to 100,000 and a glass transition temperature below -30°C , preferably below -50°C . Suitable acids include maleic, citraconic, aconitic, itaconic, citric and fumaric acids and their anhydrides. The copolymer of the invention is preferably substantially amorphous.

10 A preferred copolymer has an ethylene-propylene copolymer backbone which is grafted with one or more unsaturated cyclic anhydrides, preferably maleic acid anhydride. The amount of ethylene and propylene in the copolymer backbone may range for each of these components between 1 and 99 percent by weight, relative to the weight of the
15 backbone. The amount of the grafted phase is about 0.1 to 10%, preferably 0.5 to 1.0% most preferably, about 0.7% relative to the weight of the grafted olefinic copolymer. A suitable copolymer is available commercially from Exxon under the trade name Exxelor* VA 1803.

20

25

* trade-mark

Mo-3575

The "critical thickness" of the composition of the invention is a material parameter which corresponds to the maximum thickness which the part molded from the composition may have while still maintaining ductility in notched Izod impact test per ASTM D-256. Parts having a thickness greater than the critical thickness fail in a brittle fashion. The composition of the invention is characterized in that its ductility is maintained for molded articles having a thickness of greater than 200 mils, preferably greater than 220 mils.

The procedures used in the determinations of the flammability ratings of polycarbonate compositions in accordance with UL-94 and in accordance with UL-94 5V are well known in the art. Specific note is made of the UL-94 5V test and the ratings A and B thereof.

In accordance with the test for flammability of plastic materials - UL-94 "4 Vertical Burning Test for Classifying Materials 94-5 VA or 94-5VB", a material classed 94-5VA shell.

"A. Not have any bar specimens that burn with flaming or glowing combustion for more than 60 seconds after the fifth flame.

B. Not have any bar specimens that drip flaming particles that ignite dry absorbent surgical cottong heated 12 inches (305 mm) below the test specimens.

C. Not have any plaque specimens that exhibit a burn through (hole)."

The classfication 94-5VB designates a material which althugh meeting the criteria A&B above, "permit a burn through (hole) on plaque specimen."

The composition of the invention is characterized in that it combined good flammability rating as determined in accordance with the rigorous UL-94 5V, and good impact performance, critical thickness greater than 200 mils.

The composition of the invention contains,
0.1 to 2.0, preferably 0.2 to 0.5 percent of PTFE ,

Mo-3575

The composition of the invention contains,
0.1 to 2.0, preferably 0.2 to 0.5 percent of PTFE ,
0.1 to 1.0, preferably 0.2 to 0.4 percent of the salt,
0.5 to 2.0, preferably 0.5 to 1.0 percent of the
5 oligomeric halogenated carbonate,
0.1 to 4.0, preferably 0.5 to 1.0 percent of the
halogenated phthalimide, and
0.5 to 10, preferably 1.0 to 3.0 percent of the graft
modified olefin rubber.

10 The percents noted above are relative to the weight of the
composition.

The composition of the invention may be prepared
conventionally, using procedures well known in the art of
thermoplastic molding compositions. Further, additives
15 reinforcements, fillers, stabilizers and mold release agents,
which are known for their efficacy in the context of
polycarbonate molding compositions are suitable for use in the
composition of the invention.

Experimental

20 Compositions within the scope of the invention were
prepared and their properties tested. The compositions
described below were prepared by conventional means entailing
melt blending, extrusion and pelletizing and the test specimens
were molded from the composition by injection. In the
25 preparation of these composition there was included a small
amount of carbon black pigment which was introduced as a 1%
polycarbonate concentrate, - designated in the table below as
"pigmented concentrate"- has no criticality in the present
context.

30 A comparison between the properties of these
compositions and other compositions which are not within the
scope of the invention is presented below. The amounts of the
components are given in percent relative to the weight of the
composition.

In the experiments described below, the polycarbonate resin was a homopolycarbonate based on bisphenol-A having a melt flow index of about 11.0 g/10 min. per ASTM D 1238 (Makrolon* 2608, from Bayer Corporation). The halogenated imide used in the experiments was 1,2-bis-(tetrabromophthalimido)-ethane. The PTFE is a fibrilating product available from DuPont & Co. The tetrabromo-oligocarbonate (TBOC) used in the experiments which are described below had a degree of polymerization of 5.

The impact modifier used in the comparative examples was Paraloid* EXL-2330 - designated in the table below as "C" - an acrylate rubber, core-shell impact modifier, a product of Rohm & Haas. The modifier designated "A" was Paraloid* EXL 3607 which is a known impact modifier based on butadiene - MBS type - available commercially from Rohm & Haas. The composition in accordance with the present invention, represented by Example 3, contains, as the impact modifier, Exxelor* VA 1803, - designated "B" in the table below.

<u>Example</u>		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
20	Polycarbonate,	97.5	95.05	95.05	95.05
	PTFE,	0.2	0.2	0.2	0.2
	cryolite,	0.25	0.25	0.25	0.25
	halogenated phthalimide	0.5	0.5	0.5	0.5
	TBOC*,	1.0	1.0	1.0	1.0
25	Pigmented concentrate	1.0	1.0	1.0	1.0
	Impact modifier				
	"A"	--	2.0	--	--
	"B"	--	--	2.0	--
30	"C"	--	--	--	2.0

*trade-mark

Mo-3575

Properties:

Critical Thickness,	127	248	247	165
mils				

Flammability, UL-94

5 1/16"

Class	V-0	V-0	V-0	V-0
-------	-----	-----	-----	-----

Burning time, sec	2.2	2.1	1.6	3.7
-------------------	-----	-----	-----	-----

drips	0/5	0/5	0/5	0/5
-------	-----	-----	-----	-----

Flammability, UL-94, 5V

10 1/8"

Pass/fail	fail	fail	pass-A ¹	pass-B ¹
drips	2/5	2/5	0/5 ^{**}	1/5 ^{***}

* Tetrabromo bisphenol A oligocarbonate

** the average burn time for the 5th ignition was 9.2 seconds

15 *** the average burn time for the 5th ignition was 11.6 seconds

¹ the A and B ratings are explained in the text.

The comparison clearly points to the advantage represented by the composition of the invention where an exceptional flame retardance is combined with high impact resistance. The comparison examples which were identical in all respects except for the type of impact modifier do not share these characteristics.

25 Although the invention has been described in detail in the foregoing for the purpose of illustration, it is to be understood that such detail is solely for the purpose and the variations can be made therein by those skilled in the art without departing from the spirit and scope of the invention except as it may be limited by the claims.

30

The embodiments of the invention in which exclusive property or privilege is claimed are defined as follows:

1. A thermoplastic molding composition comprising
 - 5 (i) a polycarbonate resin,
 - (ii) fibrilating PTFE,
 - (iii) a salt formed from an alkali metal or an alkaline earth metal and an inorganic acid complex ion,
 - (iv) a halogenated phthalimide,
 - 10 (v) a halogenated oligocarbonate, and
 - (vi) a graft modified olefin rubber,wherein said graft modified olefin rubber is a graft polymer of one or more unsaturated dicarboxylic acids or their anhydride on an olefinic copolymer backbone having a weight average molecular weight of about 25,000 to
15 500,000, and a glass transition temperature below -30°C, said composition being characterized in that it exhibits a critical thickness greater than 200 mils and in that it achieves a pass rating in accordance with the flammability test of UL-94-5VA at 1/8 inch.
2. The thermoplastic molding composition of Claim 1 wherein said
20 PTFE is present in an amount of 0.2 to 0.4 percent relative to the weight of the composition.
3. The thermoplastic molding composition of Claim 1 wherein said salt is present in an amount of 0.2 to 0.4 percent relative to the weight of the composition.
- 25 4. The thermoplastic molding composition of Claim 1 wherein said halogenated phthalimide is present in an amount of 0.5 to 1.0 percent relative to the weight of the composition.
5. The thermoplastic molding composition of Claim 1 wherein said graft modified olefin rubber is present in an amount of 1.0 to 3.0 percent
30 relative to the weight of the composition.

6. The composition of Claim 1 wherein said molecular weight is about 30,000 to 100,000.

7. The composition of Claim 6 wherein said glass transition
5 temperature is below -50°C.

10

15

20

25

Mo-3575

8. The composition of Claim 6 wherein said polycarbonate is a homopolymer based on bisphenol A.

9. The composition of Claim 1 wherein said copolymer is substantially amorphous.

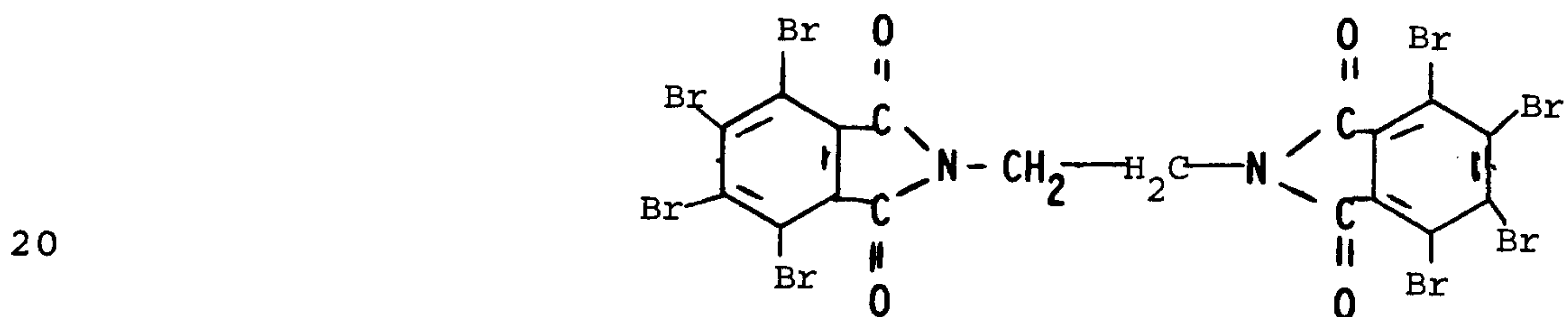
5 10. The composition of Claim 1 wherein said copolymer comprises units derived from ethylene and propylene.

11. The composition of Claim 10 wherein said copolymer is grafted with one or more unsaturated cyclic anhydrides.

10 12. The composition of Claim 11 wherein said anhydride is maleic acid anhydride.

13. The composition of Claim 12 wherein said anhydride is present in an amount of about 0.1 to 10% relative to the weight of the grafted olefinic copolymer.

15 14. The composition of Claim 13 wherein said polycarbonate is a homopolymer based on bisphenol A, the halogenated phthalimide conforms to



and the graft modified olefin rubber comprise maleic acid anhydride, ethylene and propylene.

25

30