

Aromatic formals as additives for lowering the water uptake of polycarbonates

The Application relates to new aromatic formals,
5 thermoplastic moulding compositions comprising polycarbonate and at least one aromatic formal according to the invention as an additive for lowering the water uptake of the polycarbonate and for improving the flowability, and the use of such moulding compositions for the production of
10 shaped articles, in particular optical data carriers, such as e.g. compact discs, video discs, digital versatile discs and further optical data carriers which can be written to and deleted once or several times, and the corresponding shaped articles themselves.

15 Polycarbonates are employed generally, because of their particular combination of properties, such as transparency, heat resistance and dimensional stability, as materials for injection moulding or injection-compression moulding of
20 optical data carriers. To improve the processability, processing in general taking place at temperatures in the range from 300°C to 400°C, additives such as mould release agents and stabilizers are as a rule added to the polycarbonate.

25 Aromatic polycarbonates based on bisphenol A are used in particular for the production of optical data carriers. However, they can absorb up to 0.34 wt.% of water, which can have an adverse effect on the dimensional stability of
30 the data carriers. An improved dimensional stability is of importance, however, especially if blue or blue-green lasers are employed.

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US B 6,391,418 describes substrates for data carrier media which comprise a biphenyl derivative as an additive for increasing the dimensional stability (lower shrinkage).

5 The addition of small amounts of m-terphenyl to bisphenol A polycarbonate, which leads to a reduction in the water uptake, is described in M. Ueda, Mitsubishi Engineering Plastics Corp., Technical Digest of Joint ISOM / ODS 2002 Waikoloa Hawaii, 8.7.2002, pages 33 - 35. The disadvantage
10 of these biphenyl derivatives, however, is that they are highly conjugated aromatic π systems which already absorb in the blue or blue-green spectral region. This is undesirable in storage technologies which operate in this wavelength range. Furthermore, terphenyls are relatively
15 rigid molecules, which has an adverse effect on the mechanical properties in the mixture with polycarbonate.

The possibilities described in the prior art thus do not lead to satisfactory results in every respect. However, no
20 indication at all that formals could be suitable as additives is to be found in the prior art.

There was therefore the object of providing thermoplastic moulding compositions which comprise polycarbonate with a
25 reduced water uptake and as a result have a better dimensional stability. In particular, the new disc formats with a relatively high storage capacity and possibly a thinner disc thickness, such as e.g. digital versatile discs (DVDs), require a higher heat stability compared with
30 the CD. Damage to the material occurring during processing to shaped articles and the formation of a deposit in the mould become more critical. It is thus desirable that an additive for reducing the water uptake at the same time has

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the effect of a lowering of the melt viscosity and therefore a better flow at somewhat lower temperatures.

With the moulding compositions according to the invention,
5 this object is surprisingly achieved by an improved quality of the data storage medium and an improved processability of the material in injection moulding or the injection-compression moulding process and a reduced water uptake and therefore in the end an improved dimensional stability.

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The present Application therefore provides thermoplastic moulding compositions comprising at least one polycarbonate and at least one aromatic formal according to the invention with a specific chemical structure as an additive for
15 reducing the water uptake. These aromatic formals thus lead to an improved dimensional stability of the data carriers and at the same time have the effect of a lower melt viscosity.

20 In contrast to polycarbonate, aromatic polyformals can be prepared in a homogeneous phase from bisphenols and methylene chloride in the presence of alkali metal hydroxides. In this polycondensation, methylene chloride functions simultaneously as a reactant and as a solvent.
25 US B 4,374,974 describes a process in which, starting from specific bisphenols, linear and cyclic oligo- and polyformals can be obtained after reaction with methylene chloride. The conversion of monofunctional phenols to low molecular weight aromatic formals by means of this
30 synthesis variant is not described in the prior art.

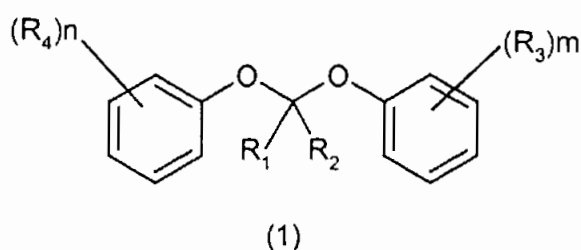
S. Tanimoto et al., Bull. Inst. Chem. Res., Kyoto Univ., vol. 56, no. 6, 1978 merely discloses a synthesis in DMSO

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or acetonitrile in the presence of 18-crown-6 for certain methyl-, chloro-, bromo- and methoxy-substituted species as a new possible use for this phase transfer catalyst.

However, nothing is said about the synthesis of further
5 formals or even the usability thereof.

The aromatic formals according to the invention are based on the general formula



10 wherein

R_1 and R_2 represent hydrogen or phenyl,

R_3 and R_4 independently of one another represent hydrogen,
15 linear or branched C_1 - C_{40} -alkyl or -alkoxy, preferably C_1 to C_{32} -alkyl or -alkoxy, particularly preferably C_1 to C_{28} -alkyl or -alkoxy, very particularly preferably C_1 to C_{26} -alkyl or -alkoxy and especially very particularly preferably C_1 to C_{24} -alkyl or -alkoxy,
20 optionally substituted C_6 to C_{14} -aryl or -aryloxy, preferably C_6 to C_{10} -aryl or -aryloxy, or C_7 to C_{30} -aralkyl, particularly preferably C_7 to C_{24} -aralkyl, and

n and m independently of one another represent an integer
25 between 0 and 5, preferably 1 to 3, particularly preferably 1 to 2 and very particularly preferably 1, it also being possible for these to be isomer mixtures.

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Compounds of the formula (1) in which at least one of the radicals R_3 and R_4 independently of one another is chosen from the alkyl substituents defined above are also preferred.

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Compounds of the formula (1) in which at least one of the radicals R_3 and R_4 independently of one another is chosen from the alkoxy substituents defined above are also preferred.

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Compounds of the formula (1) in which at least one of the radicals R_3 and R_4 independently of one another is chosen from the aryl substituents defined above are also preferred.

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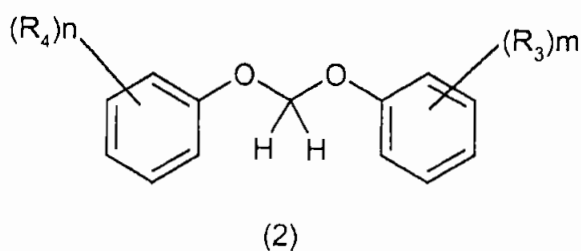
Compounds of the formula (1) in which at least one of the radicals R_3 and R_4 independently of one another is chosen from the aryloxy substituents defined above are also preferred.

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Compounds of the formula (1) in which at least one of the radicals R_3 and R_4 independently of one another is chosen from the aralkyl substituents defined above are also preferred.

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The aromatic formals are very particularly preferably described by the general formula (2)



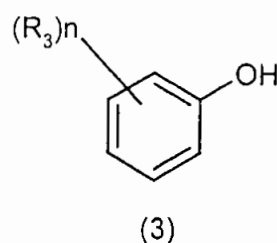
wherein

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R₃, R₄, m and n have the abovementioned meanings, it also being possible for these to be isomer mixtures.

The compounds of the formulae (1) and (2) in which R₃ and R₄ have the same meaning are furthermore very particularly preferred.

The present invention furthermore relates to a process for the preparation of formals of the formulae (1) and (2), characterized in that monofunctional phenols of the formula



wherein

R₃ and n have the abovementioned meanings, are reacted in a homogeneous solution of methylene chloride or α,α -dichlorotoluene and a suitable high-boiling solvent, such as, for example, N-methylpyrrolidone (NMP), dimethylformamide (DMF), N-methylcaprolactam (NMC), chlorobenzene, dichlorobenzene or tetrahydrofuran (THF), in the presence of a base, preferably sodium hydroxide (NaOH) or potassium hydroxide (KOH) and very particularly NaOH, preferably at temperatures of between 30 and 80°C, particularly preferably between 50 and 80°C and very particularly preferably between 60 and 80°C. Preferred high-boiling solvents are NMP, DMF and NMC, particularly preferably NMP and NMC and very particularly preferably NMP.

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The phenols of the formula (3) are known or can be prepared by processes known from the literature, for example by Friedel-Crafts alkylation (Organikum, Organisch-chemisches Grundpraktikum, corrected reprint of the 20th edition, 5 Wiley-VCH, Weinheim, p. 355, 1999). Very many phenols are also commercially obtainable (suppliers e.g. Aldrich, Fluka, Acros etc.). The phenols of the formula (3) can be employed alone as an isomer mixture or in a mixture.

10 The polymer mixtures according to the invention in general comprise the aromatic formals in a content of 10 - 60,000 ppm, preferably 10 - 50,000 ppm, particularly preferably 20 - 40,000 ppm, very particularly preferably between 50 and 30,000 ppm.

15 Embodiments which make use of the parameters, compounds, definitions and explanations mentioned under preferred, particularly preferred or very particularly preferred are preferred, particularly preferred or very particularly
20 preferred.

The definitions, parameters, compounds and explanations mentioned generally in the description or mentioned in preferred ranges, however, can also be combined with one
25 another as desired, that is to say between the particular ranges and preferred ranges.

The invention furthermore provides the use of such moulding compositions for the production of optical data carriers,
30 such as e.g. compact discs, video discs, digital versatile discs and further optical data carriers which can be written to and deleted once or several times, and the

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optical data carriers themselves which can be produced from the polymer mixtures.

The polymer mixture can of course also be used for other traditional polycarbonate uses, including in those which use a polycarbonate with a relatively high molecular weight. The uses can be transparent or opaque, such as, for example: foodstuffs and drinks packaging, optical lenses and prisms, lenses for illumination purposes, automobile headlamp lenses, glazing for construction and motor vehicles and panes of another type, such as for greenhouses, so-called twin-wall sheets or hollow sheets. Other examples of the uses are profiles, films, all types of housings, e.g. for medical equipment and domestic appliances, such as juice presses, coffee machines and mixers; for office machines, such as computers, monitors, printers and copiers; for sheets, pipes, electrical installation conduits, windows, doors and profiles for the construction sector, interior fitting-out and exterior uses; and in the electrical engineering field, e.g. for switches and plugs. The shaped articles according to the invention can furthermore be used for interior fittings and components of track vehicles, ships, aircraft, buses and other motor vehicles and for motor vehicle body parts.

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Thermoplastic moulding compositions in the context of the present invention predominantly comprise aromatic polycarbonates. Polycarbonates are to be understood as meaning both homopolycarbonates and copolycarbonates; the polycarbonate can be linear or branched in a known manner. They have a weight-average molecular weight, determined by gel permeation chromatography, of 5,000 to 80,000, preferably 10,000 to 40,000. The molecular weight is

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particularly preferably between 15,000 and 35,000, in particular 15,000 and 22,000.

These polycarbonates are prepared in a known manner from
5 diphenols, carbonic acid derivatives, optionally chain terminators and optionally branching agents.

Details of the preparation of polycarbonates have been laid down in many patent specification for about 40 years.

10 Reference may be made here by way of example only to Schnell, "Chemistry and Physics of Polycarbonates", Polymer Reviews, volume 9, Interscience Publishers, New York, London, Sydney 1964, to D. Freitag, U. Grigo, P.R. Müller, H. Nouvertne', BAYER AG, "Polycarbonates" in Encyclopedia
15 of Polymer Science and Engineering, volume 11, second edition, 1988, pages 648-718 and finally to Dres. U. Grigo, K. Kirchner and P.R. Müller "Polycarbonate" in Becker/Braun, Kunststoff-Handbuch, volume 3/1, Polycarbonate, Polyacetale, Polyester, Celluloseester, Carl
20 Hanser Verlag Munich, Vienna 1992, pages 117-299.

Diphenols which are suitable for the preparation of the polycarbonates are, for example, hydroquinone, resorcinol, dihydroxydiphenyls, bis-(hydroxyphenyl)-alkanes, bis-
25 (hydroxyphenyl)-cycloalkanes, bis-(hydroxyphenyl) sulfides, bis-(hydroxyphenyl) ethers, bis-(hydroxyphenyl) ketones, bis(hydroxyphenyl) sulfones, bis-(hydroxyphenyl)-sulfoxides, α,α' -bis-(hydroxyphenyl)-diisopropylbenzenes and nucleus-alkylated and nucleus-halogenated compounds
30 thereof.

Preferred diphenols are 4,4'-dihydroxydiphenyl, 2,2-bis-(4-hydroxyphenyl)-propane, 2,4-bis-(4-hydroxyphenyl)-2-

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methylbutane, 1,1-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-hydroxyphenyl)-propane, bis-(3,5-dimethyl-4-hydroxyphenyl) sulfone, 2,4-bis-(3,5-dimethyl-4-hydroxyphenyl)-2-methylbutane, 1,4-bis-[2-(4-hydroxyphenyl)-2-propyl]benzene, 2,2-bis-(3,5-dichloro-4-hydroxyphenyl)-propane, 2,2-bis-(3,5-dibromo-4-hydroxyphenyl)-propane, 1,1-bis-(4-hydroxyphenyl)-3,3,5-trimethylcyclohexane and 1,3-bis-[2-(4-hydroxyphenyl)-2-propyl]benzene.

Particularly preferred diphenols are 2,2-bis-(4-hydroxyphenyl)-propane (BPA), 2,2-bis-(3,5-dimethyl-4-hydroxyphenyl)-propane, 2,2-bis-(3,5-dichloro-4-hydroxyphenyl)-propane, 2,2-bis-(3,5-dibromo-4-hydroxyphenyl)-propane, 1,3-bis-[2-(4-hydroxyphenyl)-2-propyl]-benzene (BPM), 1,1-bis-(4-hydroxyphenyl)-cyclohexane and 1,1-bis-(4-hydroxyphenyl)-3,3,5-trimethylcyclohexane (TMC).

These and further suitable diphenols are described e.g. in US 3 028 635, 2 999 835, 3 148 172, 2 991 273, 3 271 367, 4 982 014 and 2 999 846, in DE-A 1 570 703, 2 063 050, 2 036 052, 2 211 956 and 3 832 396, French Patent Specification 1 561 518, in the monograph "H. Schnell, Chemistry and Physics of Polycarbonates, Interscience Publishers, New York 1964" and in JP-A 62039/1986, 62040/1986 and 105550/1986.

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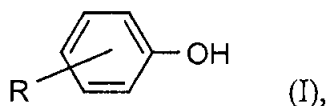
In the case of the homopolycarbonates only one diphenol is employed, and in the case of the copolycarbonates several diphenols are employed.

- 5 Moulding compositions which comprise at least one polycarbonate with diol units from BPA and/or trimethylcyclohexyl-bisphenol (TMC), preferably chosen from the group consisting of homopolymers of BPA, copolymers of BPA with TMC or copolymers with 5 to 60 wt.% TMC, are
10 preferably used.

Suitable carbonic acid derivatives are, for example, phosgene or diphenyl carbonate.

- 15 Suitable chain terminators are both monophenols and monocarboxylic acids. Suitable monophenols are phenol itself, alkylphenols, such as cresols, p-tert-butylphenol, p-n-octylphenol, p-iso-octylphenol, p-n-nonylphenol and p-iso-nonylphenol and p-cumylphenol, halogenophenols, such as
20 p-chlorophenol, 2,4-dichlorophenol, p-bromophenol, amyphenol and 2,4,6-tribromophenol, and mixtures thereof.

Preferred chain terminators are the phenols of the formula (I)



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- wherein R is hydrogen, tert-butyl or a branched or unbranched C₈- and/or C₉-alkyl radical. However, p-cumylphenol can also preferably be used. In the case of the transesterification process, the chain terminator
30 results from the diaryl carbonate employed.

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The amount of chain terminator to be employed, preferably in the phase boundary process, is 0.1 mol% to 5 mol%, based on the moles of the particular diphenols employed. The addition of the chain terminator can take place before, during or after the phosgenation.

Suitable branching agents are the compounds which are trifunctional or more than trifunctional and are known in polycarbonate chemistry, in particular those with three or more than three phenolic OH groups.

Suitable branching agents are, for example, phloroglucinol, 4,6-dimethyl-2,4,6-tri-(4-hydroxyphenyl)-hept-2-ene, 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, 2,2-bis-[4,4-bis-(4-hydroxyphenyl)-cyclohexyl]-propane, 2,4-bis-(4-hydroxyphenyl-isopropyl)-phenol, 2,6-bis-(2-hydroxy-5'-methyl-benzyl)-4-methylphenol, 2-(4-hydroxyphenyl)-2-(2,4-dihydroxyphenyl)-propane, hexa-(4-(4-hydroxyphenyl-isopropyl)-phenyl)-orthoterephthalic acid ester, tetra-(4-hydroxyphenyl)-methane, tetra-(4-(4-hydroxyphenyl-isopropyl)-phenoxy)-methane and 1,4-bis-(4',4"-dihydroxytriphenyl)-methyl)-benzene, as well as 2,4-dihydroxybenzoic acid, trimesic acid, cyanuric chloride and, for some uses, even preferably 3,3-bis-(3-methyl-4-hydroxyphenyl)-2-oxo-2,3-dihydroindole.

The amount of branching agents which are optionally to be employed is 0.01 mol% to 2 mol%, again based on the moles of the particular diphenols employed.

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In the phase boundary process, the branching agents either can be initially introduced into the reaction vessel with the diphenols and the chain terminators in the aqueous alkaline phase, or can be added as a solution in an organic solvent. In the case of the transesterification process the branching agents can be employed together with the diphenols.

All these measures for the preparation of the thermoplastic polycarbonates are familiar to the expert.

The thermoplastic polymer mixtures according to the invention can furthermore comprise conventional additives for polycarbonates in the known amounts, such as, by way of example and preferably, stabilizers against UV radiation, flameproofing agents, dyestuffs, fillers, foams, optical brighteners and antistatics. Those components which do not adversely influence the transparency of the material are preferably taken for optical uses.

These substances are to be found in many publications, such as, for example, in Additives for Plastics Handbook, John Murphy, 1999, and are commercially obtainable.

1. Suitable antioxidants are, for example:

1.1. Alkylated monophenols, for example 2,6-di-tert-butyl-4-methylphenol, 2-tert-butyl-4,6-dimethylphenol, 2,6-di-tert-butyl-4-ethylphenol, 2,6-di-tert-butyl-4-n-butylphenol, 2,6-di-tert-butyl-4-isobutylphenol, 2,6-dicyclopentyl-4-methylphenol, 2-(α -methylcyclohexyl)-4,6-dimethylphenol, 2,6-dioctadecyl-4-methylphenol, 2,4,6-tricyclohexylphenol, 2,6-di-tert-butyl-4-

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methoxymethylphenol, nonylphenols which are linear or branched in the side chain, for example 2,6-dinonyl-4-methylphenol, 2,4-dimethyl-6-(1'-methylundec-1'-yl)phenol, 2,4-dimethyl-6-(1'-methylheptadec-1'-yl)phenol and 2,4-
5 dimethyl-6-(1'-methyltridec-1'-yl)phenol.

1.2. Alkylthiomethylphenols, for example 2,4-dioctylthiomethyl-6-tert-butylphenol, 2,4-dioctylthiomethyl-6-methylphenol, 2,4-dioctylthiomethyl-6-
10 ethylphenol and 2,6-didodecylthiomethyl-4-nonylphenol.

1.3. Hydroquinones and alkylated hydroquinones, for example 2,6-di-tert-butyl-4-methoxyphenol, 2,5-di-tert-butylhydroquinone, 2,5-di-tert-amylhydroquinone, 2,6-
15 diphenyl-4-octadecyloxyphenol, 2,6-di-tert-butylhydroquinone, 2,5-di-tert-butyl-4-hydroxyanisole, 3,5-di-tert-butyl-4-hydroxyanisole, 3,5-di-tert-butyl-4-hydroxyphenyl stearate and bis(3,5-di-tert-butyl-4-hydroxyphenyl) adipate.
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1.4. Tocopherols, for example α -tocopherol, β -tocopherol, γ -tocopherol, δ -tocopherol and mixtures thereof (vitamin E).

1.5. Hydroxylated thiodiphenyl ethers, for example 2,2'-thiobis(6-tert-butyl-4-methylphenol), 2,2'-thiobis(4-octylphenol), 4,4'-thiobis(6-tert-butyl-3-methylphenol), 4,4'-thiobis(6-tert-butyl-2-methylphenol), 4,4'-thiobis(3,6-di-sec-amylphenol) and 4,4'-bis(2,6-dimethyl-4-
25 hydroxyphenyl) disulfide.
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1.6. Alkylidenebisphenols, for example 2,2'-methylenebis(6-tert-butyl-4-methylphenol), 2,2'-methylenebis(6-tert-butyl-

- 4-ethylphenol), 2,2'-methylenebis[4-methyl-(6- α -methylcyclohexyl)phenol]], 2,2'-methylenebis(4-methyl-6-cyclohexylphenol), 2,2'-methylenebis(6-nonyl-4-methylphenol), 2,2'-methylenebis(4,6-di-tert-butylphenol),
- 5 2,2'-ethylidenebis(4,6-di-tert-butylphenol), 2,2'-ethylidenebis(6-tert-butyl-4-isobutylphenol), 2,2'-methylenebis[6-(α -methylbenzyl)-4-nonylphenol], 2,2'-methylenebis[6-(α,α -dimethylbenzyl)-4-nonylphenol], 4,4'-methylenebis(2,6-di-tert-butylphenol), 4,4'-methylenebis(6-
- 10 tert-butyl-2-methylphenol), 1,1-bis(5-tert-butyl-4-hydroxy-2-methylphenyl)butane, 2,6-bis(3-tert-butyl-5-methyl-2-hydroxybenzyl)-4-methylphenol, 1,1,3-tris(5-tert-butyl-4-hydroxy-2-methylphenyl)butane, 1,1-bis(5-tert-butyl-4-hydroxy-2-methylphenyl)-3-n-dodecylmercaptobutane, ethylene
- 15 glycol bis[3,3-bis(3'-tert-butyl-4'-hydroxyphenyl)butyrate], bis(3-tert-butyl-4-hydroxy-5-methylphenyl)dicyclopentadiene, bis[2-(3'-tert-butyl-2'-hydroxy-5'-methylbenzyl)-6-tert-butyl-4-methylphenyl]terephthalate, 1,1-bis(3,5-dimethyl-2-hydroxyphenyl)butane,
- 20 2,2-bis(3,5-di-tert-butyl-4-hydroxyphenyl)propane, 2,2-bis(5-tert-butyl-4-hydroxy-2-methylphenyl)-4-n-dodecylmercaptobutane and 1,1,5,5-tetra-(5-tert-butyl-4-hydroxy-2-methylphenyl)pentane.
- 25 1.7. O-, N- and S-benzyl compounds, for example 3,5,3',5'-tetra-tert-butyl-4,4'-dihydroxydibenzyl ether, octadecyl 4-hydroxy-3,5-dimethylbenzylmercaptoacetate, tridecyl 4-hydroxy-3,5-di-tert-butylbenzylmercaptoacetate, tris(3,5-di-tert-butyl-4-hydroxybenzyl)amine, bis(4-tert-butyl-3-
- 30 hydroxy-2,6-dimethylbenzyl) dithioterephthalate, bis(3,5-di-tert-butyl-4-hydroxybenzyl) sulfide and isooctyl 3,5-di-tert-butyl-4-hydroxybenzylmercaptoacetate.

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1.8. Hydroxybenzylated malonates, for example dioctadecyl 2,2-bis(3,5-di-tert-butyl-2-hydroxybenzyl)malonate, dioctadecyl 2-(3-tert-butyl-4-hydroxy-5-methylbenzyl)malonate, didodecylmercatioethyl 2,2-bis(3,5-di-tert-butyl-4-hydroxybenzyl)malonate and bis[4-(1,1,3,3-tetramethylbutyl)phenyl] 2,2-bis(3,5-di-tert-butyl-4-hydroxybenzyl)malonate.

1.9. Aromatic hydroxybenzyl compounds, for example 1,3,5-tris-(3,5-di-tert-butyl-4-hydroxybenzyl)-2,4,6-trimethylbenzene, 1,4-bis(3,5-di-tert-butyl-4-hydroxybenzyl)-2,3,5,6-tetramethylbenzene and 2,4,6-tris(3,5-di-tert-butyl-4-hydroxybenzyl)-phenol.

1.10. Triazine compounds, for example 2,4-bis(octylmercapto)-6-(3,5-di-tert-butyl-4-hydroxyanilino)-1,3,5-triazine, 2-octylmercapto-4,6-bis(3,5-di-tert-butyl-4-hydroxyanilino)-1,3,5-triazine, 2-octylmercapto-4,6-bis(3,5-di-tert-butyl-4-hydroxyphenoxy)-1,3,5-triazine, 2,4,6-tris(3,5-di-tert-butyl-4-hydroxyphenoxy)-1,2,3-triazine, 1,3,5-tris(3,5-di-tert-butyl-4-hydroxybenzyl)isocyanurate, 1,3,5-tris(4-tert-butyl-3-hydroxy-2,6-dimethylbenzyl) isocyanurate, 2,4,6-tris(3,5-di-tert-butyl-4-hydroxy-phenylethyl)-1,3,5-triazine, 1,3,5-tris(3,5-di-tert-butyl-4-hydroxyphenylpropionyl)-hexahydro-1,3,5-triazine and 1,3,5-tris(3,5-dicyclohexyl-4-hydroxybenzyl)isocyanurate.

1.11. Acylaminophenols, for example 4-hydroxylauranilide, 4-hydroxystearanilide and octyl N-(3,5-di-tert-butyl-4-hydroxyphenyl)carbamate.

1.12. Esters of β -(3,5-di-tert-butyl-4-hydroxyphenyl)propionic acid with mono- or polyhydric alcohols, e.g. with methanol, ethanol, n-octanol, i-octanol, octadecanol, 1,6-hexanediol, 1,9-nonanediol, ethylene glycol, 1,2-propanediol, neopentylglycol, thiodiethylene glycol, diethylene glycol, triethylene glycol, pentaerythritol, tris(hydroxyethyl) isocyanurate, N,N'-bis(hydroxyethyl)oxamide, 3-thiaundecanol, 3-thiapentadecanol, trimethylhexanediol, trimethylolpropane and 4-hydroxymethyl-1-phospha-2,6,7-trioxabicyclo[2.2.2]octane; the ester with octadecanol (IRGANOX 1076® from Ciba Spec.) is very particularly suitable and preferred here.

1.13. Esters of β -(5-tert-butyl-4-hydroxy-3-methylphenyl)propionic acid with mono- or polyhydric alcohols, e.g. with methanol, ethanol, n-octanol, i-octanol, octadecanol, 1,6-hexanediol, 1,9-nonanediol, ethylene glycol, 1,2-propanediol, neopentylglycol, thiodiethylene glycol, diethylene glycol, triethylene glycol, pentaerythritol, tris(hydroxyethyl) isocyanurate, N,N'-bis(hydroxyethyl)oxamide, 3-thiaundecanol, 3-thiapentadecanol, trimethylhexanediol, trimethylolpropane and 4-hydroxymethyl-1-phospha-2,6,7-trioxabicyclo[2.2.2]octane.

1.14. Esters of β -(3,5-dicyclohexyl-4-hydroxyphenyl)propionic acid with mono- or polyhydric alcohols, e.g. with methanol, ethanol, octanol, octadecanol, 1,6-hexanediol, 1,9-nonanediol, ethylene glycol, 1,2-propanediol, neopentylglycol, thiodiethylene glycol, diethylene glycol, triethylene glycol, pentaerythritol, tris(hydroxyethyl) isocyanurate, N,N'-

bis(hydroxyethyl)oxamide, 3-thiaundecanol, 3-thiapentadecanol, trimethylhexanediol, trimethylolpropane and 4-hydroxymethyl-1-phospha-2,6,7-trioxabicyclo[2.2.2]octane.

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1.15. Esters of 3,5-di-tert-butyl-4-hydroxyphenylacetic acid with mono- or polyhydric alcohols, e.g. with methanol, ethanol, octanol, octadecanol, 1,6-hexanediol, 1,9-nonanediol, ethylene glycol, 1,2-propanediol, neopentylglycol, thiodiethylene glycol, diethylene glycol, triethylene glycol, pentaerythritol, tris(hydroxyethyl)isocyanurate, N,N'-bis(hydroxyethyl)oxamide, 3-thiaundecanol, 3-thiapentadecanol, trimethylhexanediol, trimethylolpropane and 4-hydroxymethyl-1-phospha-2,6,7-trioxabicyclo[2.2.2]octane.

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1.16. Amides of β -(3,5-di-tert-butyl-4-hydroxyphenyl)propionic acid, e.g. N,N'-bis(3,5-di-tert-butyl-4-hydroxyphenylpropionyl)hexamethylenediamide, N,N'-bis(3,5-di-tert-butyl-4-hydroxyphenylpropionyl)trimethylenediamide, N,N'-bis(3,5-di-tert-butyl-4-hydroxyphenylpropionyl)hydrazide and N,N'-bis[2-(3-[3,5-di-tert-butyl-4-hydroxyphenyl]propionyloxy)ethyl]oxamide (Naugard® XL-1 from Uniroyal).

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1.17. Ascorbic acid (vitamin C)

1.18. Aminic antioxidants, for example N,N'-diisopropyl-p-phenylenediamine, N,N'-di-sec-butyl-p-phenylenediamine, N,N'-bis(1,4-dimethylpentyl)-p-phenylenediamine, N,N'-bis(1-ethyl-3-methylpentyl)-p-phenylenediamine, N,N'-bis(1-methylheptyl)-p-phenylenediamine, N,N'-dicyclohexyl-p-

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phenylenediamine, N,N'-diphenyl-p-phenylenediamine, N,N'-bis(2-naphthyl)-p-phenylenediamine, N-isopropyl-N'-phenyl-p-phenylenediamine, N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine, N-(1-methylheptyl)-N'-phenyl-p-phenylenediamine, N-cyclohexyl-N'-phenyl-p-phenylenediamine, 4-(p-toluenesulfamoyl)diphenylamine, N,N'-dimethyl-N,N'-di-sec-butyl-p-phenylenediamine, diphenylamine, N-allyldiphenylamine, 4-isopropoxy-diphenylamine, N-phenyl-1-naphthylamine, N-(4-tert-octylphenyl)-1-naphthylamine, N-phenyl-2-naphthylamine, octylated diphenylamine, for example p,p'-di-tert-octyl-diphenylamine, 4-n-butylaminophenol, 4-butyrylaminophenol, 4-nonanoylaminophenol, 4-dodecanoylaminophenol, 4-octadecanoylaminophenol, bis(4-methoxyphenyl)amine, 2,6-di-tert-butyl-4-dimethylaminomethylphenol, 2,4'-diaminodiphenylmethane, 4,4'-diaminodiphenylmethane, N,N,N',N'-tetramethyl-4,4'-diaminodiphenylmethane, 1,2-bis[(2-methylphenyl)amino]ethane, 1,2-bis(phenylamino)propane, (o-tolyl)biguanide, bis[4-(1',3'-dimethylbutyl)phenyl]amine, tert-octylated N-phenyl-1-naphthylamine, a mixture of mono- and dialkylated tert-butyl/tert-octyldiphenylamines, a mixture of mono- and dialkylated nonyldiphenylamines, a mixture of mono- and dialkylated dodecyldiphenylamines, a mixture of mono- and dialkylated isopropyl/isohexyldiphenylamines, a mixture of mono- and dialkylated tert-butyl/diphenylamines, 2,3-dihydro-3,3-dimethyl-4H-1,4-benzothiazine, phenothiazine, a mixture of mono- and dialkylated tert-butyl/tert-octylphenothiazines, a mixture of mono- and dialkylated tert-octylphenothiazines, N-allylphenothiazine, N,N,N',N'-tetraphenyl-1,4-diaminobut-2-ene, N,N-bis(2,2,6,6-tetramethylpiperid-4-yl)hexamethylenediamine, bis(2,2,6,6-tetramethylpiperid-4-yl) sebacate, 2,2,6,6-

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tetramethylpiperidin-4-one and 2,2,6,6-tetramethylpiperidin-4-ol. Individual compounds of these or mixtures thereof can be employed.

- 5 1.19 Suitable thio-synergists are, for example, dilauryl thiodipropionate and/or distearyl thiodipropionate.

2. UV absorbers and light stabilizers can be employed in the compositions according to the invention in amounts of
10 0.1 to 15 wt.%, preferably 3 to 8 wt.%, based on the weight of the composition. Suitable UV absorbers and light stabilizers are, for example:

2.1. 2-(2'-Hydroxyphenyl)benzotriazoles, for example 2-(2'-
15 hydroxy-5'-methylphenyl)benzotriazole, 2-(3',5'-di-tert-butyl-2'-hydroxyphenyl)benzotriazole, 2-(5'-tert-butyl-2'-hydroxyphenyl)benzotriazole, 2-(2'-hydroxy-5'-(1,1,3,3-tetramethylbutyl)phenyl)benzotriazole, 2-(3',5'-di-tert-butyl-2'-hydroxyphenyl)-5-chlorobenzotriazole, 2-(3'-tert-
20 butyl-2'-hydroxy-5'-methylphenyl)-5-chlorobenzotriazole, 2-(3'-sec-butyl-5'-tert-butyl-2'-hydroxyphenyl)benzotriazole, 2-(2'-hydroxy-4'-octyloxyphenyl)benzotriazole, 2-(3',5'-di-tert-amyl-2'-hydroxyphenyl)benzotriazole, 2-(3',5'-bis(α,α -dimethylbenzyl)-2'-hydroxyphenyl)benzotriazole, 2-(3'-tert-
25 butyl-2'-hydroxy-5'-(2-octyloxycarbonyl-ethyl)phenyl)-5-chlorobenzotriazole, 2-(3'-tert-butyl-5'-[2-(2-ethylhexyloxy)carbonyl-ethyl]-2'-hydroxyphenyl)-5-chlorobenzotriazole, 2-(3'-tert-butyl-2'-hydroxy-5'-(2-methoxycarbonyl-ethyl)phenyl)-5-chlorobenzotriazole, 2-(3'-
30 tert-butyl-2'-hydroxy-5'-(2-methoxycarbonyl-ethyl)phenyl)benzotriazole, 2-(3'-tert-butyl-2'-hydroxy-5'-(2-octyloxycarbonyl-ethyl)phenyl)benzotriazole, 2-(3'-tert-

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butyl-5'-[2-(2-ethylhexyloxycarbonylethyl)-2'-hydroxyphenyl]benzotriazole, 2-(3'-dodecyl-2'-hydroxy-5'-methylphenyl)benzotriazole, 2-(3'-tert-butyl-2'-hydroxy-5'-(2-isooctyloxycarbonylethyl)phenyl)benzotriazole, 2,2'-

5 methylenebis[4-(1,1,3,3-tetramethylbutyl)-6-benzotriazol-2-ylphenol]; the transesterification product of 2-[3'-tert-butyl-5'-(2-methoxycarbonylethyl)-2'-hydroxyphenyl]-2H-benzotriazole with polyethylene glycol 300; $[R-CH_2CH_2-COO-CH_2CH_2]_2$, wherein $R = 3'$ -tert-butyl-4'-hydroxy-5'-2H-

10 benzotriazol-2-ylphenyl, 2-[2'-hydroxy-3'-(α,α -dimethylbenzyl)-5'-(1,1,3,3-tetramethylbutyl)phenyl]benzotriazole and 2-[2'-hydroxy-3'-(1,1,3,3-tetramethylbutyl)-5'-(α,α -dimethylbenzyl)phenyl]benzotriazole.

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2.2 2-Hydroxybenzophenones, for example the 4-hydroxy, 4-methoxy, 4-octyloxy, 4-decyloxy, 4-dodecyloxy, 4-benzyloxy, 4,2',4'-trihydroxy and 2'-hydroxy-4,4'-dimethoxy derivatives.

20

2.3 Esters of substituted and unsubstituted benzoic acids, such as, for example, 4-tert-butylphenyl salicylate, phenyl salicylate, octylphenyl salicylate, dibenzoylresorcinol, bis(4-tert-butylbenzoyl)resorcinol, benzoylresorcinol, 2,4-

25 di-tert-butylphenyl 3,5-di-tert-butyl-4-hydroxybenzoate, hexadecyl 3,5-di-tert-butyl-4-hydroxybenzoate, octadecyl 3,5-di-tert-butyl-4-hydroxybenzoate and 2-methyl-4,6-di-tert-butylphenyl 3,5-di-tert-butyl-4-hydroxybenzoate

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2.4. Acrylates, for example ethyl α -cyano- β,β -diphenylacrylate, isooctyl α -cyano- β,β -diphenylacrylate, methyl α -carbomethoxycinnamate, methyl α -cyano- β -methyl-p-methoxycinnamate, butyl α -cyano- β -methyl-p-

methoxycinnamate, methyl α -carbomethoxy-p-methoxycinnamate and N-(β -carbomethoxy- β -cyanovinyl)-2-methylindoline.

2.5. Nickel compounds, for example nickel complexes of
5 2,2'-thiobis[4-(1,1,3,3-tetramethylbutyl)]phenol], such as
the 1:1 or 1:2 complex, with or without additional ligands,
such as n-butylamine, triethanolamine or N-
cyclohexyldiethanolamine, nickel dibutyldithiocarbamate,
nickel salts of monoalkyl esters, e.g. of the methyl or
10 ethyl ester, of 4-hydroxy-3,5-di-tert-butylbenzylphosphonic
acid, nickel complexes of ketoximes, e.g. of 2-hydroxy-4-
methylphenyl undecyl ketoxime, and nickel complexes of 1-
phenyl-4-lauroyl-5-hydroxypyrazole, with or without
additional ligands.

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2.6 Sterically hindered amines, for example bis(2,2,6,6-
tetramethyl-4-piperidyl) sebacate, bis(2,2,6,6-tetramethyl-
4-piperidyl) succinate, bis(1,2,2,6,6-pentamethyl-4-
piperidyl) sebacate, bis(1-octyloxy-2,2,6,6-tetramethyl-4-
20 piperidyl) sebacate, bis(1,2,2,6,6-pentamethyl-4-
piperidyl), n-butyl 3,5-di-tert-butyl-4-hydroxybenzyl-
malonate, the condensate of 1-(2-hydroxyethyl)-2,2,6,6-
tetramethyl-4-hydroxypiperidine and succinic acid, linear
or cyclic condensates of N,N'-bis(2,2,6,6-tetramethyl-4-
25 piperidyl)hexamethylenediamine and 4-tert-octylamino-2,6-
dichloro-1,3,5-triazine, tris(2,2,6,6-tetramethyl-4-
piperidyl) nitrilotriacetate, tetrakis(2,2,6,6-tetramethyl-
4-piperidyl) 1,2,3,4-butanetetracarboxylate, 1,1'-(1,2-
ethanediyl) bis(3,3,5,5-tetramethylpiperazinone), 4-
30 benzoyl-2,2,6,6-tetramethylpiperidine, 4-stearyloxy-
2,2,6,6-tetramethylpiperidine, bis(1,2,2,6,6-
pentamethylpiperidyl) 2-n-butyl-2-(2-hydroxy-3,5-di-tert-
butylbenzyl)malonate, 3-n-octyl-7,7,9,9-tetramethyl-1,3,8-

triazaspiro[4,5]decane-2,4-dione, bis(1-octyloxy-2,2,6,6-tetramethylpiperidyl) sebacate, bis(1-octyloxy-2,2,6,6-tetramethylpiperidyl) succinate, linear or cyclic condensates of N,N'-bis(2,2,6,6-tetramethyl-4-piperidyl)hexamethylenediamine and 4-morpholino-2,6-dichloro-1,3,5-triazine, the condensate of 2-chloro-4,6-bis(4-n-butylamino-2,2,6,6-tetramethylpiperidyl)-1,3,5-triazine and 1,2-bis(3-aminopropylamino)ethane, the condensate of 2-chloro-4,6-bis(4-n-butylamino-1,2,2,6,6-pentamethylpiperidyl)-1,3,5-triazine and 1,2-bis(3-aminopropylamino)ethane, 8-acetyl-3-dodecyl-7,7,9,9-tetramethyl-1,3,8-triazaspiro[4,5]decane-2,4-dione, 3-dodecyl-1-(2,2,6,6-tetramethyl-4-piperidyl)pyrrolidine-2,5-dione, 3-dodecyl-1-(1,2,2,6,6-pentamethyl-4-piperidyl)pyrrolidine-2,5-dione, a mixture of 4-hexadecyloxy- and 4-stearyloxy-2,2,6,6-tetramethylpiperidine, a condensation product of N,N'-bis(2,2,6,6-tetramethyl-4-piperidyl)hexamethylenediamine and 4-cyclohexylamino-2,6-dichloro-1,3,5-triazine, a condensation product of 1,2-bis(3-aminopropylamino)ethane and 2,4,6-trichloro-1,3,5-triazine as well as 4-butylamino-2,2,6,6-tetramethylpiperidine (CAS reg. no. [136504-96-6]); N-(2,2,6,6-tetramethyl-4-piperidyl)-n-dodecyl-succinimide, N-(1,2,2,6,6-pentamethyl-4-piperidyl)-n-dodecyl-succinimide, 2-undecyl-7,7,9,9-tetramethyl-1-oxa-3,8-diaza-4-oxospiro[4,5]decane, a reaction product of 7,7,9,9-tetramethyl-2-cycloundecyl-1-oxa-3,8-diaza-4-oxospiro[4,5]decane and epichlorohydrin, 1,1-bis(1,2,2,6,6-pentamethyl-4-piperidyloxycarbonyl)-2-(4-methoxyphenyl)ethene, N,N'-bis(formyl)-N,N'-bis(2,2,6,6-tetramethyl-4-piperidyl)hexamethylenediamine, diesters of 4-methoxymethylenemalonic acid with 1,2,2,6,6-pentamethyl-4-hydroxypiperidine, poly[methylpropyl-3-oxy-4-(2,2,6,6-

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tetramethyl-4-piperidyl)]siloxane and a reaction product of maleic anhydride- α -olefin copolymer with 2,2,6,6-tetramethyl-4-aminopiperidine or 1,2,2,6,6-pentamethyl-4-aminopiperidine.

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2.7. Oxamides, for example 4,4'-dioctyloxyoxanilide, 2,2'-diethoxyoxanilide, 2,2'-dioctyloxy-5,5'-di-tert-butoxanilide, 2,2'-didodecyloxy-5,5'-di-tert-butoxanilide, 2-ethoxy-2'-ethyloxanilide, N,N'-bis(3-

10 dimethylaminopropyl)oxamide, 2-ethoxy-5-tert-butyl-2'-ethoxanilide and a mixture thereof with 2-ethoxy-2'-ethyl-5,4'-di-tert-butoxanilide, mixtures of o- and p-methoxy-disubstituted oxanilides and mixtures of o- and p-ethoxy-disubstituted oxanilides.

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2.8. 2-(2-Hydroxyphenyl)-1,3,5-triazines, for example 2,4,6-tris(2-hydroxy-4-octyloxyphenyl)-1,3,5-triazine, 2-(2-hydroxy-4-octyloxyphenyl)-4,6-bis(2,4-dimethylphenyl)-1,3,5-triazine, 2-(2,4-dihydroxyphenyl)-4,6-bis(2,4-

20 dimethylphenyl)-1,3,5-triazine, 2,4-bis(2-hydroxy-4-propyloxyphenyl)-6-(2,4-dimethylphenyl)-1,3,5-triazine, 2-(2-hydroxy-4-octyloxyphenyl)-4,6-bis(4-methylphenyl)-1,3,5-triazine, 2-(2-hydroxy-4-dodecyloxyphenyl)-4,6-bis(2,4-dimethylphenyl)-1,3,5-triazine, 2-(2-hydroxy-4-

25 tridecyloxyphenyl)-4,6-bis(2,4-dimethylphenyl)-1,3,5-triazine, 2-[2-hydroxy-4-(2-hydroxy-3-butyloxypropoxy)phenyl]-4,6-bis(2,4-dimethyl)-1,3,5-triazine, 2-[2-hydroxy-4-(2-hydroxy-3-octyloxypropoxy)phenyl]-4,6-bis(2,4-dimethyl)-1,3,5-

30 triazine, 2-[4-(dodecyloxy/tridecyloxy-2-hydroxypropoxy)-2-hydroxyphenyl]-4,6-bis(2,4-dimethylphenyl)-1,3,5-triazine, 2-[2-hydroxy-4-(2-hydroxy-3-dodecyloxypropoxy)phenyl]-4,6-bis(2,4-dimethylphenyl)-1,3,5-triazine, 2-(2-hydroxy-4-

- 25 -

hexyloxy)phenyl-4,6-diphenyl-1,3,5-triazine, 2-(2-hydroxy-4-methoxyphenyl)-4,6-diphenyl-1,3,5-triazine, 2,4,6-tris[2-hydroxy-4-(3-butoxy-2-hydroxypropoxy)phenyl]-1,3,5-triazine, 2-(2-hydroxyphenyl)-4-methoxyphenyl)-6-phenyl-1,3,5-triazine and 2-{2-hydroxy-4-[3-(2-ethylhexyl-1-oxy)-2-hydroxypropyloxy]phenyl}-4,6-bis(2,4-dimethylphenyl)-1,3,5-triazine.

Individual compounds of these or mixtures thereof can be employed.

3. Suitable metal deactivators are, for example, N,N'-diphenyloxamide, N-salicylal-N'-salicyloylhydrazine, N,N'-bis(salicyloyl)hydrazine, N,N'-bis(3,5-di-tert-butyl-4-hydroxyphenylpropionyl)hydrazine, 3-salicyloylamino-1,2,4-triazole, bis(benzylidene)oxalyldihydrazide, oxanilide, isophthaloyldihydrazide, sebacoylbisphenylhydrazide, N,N'-diacetyladi-poyldihydrazide, N,N'-bis(salicyloyl)oxalyldihydrazide and N,N'-bis(salicyloyl)thiopropionyl-dihydrazide. Individual compounds of these or mixtures thereof can be employed.

4. Suitable peroxide-trapping agents are, for example, esters of β -thiodipropionic acid, for example the lauryl, stearyl, myristyl or tridecyl ester, mercaptobenzimidazole or the zinc salt of 2-mercaptobenzimidazole, zinc dibutyldithiocarbamate, dioctadecyl disulfide and pentaerythritol tetrakis(dodecylmercapto)propionate. Individual compounds of these or mixtures thereof can be employed.

5. Suitable basic costabilizers are, for example, melamine, polyvinylpyrrolidone, dicyandiamide, triallyl cyanurate,

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urea derivatives, hydrazine derivatives, amines, polyamides, polyurethanes, alkali metal salts and alkaline earth metal salts of higher fatty acids, for example calcium stearate, zinc stearate, magnesium behenate, magnesium stearate, sodium ricinoleate and potassium palmitate, antimony pyrocatecholate or zinc pyrocatecholate. Individual compounds of these or mixtures thereof can be employed.

10 6. Suitable nucleating agents are, for example, inorganic substances, such as talc, metal oxides, such as titanium dioxide or magnesium oxide, phosphates, carbonates or sulfates, preferably of alkaline earth metals; organic compounds, such as mono- or polycarboxylic acids and salts
15 thereof, e.g. 4-tert-butylbenzoic acid, adipic acid, diphenylacetic acid, sodium succinate or sodium benzoate; and polymeric compounds, such as ionic copolymers (ionomers). 1,3:2,4-Bis(3',4'-dimethylbenzylidene)sorbitol, 1,3:2,4-
20 di(paramethyldibenzylidene)sorbitol and 1,3:2,4-di(benzylidene)sorbitol are particularly preferred. Individual compounds of these or mixtures thereof can be employed.

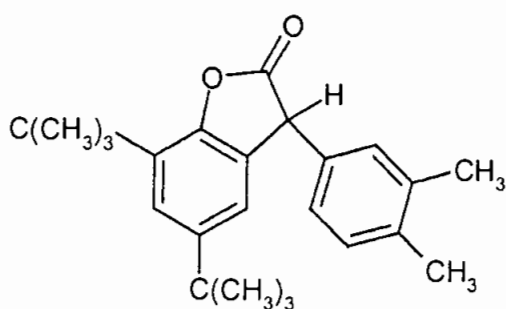
25 7. Suitable fillers and reinforcing agents are, for example, calcium carbonate, silicates, glass fibres, glass balloons, asbestos, talc, kaolin, mica, barium sulfate, metal oxides and hydroxides, carbon black, graphite, wollastonite, wood flour and flours or fibres of other
30 natural products and synthetic fibres. Individual compounds of these or mixtures thereof can be employed.

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8. Other suitable additives are, for example, plasticizers, lubricants, emulsifiers, pigments, viscosity modifiers, catalysts, flow agents, optical brighteners, flameproofing agents, antistatic agents and blowing agents.

5

9. Suitable benzofuranones and indolinones are, for example, those which are disclosed in US 4,325,863; US 4,338,244; US 5,175,312; US 5,216,052; US 5,252,643; DE-A-4316611; DE-A-4316622; DE-A-4316876; EP-A-0589839 or EP-A-10 0591102, or 3-[4-(2-acetoxyethoxy)phenyl]-5,7-di-tert-butylbenzofuran-2-one, 5,7-di-tert-butyl-3-[4-(2-stearoyloxyethoxy)phenyl]benzofuran-2-one, 3,3'-bis[5,7-di-tert-butyl-3-(4-[2-hydroxyethoxy]phenyl)benzofuran-2-one], 5,7-di-tert-butyl-3-(4-ethoxyphenyl)benzofuran-2-one, 3-(4-15 acetoxy-3,5-dimethylphenyl)-5,7-di-tert-butylbenzofuran-2-one, 3-(3,5-dimethyl-4-pivaloyloxyphenyl)-5,7-di-tert-butylbenzofuran-2-one, 3-(3,4-dimethylphenyl)-5,7-di-tert-butylbenzofuran-2-one and 3-(2,3-dimethylphenyl)-5,7-di-tert-butylbenzofuran-2-one; and lactone antioxidants such 20 as



(8)

These compounds act, for example, as antioxidants. Individual compounds of these or mixtures thereof can be 25 employed.

10. Suitable fluorescent plasticizers are those listed in "Plastics Additives Handbook", eds. R. Gächter and H. Müller, Hanser Verlag, 3rd ed., 1990, page 775-789.

5 11. Suitable flame-retardant additives are phosphate esters, i.e. triphenyl phosphate, resorcinol-diphosphoric acid esters, bromine-containing compounds, such as brominated phosphoric acid esters, brominated oligocarbonates and polycarbonates, and salts, such as
10 $C_4F_9SO_3^-Na^+$.

12. Suitable impact modifiers are butadiene rubber with grafted-on styrene-acrylonitrile or methyl methacrylate, ethylene-propylene rubbers with grafted-on maleic
15 anhydride, ethyl and butyl acrylate rubbers with grafted-on methyl methacrylate or styrene-acrylonitrile and interpenetrating siloxane and acrylate networks with grafted-on methyl methacrylate or styrene-acrylonitrile.

20 13. Suitable polymers are SAN, ABS, PMMA, PTFE, PSU, PPS, polyolefins, such as polyethylene, polypropylene and ethylene-propylene rubbers, epoxy resins, polyesters, such as PBT, PET, PCT, PCTG and PETG, and other polycarbonates produced in the interfacial process.

25 14. Suitable antistatic agents are sulfonate salts, for example tetraethylammonium salts of $C_{12}H_{25}SO_3^-$ or $C_8F_{17}SO_3^-$.

15. Suitable colouring agents are pigments and organic and
30 inorganic dyestuffs.

16. Compounds which contain epoxide groups, such as 3,4-epoxycyclohexylmethyl 3,4-epoxycyclohexylcarboxylate and copolymers of glycidyl methacrylate and epoxysilanes.

5 17. Compounds which contain anhydride groups, such as maleic anhydride, succinic anhydride, benzoic anhydride and phthalic anhydride.

18. Phosphites and phosphonites which are suitable as
 10 stabilizers are, for example, triphenyl phosphite, diphenyl alkyl phosphites, phenyl dialkyl phosphites, tris(nonylphenyl) phosphite, trilauryl phosphite, trioctadecyl phosphite, distearyl pentaerythritol diphosphite, tris(2,4-di-tert-butylphenyl) phosphite,
 15 diisodecyl pentaerythritol diphosphite, bis(2,4-di-tert-butylphenyl) pentaerythritol diphosphite, bis(2,6-di-tert-butyl-4-methylphenyl) pentaerythritol diphosphite, diisodecyl oxypentaerythritol diphosphite, bis(2,4-di-tert-butyl-6-methylphenyl) pentaerythritol diphosphite,
 20 bis(2,4,6-tris(tert-butylphenyl) pentaerythritol diphosphite, tristearyl sorbitol triphosphite, tetrakis(2,4-di-tert-butylphenyl) 4,4'-biphenylenediphosphonite, 6-isooctyloxy-2,4,8,10-tetra-tert-butyl-12H-dibenz[d,g]-1,3,2-dioxaphosphocine, 6-fluoro-2,4,8,10-tetra-tert-butyl-12-methyl-dibenz[d,g]-
 25 1,3,2-dioxaphosphocine, bis(2,4-di-tert-butyl-6-methylphenyl) methyl phosphite, bis(2,4-di-tert-butyl-6-methylphenyl) ethyl phosphite, 6-fluoro-2,4,8,10-tetra-tert-butyl-12-methyldibenz[d,g]-1,3,2-dioxaphosphocine,
 30 2,2',2''-nitrilo[triethyl tris(3,3',5,5'-tetra-tert-butyl-1,1'-biphenyl-2,2'-diyl)-phosphite], 2-ethyl-hexyl (3,3',5,5'-tetra-tert-butyl-1,1'-biphenyl-2,2'-diyl)-phosphite and 5-butyl-5-ethyl-2-(2,4,6-tri-tert-

- 30 -

butylphenoxy)-1,3,2-dioxaphosphirane. Individual compounds of these or mixtures thereof can be employed.

Tris(2,4-di-tert-butylphenyl) phosphite (Irgafos® 168, Ciba-
5 Geigy) or triphenylphosphine are particularly preferred.

The compounds of groups 16 and 17 act as melt stabilizers. They can be employed individually or in mixtures.

- 10 Esters of mono- or polyhydric alcohols with long-chain carboxylic acids, such as Loxiol G32 or Loxiol G33, are preferably used as mould release agents. Those mould release agents which have not been completely esterified and accordingly contain free OH groups are also preferred.
- 15 (Partial) esters of saturated monobasic fatty acids having 16 to 22 carbon atoms with glycerol, trimethylolpropane, pentaerythritol or similar polyhydric alcohols are particularly preferred, in particular glycerol monostearate (GMS) and glycerol monopalmitate. Pentaerythritol
- 20 tetrastearate (PETS) is furthermore preferred.

Such saturated monofunctional fatty acid esters of glycerol are employed by themselves or as mixtures with two or more components. The saturated monoesters of glycerol are

25 conventionally prepared via transesterification of hydrogenated animal or vegetable oil with glycerol. Although the reaction product can also contain esters other than the glycerol esters, it is employed as a mould release agent. For example, the mixture can contain small or

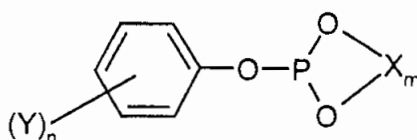
30 larger contents of diglycerides and triglycerides.

The optimum amount of mould release agent in the production of CDs and other optical storage media (DVDs etc.) is

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determined on the one hand by an adequate mould release action, and on the other hand by the formation of a deposit on the mould. Concentrations which are conventionally employed are between 50 to 1,000 ppm, more advantageously
 5 between 100 and 500 ppm of mould release agent. For the other uses of polycarbonate the concentrations are 100 - 10,000 ppm, preferably 2,000 - 7,000 ppm.

Specific phosphites which have both aromatic and aliphatic
 10 radicals in one molecule are used, for example but not by way of limitation, as heat stabilizers. These are compounds of the following structure:



wherein

15

n represents the number 0-5, preferably 1-3 and very particularly preferably represents 3,

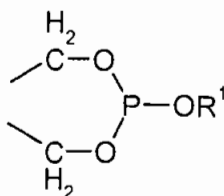
Y in each case independently of one another, denotes
 20 alkyl or optionally substituted aryl, preferably C₁-C₄-alkyl, particularly preferably methyl, sec-butyl and tert-butyl,

m represents the number 1-3, preferably 3 and
 25

X in each case independently of one another, represents an optionally substituted methylene radical, wherein at least one methylene radical must be completely substituted and the substituents independently of one
 30 another are chosen from the group consisting of C₁-C₂₀-alkyl, or the two substituents on a completely

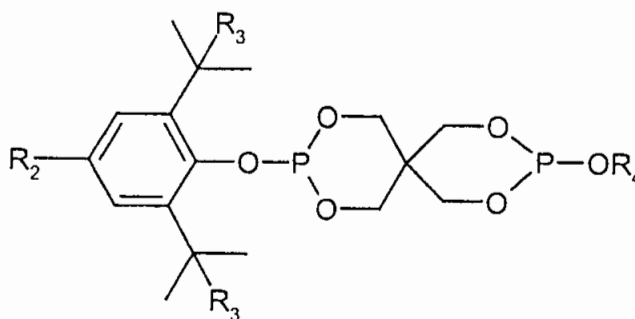
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substituted methylene radical together represent a radical



- 5 in which R^1 is chosen from the group consisting of C_1 - C_{18} -alkyl, C_3 - C_{12} -cycloalkyl, C_6 - C_{30} -alkaryl and aryl, wherein these radicals in turn can be substituted by 1 - 4 O-alkylene-O and/or carboxylic acid ester COO radicals; C_2 - C_{18} -polyhydroxyalkyl having 2 to 10 hydroxyl groups; and C_2 -
10 C_{18} -polyphenyl radicals having 2 to ten phenolic OH groups.

Preferred compounds here are those of the formula



in which

15

R_2 represents C_1 - C_6 -alkyl;

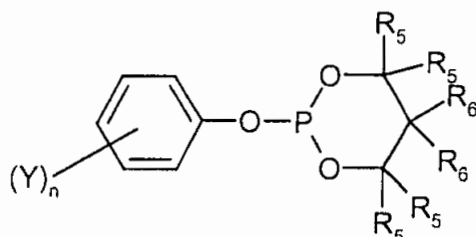
R_3 represents methyl or ethyl and

- 20 R_4 is chosen from the group consisting of C_1 - C_{18} -alkyl, C_3 - C_{12} -cycloalkyl, C_6 - C_{30} -alkaryl and aryl, wherein these radicals in turn can be substituted by 1 - 4 O-alkylene-O and/or carboxylic acid ester COO radicals; C_2 - C_{18} -polyhydroxyalkyl having 2 to 10 hydroxyl groups;

- 33 -

and C₂-C₁₈-polyphenyl radicals having 2 to 10 phenolic OH groups.

Compounds which are also preferred are those of the formula



5

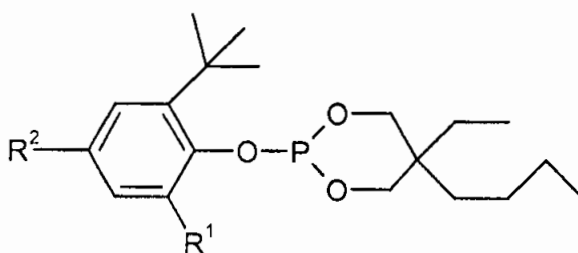
wherein Y and n have the abovementioned meanings and

R₅ independently of one another, is chosen from the group consisting of hydrogen and C₃-C₂₀-alkyl, and preferably at least one R₅ here represents alkyl, and

10

R₆ independently of one another represent C₁-C₁₀-alkyl.

Particularly preferred compounds are those of the formula



15

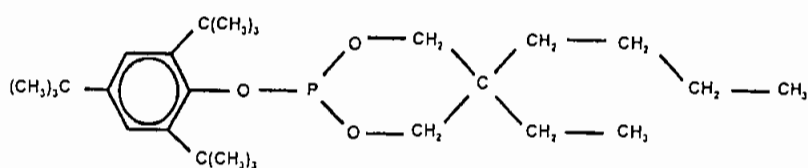
wherein R¹ and R² represent methyl, sec-butyl or tert-butyl.

Compounds which are also particularly preferred are moreover those defined in EP A1 0 038 876 on p. 16-20 and the example mentioned on page 21 in the same specification.

20

(2,4,6-Tri-t-butylphenyl) (2-butyl-2-ethyl-propane-1,3-diyl) phosphite is very particularly preferred, this having the following structure:

- 34 -



The phosphites can be employed by themselves, but also in combination with other phosphorus compounds, it also being possible for the other phosphorus compounds to be those
 5 which have a different oxidation number for the phosphorus. Accordingly e.g. combinations of the phosphites according to the invention with other phosphites, with phosphines, e.g. triphenylphosphine, with phosphonites, with phosphates, with phosphonates etc. can be employed.

10

The phosphites employed are generally known or can be prepared analogously to known phosphites. (2,4,6-Tri-*t*-butylphenyl) (2-butyl-2-ethyl-propane-1,3-diyl) phosphite is described e.g. in EP-A 702018 and EP 635514.

15

The polymer mixtures according to the invention in general comprises the phosphorus compound in a content of 10 - 5,000 ppm, preferably 10 - 1,000 ppm, particularly preferably 20 - 500 ppm, very particularly preferably
 20 between 50 and 250 ppm.

The addition of the mould release agents, the phosphorus compound and the formals according to the invention to the thermoplastic moulding compositions takes place, by way of
 25 example and preferably, by a procedure in which they are metered in after the preparation and during the working up of the polycarbonates, e.g. by addition to the polycarbonate polymer solution, or into a melt of the thermoplastic moulding compositions. It is furthermore
 30 also possible to meter in the components independently of

- 35 -

one another in various working steps, e.g. one of the components during the working up of the polymer solution and the other component(s) into the melt, as long as it is ensured that all the components are contained during the
5 production of the end products (shaped articles).

For uses in the CD, DVD and other optical recording media sector, the expert will of course choose, from the abovementioned additives, suitable additives which do not
10 impair the transparency.

Very particularly suitable additives are IRGANOX 1076 ®, see above, and benzotriazoles of group 2.1 (so-called Tinuvin), in particular in a mixture with one another and
15 triphenylphosphine (TPP).

The moulding compositions according to the invention are used for the production of shaped articles, preferably optical media, in particular for the production of compact
20 discs and DVDs as well as optical media which can be written to and deleted once or several times, in the manner known for polycarbonates. The layers which can be written to here comprise in particular dyestuffs or metallic layers, the latter using the change from the amorphous into
25 the crystalline state as the recording principle or having magnetic properties.

This production of the optical media is preferably carried out from the finished prepared moulding compositions
30 according to the invention, which are obtained, for example, as granules. However, the optical media can also be produced by incorporation of the components into pure or commercially available polycarbonates and/or into the

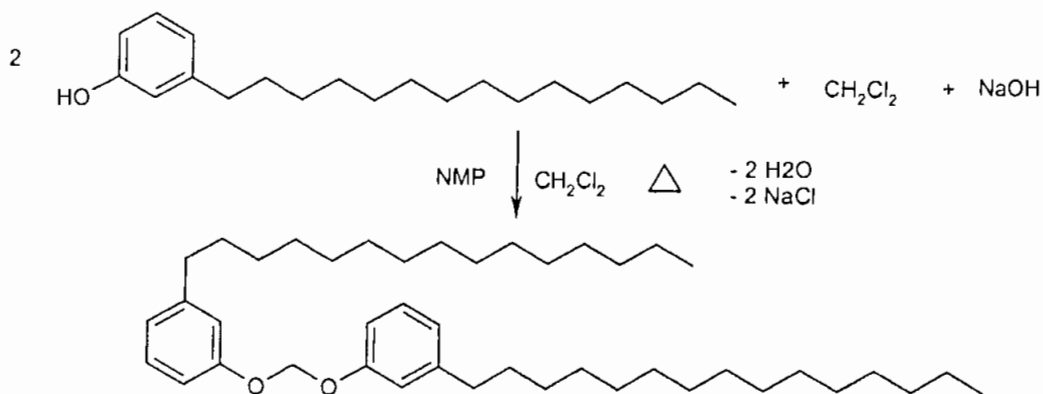
- 36 -

conventional additives in the production of shaped articles from polycarbonates.

The invention accordingly also provides shaped articles, such as, in particular, optical data carriers, preferably compact discs and DVDs, which are obtainable from the thermoplastic moulding compositions according to the invention.

10 The thermoplastic moulding compositions according to the invention have the advantage that they have a relatively low water uptake and therefore an improved dimensional stability. They are furthermore distinguished by improved flow properties, since they have a relatively low melt
15 viscosity.

The following examples serve to explain the invention. The invention is not limited to the examples.

ExamplesSynthesis of the aromatic formals5 Example 1:

50.0 g (0.16 mol) distilled 3-pentadecylphenol and 16.0 g (0.40 mol) sodium hydroxide (microprills from Riedel) are added to a mixture of 125 ml methylene chloride and 225 ml N-methylpyrrolidone (NMP). The mixture was then boiled under reflux for 1 hour. After cooling of the reaction mixture, methylene chloride and water were added until an adequate phase separation was reached. The organic phase was separated off and washed several times with water to the neutral point. The dried organic phase was then precipitated in methanol. The crude product obtained was finally rinsed several times with methanol and in conclusion dried at 80°C in a vacuum drying cabinet. 44.8 g (90.2% of theory) of a waxy solid were obtained.

Analysis:

¹H-NMR (400 MHz, TMS, CDCl₃) δ = 7.2-6.82 (m, 8H), 5.68 (s, 2H), 2.58-2.54 (m, 4H), 1.62-1.57 (m, 4H), 1.39-1.20 (m, 48H), 0.89-0.86 (t, 6H).

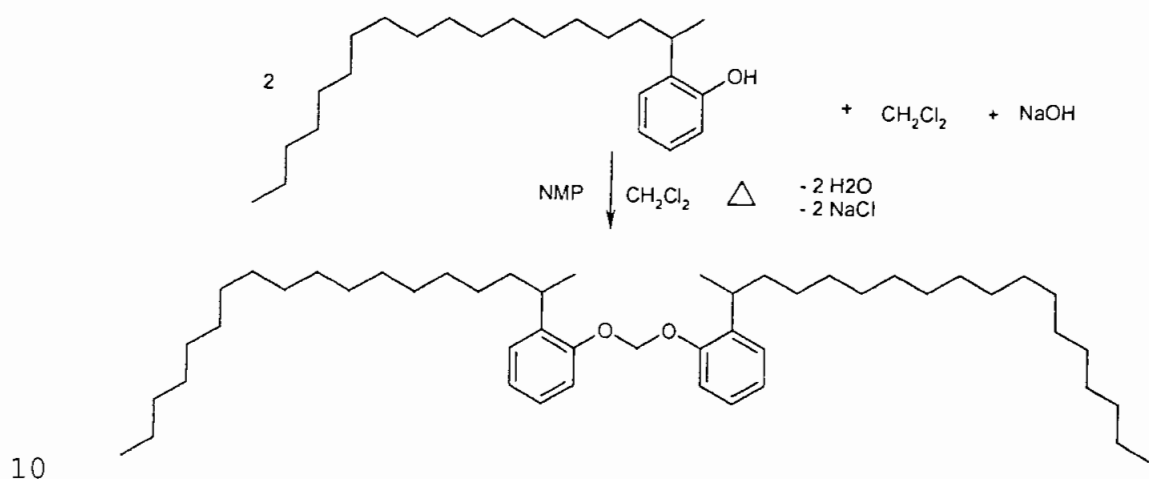
- 38 -

Example 2:

Analogous to example 1, but 4 times the batch size.

5 Yield: 181.6 g (91.4% of theory)

Analysis: analogous NMR spectrum to that under example 1

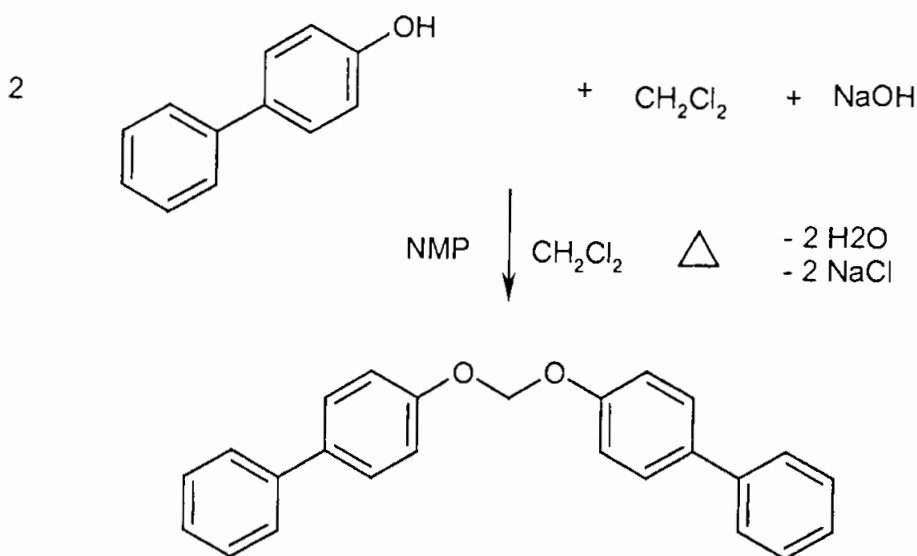
Example 3:

50.0 g (0.14 mol) octadecylphenol and 14.4 g (0.36 mol) sodium hydroxide (microprills from Riedel) are added to a mixture of 125 ml methylene chloride and 225 ml N-methylpyrrolidone (NMP). The mixture was then boiled under reflux for 1 hour. After cooling of the reaction mixture, methylene chloride and water were added until an adequate phase separation was reached. The organic phase was separated off and washed several times with water to the neutral point. The dried organic phase was then precipitated in methanol. The crude product obtained was finally rinsed several times with methanol and in conclusion dried at 80°C in a vacuum drying cabinet. 42.0 g (85.1% of theory) of a waxy solid were obtained.

Analysis:

$^1\text{H-NMR}$ (400 MHz, TMS, CDCl_3) δ = 7.22-6.97 (m, 8H), 5.7 (s, 2H), 3.15-3.05 (m, 2H), 1.55-0.9 (m, 36H), 0.85-0.81 (t, 6H).

Example 4:



10 23.8 g (0.14 mol) 4-hydroxybiphenyl and 14.4 g (0.36 mol) sodium hydroxide (microprills from Riedel) are added to a mixture of 125 ml methylene chloride and 225 ml N-methylpyrrolidone (NMP). The mixture was then boiled under reflux for 1 hour. After cooling of the reaction mixture,

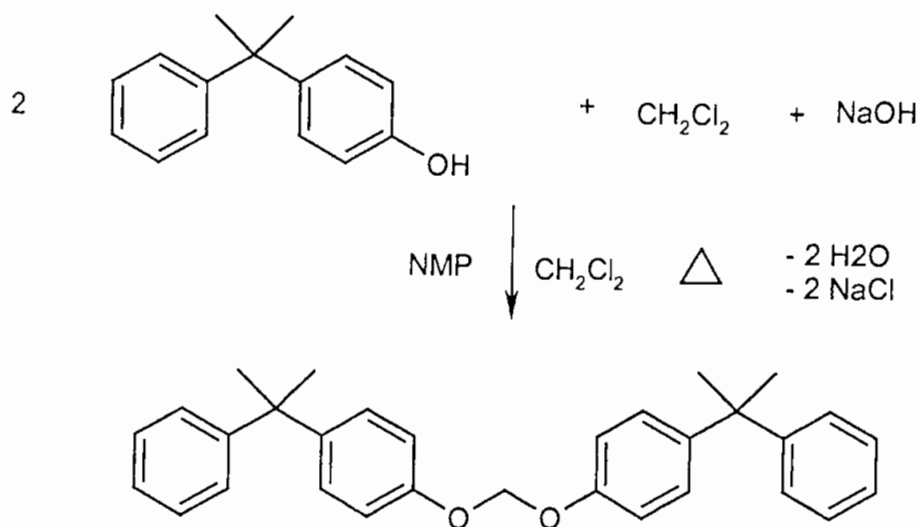
15 methylene chloride and water were added until an adequate phase separation was reached. The organic phase was separated off and washed several times with water to the neutral point. The dried organic phase was then precipitated in methanol. The crude product obtained was

20 finally rinsed several times with methanol and in conclusion dried at 80°C in a vacuum drying cabinet. 21.7 g (87.9% of theory) of a white solid were obtained.

- 40 -

Analysis:

$^1\text{H-NMR}$ (400 MHz, TMS, CDCl_3) δ = 7.65-7.5 (m, 8H), 7.45-7.35 (m, 4H), 7.35-7.25 (m, 2H), 7.25-7.15 (m, 4H), 5.8 (s, 2H).

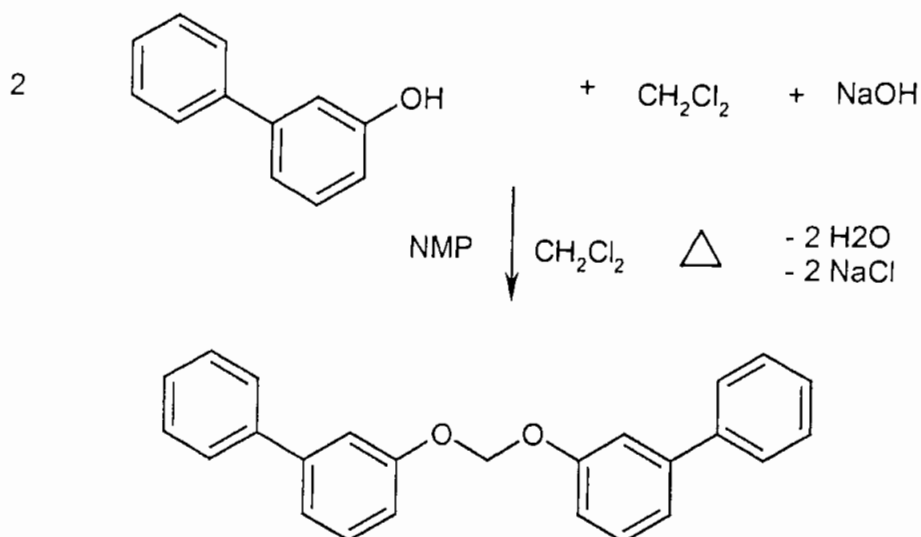
Example 5:

29.7 g (0.14 mol) 4-cumylphenol and 14.4 g (0.36 mol) sodium hydroxide (microprills from Riedel) are added to a mixture of 125 ml methylene chloride and 225 ml N-methylpyrrolidone (NMP). The mixture was then boiled under reflux for 1 hour. After cooling of the reaction mixture, methylene chloride and water were added until an adequate phase separation was reached. The organic phase was separated off and washed several times with water to the neutral point. The dried organic phase was then precipitated in methanol. The crude product obtained was finally rinsed several times with methanol and in conclusion dried at 80°C in a vacuum drying cabinet. 21.5 g (70.3% of theory) of a white solid were obtained.

Analysis:

- 41 -

$^1\text{H-NMR}$ (400 MHz, TMS, CDCl_3) δ = 7.28-7.19 (m, 8H), 7.19-7.09 (m, 6H), 7.05-6.95 (m, 4H), 5.68 (s, 2H), 1.65 (s, 12H).

5 Example 6:

23.8 g (0.14 mol) 3-hydroxybiphenyl and 14.4 g (0.36 mol) sodium hydroxide (microprills from Riedel) are added to a mixture of 125 ml methylene chloride and 225 ml N-methylpyrrolidone (NMP). The mixture was then boiled under reflux for 1 hour. After cooling of the reaction mixture, methylene chloride and water were added until an adequate phase separation was reached. The organic phase was separated off and washed several times with water to the neutral point. The dried organic phase was then precipitated in methanol. The crude product obtained was finally rinsed several times with methanol and in conclusion dried at 80°C in a vacuum drying cabinet. 14.2 g (57.6% of theory) of a white solid were obtained.

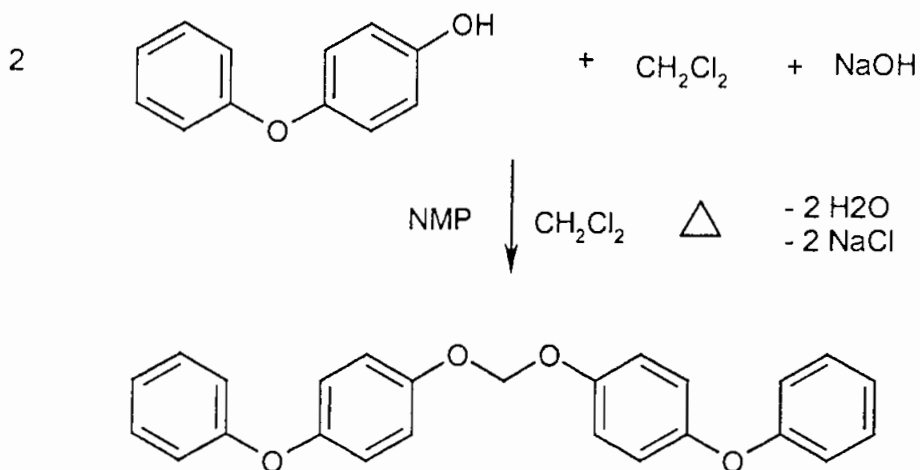
20

Analysis:

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^1H -NMR (400 MHz, TMS, CDCl_3) δ = 7.6-7.5 (m, 4H), 7.5-7.2 (m, 12H), 7.15-7.05 (m, 2H), 5.85 (s, 2H).

Example 7:



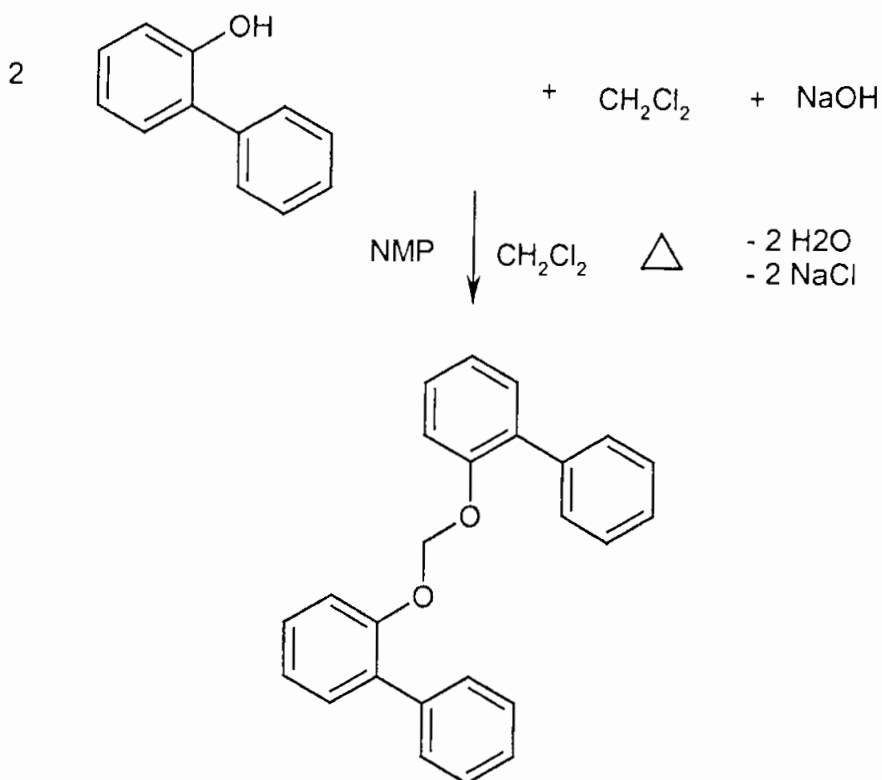
24.2 g (0.13 mol) 4-hydroxydiphenyl ether and 13.0 g (0.325 mol) sodium hydroxide (microprills from Riedel) are added to a mixture of 125 ml methylene chloride and 225 ml N-methylpyrrolidone (NMP). The mixture was then boiled under reflux for 1 hour. After cooling of the reaction mixture, methylene chloride and water were added until an adequate phase separation was reached. The organic phase was separated off and washed several times with water to the neutral point. The dried organic phase was then

15 precipitated in a methanol/water mixture (1:1). The crude product obtained was finally rinsed several times with water and in conclusion dried at 80°C in a vacuum drying cabinet. 21.0 g (84.0% of theory) of a white solid were obtained.

20

Analysis:

^1H -NMR (400 MHz, TMS, CDCl_3) δ = 7.35-7.22 (m, 4H), 7.15-7.02 (m, 6H), 7.02-6.9 (m, 8H), 5.65 (s, 2H).

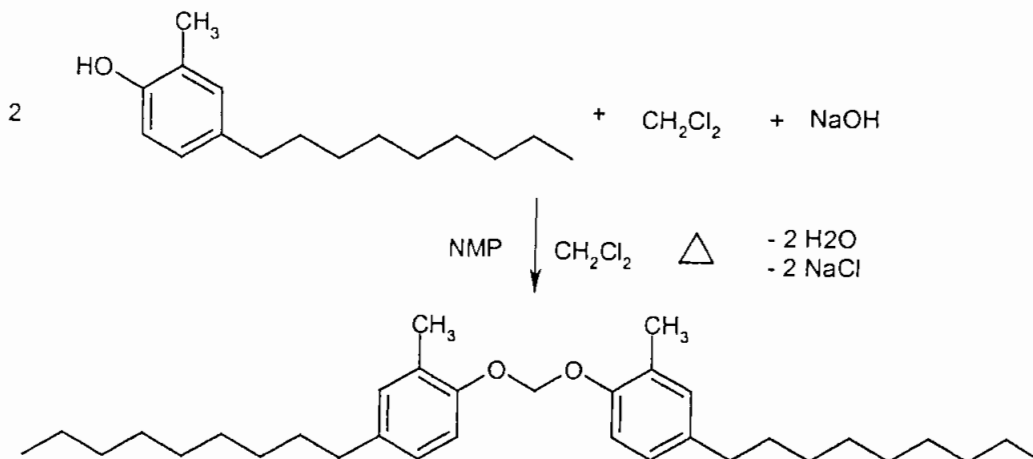
Example 8:

23.8 g (0.14 mol) 4-cumylphenol and 14.4 g (0.36 mol)
 5 sodium hydroxide (microprills from Riedel) are added to a
 mixture of 125 ml methylene chloride and 225 ml N-
 methylpyrrolidone (NMP). The mixture was then boiled under
 reflux for 1 hour. After cooling of the reaction mixture,
 methylene chloride and water were added until an adequate
 10 phase separation was reached. The organic phase was
 separated off and washed several times with water to the
 neutral point. The dried organic phase was then
 precipitated in methanol. The crude product obtained was
 finally rinsed several times with methanol and in
 15 conclusion dried at 80°C in a vacuum drying cabinet. 13.0
 g (52.7% of theory) of a white solid were obtained.

Analysis:

- 44 -

$^1\text{H-NMR}$ (400 MHz, TMS, CDCl_3) δ = 7.45-7.15 (m, 16H), 7.15-7.05 (m, 2H), 5.58 (s, 2H).

Example 9:

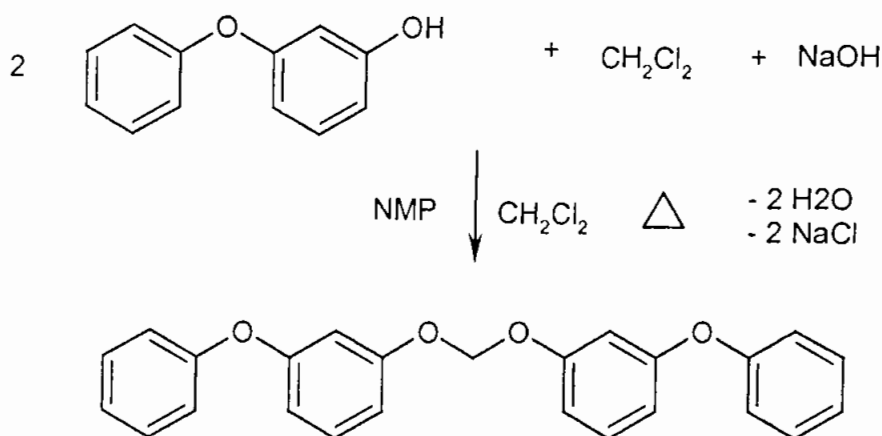
50.0 g (0.21 mol) 2-methyl-4-nonylphenol and 21.3 g (0.53 mol) sodium hydroxide (microprills from Riedel) are added to a mixture of 125 ml methylene chloride and 225 ml N-methylpyrrolidone (NMP). The mixture was then boiled under reflux for 1 hour. After cooling of the reaction mixture, methylene chloride and water were added until an adequate phase separation was reached. The organic phase was separated off and washed several times with water to the neutral point. The dried organic phase was then precipitated in methanol. The crude product obtained was finally rinsed several times with methanol and in conclusion dried at 80°C in a vacuum drying cabinet. 9.4 g (18.6% of theory) of a highly viscous substance were obtained.

20

Analysis:

$^1\text{H-NMR}$ (400 MHz, TMS, CDCl_3) δ = 7.1-6.9 (m, 6H), 5.65 (s, 2H), 2.12 (s, 6H), 1.7-0.45 (m, 38H).

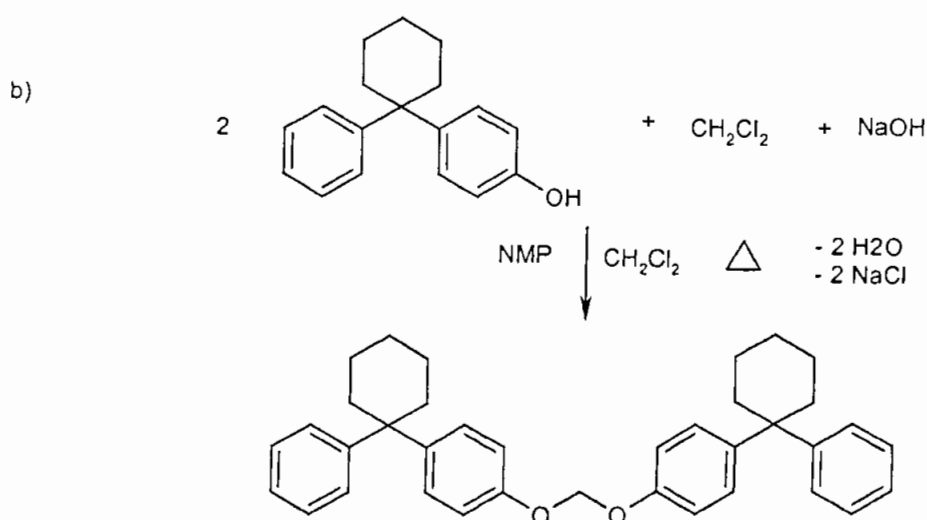
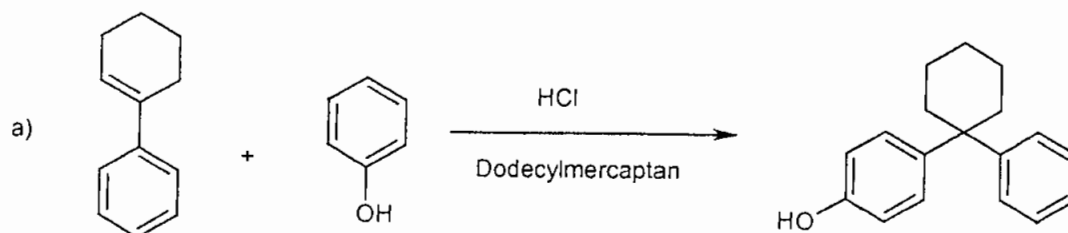
- 45 -

Example 10:

17.4 g (0.093 mol) 3-hydroxydiphenyl ether and 9.3 g (0.23
 5 mol) sodium hydroxide (microprills from Riedel) are added
 to a mixture of 100 ml methylene chloride and 180 ml N-
 methylpyrrolidone (NMP). The mixture was then boiled under
 reflux for 1 hour. After cooling of the reaction mixture,
 methylene chloride and water were added until an adequate
 10 phase separation was reached. The organic phase was
 separated off and washed several times with water to the
 neutral point. The organic phase was then concentrated.
 The crude product obtained was finally rinsed several times
 with water and in conclusion dried under a high vacuum at
 15 160°C. 15.7 g (90.7% of theory) of a highly viscous
 substance were obtained.

Analysis:

20 $^1\text{H-NMR}$ (400 MHz, TMS, CDCl_3) δ = 7.45-7.35 (m, 4H), 7.35-7.2
 (m, 2H), 7.2-7.1 (m, 2H), 7.1-7.0 (m, 4H), 6.9-6.8 (m, 2H),
 6.8-6.7 (m, 2H), 6.7-6.6 (m, 2H), 5.82 (s, 2H).

Example 11:

a) 24 g (0.15 mol) 1-phenyl-1-cyclohexene (Aldrich) and, in a large excess, 56.5 g (0.60 mol) freshly distilled phenol are initially introduced into the reaction vessel, and 0.3 g (0.0015 mol) dodecylmercaptan is added to the reaction batch as a catalyst. Passing in of gaseous hydrogen chloride is started at a temperature of 30°C. This is maintained for 20 minutes in total. After the mixture had solidified the excess phenol was distilled off under a water pump vacuum. The last residues of phenol could be distilled off at 120°C under a high vacuum. 36.5 g (96.4% of theory) of a white solid are obtained.

15 Analysis:

- 47 -

¹H-NMR (400 MHz, TMS, CDCl₃) δ = 9.12 (s, 1H), 7.3-7.15 (m, 4H), 7.15-7.0 (m, 3H), 6.7-6.6 (m, 2H), 2.2 (m, 4H), 1.45 (m, 6H).

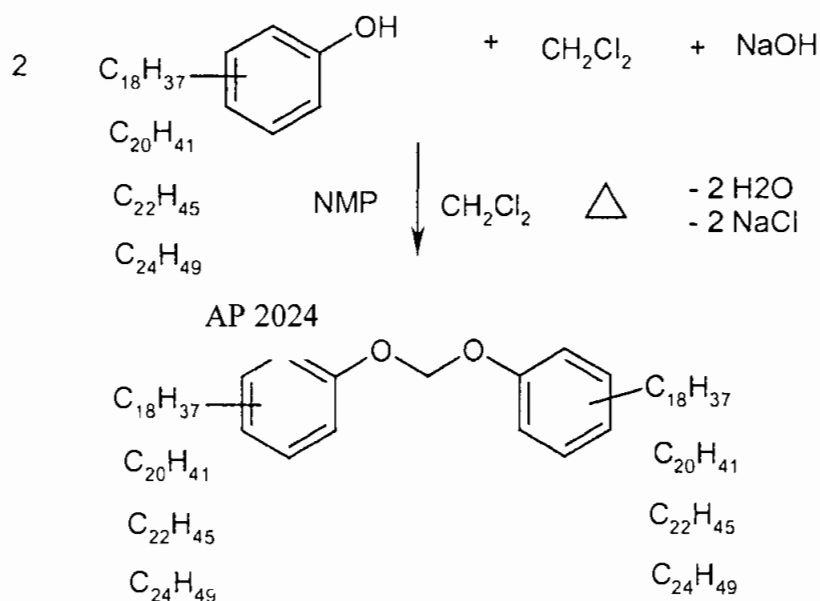
5 b) 5 g (0.0198 mol) of the product from example 11a) and 1.98g (0.05 mol) sodium hydroxide (microprills from Riedel) are added to a mixture of 30 ml methylene chloride and 55 ml N-methylpyrrolidone (NMP). The mixture was then boiled under reflux for 1 hour. After cooling of the reaction
10 mixture, methylene chloride and water were added until an adequate phase separation was reached. The organic phase was separated off and washed several times with water to the neutral point. The dried organic phase was then precipitated in methanol. The crude product obtained was
15 finally rinsed several times with methanol and in conclusion dried at 80°C in a vacuum drying cabinet. 3.7 g (72.3% of theory) of a white solid were obtained.

Analysis:

20

¹H-NMR (400 MHz, TMS, CDCl₃) δ = 7.3-7.2 (m, 8), 7.2-7.15 (m, 4H), 7.15-7.05 (m, 2H), 7.0-6.9 (m, 4H), 5.65 (s, 2H), 2.25 (m, 8H), 1.65-1.45 (m, 12H).

Example 12:



50.0 g AP 2024 (mixture of phenols with the abovementioned radicals R¹, Idemitsu Petrochemicals Co. Ltd., Tokyo, Japan) and 13.2 g (0.33 mol) sodium hydroxide (microprills from Riedel) are added to a mixture of 125 ml methylene chloride and 225 ml N-methylpyrrolidone (NMP). The mixture was then boiled under reflux for 1 hour. After cooling of the reaction mixture, methylene chloride and water were added until an adequate phase separation was reached. The organic phase was separated off and washed several times with water to the neutral point. The dried organic phase was then precipitated in methanol. The crude product obtained was finally rinsed several times with methanol and in conclusion dried at 80°C in a vacuum drying cabinet. 30.5 g of a highly viscous substance were obtained.

Analysis:

20 $^1\text{H-NMR}$ (400 MHz, TMS, CDCl_3) δ = 7.2-6.9 (m, H_{ar}), 5.75-5.65 (m, H_{OCH_2}), 1.7-0.7 (m, H_{alk}).

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The formalis obtained in this way are tested as an additive in the following polycarbonate types:

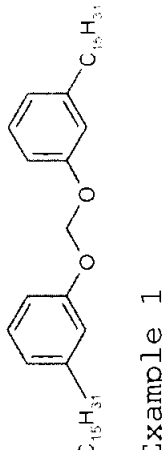
5 Makrolon® CD2005 (Bayer AG, global polycarbonate type for optical storage media based on bisphenol A, low-viscosity, MFR 63 g/10 min, easily removable from the mould, injection moulding)

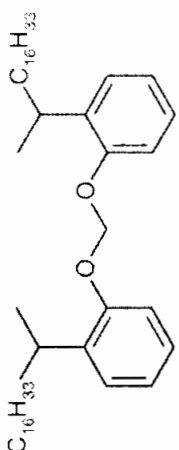
10 Apec 1800 (Bayer AG, co-polycarbonate type based on bisphenol A and TMC-bisphenol; base type softening temperature (VST/B 120) = 185°C)

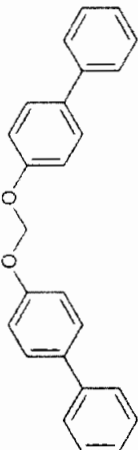
The determination of the water content of the polycarbonates takes place after storage in a damp climate
15 at 95% relative humidity of air and a storage temperature of 30°C. The water content is determined immediately before and after storage for 7 and 14 days in a damp climate by means of quantitative Karl-Fischer titration (coulometric titration).

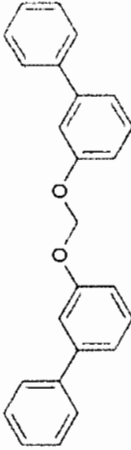
20

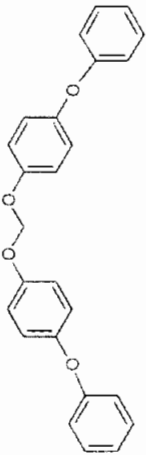
Water uptake [wt.%] of polycarbonate with additives

<u>Structure</u>			<u>Polymer</u>		Example 1 [wt.%]	Tg [°C]	directly	after 7 days	after 14 days
 Example 1			Makrolon CD2005	with	1.0	135	0.07%	0.20...0. 21%	0.15...0. 19%
			Makrolon CD2005	with	2.0	128	0.03...0 .04%	0.18...0. 19%	0.14...0. 23%
			Makrolon CD2005	with	3.0	123	0.03 / 0.05	0.17 / 0.23	0.17 / 0.24
			Apec 1800	with	1.0	176	0.04	0.26 / 0.30	0.26 / 0.29
			Apec 1800	with	2.0	165	0.03 / 0.04	0.20 / 0.26	0.19 / 0.28
			Apec 1800	with	3.0	157	0.02 / 0.03	0.23 / 0.25	0.23 / 0.26

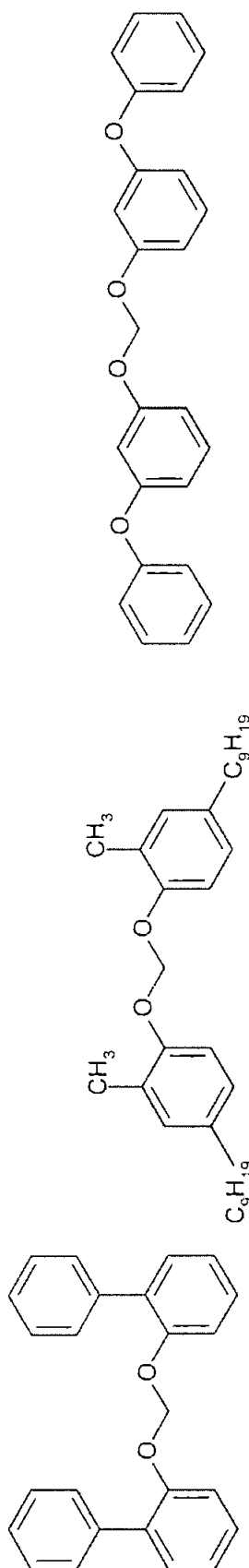
<u>Structure</u>		<u>Polymer</u>		Example 3 [wt. %]		Tg [°C]	directly	after 7 days	after 14 days
 Example 3		Makrolon CD2005	with	1.0	of	136	0.06%	0.18..0.20%	0.19..0.27%
		Makrolon CD2005	with	2.0	of	130	0.07%	0.14..0.26%	0.15..0.24%
		Makrolon CD2005	with	3.0	of	126	0.06%	0.15..0.21%	0.15..0.16%
		Apec 1800	with	1.0	of	175	0.06..0.07%	0.26..0.29%	0.23..0.26%
		Apec 1800	with	2.0	of	166	0.04..0.05%	0.27..0.29%	0.21..0.24%
		Apec 1800	with	3.0	of	158	0.05%	0.21..0.25%	0.21..0.23%

	<u>Structure</u>	<u>Polymer</u>		Example 4 [wt. %]	Tg [°C]	directly	after 7 days	after 14 days
 Example 4		Makrolon CD2005	with	1.0	137	0.04	0.21 / 0.24	0.20 / 0.28
		Makrolon CD2005	with	2.0	132	0.05	0.20 / 0.22	0.21 / 0.29
		Makrolon CD2005	with	3.0	128	0.02 / 0.03	0.17 / 0.25	0.17 / 0.28
		Apec 1800	with	1.0	176	0.04	0.31 / 0.32	0.28 / 0.33
		Apec 1800	with	2.0				
		Apec 1800	with	3.0				

<u>Structure</u>			<u>Polymer</u>		Example 6 [wt. %]	Tg [°C]	directly	after 7 days	after 14 days	
 Example 6										
			Makrolon CD2005	with	3.0	of	127	0.03	0.12/0.25	0.15/0.23
			Apec 1800	with	3.0	of	165	0.03	0.23/0.26	0.23/0.25

	<u>Structure</u>	<u>Polymer</u>		Example 7 [wt. %]	Tg [°C]	directly	after 7 days	after 14 days
 Example 7								
		Makrolon CD2005	with	3.0	130	0.03	0.18/0.23	0.14/0.20
		Apec 1800	with	3.0	162	0.003	0.19/0.25	0.17/0.27

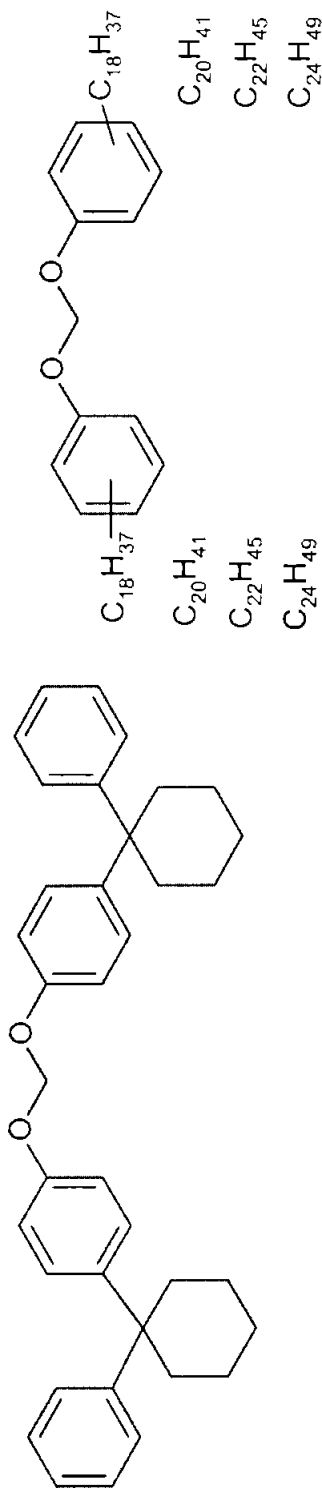
The following formulae were employed in an analogous manner.



Example 8

Example 9

Example 10



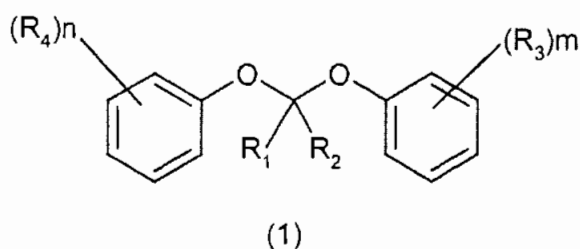
Example 11

Example 12

5 The results of the experiments show the surprising and completely unexpected action of the compounds according to the invention as additives which lower the water uptake in polycarbonate. The polycarbonates not finished in a corresponding manner show, in contrast, water uptakes of 0.32-0.34% for CD 2005 and 0.4% for Apec 1800.

Patent claims

1. Composition comprising at least one polycarbonate and
at least one aromatic formal of the following
5 structure

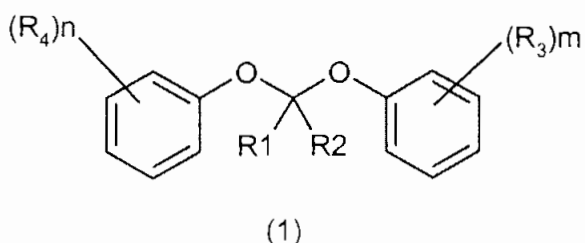


wherein R_1 and R_2 represent hydrogen or phenyl, R_3 and R_4 represent hydrogen, linear or branched C_1 - C_{40} -alkyl or -alkoxy, optionally substituted aryl or aryloxy, or
10 aralkyl and n and m independently of one another represent an integer between 0 and 5, it also being possible for these to be isomer mixtures.

2. Composition according to claim 1, wherein this
15 additionally comprises, as mould release agents, esters of polyhydric alcohols with long-chain carboxylic acids, the esters still containing at least one free OH group.
- 20 3. Composition according to the preceding claims, wherein the polycarbonate has a molecular weight of 15,000 to 35,000.
4. Composition according to the preceding claims,
25 comprising the aromatic formal in general in a content of 10 - 60,000 ppm.
5. Composition according to the preceding claims, comprising 0.01 to 1.5 wt.% of mould release agent.

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6. Composition according to the preceding claims, comprising a heat stabilizer.
- 5 7. Use of the compositions according to the preceding claims for the production of shaped articles.
8. Optical data carriers produced from compositions of claims 1 to 7.
- 10 9. Compounds of the formula



- wherein R_1 and R_2 represent hydrogen or phenyl, R_3 and R_4 represent hydrogen, linear or branched C_1 - C_{40} -alkyl or -alkoxy, optionally substituted aryl or aryloxy or aralkyl and n and m independently of one another represent an integer between 0 and 5, it also being possible for these to be isomer mixtures, with the proviso that n and m may not simultaneously represent 0 and in the case where n and m represent 1 and R_3 and R_4 are identical, R_3 and R_4 may not represent *m*- or *p*-methyl or *p*- CHO_3 .
10. Process for the preparation of compounds of the formula (1), wherein optionally substituted, monofunctional phenols are reacted in a homogeneous solution of methylene chloride or α, α -dichlorotoluene and a suitable high-boiling solvent in the presence of a base at temperatures of between 30 and 80°C.