

Description

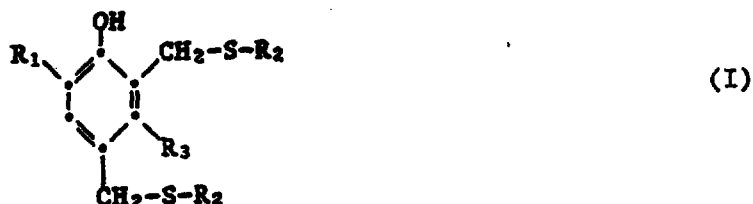
The present invention relates to compositions containing a substituted bis(alkylthiomethyl)phenol as stabiliser, as well as to novel bis(alkylthiomethyl)phenols.

Phenols containing alkylthiomethyl are known as stabilisers. For example, US patent specification 3 660 352 describes the use of 2,4,6-trialkyl-bis(3,5-alkylthiomethyl)phenols as antioxidants in polymers and elastomers. Moreover, 2,6-bis(alkoxycarbonylalkylenethiomethyl)-4-alkylphenols are known from US patent specification 3 227 677 as antioxidants for polyolefins.

According to British patent specification 1 184 533, 2,4-bis(alkylthiomethyl)-3,6-dialkylphenols can be employed as stabilisers for organic polymers such as styrene/butadiene copolymers, ABS resins, MBS resin and SAN resins, and also for synthetic oils.

There still exists a need for effective stabilisers for materials which are sensitive to thermal, oxidative or light-induced degradation.

Accordingly, the present invention relates to a composition containing an elastomer or a tackifying resin and at least one compound of formula I



wherein

R_1 is C_1 - C_8 alkyl or C_5 - C_{12} cycloalkyl, the radicals R_2 , each independently of the other, are C_1 - C_{18} alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by $-\text{OCO}-\text{R}_4$, $-\text{CO}-\text{OR}_5$ or $-\text{CO}-\text{NR}_5\text{R}_6$, or they are phenyl or benzyl, R_3 is hydrogen or methyl, with the proviso that, if R_1 is other than methyl, then R_3 is methyl, R_4 is C_1 - C_{17} alkyl, C_2 - C_8 alkenyl or a radical of formula Ia



m is 0, 1 or 2, the radicals R' , each independently of the other, have the meanings indicated for R_1 , R_5 is $\text{C}_1\text{-C}_{20}$ alkyl which may be interrupted by $-\text{O}-$, $-\text{S}-$ or $-\text{NR}'-$, and R_6 is hydrogen or has one of the meanings indicated for R_5 .

R_1 and R' as $\text{C}_1\text{-C}_8$ alkyl are for example methyl, ethyl, n-propyl, isopropyl, n-butyl, sec-butyl, tert-butyl, n-pentyl, isopentyl, n-hexyl, 1,1-dimethylbutyl, n-heptyl, n-octyl or 2-ethylhexyl.

Preferably, R_1 and R' are $\text{C}_1\text{-C}_4$ alkyl, in particular methyl, ethyl, isopropyl or tert-butyl, most particularly methyl or tert-butyl.

R_1 and R' as $\text{C}_5\text{-C}_{12}$ cycloalkyl are for example cyclopentyl, cyclohexyl, cycloheptyl, cyclooctyl or cyclododecyl. Preferably, R_1 and R' are $\text{C}_5\text{-C}_8$ cycloalkyl, in particular cyclohexyl.

R_2 as $\text{C}_1\text{-C}_{18}$ alkyl is for example, in addition to the radicals mentioned for R_1 , also n-nonyl, n-decyl, 1,1,3,3-tetramethylbutyl, 1,1,3,3-tetramethylhexyl, n-undecyl, n-dodecyl, 1,1,3,3,5,5-hexamethylhexyl, n-tetradecyl, n-hexadecyl or n-octadecyl. Preferably, R_2 is $\text{C}_4\text{-C}_{18}$ alkyl, in particular $\text{C}_8\text{-C}_{18}$ alkyl, e.g. n-octyl or n-dodecyl.

R_2 as $\text{C}_1\text{-C}_{18}$ alkyl may be substituted by one or two hydroxyl groups. Examples of such radicals are 2-hydroxyethyl, 2-hydroxypropyl, 2-hydroxybutyl, 2-hydroxydodecyl, 2-hydroxyhexadecyl, 2-hydroxyoctadecyl or 2,3-dihydroxypropyl. 2-Hydroxyethyl is preferred.

R_4 as $\text{C}_1\text{-C}_{17}$ alkyl is for example one of the radicals indicated for R_2 or methyl, preferably $\text{C}_1\text{-C}_{12}$ alkyl, such as methyl, ethyl, n-propyl, isopropyl, n-butyl, tert-butyl, n-hexyl, n-octyl, 2-ethylhexyl or n-dodecyl.

If R_4 is $\text{C}_2\text{-C}_8$ alkenyl then, for example, the radicals vinyl, allyl, methallyl, but-3-enyl, pent-4-enyl, hex-5-enyl, oct-7-enyl, dec-9-enyl

or dodec-11-enyl are suitable. Preferably, R_4 is vinyl or allyl.

R_4 as a radical of formula Ia may be for example 4-hydroxy-3,5-dimethylphenyl, 4-hydroxy-3,5-di-tert-butylphenyl, 4-hydroxy-3,5-dimethylbenzyl, 4-hydroxy-3,5-di-tert-butylbenzyl or 4-hydroxy-3,5-dimethylphenylethyl, preferably 4-hydroxy-3,5-di-tert-butylbenzyl.

R_5 or R_6 as C_1 - C_{20} alkyl is for example one of the radicals indicated for R_2 or methyl, octadecyl or eicosyl, preferably methyl, ethyl, n-hexyl, n-octyl or n-dodecyl.

R_5 or R_6 as C_1 - C_{20} alkyl which is interrupted by -O-, -S- or -NR'- is for example 3-oxabutyl, 3-oxapentyl, 3,6-dioxaheptyl, 3,6,9-trioxadecyl, 3,6,9,12-tetraoxatridecyl, 3,6,9,12,15-pentaoxahexadecyl, 3,6,9,12,15,18-hexaoxanonadecyl, 3-thiabutyl, 3-azabutyl, 3-methyl-3-azapentyl, 3-ethyl-3-azapentyl, 3-methyl-3-aza-6-oxaheptyl, with 3-oxapentyl or 3-azabutyl being preferred.

Preferred compositions are those containing an elastomer and at least one compound of formula I.

Particularly preferred compositions are those containing an elastomer and at least one compound of formula I, wherein the radicals R_2 , each independently of the other, are C_2 - C_{18} alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by -OCO- R_4 , -CO-OR₅ or -CO-NR₅R₆, with R_4 , R_5 and R_6 being as defined above.

More particularly preferred compositions are those which contain an elastomer or a tackifying resin and in which R_1 in formula I is C_1 - C_4 alkyl, in particular methyl or tert-butyl.

Further preferred compositions are those which contain an elastomer or a tackifying resin and in which R_2 in formula I is C_4 - C_{18} alkyl, -CH₂CH₂-OH, -CH₂CH₂-O-CO- R_4 , -CH₂-CO- R_5 or -CH₂CH₂-CO- R_5 , with R_4 and R_5 being as defined above. A particularly preferred meaning of R_2 is C_4 - C_{18} alkyl or -CH₂-COO- R_6 , with R_6 being as defined above. Most particularly preferably, R_2 is C_4 - C_{18} alkyl.

Examples of representatives of compounds of formula I are the substances listed below:

2,4-bis(2'-hydroxyethylthiomethyl)-6-methylphenol,
2,4-bis(2',3'-dihydroxypropylthiomethyl)-3,6-dimethylphenol,
2,4-bis(2'-acetyloxyethylthiomethyl)-3,6-dimethylphenol,
2,4-bis(2'-n-decanoyloxyethylthiomethyl)-6-methylphenol,
2,4-bis(n-octylthiomethyl)-6-methylphenol,
2,4-bis(tert-octylthiomethyl)-6-methylphenol,¹
2,4-bis(tert-dodecylthiomethyl)-6-methylphenol,²
2,4-bis-(benzylthiomethyl)-6-methylphenol,
2,4-bis(phenylthiomethyl)-3-methyl-6-tert-butylphenol,
2,4-bis(2'-ethylhexyloxycarbonylmethylthiomethyl)-6-methylphenol,
2,4-bis(n-octadecyloxycarbonylmethylthiomethyl)-3,6-dimethylphenol,
2,4-bis[2'-(2"-ethylhexyloxycarbonyl)ethylthiomethyl]-3-methyl-6-tert-butylphenol.

Examples of materials which the compositions of the present invention may contain as elastomers are:

1. Polydienes, for example polybutadiene, polyisoprene or polychloroprene; block polymers, for example styrene/butadiene/styrene, styrene/isoprene/styrene or acrylonitrile/butadiene copolymers.
2. Copolymers of monoolefins and diolefins with each other or with other vinyl monomers, e.g. ethylene/alkyl acrylate copolymers, ethylene/alkyl methacrylate copolymers, ethylene/vinyl acetate copolymers and terpolymers of ethylene with propylene and a diene, such as hexadiene, dicyclopentadiene or ethylidene-norbornene.

¹ tert-octyl is 1,1,3,3-tetramethylbutyl

² tert-dodecyl is a mixture comprising 1,1,3,3,5,5-hexamethylhexyl and 1,1,4,6,6-pentamethylhept-4-yl

3. Halogen-containing polymers, e.g. polychloroprene, chlorinated rubbers, chlorinated or sulfochlorinated polyethylene, epichlorohydrin homo- and copolymers, chlorotrifluoroethylene copolymers, polymers from halogen-containing vinyl compounds, e.g. polyvinylidene chloride, polyvinylidene fluoride, as well as copolymers thereof, such as vinyl chloride/vinylidene chloride, vinyl chloride/vinyl acetate or vinylidene chloride/vinyl acetate.

4. Polyurethanes which are derived from polyethers, polyesters and polybutadiene with terminal hydroxyl groups on the one hand and aliphatic or aromatic polyisocyanates on the other hand, as well as precursors thereof.

5. Natural rubbers.

6. Mixtures (polyblends) of the above polymers.

7. Aqueous emulsions of natural or synthetic rubbers, e.g. natural rubber latex or latices of carboxylated styrene/butadiene copolymers.

These elastomers may be present in the form of latices and can be stabilised as such.

Preferred compositions are those containing as elastomer a polydiene such as polybutadiene rubber, a halogen-containing polymer such as polyvinylidene fluoride, or a polyurethane.

The compositions of the invention advantageously contain 0.01 to 10 % by weight, in particular 0.05 to 5.0 % by weight, of the stabiliser of formula I, based on the elastomer. Mixtures of stabilisers of formula I may also be employed.

Incorporation into the elastomers can be effected, for example, by blending in the substances of formula I and further optional additives by methods conventionally employed in the art, before or during moulding, or also by applying the dissolved or dispersed compounds to the polymer, with or without subsequent evaporation of the solvent. The

compounds of formula I may also be added to the plastics to be stabilised in the form of a master batch which contains these compounds for example in a concentration of 2.5 to 25 % by weight.

Examples of materials which the compositions of the invention may contain as tackifying resins are:

- natural colophonium resins (rosins) such as gum rosin, wood rosin, tall oil rosin
- derivatives of colophonium resins, e.g. glycerol esters, pentaerythritol esters, each of which may be hydrogenated or nonhydrogenated, disproportionated or non-disproportionated
- synthetic C₅- or C₈-hydrocarbon resins
- indene resins, methylindene resins, coumarone-indene resins
- terpene resins
- methyl styrene resins
- phenol resins
- further tackifiers such as asphalt or bitumen
- mixtures of the above resins
- aqueous emulsions of the above resins.

Preferred compositions are those containing a synthetic C₅- or C₈-hydrocarbon resin, a colophonium resin or a derivative of colophonium resins.

The tackifying resin compositions advantageously contain 0.01 to 10 % by weight, in particular 0.03 to 3.0 % by weight, of the stabiliser of formula I, based on the tackifying resin. Mixtures of stabilisers of formula I may also be employed.

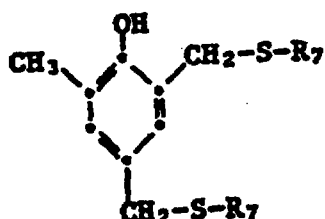
Incorporation of the compounds of formula I into the tackifying resins may be effected by the methods conventionally employed in the art, before, during or after manufacture or modification.

The compositions of the invention can be used in a very wide range of forms, for example as films, filaments, ribbons, moulding compositions, profiles, or as binders for surface coatings, adhesives or cements.

Some of the compounds of formula I are known.

Those compounds of formula I which are novel likewise constitute subject matter of the present invention and correspond to the formula II.

Accordingly, the invention also relates to compounds of formula II



(II)

wherein the radicals R₇, each independently of the other, are C₈-C₁₈alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by -OCO-R₄, -CO-OR₅ or -CO-NR₅R₆, with R₄, R₅ and R₆ being as defined above.

The exemplary and preferred possible meanings indicated above for R₂ in formula I also apply to R₇ in formula II. The same applies to the symbols R₄, R₅ and R₆.

Preferred compounds of formula II are those wherein the radicals R₇, each independently of the other, are unsubstituted C₈-C₁₈-alkyl.

Particularly preferred compounds of formula II are those wherein the radicals R₇ are identical and are C₈-C₁₂alkyl.

The known and the novel compounds of formulae I and II are prepared by methods known per se, for example as described in GB-A-1 184 533 and in US-A-3 227 677. All starting materials are known compounds and can be prepared by known methods. Some of the starting materials are commercially available.

The present invention also relates to a process for the preparation of compounds of formula II, which comprises reacting 2,4-bis-(dimethylaminomethyl)-6-methylphenol with a mercaptan R₇-SH.

In addition to being suitable for the stabilisation of elastomers and of tackifying resins, the phenols of formula II of this invention are also

suitable for the stabilisation of lubricants based on mineral oils or synthetic oils, in particular motor oils.

Suitable lubricants are known to the person skilled in the art and are described e.g. in "Schmiermittel Taschenbuch" (Handbook of Lubricants), Hüthig Verlag, Heidelberg, 1974.

Accordingly, the invention also relates to the use of compounds of formula II as stabilisers for lubricants against the action of oxygen, heat, light and high-energy radiation.

The invention further relates to compositions containing a lubricant and at least one compound of formula II.

The phenols of formula II of this invention are advantageously added in a concentration of 0.01 to 10 % by weight, based on the lubricant. It is preferred to employ 0.05 to 5.0 % by weight, particularly preferably 0.1 to 2.0 % by weight, of the phenols, based on the lubricant.

Mixtures of phenols of formula II may also be employed.

Lubricant formulations of this invention containing phenols of formula II may also contain other additives which are added to improve certain performance characteristics, e.g. further antioxidants, metal passivators, rust inhibitors, viscosity index improvers, pour-point depressors, dispersants/surfactants and anti-wear additives.

Examples of further additives with which the phenols of formula II of this invention may be employed in lubricants are:

1. Antioxidants

1.1. Alkylated monophenols such as 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-i-butylphenol, 2,6-di-cyclopentyl-4-methylphenol, 2-(α -methylcyclohexyl)-4,6-

dimethylphenol, 2,6-di-octadecyl-4-methylphenol, 2,4,6-tri-cyclohexylphenol and 2,6-di-tert-butyl-4-methoxymethylphenol.

1.2. Alkylated hydroquinones such as 2,6-di-tert-butyl-4-methoxyphenol, 2,5-di-tert-butyl-hydroquinone, 2,5-di-tert-amyl-hydroquinone and 2,6-diphenyl-4-octadecyloxyphenol.

1.3. Hydroxylated thiodiphenyl ethers such as 2,2'-thio-bis-(6-tert-butyl-4-methylphenol), 2,2'-thio-bis-(4-octylphenol), 4,4'-thio-bis-(6-tert-butyl-3-methylphenol) and 4,4'-thio-bis-(6-tert-butyl-2-methylphenol).

1.4. Alkylidene-bisphenols such as 2,2'-methylene-bis-(6-tert-butyl-4-methylphenol), 2,2'-methylene-bis-(6-tert-butyl-4-ethylphenol), 2,2'-methylene-bis-[4-methyl-6-(α -methylcyclohexyl)-phenol], 2,2'-methylene-bis-(4-methyl-6-cyclohexylphenol), 2,2'-methylene-bis-(6-nonyl-4-methylphenol), 2,2'-methylene-bis-(4,6-di-tert-butylphenol), 2,2'-ethylidene-bis-(4,6-di-tert-butylphenol), 2,2'-ethylidene-bis-(6-tert-butyl-4-iso-butylphenol), 2,2'-methylene-bis-[6-(α -methylbenzyl)-4-nonylphenol], 2,2'-methylene-bis-[6- α,α -dimethylbenzyl)-4-nonylphenol], 4,4'-methylene-bis-(2,6-di-tert-butylphenol), 4,4'-methylene-bis-(6-tert-butyl-2-methylphenol), 1,1-bis-(5-tert-butyl-4-hydroxy-2-methylphenyl)-butane, 2,6-di-(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 glycol bis-[3,3-bis-(3'-tert-butyl-4'-hydroxyphenyl)-butyrate], di-(3-tert-butyl-4-hydroxy-5-methylphenyl)-dicyclopentadiene and di-[2-(3'-tert-butyl-2'-hydroxy-5'-methyl-benzyl)-6-tert-butyl-4-methyl-phenyl] terephthalate.

1.5. Benzyl compounds such as 1,3,5-tri-(3,5-di-tert-butyl-4-hydroxybenzyl)-2,4,6-trimethylbenzene, di-(3,5-di-tert-butyl-4-hydroxybenzyl) sulfide, isooctyl 3,5-di-tert-butyl-4-hydroxybenzylmercaptoacetate, bis-(4-tert-butyl-3-hydroxy-2,6-dimethylbenzyl) dithiolterephthalate, 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, dioctadecyl 3,5-di-tert-butyl-4-hydroxybenzylphosphonate and calcium monoethyl 3,5-di-tert-butyl-4-hydroxybenzylphosphonate

1.6. Acylaminophenols such as 4-hydroxylauranilide, 4-hydroxystearanilide, 2,4-bis-octylmercapto-6-(3,5-di-tert-butyl-4-hydroxyanilino)-s-triazine and octyl N-(3,5-di-tert-butyl-4-hydroxyphenyl)-carbamate.

1.7. Esters of β -(3,5-di-tert-butyl-4-hydroxyphenyl)-propionic acid with monohydric or polyhydric alcohols, for example, with methanol, octadecanol, 1,6-hexanediol, neopentyl glycol, thiodiethylene glycol, diethylene glycol, triethylene glycol, pentaerythritol, tris-hydroxyethyl isocyanurate and di-hydroxyethyl-oxalic diamide.

1.8. Esters of β -(5-tert-butyl-4-hydroxy-3-methylphenyl)-propionic acid with monohydric or polyhydric alcohols, for example, with methanol, octadecanol, 1,6-hexanediol, neopentyl glycol, thiodiethylene glycol, diethylene glycol, triethylene glycol, pentaerythritol, tris-hydroxyethyl isocyanurate and di-hydroxyethyl-oxalic diamide

1.9. Amides of β -(3,5-di-tert-butyl-4-hydroxyphenyl)-propionic acid, for example N,N'-di-(3,5-di-tert-butyl-4-hydroxyphenylpropionyl)-hexamethylenediamine, N,N'-di-(3,5-di-tert-butyl-4-hydroxyphenylpropionyl)-trimethylenediamine and N,N'-di-(3,5-di-tert-butyl-4-hydroxyphenylpropionyl)-hydrazine.

2. UV-absorbers and light-stabilisers

2.1. 2-(2'-Hydroxyphenyl)-benzotriazoles, for example the 5'-methyl, 3',5'-di-tert-butyl, 5'-tert-butyl, 5'-(1,1,3,3-tetramethylbutyl), 5-chloro-3',5'-di-tert-butyl, 5-chloro-3'-tert-butyl-5'-methyl, 3'-sec-butyl-5'-tert-butyl, 4'-octoxy, 3',5'-di-tert-amyl or 3'-5'-bis(α,α -dimethylbenzyl) derivative.

2.2. 2-Hydroxybenzophenones, for example the 4-hydroxy, 4-methoxy, 4-octoxy, 4-decyloxy, 4-dodecyloxy, 4-benzyloxy, 4,2',4'-trihydroxy or 2'-hydroxy-4,4'-dimethoxy derivative.

2.3. Esters of optionally substituted benzoic acids, for example 4-tert-butylphenyl salicylate, phenyl salicylate, octylphenyl salicylate, dibenzoylresorcinol, bis-(4-tert-butylbenzoyl)-resorcinol, benzoyl-

resorcinol, 2,4-di-tert-butylphenyl 3,5-di-tert-butyl-4-hydroxybenzoate or hexadecyl 3,5-di-tert-butyl-4-hydroxybenzoate.

2.4. Acrylates. for example ethyl α -cyano- β,β -diphenylacrylate or iso-octyl α -cyano- β,β -diphenylacrylate, methyl α -carbomethoxycinnamate, methyl α -cyano- β -methyl-p-methoxycinnamate or butyl α -cyano- β -methyl-p-methoxycinnamate, methyl α -carbomethoxy-p-methoxycinnamate or N-(β -carbomethoxy- β -cyanovinyl)-2-methylindoline.

2.5. Nickel compounds. for example nickel complexes of 2,2'-thio-bis-[4-(1,1,3,3-tetramethylbutyl)-phenol], such as the 1:1 or 1:2 complex optionally having additional ligands such as n-butylamine, triethanolamine or N-cyclohexyl-diethanolamine, nickel dibutyldithiocarbamate, nickel salts of the monoalkyl esters of 4-hydroxy-3,5-di-tert-butylbenzylphosphonic acid, such as the methyl or ethyl esters, nickel complexes of ketoximes such as of 2-hydroxy-4-methyl-phenyl-undecylketone oxime, nickel complexes of 1-phenyl-4-lauroyl-5-hydroxypyrazole, optionally with additional ligands.

2.6. Sterically hindered amines. for example bis-(2,2,6,6-tetramethyl-piperidyl) sebacate, bis-(1,2,2,6,6-pentamethylpiperidyl) sebacate, bis(1,2,2,6,6-pentamethylpiperidyl) n-butyl-3,5-di-tert-butyl-4-hydroxybenzylmalonate, the condensation product of 1-hydroxyethyl-2,2,6,6-tetramethyl-4-hydroxypiperidine and succinic acid, the condensation product of N,N'-(2,2,6,6-tetramethyl-4-piperidyl)-hexamethylenediamine and 4-tert-octyl-amino-2,6-dichloro-1,3,5-s-triazine, tris-(2,2,6,6-tetramethyl-4-piperidyl) nitrilotriacetate, tetrakis-(2,2,6,6-tetramethyl-4-piperidyl) 1,2,3,4-butanetetracarboxylic acid [sic], 1,1'-(1,2-ethanediyl)-bis-(3,3,5,5-tetramethyl-piperazinone).

2.7. Oxalic acid diamides. for example 4,4'-dioctyloxy-oxanilide, 2,2'-dioctyloxy-5,5'-di-tert-butyl-oxanilide, 2,2'-didodecyloxy-5,5'-di-tert-butyl-oxanilide, 2-ethoxy-2'-ethyl-oxanilide, N,N'-bis-(3-dimethylamino-propyl)-oxalamide, 2-ethoxy-5-tert-butyl-2'-ethyl-oxanilide and its mixture with 2-ethoxy-2'-ethyl-5,4'-di-tert-butyl-oxanilide, or mixtures of o- and p-methoxy- and also o- and p-ethoxy disubstituted oxanilides.

3. Metal deactivators, for example N,N'-diphenyloxalic acid diamide, N-salicylal-N'-salicyloylhydrazine, N,N'-bis-salicyloylhydrazine, N,N'-bis-(3,5-di-tert-butyl-4-hydroxyphenylpropionyl)-hydrazine, 3-salicyloylamino-1,2,4-triazole and bis-benzylideneoxalic dihydrazide.

4. Phosphites and phosphonites, for example triphenyl phosphite, diphenyl alkyl phosphites, phenyl dialkyl phosphites, tri-(nonylphenyl) phosphite, trilauryl phosphite, trioctadecyl phosphite, distearyl pentaerythritol diphosphite, tris-(2,4-di-tert-butylphenyl) phosphite, diisodecyl pentaerythritol diphosphite, di-(2,4-di-tert-butylphenyl) pentaerythritol diphosphite, tristearyl sorbitol triphosphite, tetrakis-(2,4-di-tert-butylphenyl) 4,4'-biphenylene-diphosphonite and 3,9-bis-(2,4-di-tert-butylphenoxy-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane.

5. Peroxide-destroying compounds, for example esters of β -thiodipropionic acid, for example the lauryl, stearyl, myristyl or tridecyl esters, mercaptobenzimidazole or the zinc salt of 2-mercaptobenzimidazole, zinc dibutyldithiocarbamate, dioctadecyl disulfide and pentaerythritol tetrakis-(β -dodecylmercapto)-propionate.

6. Polyamide stabilisers, for example copper salts in combination with iodides and/or phosphorus compounds and divalent manganese salts.

7. Basic costabilisers, for example melamine, polyvinylpyrrolidone, dicyandiamide, triallyl cyanurate, urea derivatives, hydrazine derivatives, amines, polyamides, polyurethanes, alkali metal and alkaline earth metal salts of higher fatty acids, for example Ca stearate, Zn stearate, Mg stearate, Na ricinoleate and K palmitate, antimony pyrocatecholate or tin pyrocatecholate.

8. Nucleating agents, for example 4-tert-butyl-benzoic acid, adipic acid and diphenylacetic acid.

9. Fillers and reinforcing agents, for example calcium carbonate, silicates, glass fibres, asbestos, talc, kaolin, mica, barium sulfate, metal oxides and hydroxides, carbon black and graphite.

10. Further additives. for example plasticisers, lubricants, emulsifiers, pigments, fluorescent brighteners, flameproofing agents, anti-static agents and foaming agents.

In practice, the compositions of the invention containing an elastomer or a tackifying resin and phenols of formula I may also contain further additives. Examples of such additives are:

1. Antioxidants

Examples of antioxidants are to be found under the above sections 1 to 10 concerning additional additives for lubricants.

2. UV-absorbers and light-stabilisers

2.1. 2-(2'-Hydroxyphenyl)-benzotriazoles. for example the 5'-methyl, 3',5'-di-tert-butyl, 5'-tert-butyl, 5'-(1,1,3,3-tetramethylbutyl), 5-chloro-3',5'-di-tert-butyl, 5-chloro-3'-tert-butyl-5'-methyl, 3'-sec-butyl-5'-tert-butyl, 4'-octoxy, 3',5'-di-tert-amyl or 3'-5'-bis(α,α -dimethylbenzyl) derivative.

2.2. 2-Hydroxybenzophenones. for example the 4-hydroxy, 4-methoxy, 4-octoxy, 4-decyloxy, 4-dodecyloxy, 4-benzyloxy, 4,2',4'-trihydroxy or 2'-hydroxy-4,4'-dimethoxy derivative.

2.3. Esters of optionally substituted benzoic acids. for example 4-tert-butylphenyl salicylate, phenyl salicylate, octylphenyl salicylate, dibenzoylresorcinol, bis-(4-tert-butylbenzoyl)-resorcinol, benzoyl-resorcinol, 2,4-di-tert-butylphenyl 3,5-di-tert-butyl-4-hydroxybenzoate or hexadecyl 3,5-di-tert-butyl-4-hydroxybenzoate.

2.4. Acrylates. for example ethyl α -cyano- β,β -diphenylacrylate or iso-octyl α -cyano- β,β -diphenylacrylate, methyl α -carbomethoxycinnamate, methyl α -cyano- β -methyl-p-methoxycinnamate or butyl α -cyano- β -methyl-p-methoxycinnamate, methyl α -carbomethoxy-p-methoxycinnamate or N-(β -carbomethoxy- β -cyanovinyl)-2-methylindoline.

2.5. Nickel compounds. for example nickel complexes of 2,2'-thio-bis-[4-(1,1,3,3-tetramethylbutyl)-phenol], such as the 1:1 or 1:2 complex optionally having additional ligands such as n-butylamine, triethanolamine or N-cyclohexyl-diethanolamine, nickel dibutyldithiocarbamate, nickel salts of the monoalkyl esters of 4-hydroxy-3,5-di-tert-butylbenzylphosphonic acid, such as the methyl or ethyl esters, nickel complexes of ketoximes such as of 2-hydroxy-4-methyl-phenyl-undecylketone oxime, nickel complexes of 1-phenyl-4-lauroyl-5-hydroxypyrazole, optionally with additional ligands.

2.6. Sterically hindered amines. for example bis-(2,2,6,6-tetramethyl-piperidyl) sebacate, bis-(1,2,2,6,6-pentamethylpiperidyl) sebacate, bis(1,2,2,6,6-pentamethylpiperidyl) n-butyl-3,5-di-tert-butyl-4-hydroxybenzylmalonate, the condensation product of 1-hydroxyethyl-2,2,6,6-tetramethyl-4-hydroxypiperidine and succinic acid, the condensation product of N,N'-(2,2,6,6-tetramethyl-4-piperidyl)-hexamethylenediamine and 4-tert-octyl-amino-2,6-dichloro-1,3,5-s-triazine, tris-(2,2,6,6-tetramethyl-4-piperidyl) nitrilotriacetate, tetrakis-(2,2,6,6-tetramethyl-4-piperidyl) 1,2,3-4-butanetetracarboxylic acid [sic], 1,1'-(1,2-ethanediyl)-bis-(3,3,5,5-tetramethyl-piperazinone).

2.7. Oxalic acid diamides. for example 4,4'-dioctyloxy-oxanilide, 2,2'-dioctyloxy-5,5'-di-tert-butyl-oxanilide, 2,2'-didodecyloxy-5,5'-di-tert-butyl-oxanilide, 2-ethoxy-2'-ethyl-oxanilide, N,N'-bis-(3-dimethylamino-propyl)-oxalamide, 2-ethoxy-5-tert-butyl-2'-ethyl-oxanilide and its mixture with 2-ethoxy-2'-ethyl-5,4'-di-tert-butyl-oxanilide, or mixtures of o- and p-methoxy- and also o- and p-ethoxy disubstituted oxanilides.

3. Phosphites and phosphonites. for example triphenyl phosphite, diphenyl alkyl phosphites, phenyl dialkyl phosphites, tri-(nonylphenyl) phosphite, trilauryl phosphite, trioctadecyl phosphite, distearyl pentaerythritol diphosphite, tris-(2,4-di-tert-butylphenyl) phosphite, diisodecyl pentaerythritol diphosphite, di-(2,4-di-tert-butylphenyl) pentaerythritol diphosphite, tristearyl sorbitol triphosphite, tetrakis-(2,4-di-tert-butylphenyl) 4,4'-biphenylene-diphosphonite and 3,9-bis-(2,4-di-tert-butylphenoxy)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane.

4. Peroxide-destroying compounds. for example esters of β -thiodipropionic acid, for example the lauryl, stearyl, myristyl or tridecyl esters, mercaptobenzimidazole or the zinc salt of 2-mercaptobenzimidazole, zinc dibutyldithiocarbamate, dioctadecyl disulfide and pentaerythritol tetrakis-(β -dodecylmercapto)-propionate.

5. Polyamide stabilisers. for example copper salts in combination with iodides and/or phosphorus compounds and divalent manganese salts.

6. Basic costabilisers. for example melamine, polyvinylpyrrolidone, dicyandiamide, triallyl cyanurate, urea derivatives, hydrazine derivatives, amines, polyamides, polyurethanes, alkali metal and alkaline earth metal salts of higher fatty acids, for example Ca stearate, Zn stearate, Mg stearate, Na ricinoleate and K palmitate, antimony pyrocatecholate or tin pyrocatecholate.

7. Nucleating agents. for example 4-tert-butyl-benzoic acid, adipic acid and diphenylacetic acid.

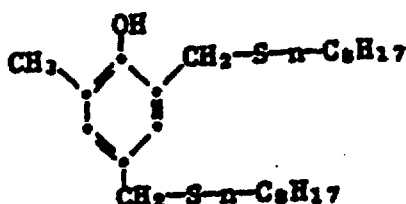
8. Fillers and reinforcing agents. for example calcium carbonate, silicates, glass fibres, asbestos, talc, kaolin, mica, barium sulfate, metal oxides and hydroxides, carbon black and graphite.

9. Further additives. for example plasticisers, lubricants, emulsifiers, pigments, fluorescent brighteners, flameproofing agents, anti-static agents, foaming agents, waxes, oils and organic solvents.

The invention is illustrated in more detail by the following Examples. In these Examples, in the remainder of the description and in the patent claims, parts and percentages are by weight.

PREPARATION EXAMPLE

Example 1: Preparation of 2,4-bis(n-octylthiomethyl)-6-methylphenol (compound 1)



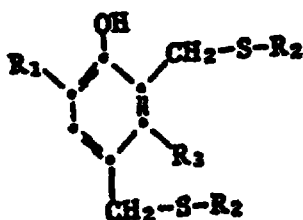
160.74 g (0.72 mole) of 2,4-bis(dimethylaminomethyl)-6-methylphenol and 210.65 g (1.44 moles) of n-octanethiol are heated in an apparatus equipped with stirrer and multiple coil condenser for 36 hours at 150°C, with dimethylamine being continuously drawn off at 53.2 bar. 291.6 g (95 %) of a yellow oil are obtained. Pure 2,4-bis(n-octylthiomethyl)-6-methylphenol is obtained in the form of a colourless oil by column chromatography of the crude product through silica gel.

Analysis values:

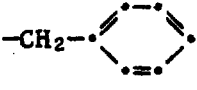
calculated	70.69 % C	found	70.85 % C
	10.44 % H		10.42 % H
	15.09 % S		15.11 % S

¹H-NMR (CDCl₃; 100 MHz, data in δ [ppm] based on TMS = 0, s - singlet): characteristic signals for Ar-CH₂S at 3.77 (s) and 3.6 (s).

The following compounds of formula I are prepared in analogous manner:



(I)

Compound	R ₁	R ₂	R ₃	Physical data
compound 2	CH ₃	n-C ₁₂ H ₂₅	H	m.p.: 28°C
compound 3	CH ₃	n-C ₁₂ H ₂₅	CH ₃	m.p.: 43°C
compound 4	C(CH ₃) ₃	n-C ₁₂ H ₂₅	CH ₃	m.p.: 40°C
compound 5	CH ₃	n-C ₈ H ₁₇	CH ₃	liquid
compound 6	CH ₃		H	m.p.: 99-100°C
compound 7	CH ₃		H	liquid
compound 8	CH ₃	-CH ₂ -COO-CH ₂ CH(CH ₂) ₃ -CH ₃ CH ₂ CH ₃	H	liquid
compound 9	CH ₃	-CH ₂ CH ₂ -OH	H	liquid
compound 10	CH ₃	-C(CH ₃) ₂ -CH ₂ -C(CH ₃) ₂ -CH ₂ -C(CH ₃) ₃	H	liquid
compound 11	CH ₃	-C(CH ₃) ₂ -CH ₂ -C(CH ₃) ₃	H	liquid

APPLICATION EXAMPLES

Compounds 1 to 4 of Example 1 are tested for their stabilising action.

Example 2: Stabilisation of polybutadiene rubber (oven ageing)

100 g of polybutadiene which has been prestabilised with 0.4 % of 2,6-di-tert-butyl-p-cresol are blended homogeneously on a roll mill at 50°C for 6 minutes with 0.25 % of the compound to be tested. Samples having a thickness of 10 mm are pressed at 80°C from the rolled sheets. A further sample is prepared in the same manner without a stabiliser.

The compositions of the invention are tested by subjecting the samples to thermal ageing in a circulating air oven at 80°C. The criterion used is the undesired gel content formed during oven ageing. This is determined as

follows:

1 gram of polybutadiene is dissolved overnight at room temperature in 100 ml of toluene. The solution is filtered through a glass filter funnel (pore size 00), and the filtered solution is evaporated to dryness.

The gel content is calculated as follows

$$\text{gel} = \frac{E - A}{E} \times 100 (\%)$$

E - initial weight (1 gram)

A - weight of the residue after evaporation

The gel content increases rapidly after an induction period. The time in which a sample reaches a gel content of 2 % is taken as the arbitrary definition of the induction period. In order to measure this induction period, the gel content is determined periodically.

The results are summarised in Table 1.

Table 1

Stabiliser	Induction time (in days) until the gel content is 2 %
none	21
compound 2	77
compound 3	84
compound 4	56

Example 3: Stabilisation of polybutadiene rubber (Brabender)

100 parts of polybutadiene which has been prestabilised with 0.4 % of 2,6-di-tert.-butyl-p-cresol are kneaded in a Brabender plastograph at 160°C and 60 rpm for 30 minutes with the addition of 0.25 % of the stabiliser to be tested. The induction time is measured from the torque curve, i.e. the

kneading time in minutes until the torque increases by 100 mp after the minimum torque.

The results are shown in Table 2.

Table 2

Stabiliser	Induction time (in minutes)
none	8
compound 1	> 30
compound 2	23
compound 3	23.5
compound 4	26

Example 4: TFOUT test (Thin-film oxygen uptake test)

This test is a modified version of the rotary bomb oxidation test for mineral oils (ASTM D 2272). There is an exact description of the test in C.S. Ku and S.M. Hsu, A Thin-Film Oxygen Uptake Test for the Evaluation of Automotive Crankcase Lubricants, Lubrication Engineering, Vol. 40 (2), pp. 75-83, (1984). The test oil is a motor oil based on mineral oil. The motor oil contains half of the customary amount of zinc dithiophosphate (0.75 %; zinc content 0.06 %, based on the motor oil); this change is made so that a potential effect of the stabiliser to be tested can be shown.

Compound 1 of Example 1 is tested in the above-described motor oil in the presence of 2 % of water and in the presence of a liquid oxidised, nitrated fraction of a petrol as catalyst (4 % concentration) and a liquid metal naphthenate as further catalyst (4 % concentration; water and the two liquid catalyst substances were delivered with a certificate of analysis under Standard Reference Material No. 1817 of the National Bureau of Standards (NBS). The test is complete when there is a marked kink in the pressure/time diagram. The results shown in the Table below indicate the time (in minutes) until there is a kink in the pressure/time diagram.

Long periods of time correspond to good stabiliser activity. Concentration of the stabiliser: 0.5 %, based on the oil.

Table 3

Stabiliser	Time until marked drop in pressure
none	85
compound 1	134

**Example 5: Stabilisation of a hydrogenated C₉-hydrocarbon resin
(oven ageing)**

50 g of resin which has been prestabilised with 0.15 % of 2,6-di-tert-butyl-p-cresol are melted in a glass flask at 170°C, and, with stirring, 0.1 % of compound 1 are mixed in over 15 minutes. The hot melt is then poured into aluminium dishes and petri dishes. The layer thickness of the congealed resinous mass is about 15 mm in the aluminium dishes and 1 mm in the petri dishes. The composition of the invention is tested by subjecting the samples to thermal ageing in a circulating air oven at 170°C. The criterion used is the undesired discolouration occurring during oven ageing. This is determined as follows:

- a) in the case of the 1 mm samples: Yellowness Index according to
ASTM D 1925-70 and
- b) in the case of the 15 mm samples: Gardner colour value according to
DIN 6161.

Higher values indicate greater discolouration.

The results are summarised in Table 4.

Table 4

Stabiliser	Yellowness Index after hours at 170°C			Gardner colour value after hours at 170°C		
	0	12	30	0	12	30
none	3	86	126	1	5	9
compound 1	3	6	12	1	1-2	3-4

Patent claims for the Contracting States: BE, CH, DE, FR, GB, IT, LI, NL

1. A composition containing an elastomer or a tackifying resin and at least one compound of formula I



wherein

R_1 is C_1 - C_8 alkyl or C_5 - C_{12} cycloalkyl, the radicals R_2 , each independently of the other, are C_1 - C_{18} alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by $-OCO-R_4$, $-CO-OR_5$ or $-CO-NR_5R_6$ or they are phenyl or benzyl, R_3 is hydrogen or methyl, with the proviso that, if R_1 is other than methyl, then R_3 is methyl, R_4 is C_1 - C_{17} alkyl, C_2 - C_8 alkenyl or a radical of formula Ia



m is 0, 1 or 2, the radicals R' , each independently of the other, have the meanings indicated for R_1 , R_5 is C_1 - C_{20} alkyl which may be interrupted by $-O-$, $-S-$ or $-NR'-$, and R_6 is hydrogen or has one of the meanings indicated for R_5 .

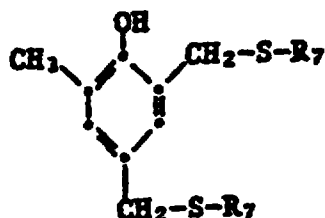
2. A composition according to claim 1, containing an elastomer and at least one compound of formula I according to claim 1.

3. A composition according to claim 2, wherein the radicals R_2 , each independently of the other, are C_2 - C_{18} alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by $-OCO-R_4$, $-CO-OR_5$ or $-CO-NR_5R_6$, or they are benzyl or phenyl, with R_4 , R_5 and R_6 being as defined in claim 1.

4. A composition according to claim 1, wherein R_1 is C_1 - C_4 alkyl.

5. A composition according to claim 2, wherein R_1 is methyl or tert-butyl.

6. A composition according to claim 1, wherein R_2 is C_4 - C_{18} alkyl, $-CH_2CH_2-OH$, $-CH_2CH_2-OCO-R_4$, $-CH_2-COO-R_5$ or $-CH_2CH_2-COO-R_5$, or benzyl or phenyl, with R_4 and R_5 being as defined in claim 1.
7. A composition according to claim 6, wherein R_2 is C_4 - C_{18} alkyl.
8. A composition according to claim 1, wherein the elastomer is a polydiene, a halogen-containing polymer or a polyurethane.
9. A composition according to claim 1, containing 0.05 to 5.0 % by weight of the stabiliser of formula I, based on the elastomer or the tackifying resin.
10. A compound of formula II



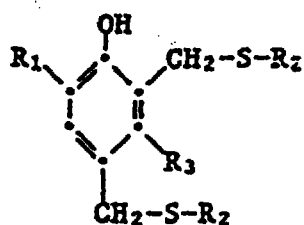
(II)

wherein the radicals R_7 , each independently of the other, are C_6 - C_{18} alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by $-OCO-R_4$, $-CO-OR_5$ or $-CO-NR_5R_6$, or they are phenyl or benzyl, with R_4 , R_5 and R_6 being as defined in claim 1.

11. A compound of formula II according to claim 10, wherein the radicals R_7 , each independently of the other, are unsubstituted C_6 - C_{18} alkyl.
12. Use of a compound of formula II for stabilising lubricants against the action of oxygen, heat, light and high-energy radiation.
13. A composition containing a lubricant and at least one compound of formula II according to claim 10.

Patentansprüche für den Vertragsstaat: ES (As printed)

1. Zusammensetzungen enthaltend ein Elastomer oder ein klebrigmachendes Harz und mindestens eine Verbindung der Formel I



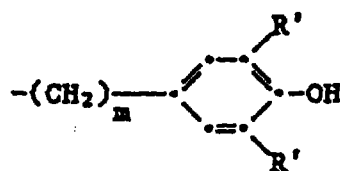
(I),

10 worin

R_1 C_1 - C_6 -Alkyl oder C_5 - C_{12} -Cycloalkyl bedeutet, die Reste R_2 unabhängig voneinander für C_1 - C_{18} -Alkylgruppen stehen, welche unsubstituiert sind, oder durch 1 oder 2 Hydroxylgruppen oder durch $-OCO-R_4$, $-CO-OR_5$ oder $-CO-NR_5R_6$ substituiert sind, oder Phenyl oder Benzyl bedeuten,

15 R_3 Wasserstoff oder Methyl bedeutet, unter der Bedingung, daß, wenn R_1 von Methyl verschieden ist, R_3 für Methyl steht,

R_4 C_1 - C_{17} -Alkyl, C_2 - C_6 -Alkenyl oder ein Rest der Formel Ia ist



(Ia),

25 m für 0,1 oder 2 steht, und die Reste

R' unabhängig voneinander die für R_1 genannte Bedeutung haben,

R_5 ein gegebenenfalls durch $-O-$, $-S-$ oder $-NR'$ - unterbrochenes C_1 - C_{20} -Alkyl ist, und

R_6 für Wasserstoff steht oder eine für R_5 genannte Bedeutung besitzt.

30 2. Zusammensetzungen gemäß Anspruch 1, enthaltend ein Elastomer und mindestens eine Verbindung der Formel I gemäß Anspruch 1.

3. Zusammensetzungen gemäß Anspruch 2, worin die Reste R_2 unabhängig voneinander für C_2 - C_{18} -Alkylgruppen stehen, welche unsubstituiert sind, oder durch 1 oder 2 Hydroxylgruppen oder durch $-OCO-R_4$, $-CO-OR_5$ oder $-CO-NR_5R_6$ substituiert sind, oder Benzyl oder Phenyl bedeuten, wobei R_4 , R_5 und R_6 die in Anspruch 1 genannte Bedeutung haben.

4. Zusammensetzungen gemäß Anspruch 1, worin R_1 C_1 - C_4 -Alkyl ist.

5. Zusammensetzungen gemäß Anspruch 2, worin R_1 Methyl oder t-Butyl ist.

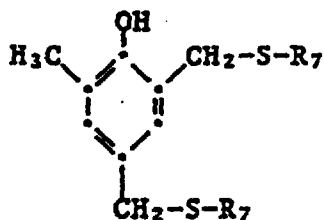
6. Zusammensetzungen gemäß Anspruch 1, worin R_2 C_4 - C_{18} -Alkyl, $-CH_2CH_2-OH$, $-CH_2CH_2-OCO-R_4$, $-CH_2-COO-R_5$ oder $-CH_2CH_2-COO-R_5$, Benzyl oder Phenyl bedeutet, wobei R_4 und R_5 die in Anspruch 1 genannte Bedeutung haben.

7. Zusammensetzungen gemäß Anspruch 6, worin R_2 C_4 - C_{18} -Alkyl bedeutet.

8. Zusammensetzungen gemäß Anspruch 1, worin das Elastomer ein Polydien, ein halogenhaltiges Polymer oder ein Polyurethan ist.

9. Zusammensetzungen gemäß Anspruch 1, enthaltend 0,05-5,0 Gew.-% des Stabilisators der Formel I, bezogen auf das Elastomer bzw. auf das klebrigmachende Harz.

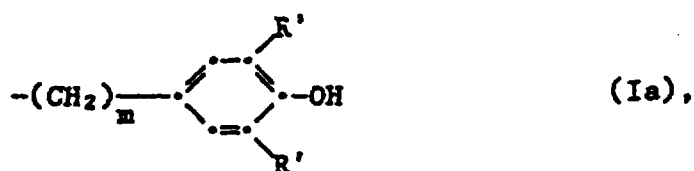
10. Verfahren zur Herstellung von Verbindungen der Formel II



(II),

55 worin die Reste R_7 unabhängig voneinander für C_6 - C_{18} -Alkylgruppen stehen, welche unsubstituiert sind oder durch 1 oder 2 Hydroxylgruppen oder durch $-OCO-R_4$, $-CO-OR_5$ oder $-CO-NR_5R_6$ substituiert sind, oder Phenyl oder Benzyl bedeuten,

60 R_4 C_1 - C_{17} -Alkyl, C_2 - C_6 -Alkenyl oder ein Rest der Formel Ia ist



m für 0, 1 oder 2 steht, und die Reste R' C₁-C₈-Alkyl oder C₂-C₁₂-Cycloalkyl bedeuten, R₅ in gegebenenfalls durch -O-, -S- oder -NR'- unterbrochenes C₁-C₂₀-Alkyl ist, und R₆ für Wasserstoff steht oder eine für R₅ genannte Bedeutung besitzt, dadurch gekennzeichnet, daß man 2,4-Bis(dimethylaminomethyl)-6-methylphenol mit einem Mercaptan R₇-SH umsetzt.

11. Verfahren gemäß Anspruch 10, worin die Reste R₇ unabhängig voneinander für unsubstituiertes C₆-C₁₈-Alkyl stehen.

12. Zusammensetzungen enthaltend einen Schmierstoff und mindestens eine Verbindung der Formel II gemäß Anspruch 10.

Claims for the Contracting States: BE, CH, DE, FR, GB, IT, LI, NL (As printed)

1. A composition containing an elastomer or a tackifying resin and at least one compound of formula I



wherein

R₁ is C₁-C₈alkyl or C₂-C₁₂cycloalkyl, the radicals R₂, each independently of the other, are C₁-C₈alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by -OCO-R₄, -CO-OR₅ or -CO-NR₆R₆, or they are phenyl or benzyl, R₃ is hydrogen or methyl, with the proviso that, if R₁ is other than methyl, then R₃ is methyl, R₄ is C₁-C₁₇alkyl, C₂-C₈alkenyl or a radical of formula Ia



m is 0, 1 or 2, the radicals R', each independently of the other, have the meanings indicated for R₁, R₅ is C₁-C₂₀alkyl which may be interrupted by -O-, -S- or -NR'-, and R₆ is hydrogen or has one of the meanings indicated for R₅.

2. A composition according to claim 1, containing an elastomer and at least one compound of formula I according to claim 1.

3. A composition according to claim 2, wherein the radicals R₂, each independently of the other, are C₂-C₁₈alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by -OCO-R₄, -CO-OR₅ or -CO-NR₆R₆, or they are benzyl or phenyl, with R₄, R₅ and R₆ being as defined in claim 1.

4. A composition according to claim 1, wherein R₁ is C₁-C₄-alkyl.

5. A composition according to claim 2, wherein R₁ is methyl or tert-butyl.

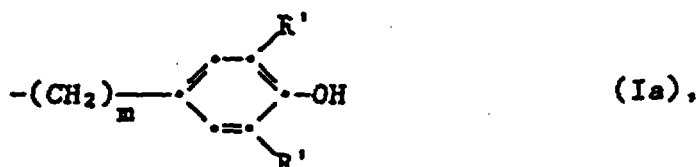
6. A composition according to claim 1, wherein R₂ is C₄-C₁₈alkyl, -CH₂CH₂-OH, -CH₂CH₂-OCO-R₄, -CH₂-COO-R₅ or -CH₂CH₂-COO-R₅, or benzyl or phenyl, with R₄ and R₅ being as defined in claim 1.

7. A composition according to claim 6, wherein R₂ is C₄-C₁₈alkyl.

8. A composition according to claim 1, wherein the elastomer is a polydiene, a halogen-containing polymer or a polyurethane.

9. A composition according to claim 1, containing 0.5 to 5.0% by weight of the stabiliser of formula I, based on the elastomer or the tackifying resin.

10. A compound of formula II



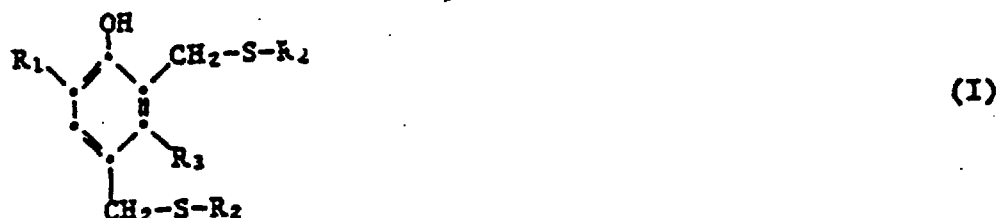
m für 0, 1 oder 2 steht, und die Reste R' C₁-C₈-Alkyl oder C₆-C₁₂-Cycloalkyl bedeuten, R₅ ein gegebenenfalls durch -O-, -S- oder -NR'- unterbrochenes C₁-C₂₀-Alkyl ist, und R₆ für Wasserstoff steht oder eine für R₅ genannte Bedeutung besitzt, dadurch gekennzeichnet, daß man 2,4-Bis(dimethylaminomethyl)-6-methylphenol mit einem Merkaptan R₇-SH umsetzt.

11. Verfahren gemäß Anspruch 10, worin die Reste R₇ unabhängig voneinander für unsubstituiertes C₆-C₁₈-Alkyl stehen.

12. Zusammensetzungen enthaltend einen Schmierstoff und mindestens eine Verbindung der Formel II gemäß Anspruch 10.

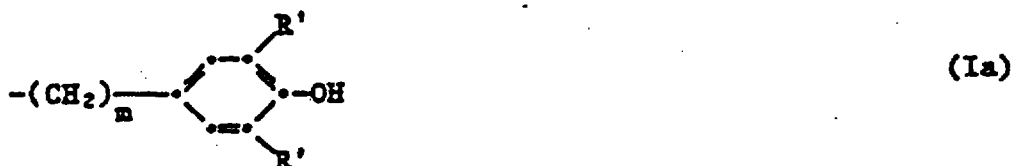
Claims for the Contracting States: BE, CH, DE, FR, GB, IT, LI, NL (As printed)

1. A composition containing an elastomer or a tackifying resin and at least one compound of formula I



wherein

R₁ is C₁-C₈alkyl or C₆-C₁₂cycloalkyl, the radicals R₂, each independently of the other, are C₁-C₁₈alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by -OCO-R₄, -CO-OR₅ or -CO-NR₆R₆, or they are phenyl or benzyl, R₃ is hydrogen or methyl, with the proviso that, if R₁ is other than methyl, then R₃ is methyl, R₄ is C₁-C₇alkyl, C₂-C₈alkenyl or a radical of formula Ia



m is 0, 1 or 2, the radicals R', each independently of the other, have the meanings indicated for R₁, R₅ is C₁-C₂₀alkyl which may be interrupted by -O-, -S- or -NR'-, and R₆ is hydrogen or has one of the meanings indicated for R₅.

2. A composition according to claim 1, containing an elastomer and at least one compound of formula I according to claim 1.

3. A composition according to claim 2, wherein the radicals R₂, each independently of the other, are C₂-C₁₈alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by -OCO-R₄, -CO-OR₅ or -CO-NR₆R₆, or they are benzyl or phenyl, with R₄, R₅ and R₆ being as defined in claim 1.

4. A composition according to claim 1, wherein R₁ is C₁-C₄-alkyl.

5. A composition according to claim 2, wherein R₁ is methyl or tert-butyl.

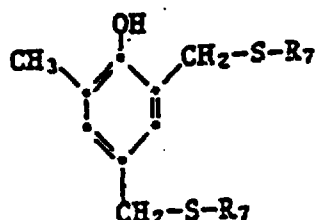
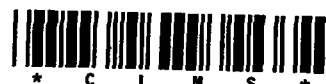
6. A composition according to claim 1, wherein R₂ is C₄-C₁₈alkyl, -CH₂CH₂-OH, -CH₂CH₂-OCO-R₄, -CH₂-COO-R₅ or -CH₂CH₂-COO-R₆, or benzyl or phenyl, with R₄ and R₅ being as defined in claim 1.

7. A composition according to claim 6, wherein R₂ is C₄-C₁₈alkyl.

8. A composition according to claim 1, wherein the elastomer is a polydiene, a halogen-containing polymer or a polyurethane.

9. A composition according to claim 1, containing 0.05 to 5.0% by weight of the stabiliser of formula I, based on the elastomer or the tackifying resin.

10. A compound of formula II



(II)

wherein the radicals R_7 , each independently of the other, are C_6 - C_{18} alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by $-\text{OCO-R}_4$, $-\text{CO-OR}_5$ or $-\text{CO-NR}_5R_6$, or they are phenyl or benzyl, with R_4 , R_5 and R_6 being as defined in claim 1.

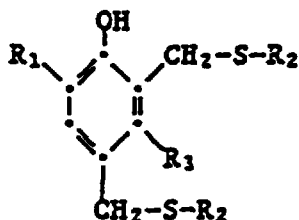
11. A compound of formula II according to claim 10, wherein the radicals R_7 , each independently of the other, are unsubstituted C_6 - C_{18} alkyl.

12. Use of a compound of formula II for stabilising lubricants against the action of oxygen, heat, light and high-energy radiation.

13. A composition containing a lubricant and at least one compound of formula II according to claim 10.

Claims for the Contracting State: ES (As printed)

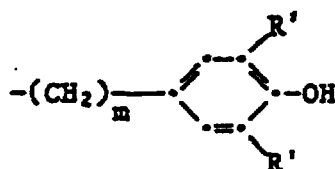
1. A composition containing an elastomer or a tackifying resin and at least one compound of formula I



(I)

wherein

R_1 is C_7 - C_{20} alkyl or C_5 - C_{12} cycloalkyl, the radicals R_2 , each independently of the other, are C_7 - C_{18} alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by $-\text{OCO-R}_4$, $-\text{CO-OR}_5$ or $-\text{CO-NR}_5R_6$, or they are phenyl or benzyl, R_3 is hydrogen or methyl, with the proviso that, if R_1 is other than methyl, then R_3 is methyl, R_4 is C_7 - C_{17} alkyl, C_2 - C_8 alkenyl or a radical of formula Ia



(Ia)

m is 0, 1 or 2, the radicals R' , each independently of the other, have the meanings indicated for R_1 , R_5 is C_7 - C_{20} alkyl which may be interrupted by $-\text{O}-$, $-\text{S}-$ or $-\text{NR}'-$, and R_6 is hydrogen or has one of the meanings indicated for R_5 .

2. A composition according to claim 1, containing an elastomer and at least one compound of formula I according to claim 1.

3. A composition according to claim 2, wherein the radicals R_2 , each independently of the other, are C_2 - C_{18} alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by $-\text{OCO-R}_4$, $-\text{CO-OR}_5$ or $-\text{CO-NR}_5R_6$, or they are benzyl or phenyl, with R_4 , R_5 and R_6 being as defined in claim 1.

4. A composition according to claim 1, wherein R_1 is C_7 - C_4 alkyl.

5. A composition according to claim 2, wherein R_1 is methyl or tert-butyl.

6. A composition according to claim 1, wherein R_2 is C_4 - C_{18} alkyl, $-\text{CH}_2\text{CH}_2\text{-OH}$, $-\text{CH}_2\text{CH}_2\text{-OCO-R}_4$, $-\text{CH}_2\text{-COO-R}_5$ or $-\text{CH}_2\text{CH}_2\text{-COO-R}_5$, or benzyl or phenyl, with R_4 and R_5 being as defined in claim 1.

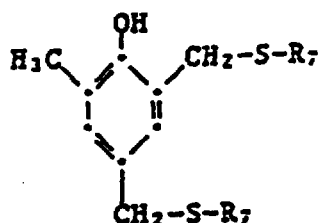
7. A composition according to claim 6, wherein R_2 is C_4 - C_{18} alkyl.

8. A composition according to claim 1, wherein the elastomer is a polydiene, a halogen-containing polymer or a polyurethane.

9. A composition according to claim 1, containing 0.05 to 5.0% by weight of the stabiliser of formula I, based on the elastomer or the tackifying resin.

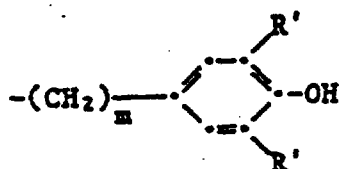


10. A process for the preparation of a compound of formula II



(II)

wherein the radicals R_7 , each independently of the other, are C_6 - C_{18} alkyl groups which are unsubstituted or substituted by 1 or 2 hydroxyl groups or by $-\text{OCO}-\text{R}_4$, $-\text{CO}-\text{OR}_5$ or $-\text{CO}-\text{NR}_5\text{R}_6$, or they are phenyl or benzyl, R_4 is C_1 - C_{17} alkyl, C_2 - C_8 alkenyl or a radical of formula Ia



(Ia)

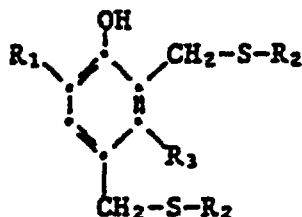
m is 0, 1 or 2, and the radicals R' are C_1 - C_8 alkyl or C_5 - C_{12} cycloalkyl, R_5 is C_1 - C_{20} alkyl which may be interrupted by $-\text{O}-$, $-\text{S}-$ or $-\text{NR}'-$, and R_6 is hydrogen or has one of the meanings indicated for R_6 , which comprises reacting 2,4-bis(dimethylaminomethyl)-6-methylphenol with a mercaptan R_7-SH .

11. A process according to claim 10, wherein the radicals R_7 , each independently of the other, are unsubstituted C_6 - C_{18} alkyl.

12. A composition containing a lubricant and at least one compound of formula II according to claim 10.

Revendications pour les Etats contractants: BE, CH, DE, FR, GB, IT, LI, NL (As printed)

1. Compositions qui contiennent un élastomère ou une résine colle et au moins un composé répondant à la formule I:



(I),

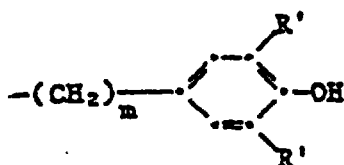
dans laquelle:

R_1 représente un alkyle en C_1 - C_8 ou un cycloalkyle en C_5 - C_{12} ,

les R_2 représentent chacun, indépendamment l'un de l'autre, un alkyle en C_1 - C_{18} , non substitué ou porteur d'un ou deux radicaux hydroxy ou porteur d'un radical $-\text{OCO}-\text{R}_4$, $-\text{CO}-\text{OR}_5$ ou $-\text{CO}-\text{NR}_5\text{R}_6$, un phényle ou un benzyle,

R_3 représente l'hydrogène ou un méthyle, avec la condition que, lorsque R_1 n'est pas un méthyle, R_3 soit un méthyle,

R_4 représente un alkyle en C_1 - C_{17} , un alcényle en C_2 - C_8 ou un radical répondant à la formule Ia:



(Ia),

dans laquelle m est égal à 0, à 1 ou à 2 et les symboles R' ont chacun, indépendamment l'un de l'autre, la signification qui a été donnée pour R' ,

R_5 représente un radical alkyle en C_1 - C_{20} éventuellement interrompu par $-\text{O}-$, $-\text{S}-$ ou $-\text{NR}'-$,

R_6 représente l'hydrogène ou a la signification qui a été donnée pour R_6 .



2. Compositions selon la revendication 1 qui contiennent un élastomère et au moins un composé de formule I selon la revendication 1.

3. Compositions selon la revendication 2 dans lesquelles les R_2 représentent chacun, indépendamment l'un de l'autre, un alkyle en C_2-C_{18} non substitué ou porteur d'un ou de deux radicaux hydroxy ou d'un radical $-OCO-R_4$, $-CO-OR_5$ ou $-CO-NR_5R_6$, un benzyle ou un phényle, les symboles R_4 , R_5 et R_6 ayant les significations qui leur ont été données à la revendication 1.

4. Compositions selon la revendication 1 dans lesquelles R_1 représente un alkyle en C_1-C_4 .

5. Compositions selon la revendication 2 dans lesquelles R_1 représente un radical méthyle ou tert-butyle.

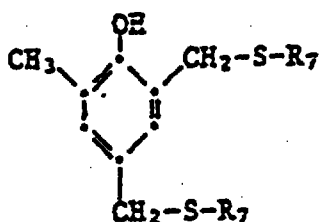
6. Compositions selon la revendication 1 dans lesquelles R_2 représente un alkyle en C_4-C_{18} , $-CH_2CH_2-OH$, $-CH_2CH_2-OCO-R_4$, $-CH_2-COO-R_5$ ou $-CH_2CH_2-COO-R_5$, un benzyle ou un phényle, les symboles R_4 et R_5 ayant les significations qui leur ont été données à la revendication 1.

7. Compositions selon la revendication 6 dans lesquelles R_2 représente un alkyle en C_4-C_{18} .

8. Compositions selon la revendication 1 dans lesquelles l'élastomère est un polydiène, un polymère halogéné ou un polyuréthane.

9. Compositions selon la revendication 1 qui contiennent de 0,05 à 5,0% en poids du stabilisant de formule I, par rapport à l'élastomère ou à la résine colle.

10. Composés répondant à la formule II



(II),

dans laquelle les R_7 représentent chacun, indépendamment l'un de l'autre, un alkyle en C_6-C_{18} non substitué ou porteur d'un ou de deux radicaux hydroxy ou d'un radical $-OCO-R_4$, $-CO-OR_5$ ou $-CO-NR_5R_6$, un phényle ou un benzyle, les symboles R_4 , R_5 et R_6 ayant les significations qui leur ont été données à la revendication 1.

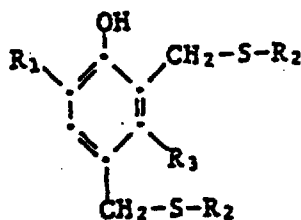
11. Composés de formule II selon la revendication 10 dans lesquels les R_7 représentent chacun, indépendamment l'un de l'autre, un radical alkyle en C_6-C_{18} qui ne porte pas de substituant.

12. Application de composés de formule II comme stabilisants pour des lubrifiants à protéger contre la dégradation due à l'action de l'oxygène, de la chaleur, de la lumière et de rayonnements de haute énergie.

13. Compositions qui contiennent un lubrifiant et au moins un composé de formule II selon la revendication 10.

Revendications pour l'Etat Contractant: ES (As printed)

1. Compositions qui contiennent un élastomère ou une résine colle et au moins un composé répondant à la formule I:



(I),

dans laquelle:

R_1 représente un alkyle en C_1-C_8 ou un cycloalkyle en C_5-C_{12} ,

les R_2 représentent chacun, indépendamment l'un de l'autre, un alkyle en C_1-C_{18} , non substitué ou porteur d'un ou deux radicaux hydroxy ou porteur d'un radical $-OCO-R_4$, $-CO-OR_5$ ou $-CO-NR_5R_6$, un phényle ou un benzyle,

R_3 représente l'hydrogène ou un méthyle, avec la condition que, lorsque R_1 n'est pas un méthyle, R_3 soit un méthyle,

R_4 représente un alkyle en C_1-C_{17} , un alcényle en C_2-C_8 ou un radical répondant à la formule Ia:

11. Composés selon la revendication 10, dans lesquels les R_7 représentent l'un de l'autre, un alkyle en C_6-C_{18} non substitué.

12. Compositions contenant un lubrifiant et au moins un composé de formule II selon la revendication 10.