tertbutyl C7-C9 mixed alcohol ester of phenpropionate, 1.8 to 2.2 parts of 2-methyl-4, 6-di-(octylsulfanylmethyl)phenol, 0.8 to 1.2 parts of reaction product of N-phenylphenylamine and 2, 4, 4-trimethylpentene. The obtained antioxidant composition is dissolved in cyclohexane first before added into SBS resin solution. And cyclohexane is the solvent of solution polymerization of SBS. The dissolving rate is low because of the polarity discrepancy between cyclohexane and antioxidant composition. Furthermore, cyclohexane has a boiling point of 80.74°C, which is lower than that of water. In “drying” step of preparing raw rubbers, i.e. removing solvent as well as monomer residue from rubber resins by hot water or steam, antioxidants tend to move into water, which brings a significant decrease of efficient antioxidants in raw rubbers. Moreover, the contaminated water requires further treatment to avoid polluting environment.

Therefore, it is still required to provide a new liquid antioxidant composition that is stable during “drying” process of rubber resins synthesized via solution polymerization, non-staining as well as applicable for wide temperature range besides sufficient anti-oxidation.

**Summary**

The present disclosure provides a liquid antioxidant composition used for raw rubbers, comprising

a) 5% to 30% by weight of at least one aromatic amine-based antioxidant agent;
b) 20% to 70% by weight of at least one hindered phenol-based antioxidant agent;
c) 0% to 40% by weight of at least one phosphite-based antioxidant agent; and
d) 20% to 40% by weight of at least one solvent having boiling point higher than 185°C and freezing point lower than -10°C under 101.325KPa, the weight percentage of component a), b) , c) or d) is based on the total weight of antioxidant composition, wherein the mixture of component a), b) and c) is liquid at 25°C under 101.325KPa.

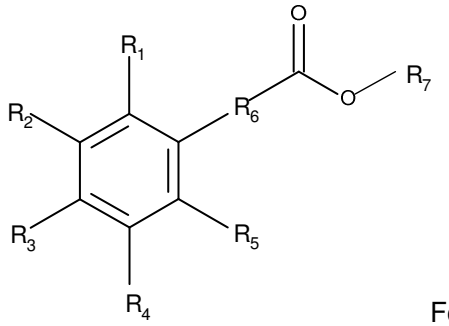
In an aspect, there is provided a liquid antioxidant composition used for raw rubbers, comprising

a) 5% to 30% by weight of at least one aromatic amine-based antioxidant agent;

a) 20% to 70% by weight of at least one hindered phenol-based antioxidant agent;

b) 0% to 40% by weight of at least one phosphite-based antioxidant agent; and

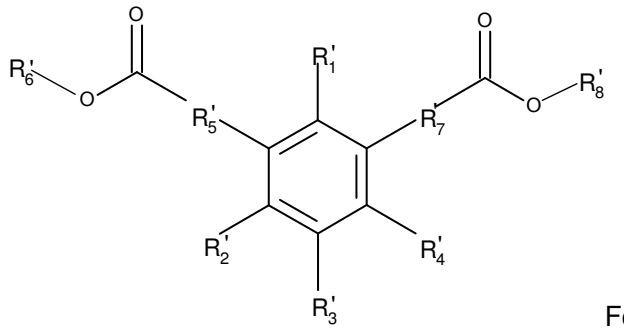
d) 20% to 40% by weight of at least one solvent having boiling point higher than 185°C and freezing point lower than -10°C under 101.325KPa, wherein said solvent is one or more selected from linear or branched alkane having $C_9$ to $C_{30}$, cyclane having $C_{10}$ to $C_{30}$, linear saturated carboxylic acid having $C_8$ to $C_{18}$, branched saturated carboxylic acid having $C_8$ to $C_{12}$, linear saturated alcohol having $C_8$ to $C_{18}$ and branched saturated alcohol having $C_8$ to $C_{12}$, alkyl-substituted phosphonic acid having $C_6$ to $C_{12}$, saturated or unsaturated monobasic aromatic acid ester having Formula I:



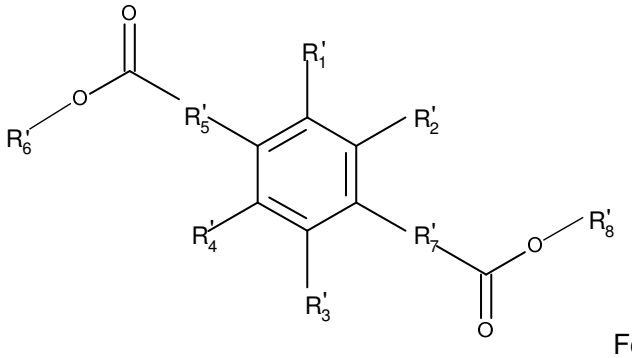

Formula I

wherein, $R_1$ to $R_5$ are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_6$ is selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$ or represents a covalent bond; $R_7$ is selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

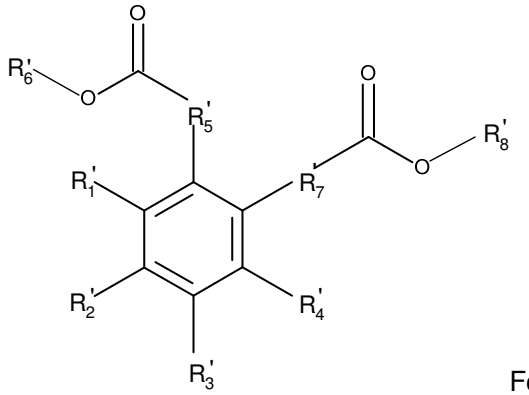
saturated or unsaturated dibasic aromatic acid ester having Formula II-(a) and/or Formula II-(b) and/or Formula II-(c):



Formula II-(a)

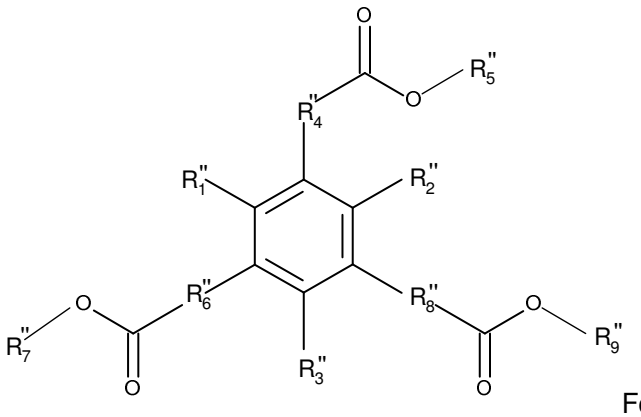


Formula II-(b)

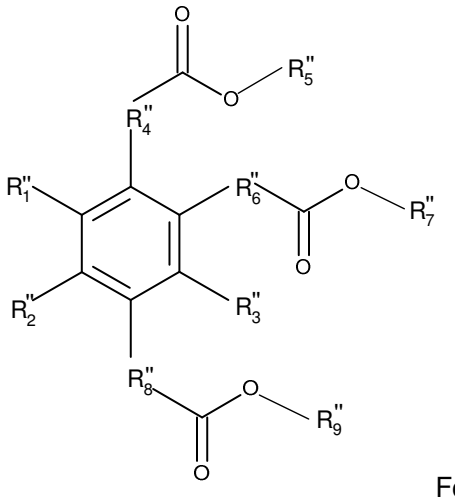


Formula II-(c)

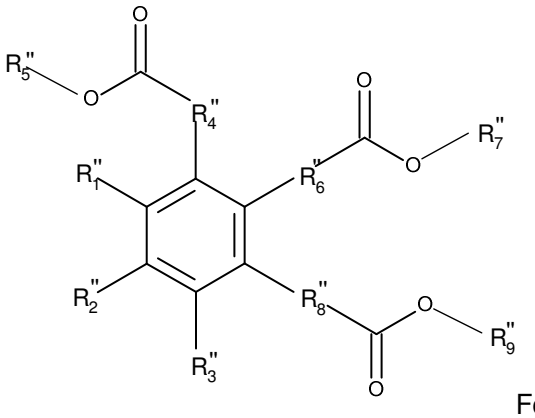
wherein, $R_1$' to $R_4$' are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_5$' and $R_7$' are independently selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$ or represents a covalent bond; $R_6$' and $R_8$' are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and saturated or unsaturated tribasic aromatic acid ester having Formula III-(a) and/or Formula III-(b) and/or Formula III-(c):



Formula III-(a)



Formula III-(b)

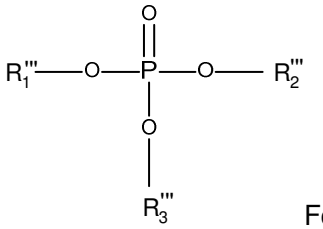


Formula III-(c)

wherein, $R_1$'' to $R_3$'' are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_4$'', $R_6$'' and $R_8$'' are independently selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$ or represents a

covalent bond; $R_5$'', $R_7$'' and $R_9$'' are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

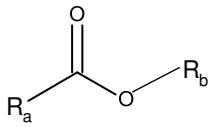
alkylated phosphate having Formula IV:



Formula IV

wherein, $R_1$''' to $R_3$''' are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

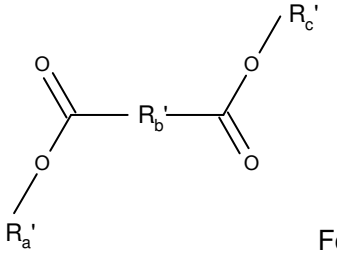
saturated or unsaturated monobasic carboxylic acid ester having Formula V:



Formula V

wherein, $R_a$ and $R_b$ are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

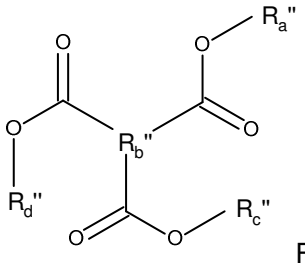
saturated or unsaturated dibasic carboxylic acid ester having Formula VI:



Formula VI

wherein, $R_a$' and $R_c$' are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_b$' is selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$, and

saturated or unsaturated tribasic carboxylic acid ester having Formula VII:




Formula VII

wherein, $R_a$", $R_c$" and $R_d$" are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_b$" is selected from saturated or unsaturated linear or branched alkylidene groups having $C_1$ to $C_{15}$, and

wherein the weight percentage of component a), b) , c) or d) is based on the total weight of antioxidant composition, and wherein the mixture of component a), b) and c) is liquid at 25°C under 101.325KPa,

The present disclosure provides a liquid antioxidant composition used for raw rubbers, comprising

a) 5% to 20% by weight of solid aromatic amine-based antioxidant agent;
b) 20% to 50% by weight of solid hindered phenol-based antioxidant agent;
c) 0% to 30% by weight of solid phosphite-based antioxidant agent; and

d) 30% to 40% by weight of solvent having boiling point higher than 185°C and freezing point lower than -10°C under 101.325KPa, the weight percentage of component a), b) , c) or d) is based on the total weight of antioxidant composition.

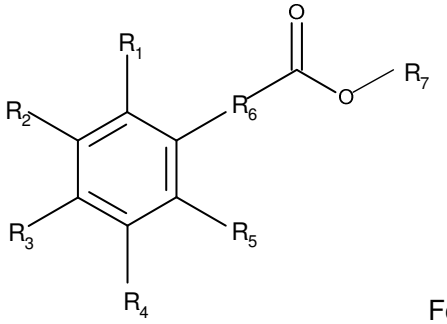
In another aspect, there is provided a liquid antioxidant composition used for raw rubbers, comprising

a) 5% to 20% by weight of solid aromatic amine-based antioxidant agent;

b) 20% to 50% by weight of solid hindered phenol-based antioxidant agent;

c) 0% to 30% by weight of solid phosphite-based antioxidant agent; and

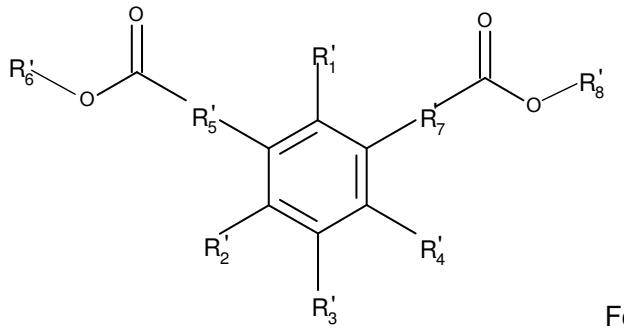
d) 30% to 40% by weight of solvent having boiling point higher than 185°C and freezing point lower than -10°C under 101.325KPa, wherein said solvent is one or more selected from linear or branched alkane having $C_9$ to $C_{30}$, cyclane having $C_{10}$ to $C_{30}$, linear saturated carboxylic acid having $C_8$ to $C_{18}$, branched saturated carboxylic acid having $C_8$ to $C_{12}$, linear saturated alcohol having $C_8$ to $C_{18}$ and branched saturated alcohol having $C_8$ to $C_{12}$, alkyl-substituted phosphonic acid having $C_6$ to $C_{12}$, saturated or unsaturated monobasic aromatic acid ester having Formula I:



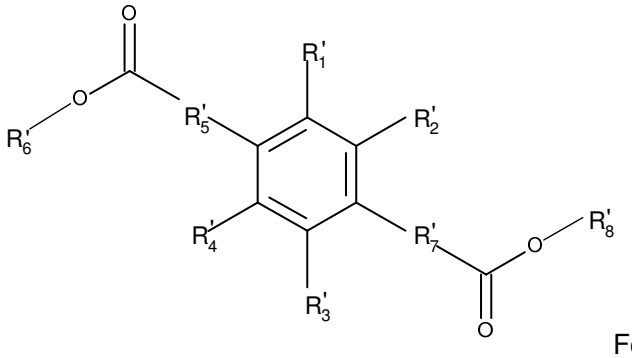

Formula I

wherein, $R_1$ to $R_5$ are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_6$ is selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$ or represents a covalent bond; $R_7$ is selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

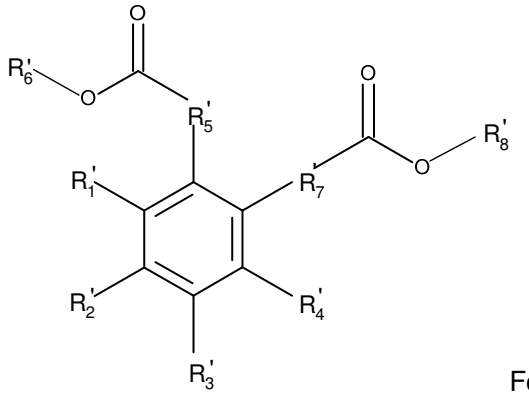
saturated or unsaturated dibasic aromatic acid ester having Formula II-(a) and/or Formula II-(b) and/or Formula II-(c):



Formula II-(a)

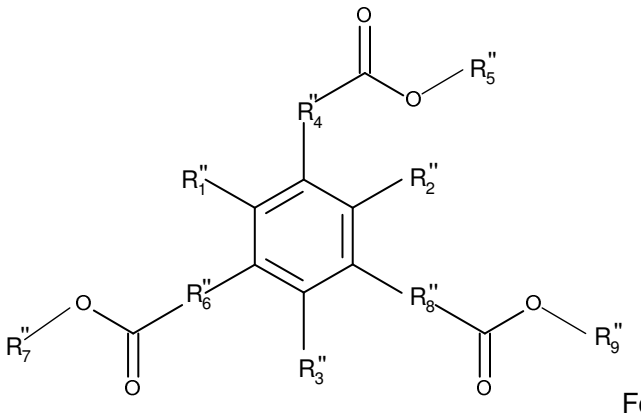


Formula II-(b)

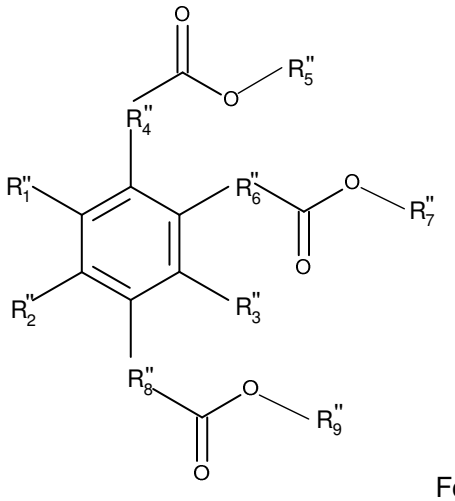


Formula II-(c)

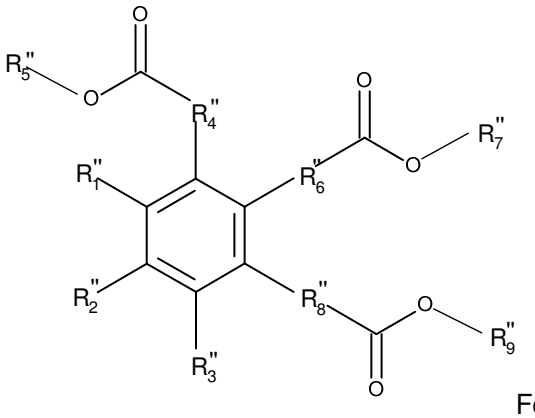
wherein, $R_1$' to $R_4$' are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_5$' and $R_7$' are independently selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$ or represents a covalent bond; $R_6$' and $R_8$' are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and saturated or unsaturated tribasic aromatic acid ester having Formula III-(a) and/or Formula III-(b) and/or Formula III-(c):



Formula III-(a)



Formula III-(b)

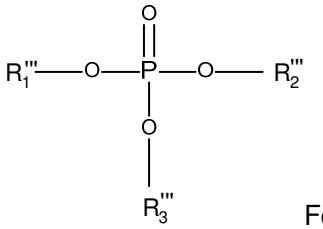


Formula III-(c)

wherein, $R_1$'' to $R_3$'' are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_4$'', $R_6$'' and $R_8$'' are independently selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$ or represents a

covalent bond; $R_5$'', $R_7$'' and $R_9$'' are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

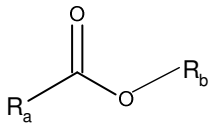
alkylated phosphate having Formula IV:



Formula IV

wherein, $R_1$''' to $R_3$''' are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

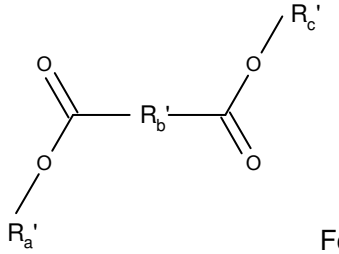
saturated or unsaturated monobasic carboxylic acid ester having Formula V:



Formula V

wherein, $R_a$ and $R_b$ are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

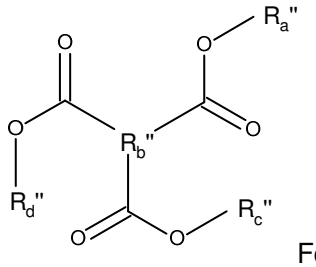
saturated or unsaturated dibasic carboxylic acid ester having Formula VI:



Formula VI

wherein, $R_a$' and $R_c$' are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_b$' is selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$, and

saturated or unsaturated tribasic carboxylic acid ester having Formula VII:




Formula VII

wherein, $R_a$", $R_c$" and $R_d$" are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_b$" is selected from saturated or unsaturated linear or branched alkylidene groups having $C_1$ to $C_{15}$, and

wherein the weight percentage of component a), b) , c) or d) is based on the total weight of antioxidant composition.

In another aspect, the present disclosure provides a use of said antioxidant composition in raw rubbers synthesized via solution polymerization or in natural rubbers.

In another aspect, there is provided a process of using antioxidant composition as defined above in raw rubbers synthesized via solution polymerization comprising steps of i) dissolving component a), b) and c) into d); ii) diluting liquid antioxidant composition by solvent for solution polymerization of raw rubbers; iii) adding diluted liquid antioxidant composition into raw rubbers synthesized via solution polymerization.

In another aspect, the present disclosure provides a raw rubber product comprising said antioxidant composition.

In a an embodiment, the present disclosure provides a process of using the invented antioxidant composition in raw rubbers synthesized via solution polymerization or natural rubbers comprising steps of i) dissolving component a), b) and c) into d); ii) diluting liquid antioxidant composition by solvent for solution polymerization of raw rubbers; iii) adding diluted liquid antioxidant composition into raw rubbers synthesized via solution polymerization or natural rubbers.

**Detailed Description of Invention**

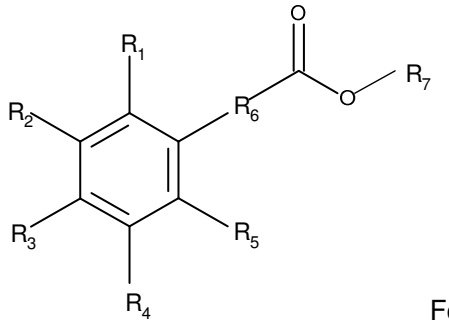
Technical Problems

For rubber resins synthesized via solution polymerization, one significant step of process is to remove solvent and monomer residues from raw rubber solution by hot water or steam. During this step, antioxidant agents are prone to separate from rubber resins and dissolve into water, which in one side, leads to a loss of antioxidant agents in rubber resins and in another side contaminates water. The contaminated water needs to be treated to prevent environmental damages.

Part of antioxidant agents are liquid while the others are solid at around 25$^{o}$C. The term “liquid” means the upper limit of melting range or melting point of an antioxidant agent without dissolving into any solvent is no more than 25$^{o}$C under 101.325KPa. The term “solid” means the lower limit of melting range or melting point of an antioxidant agent without dissolving into any solvent is more than 25$^{o}$C under 101.325KPa. The liquid antioxidant agents turn to freeze at temperature like 5$^{o}$C,

## Claim

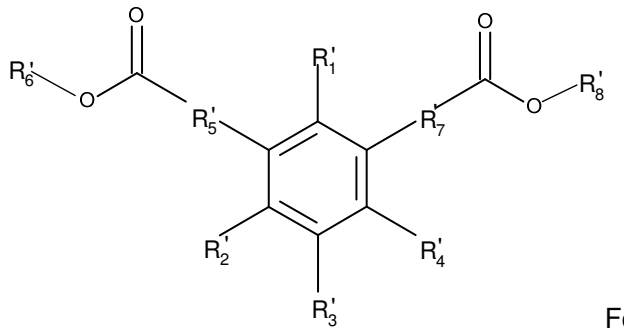
1. A liquid antioxidant composition used for raw rubbers, comprising
    a) 5% to 30% by weight of at least one aromatic amine-based antioxidant agent;
    b) 20% to 70% by weight of at least one hindered phenol-based antioxidant agent;
    c) 0% to 40% by weight of at least one phosphite-based antioxidant agent; and
    d) 20% to 40% by weight of at least one solvent having boiling point higher than 185°C and freezing point lower than -10°C under 101.325KPa, wherein said solvent is one or more selected from linear or branched alkane having $C_9$ to $C_{30}$, cyclane having $C_{10}$ to $C_{30}$, linear saturated carboxylic acid having $C_8$ to $C_{18}$, branched saturated carboxylic acid having $C_8$ to $C_{12}$, linear saturated alcohol having $C_8$ to $C_{18}$ and branched saturated alcohol having $C_8$ to $C_{12}$, alkyl-substituted phosphonic acid having $C_6$ to $C_{12}$, saturated or unsaturated monobasic aromatic acid ester having Formula I:



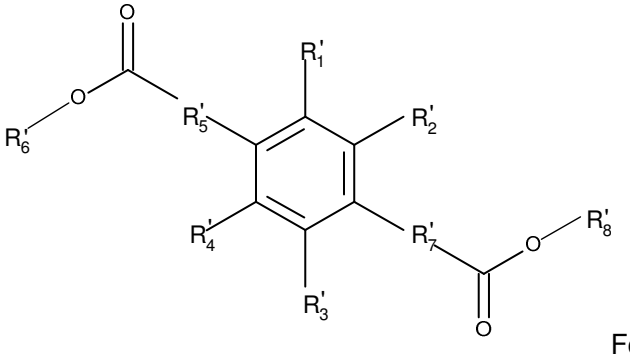

Formula I

wherein, $R_1$ to $R_5$ are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_6$ is selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$ or represents a covalent bond; $R_7$ is selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

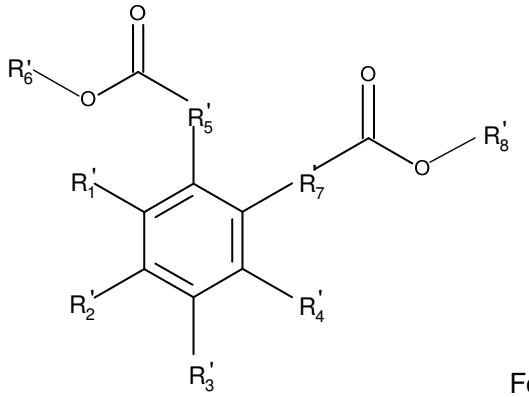
saturated or unsaturated dibasic aromatic acid ester having Formula II-(a) and/or Formula II-(b) and/or Formula II-(c):



Formula II-(a)



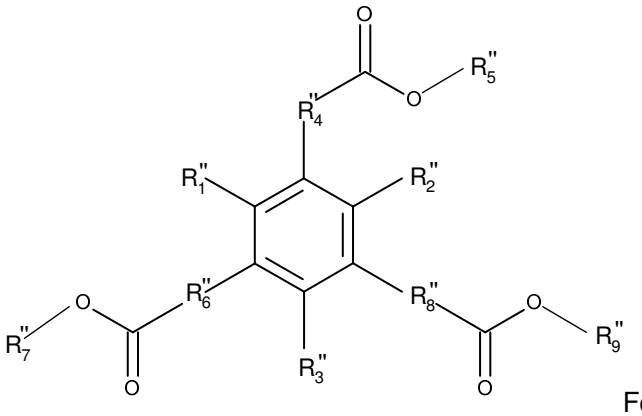
Formula II-(b)



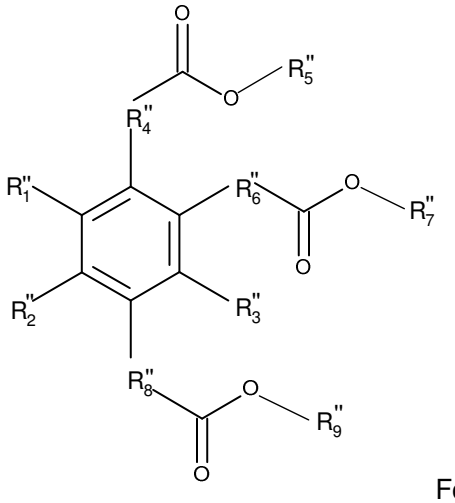
Formula II-(c)

wherein, $R_1$' to $R_4$' are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_5$' and $R_7$' are independently selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$ or represents a covalent bond; $R_6$' and $R_8$' are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

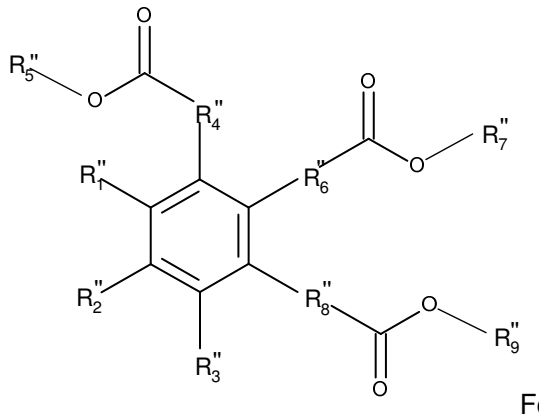
saturated or unsaturated tribasic aromatic acid ester having Formula III-(a) and/or Formula III-(b) and/or Formula III-(c):



Formula III-(a)



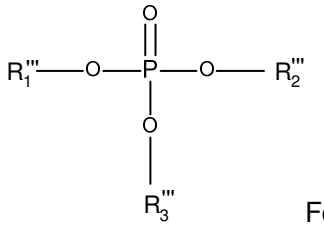
Formula III-(b)



Formula III-(c)

wherein, $R_1$'' to $R_3$'' are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_4$'', $R_6$'' and $R_8$'' are independently selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$ or represents a covalent bond; $R_5$'', $R_7$'' and $R_9$'' are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

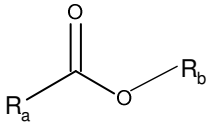
alkylated phosphate having Formula IV:



Formula IV

wherein, $R_1$''' to $R_3$''' are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

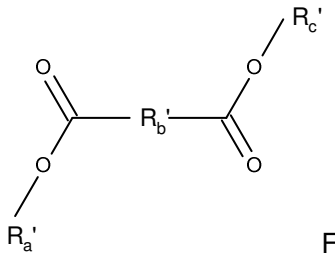
saturated or unsaturated monobasic carboxylic acid ester having Formula V:



Formula V

wherein, $R_a$ and $R_b$ are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

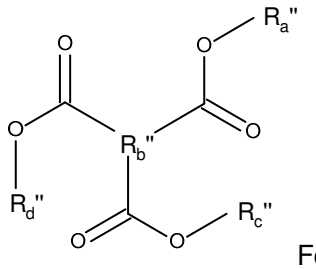
saturated or unsaturated dibasic carboxylic acid ester having Formula VI:



Formula VI

wherein, $R_a$' and $R_c$' are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_b$' is selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$, and

saturated or unsaturated tribasic carboxylic acid ester having Formula VII:



Formula VII

wherein, $R_a$", $R_c$" and $R_d$" are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_b$" is selected from saturated or unsaturated linear or branched alkylidene groups having $C_1$ to $C_{15}$,

wherein the weight percentage of component a), b) , c) or d) is based on the total weight of antioxidant composition, and wherein the mixture of component a), b) and c) is liquid at 25°C under 101.325KPa.

2. The antioxidant composition according to Claim 1, wherein said aromatic amine-based antioxidant agent is one or more selected from N,N'-di-sec-butyl-1,4-phenylenediamine, N-phenylbenzenamine reaction products with 2,4,4-trimethylpentene, bis(4-octylphenyl)amine, 4,4'-bis(α,α-dimethylbenzyl)diphenylamine, N,N'-di-2-naphthyl-p-phenylenediamine, N,N'-diphenyl-p-phenylenediamine, N-phenyl-N'-isopropyl-p-

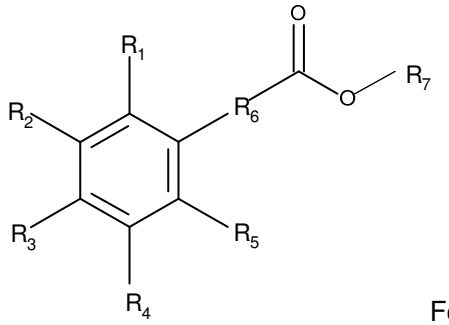
phenylenediamine, N-phenyl-N'-(1,3-dimethylbutyl)-p-phenylenediamine, N-phenyl-N'-(3-methacryloyloxy-2-hydroxypropyl)-p-phenylenediamine, N,N'-bis(methyl-phenyl)-1,4-benzendiamine.

3. The antioxidant composition according to Claim 1 or 2, wherein said hindered phenol-based antioxidant agent is one or more selected from poly(oxy-1,2-ethanediyl)-alpha-[3-[3,5-bis(1,1-dimethylethyl)-4-hydroxyphenyl]-1-oxopropyl]-omega-[3-[3,5-bis(1,1-dimethylethyl)-4-hydroxyphenyl]-1-oxopropoxy], 2,4-bis[(octylthio)methyl]-o-cresol, 2,4-bis[(dodecylthio)methyl]-o-cresol, octyl-3,5-di-tert-butyl-4-hydroxy-hydrocinnamate, 3,5-bis(1,1-dimethylethyl)-4-hydroxybenzenepropanoic acid C7-C9-branched alkyl ester, 4,4'-butylidene bis-(3-methyl-6-tert-butylphenol), 3,5-bis(1,1-dimethylethyl)-4-hydroxybenzenepropanoic acid octadecyl ester, pentaerythritol tetrakis(3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate), triethylene glycol-bis[3-(3-tert-butyl-5-methyl-4-hydroxyphenyl)propionate], 2,4-bis(n-octylthio)-6-(4-hydroxy-3,5-di-tert-butylanilino)-1,3,5-triazine, tris-(3,5-di-tert-butyl-4-hydroxybenzyl)-isocyanurate, 2,2-thio-diethylene bis[3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate].

4. The antioxidant composition according to any one of Claims 1 to 3, wherein said phosphite-based antioxidant agent is one or more selected from diphenyl-mono(2-ethylhexyl)phosphite, diphenyl-monotridecyl-phosphite, diphenyl-isodecylphosphite, diphenyl-isooctyl-phosphite, diphenyl-nonylphenyl-phosphite, triphenyl phosphite, triisodecyl phosphite, tris(2-ethylhexyl)phosphite, tetraphenyltetra(tridecyl)pentaerythritol tetraphosphite, 1,1,3-tris(2-methyl-4-di-tridecylphosphite-5-tert-butylphenyl)butane, 4,4'-butylidene bis(3-methyl-6-tert-butyl-di-tridecyl phosphite), 2,2'-ethylidene bis(4,6-di-tert-butyl-phenol)fluorophosphite, 4,4'-isopropylidene-diphenyl alkyl ($C_{12}$ to $C_{15}$) phosphites, bis(nonylphenyl)pentaerythritol diphosphite, hydrogenated bisphenol A-pentaerythritol phosphite polymers, 3,9-bis(octadecyloxy)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane, tetra-C12-15-alkyl(propane-2,2-diylbis(4,1-phenylene))bis(phosphite), 2-entylhexyldiphenyl phosphite, tris((mono and di)-nonylphenyl)phosphite, tri-(2,4-di-tert-butylphenyl)phosphite, tetraphenyl dipropylene glycol diphosphite, distearylpentaerythritoldiphosphite.

5. A liquid antioxidant composition used for raw rubbers, comprising

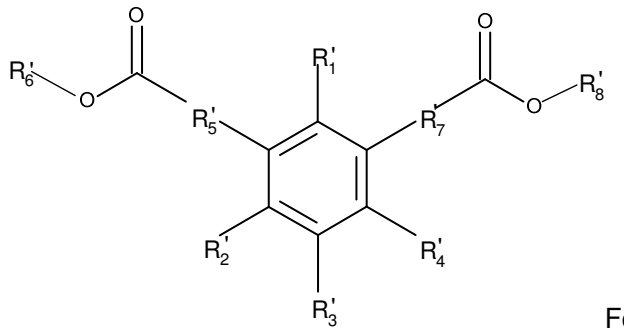
a) 5% to 20% by weight of solid aromatic amine-based antioxidant agent;
b) 20% to 50% by weight of solid hindered phenol-based antioxidant agent;
c) 0% to 30% by weight of solid phosphite-based antioxidant agent; and
d) 30% to 40% by weight of solvent having boiling point higher than 185°C and freezing point lower than -10°C under 101.325KPa, wherein said solvent is one or more selected from linear or branched alkane having $C_9$ to $C_{30}$, cyclane having $C_{10}$ to $C_{30}$, linear saturated carboxylic acid having $C_8$ to $C_{18}$, branched saturated carboxylic acid having $C_8$ to $C_{12}$, linear saturated alcohol having $C_8$ to $C_{18}$ and branched saturated alcohol having $C_8$ to $C_{12}$, alkyl-substituted phosphonic acid having $C_6$ to $C_{12}$, saturated or unsaturated monobasic aromatic acid ester having Formula I:



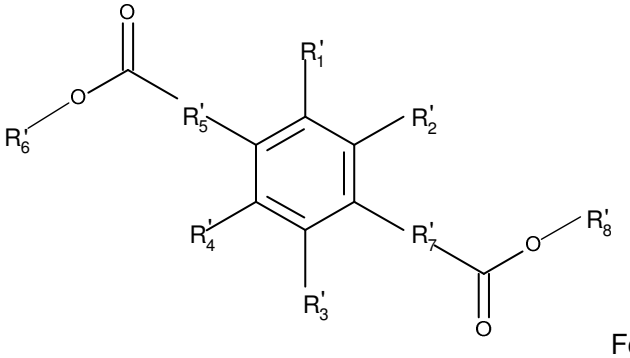

Formula I

wherein, $R_1$ to $R_5$ are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_6$ is selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$ or represents a covalent bond; $R_7$ is selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

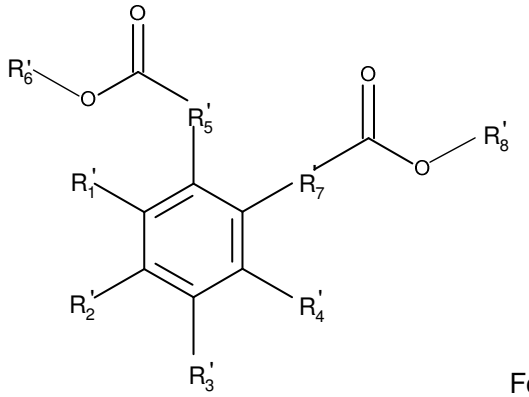
saturated or unsaturated dibasic aromatic acid ester having Formula II-(a) and/or Formula II-(b) and/or Formula II-(c):



Formula II-(a)



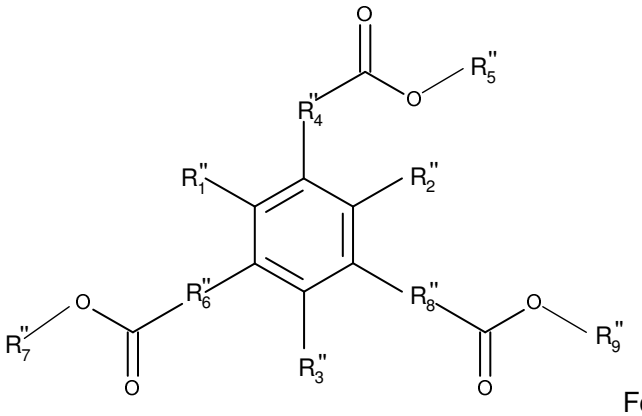
Formula II-(b)



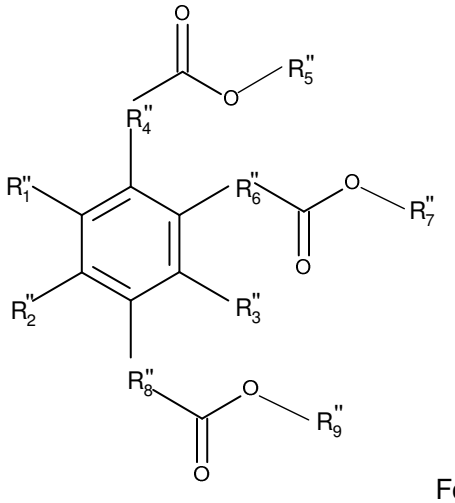
Formula II-(c)

wherein, $R_1$' to $R_4$' are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_5$' and $R_7$' are independently selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$ or represents a covalent bond; $R_6$' and $R_8$' are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

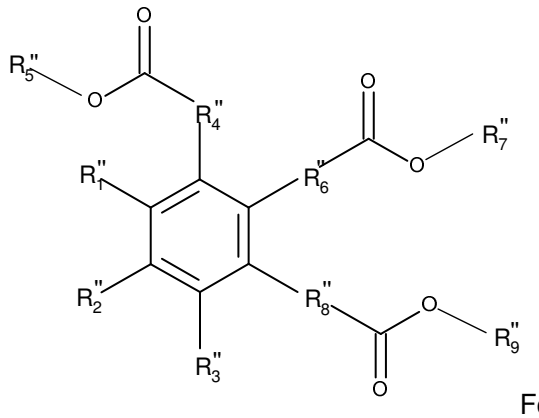
saturated or unsaturated tribasic aromatic acid ester having Formula III-(a) and/or Formula III-(b) and/or Formula III-(c):



Formula III-(a)



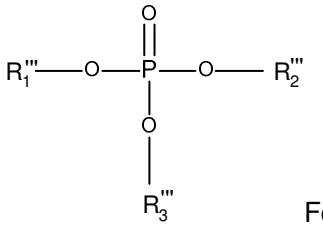
Formula III-(b)



Formula III-(c)

wherein, $R_1$'' to $R_3$'' are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_4$'', $R_6$'' and $R_8$'' are independently selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$ or represents a covalent bond; $R_5$'', $R_7$'' and $R_9$'' are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

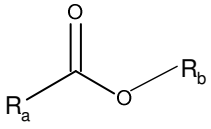
alkylated phosphate having Formula IV:



Formula IV

wherein, $R_1$''' to $R_3$''' are independently selected from hydrogen, saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

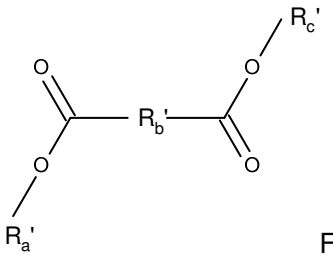
saturated or unsaturated monobasic carboxylic acid ester having Formula V:



Formula V

wherein, $R_a$ and $R_b$ are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$, and

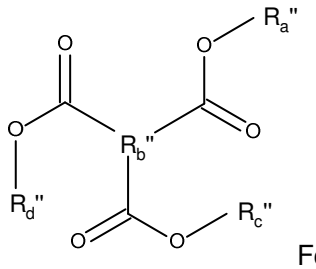
saturated or unsaturated dibasic carboxylic acid ester having Formula VI:



Formula VI

wherein, $R_a$' and $R_c$' are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_b$' is selected from saturated or unsaturated linear or branched alkylene groups having $C_1$ to $C_{15}$, and

saturated or unsaturated tribasic carboxylic acid ester having Formula VII:



Formula VII

wherein, $R_a$", $R_c$" and $R_d$" are independently selected from saturated or unsaturated linear or branched alkyl groups having $C_1$ to $C_{15}$; $R_b$" is selected from saturated or unsaturated linear or branched alkylidene groups having $C_1$ to $C_{15}$, and

wherein the weight percentage of component a), b) , c) or d) is based on the total weight of antioxidant composition.

6. The antioxidant composition according to Claim 5, wherein said solid aromatic amine-based antioxidant agent is one or more selected from bis(4-octylphenyl)amine, 4,4'-bis(α,α-dimethylbenzyl)diphenylamine, N,N'-di-2-naphthyl-p-phenylenediamine, N,N'-diphenyl-p-phenylenediamine, N-phenyl-N'-isopropyl-p-phenylenediamine, N-phenyl-N'-(1,3-dimethylbutyl)-p-phenylenediamine and N-phenyl-N'-(3-methacryloyloxy-2-hydroxypropyl)-p-phenylenediamine, N-1,3-dimethylbutyl-N'-phenyl-p-phenylenediamine, N,N'-bis(methyl-phenyl)-1,4-benzendiamine.

7. The antioxidant composition according to any one of Claims 5 or 6, wherein said solid hindered phenol-based antioxidant agent is one or more selected from 2,4-bis[(dodecylthio)methyl]-o-cresol, 4,4'-butylidene bis-(3-methyl-6-tert-butylphenol), 3,5-bis(1,1-dimethylethyl)-4-hydroxybenzenepropanoic acid octadecyl ester, pentaerythritol tetrakis(3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate), triethylene glycol-bis[3-(3-tert-butyl-5-methyl-4-hydrophenyl)propionate], 2,4-bis(n-octylthio)-6-(4-hydroxy-3,5-di-tert-butylanilino)-1,3,5-triazine, tris-(3,5-di-tert-butyl-4-hydroxybenzyl)-isocyanurate, 2,2-thio-diethylene bis[3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate].

8. The antioxidant composition according to any one of Claims 5 to 7, wherein said solid phosphite-based antioxidant agent is one or more selected from tri-(2,4-di-tert-butylphenyl)phosphite, tetraphenyl dipropylene glycol diphosphite, distearylpentaerythritoldiphosphite and 3,9-bis(octadecyloxy)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane.

9. The antioxidant composition according to any one of Claims 1 to 8, wherein said solvent is one or more selected from hendecane, n-dodecane, 2-methylnonane, n-decane, butylcyclohexane, pentylcyclohexane, hexylcyclohexane, heptylcyclohexane, octylcyclohexane, nonylcyclohexane, decylcyclohexane, undecylcyclohexane, dodecylcyclohexane, pentylcyclopentane, pentylcyclopentane, hexylcyclopentane, heptycyclopentane, octylcyclopentane, nonylcyclopentane, decylcyclopentane, undecylcyclopentane, dodecylclopentane, 2-ethylhexanoic acid, hexanoic acid, heptanoic acid, neo-decanoic acid, isononanoic acid, neodecanoic acid, n-octyl alcohol, n-nonanol, n-decyl alcohol, n-undecanol, isooctyl alcohol, isononyl alcohol, isodecyl alcohol, methyl benzoate, ethyl benzoate, propyl benzoate, butyl benzoate, hexyl benzoate, diethyl phthalate, dipropyl phthalate, dibutyl phthalate, dipentyl phthalate, dihexyl phthalate, diheptyl phthalate, dioctyl phthalate, diisooctyl phthalate, dinonyl phthalate, diisononyl phthalate, didecyl phthalate, diisodecyl phthalate, trimethyl orthobenzoate , ethyl oleate, butyl oleate octyl acetate, decyl acetate, isononyl acetate, nonyl acetate, n-octyl propanoate, decyl propanoate, isononyl propanoate, nonyl propanoate, pentyl butanoate, hexyl butyrate, heptyl butanoate, n-octyl butanoate, butyl valerate, amyl valerate, hexyl valerate, butyl caproate, amyl caproate, hexyl hexanoate, ethyl heptanoate, propyl heptanoate, butyl

heptoate, pentyl heptanoate, methyl octanoate, etheyl octanoate, propyl octanoate, butyl octanoate, amyl octanoate, hexyl octanoate, heptyl octanoate, octyl octanoate, nonyl octanoate, methyl nonanoate, ethyl nonanoate, isoamyl nonanoate, isononyl isononanoate, methyl caprate, ethyl caprate, propyl decanoate, butyl caprate, isoamyl decanoate, lauricacidisoamylester, ethylene glycol diacetate, ethylene glycol di-n-butyrate, dibutyl malonate, diethyl malonate, dihexyl malonate, diethyl succinate, dipropyl succinate, dibutyl succinate, dipentyl succinate, dimethyl glutarate, diethyl glutarate, diethyl adipate, diisopropyl adipate, diisobutyl adipate, di(2-ethylhexyl)adipate, dihexyl adipate, diisononyl adipate, diisodecyl adipate, dibutyl sebacate, bishexyl sebacate, bis(2-ethylhexyl) sebacate, dioctyl sebacate, diisooctyl sebacate, glyceryl triacetate, glyceryl tripropionate, glyceryl tributyrate, triisobutyl phosphate, triamyl phosphate, trihexyl phosphate and trioctyl phosphate.

10. The antioxidant composition according to Claim 1 or 5, wherein said solvent is one or more selected from paraffin oil, naphthenic oil, arene oil, n-dodecane, hexanoic acid, heptanoic acid, 2-ethylhexanoic acid, isononanoic acid, neodecanoic acid, n-nonanol, isodecyl alcohol, isooctyl alcohol, ethyl oleate and butyl oleate.

11. The antioxidant composition according to any one of Claims 1 to 10, wherein the freezing point of the antioxidant composition is lower than 0$^{o}$C under 101.325KPa.

12. Use of the antioxidant composition according to any one of Claims 1 to 11 in raw rubbers synthesized via solution polymerization or in natural rubber.

13. The use of the antioxidant composition according to Claim 12, wherein said raw rubbers synthesized via solution polymerization is selected from polybutadiene, polyisoprene, polybutene, poly(styrene-co-butadiene).

14. A process of using antioxidant composition according to any one of Claims 1 to 11 in raw rubbers synthesized via solution polymerization comprising steps of i) dissolving component a), b) and c) into d); ii) diluting liquid antioxidant composition by solvent for solution polymerization of raw rubbers; iii) adding diluted liquid antioxidant composition into raw rubbers synthesized via solution polymerization.

15. A raw rubber product comprising the antioxidant composition according to any one of Claims 1 to 11.

16. The raw rubber product according to Claim 15, wherein the yellowing index according to ASTM E313-1996 is less than 20.

17. The raw rubber product according to Claim 15, wherein the Mooney viscosity change from 0 to 72 hours is less than 10% and the Mooney viscosity is tested according to ISO 289-1:1994.