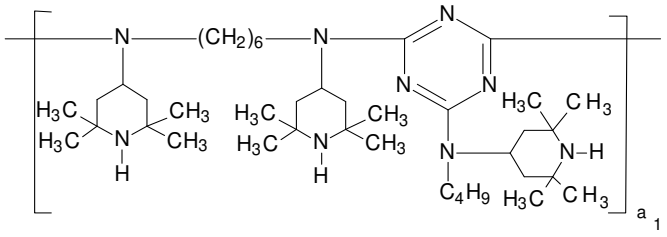
Polyethylene or polypropylene articles

Description

~~In an aspect, t~~There is provided an article in the form of a pipe, cable or geomembrane comprising polyethylene or polypropylene, and components A) and B), wherein component A) is a hindered amine light stabilizer containing a triazine residue, component B) is magnesium hydroxide which is present in an amount of 0.01% to 5% by weight relative to the weight of the polyethylene or polypropylene, and the weight ratio of component A) to component B) is 1:50 to 50:1, with the proviso that component B) is not a hydrotalcite.

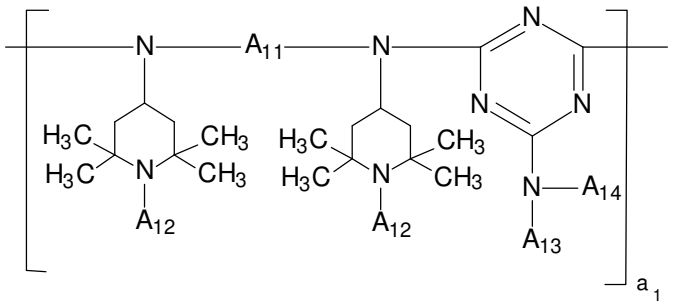
In an aspect, there is provided an article in the form of a pipe, cable or geomembrane comprising polyethylene or polypropylene, and components A), B), C) and D), wherein component A) is a compound of formula (A-I-1)



(A-I-1)

with a_1 being 2 to 10, component B) is magnesium hydroxide which is present in an amount of 0.01% to 5% by weight relative to the weight of the polyethylene or polypropylene, component C) is 1,3,5-tris(3,5-di-tert-butyl-4-hydroxybenzyl)-2,4,6-trimethylbenzene, and component D) is tris[2,4-di-tert-butylphenyl]phosphite, and the weight ratio of component A) to component B) is 1:50 to 50:1, with the proviso that component B) is not a hydrotalcite.

Component A) is in particular at least one compound of the formula (A-I), (A-II) or (A-III)

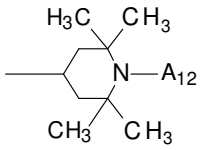


(A-I)

wherein A_{11} is C_2-C_{18}alkylene, C_5-C_7cycloalkylene or C_1-C_4alkylenedi-(C_5-C_7cycloalkylene),

the radicals A_{12} independently of one another are hydrogen, C_1-C_{12}alkyl or C_5-C_{12}cycloalkyl,

A_{13} and A_{14} independently of one another are hydrogen, C_1-C_{12}alkyl, C_5-C_{12}cycloalkyl or a group of the formula (a-1),

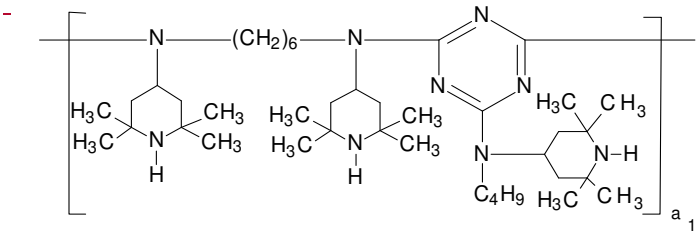


(a-1)

or the radicals A_{13} and A_{14}, together with the nitrogen atom to which they are bonded, form a 5- to 10-membered heterocyclic ring and

Claims:

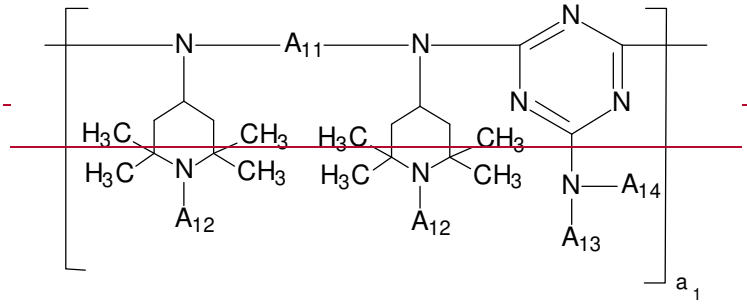
1. An article in the form of a pipe, cable or geomembrane comprising polyethylene or polypropylene, and components A), ~~and~~ B), C) and D), wherein component A) is a ~~hindered amine light stabilizer containing a triazine residue~~ compound of formula (A-I-1)



(A-I-1)

with a_1 being 2 to 10, component B) is magnesium hydroxide which is present in an amount of 0.01% to 5% by weight relative to the weight of the polyethylene or polypropylene, component C) is 1,3,5-tris(3,5-di-tert-butyl-4-hydroxybenzyl)-2,4,6-trimethylbenzene, and component D) is tris[2,4-di-tert-butylphenyl]phosphite, and the weight ratio of component A) to component B) is 1:50 to 50:1, with the proviso that component B) is not a hydrotalcite.

~~2. An article according to claim 1 wherein component A) is at least one compound of the formula (A-I), (A-II) or (A-III)~~



~~(A-I)~~

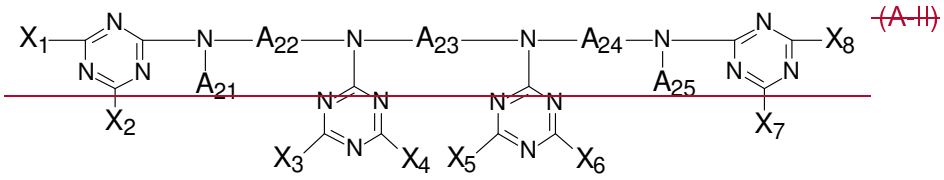
~~wherein A_{11} is C_2-C_{18}alkylene, C_5-C_7cycloalkylene or C_4-C_4alkylenedi(C_5-C_7cycloalkylene),~~

the radical A_{12} is hydrogen, C_1-C_{12}alkyl or C_5-C_{12}cycloalkyl,
A_{13} and A_{14} independently of one another are hydrogen, C_1-C_{12}alkyl, C_5-C_{12}cycloalkyl or a group of the formula (a-1),



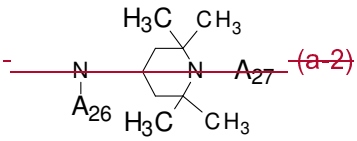
(a-1)

or the radicals A_{13} and A_{14}, together with the nitrogen atom to which they are bonded, form a 5- to 10-membered heterocyclic ring and
a_1 is a number from 1 to 20, preferably 2 to 20, and the repeating units are identical or different;



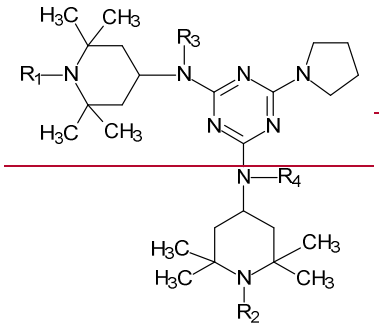
(A-II)

wherein A_{21} and A_{25} independently of one another are hydrogen, C_1-C_{12}alkyl, C_5-C_{12}cycloalkyl or a group of the formula (a-1),
A_{22}, A_{23} and A_{24} independently of one another are C_2-C_{10}alkylene, and
X_1, X_2, X_3, X_4, X_5, X_6, X_7 and X_8 independently of one another are a group of the formula (a-2),



(a-2)

in which A_{26} is hydrogen, C_1-C_{12}alkyl, C_5-C_{12}cycloalkyl or a group of the formula (a-1) as defined above, and A_{27} has one of the meanings of A_{12};

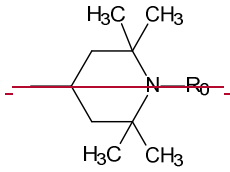


(A-III)

wherein

R_1 and R_2 independently of one another are hydrogen, C_1-C_{22}alkyl, -O·, -OH, $-CH_2CN$, C_1-C_{18}alkoxy, C_2-C_{18}alkoxy substituted by -OH; C_5-C_{12}cycloalkoxy, C_3-C_6alkenyl, C_3-C_6alkenyloxy, C_7-C_9phenylalkyl unsubstituted or substituted on the phenyl by 1, 2 or 3 C_1-C_4alkyl; or C_1-C_8acyl; and

R_3 and R_4 independently of one another are C_1-C_{22}alkyl or a group of the formula (a-3)



(a-3)

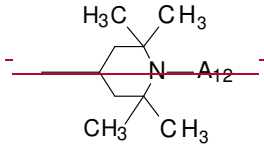
wherein R_0 has one of the meanings of R_1 and R_2.

3. An article according to claim 2 wherein

A_{11} is C_2-C_{10}alkylene,

the radical A_{12} is hydrogen, C_1-C_4alkyl or cyclohexyl,

A_{13} and A_{14} independently of one another are hydrogen, C_1-C_4alkyl, cyclohexyl or a group of the formula (a-1),



(a-1)

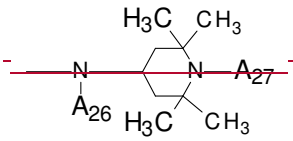
or the radicals A_{13} and A_{14}, together with the nitrogen atom to which they are bonded, form a morpholino group and

a_1 is a number from 1 to 10, preferably 2 to 10, and the repeating units are identical or different;

A_{21} and A_{25} independently of one another are hydrogen, C_1-C_4alkyl or cyclohexyl,

A_{22}, A_{23} and A_{24} independently of one another are C_2-C_{10}alkylene, and

X_1, X_2, X_3, X_4, X_5, X_6, X_7 and X_8 independently of one another are a group of the formula (a-2),

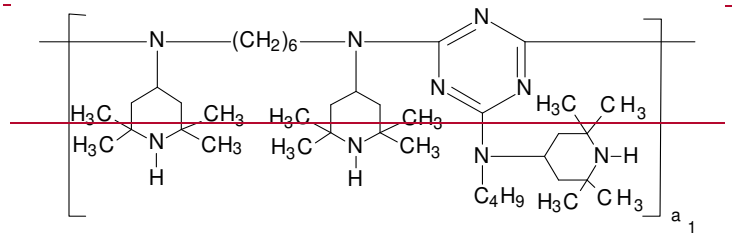
-  (a-2)

in which A_{26} is hydrogen, C_1-C_4alkyl, cyclohexyl or a group of the formula (a-1) as defined above, and A_{27} has one of the meanings of A_{12};

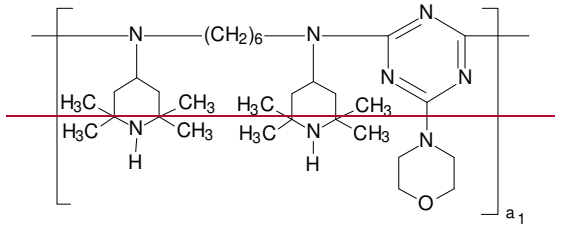
R_1 and R_2 independently of one another are hydrogen, C_1-C_4alkyl or cyclohexyl; and

R_3 and R_4 independently of one another are C_1-C_{22}alkyl.

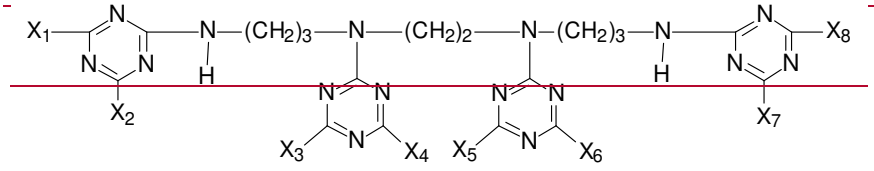
4. An article according to any of claims 1 to 3, wherein component A) is a compound of the formula (A-I-1), (A-I-2), (A-II-1) or (A-III-1),

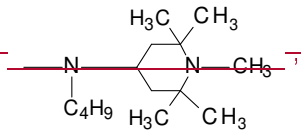
-  (A-I-1)

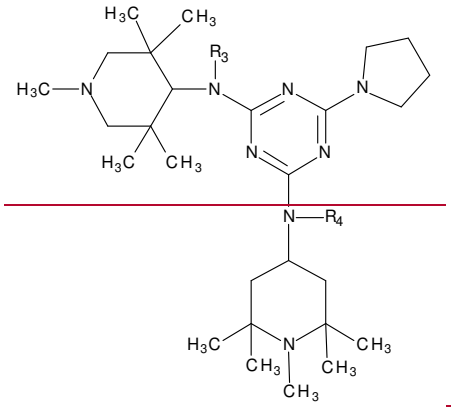
with a_1 being 2 to 10,

-  (A-I-2)

with a_1 being 2 to 10,

-  (A-II-1)

wherein X_1, X_2, X_3, X_4, X_5, X_6, X_7 and X_8 are the group ,



(A-III-1),

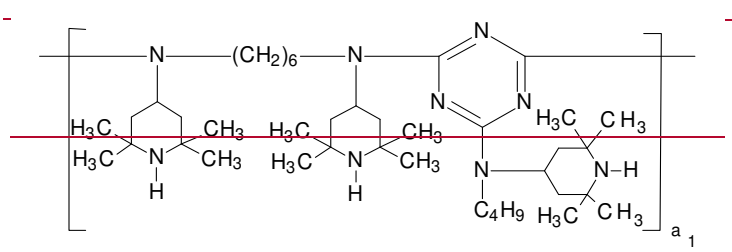
wherein R_3 and R_4 are C_1–C_{22}alkyl.

52. An article according to any of claims 1 to 4claim 1, wherein Component B) has a mean particle size of 0.2 to 10 micrometres.

6. An article according to any of claims 1 to 5 additionally comprising a component C) which is 1,3,5-tris(3,5-di-tert-butyl-4-hydroxybenzyl)-2,4,6-trimethylbenzene, ethylene bis[3,3-bis(3-tert-butyl-4-hydroxyphenyl)butyrate] or 1,3,5-tris(3,5-di-tert-butyl-4-hydroxybenzyl)-isocyanurate.

7. An article according to any of claims 1 to 6 additionally comprising a component D) which is tris(2,4-di-tert-butylphenyl)-phosphite, [3,3',5,5'-tetra-tert.-butyl-1,1'biphenyl-2,2'-diyl]-[3-(3-methyl-4-hydroxy-5-tert.butyl-phenyl)-propyl]-phosphite, [2,2'-ethylene-bis-(4,6-di-tert.-butyl-phenyl)-1,1'-diyl]-[1,6-dimethyl-4-(5,7-di-tert.-butyl)-3H-1-benzofuran-2-one)-phenyl]-phosphite, [2,2'-ethylene-bis-(4,6-di-tert.-butyl-phenyl)-1,1'-diyl]-[1-methyl-6-tert.-butyl-4-(5,7-di-tert.-butyl)-3H-1-benzofuran-2-one)-phenyl]-phosphite, 6-[3-(3-tert-butyl-4-hydroxy-5-methylphenyl)propoxy]-2,4,8,10-tetra-tert-butyldibenzo[d,f][1,3,2]dioxaphosphepin, α-tocopherol, β-tocopherol, γ-tocopherol, δ-tocopherol, dioctadecylhydroxylamine or N,N-dialkylhydroxylamine derived from hydrogenated tallow amine.

8. An article according to any of claims 1 to 7, comprising as component (A) the compound of formula (A-I-1)

-  (A-I-1)

with a_1 being 2 to 10,

as component (C) 1,3,5-tris(3,5-di tert-butyl-4-hydroxybenzyl)-2,4,6-trimethylbenzene, and

as component (D) tris[2,4-di tert-butylphenyl]phosphite.

93. An article according to any of claims 1 to 8 2 comprising additionally a hydrotalcite.

104. An article according to any of claims 1 to 93, wherein the weight ratio of component A) to component B) is 1:10 to 10:1.

115. An article according to any of claims 1 to 10 4 which is in the form of a pipe or geomembrane.

126. An article according to claim 115, which is in contact with oxidizing media.

137. An article according to any of claims 1 to 12 6 which is in the form of a pipe.

148. An article according to claim 13 7 which is in contact with chlorinated water.

159. An article according to any of claims 1 to 14 8 comprising polyethylene.