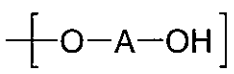
Claims

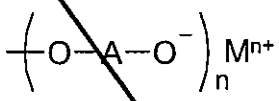
1. Polymers functionalized by terminal groups, characterized in that the polymers are diene polymers or are diene copolymers obtainable via copolymerization of dienes with vinylaromatic monomers and have, at the end of the chain, an ether-containing carbinol group of the formula (I)



(I)

where A is a divalent organic moiety which can comprise not only C and H but also heteroatoms, such as O, N, S, Si.

2. Polymers functionalized by terminal groups, according to Claim 1, characterized in that the terminal groups of the polymers take the form of metal salts of the formula (II)



(II)

where

A is a divalent organic moiety which can comprise not only C and H but also heteroatoms, such as O, N, S, Si,

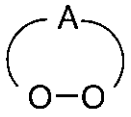
n is an integer from 1 to 4,

M is a metal or semimetal of valency from 1 to 4, preferably Li, Na, K, Mg, Ca, Fe, Co, Ni, Al, Nd, Ti, Si, Sn.

3. Polymers functionalized by terminal groups, according to Claim 2, characterized in that the diene polymer is a polybutadiene, a polyisoprene, a butadiene-isoprene copolymer, a butadiene-styrene copolymer, an isoprene-styrene copolymer or a butadiene-isoprene-styrene terpolymer.

4. Polymers functionalized by terminal groups, according to Claim 3, characterized in that one or more cycloperoxides is/are used as functionalization reagent.

5. Polymers functionalized by terminal groups, according to Claim 4, characterized in that the cycloperoxides are compounds of the general formula (III)



(III)

where A is a divalent organic moiety which can comprise not only C and H but also heteroatoms such as O, N, S, Si.

6. Polymers functionalized by terminal groups, according to Claim 5, characterized in that the average molar masses (number average) of the polymers are from 10 000 to 2 000 000 g/mol, preferably from 100 000 to 1 000 000 g/mol.

7. Polymers functionalized by terminal groups, according to Claim 6, characterized in that the glass transition temperatures of the polymers are from -110°C to +20°C, preferably from -110°C to 0°C.

8. Polymers functionalized by terminal groups, according to Claim 7, characterized in that the Mooney viscosities [ML 1+4 (100°C)] of the polymers are from 10 to 200 Mooney units, preferably from 30 to 150 Mooney units.

9. Use of cycloperoxides as functionalization reagents for producing polymers functionalized by terminal groups, according to Claim 1 or 2.

10. Process for producing polymers functionalized by terminal groups, characterized in that one or more cycloperoxides (functionalization reagents) is/are added to polymers having reactive polymer chain ends.

11. Process according to Claim 10, characterized in that the addition of the functionalization reagents takes place after conclusion of the polymerization reaction.

12. Process according to Claim 10, characterized in that an excess of functionalization reagents is used.

13. Process according to Claim 10, characterized in that stoichiometric amounts or a substoichiometric amount of functionalization reagents is/are used.

14. Process according to either of Claims 12 and 13, characterized in that the amount of functionalization reagents, based on the amount of polymer having reactive polymer chain ends, is from 0.005 to 2% by weight, preferably from 0.01 to 1% by weight.

15. Process according to any of the preceding claims, characterized in that coupling reagents are used for the reaction with the reactive polymer chain ends.

16. Use of polymers functionalized by terminal groups, according to any of the preceding claims, for producing vulcanizable rubber compositions.

17. Vulcanizable rubber compositions according to Claim 16, characterized in that they comprise antioxidants, oils, fillers, rubbers and/or rubber auxiliaries.

18. Vulcanizable rubber compositions comprising polymers functionalized by terminal groups having terminal groups of the formula (I) or (II).

19. Use of the vulcanizable rubber compositions according to Claim 18 for producing tyres, in particular tyre treads.

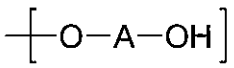
20. Use of the vulcanizable rubber compositions according to Claim 18 for producing mouldings, in particular cable sheathing, hoses, drive belts, conveyor belts, roll coverings, shoe soles, sealing rings and damping elements.

21. Tyres obtainable according to Claim 19.

22. Mouldings obtainable according to Claim 20.

Claims

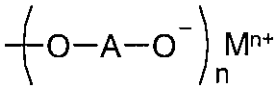
1. Polymers functionalized by terminal groups, characterized in that the polymers are diene polymers or are diene copolymers obtainable via copolymerization of dienes with vinylaromatic monomers and have, at the end of the chain, an ether-containing carbinol group of the formula (I)



(I)

where A is a divalent organic moiety which can comprise not only C and H but also heteroatoms, such as O, N, S, Si.

2. Polymers functionalized by terminal groups, according to Claim 1, characterized in that the terminal groups of the polymers take the form of metal salts of the formula (II)



(II)

where

A is a divalent organic moiety which can comprise not only C and H but also heteroatoms, such as O, N, S, Si,

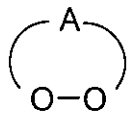
n is an integer from 1 to 4,

M is a metal or semimetal of valency from 1 to 4, preferably Li, Na, K, Mg, Ca, Fe, Co, Ni, Al, Nd, Ti, Si, Sn.

3. Polymers functionalized by terminal groups, according to Claim 2, characterized in that the diene polymer is a polybutadiene, a polyisoprene, a butadiene-isoprene copolymer, a butadiene-styrene copolymer, an isoprene-styrene copolymer or a butadiene-isoprene-styrene terpolymer.

4. Polymers functionalized by terminal groups, according to Claim 3, characterized in that one or more cycloperoxides is/are used as functionalization reagent.

5. Polymers functionalized by terminal groups, according to Claim 4, characterized in that the cycloperoxides are compounds of the general formula (III)



(III)

where A is a divalent organic moiety which can comprise not only C and H but also heteroatoms such as O, N, S, Si.

6. Polymers functionalized by terminal groups, according to Claim 5, characterized in that the average molar masses (number average) of the polymers are from 10 000 to 2 000 000 g/mol, preferably from 100 000 to 1 000 000 g/mol.

7. Polymers functionalized by terminal groups, according to Claim 6, characterized in that the glass transition temperatures of the polymers are from -110°C to +20°C, preferably from -110°C to 0°C.

8. Polymers functionalized by terminal groups, according to Claim 7, characterized in that the Mooney viscosities [ML 1+4 (100°C)] of the polymers are from 10 to 200 Mooney units, preferably from 30 to 150 Mooney units.

9. Use of cycloperoxides as functionalization reagents for producing polymers functionalized by terminal groups, according to Claim 1 or 2.

10. Process for producing the polymers functionalized by terminal groups according to claim 1 or 2, characterized in that one or more cycloperoxides (functionalization reagents) is/are added to polymers having reactive polymer chain ends.

11. Process according to Claim 10, characterized in that the addition of the functionalization reagents takes place after conclusion of the polymerization reaction.

12. Process according to Claim 10, characterized in that an excess of functionalization reagents is used.

13. Process according to Claim 10, characterized in that stoichiometric amounts or a substoichiometric amount of functionalization reagents is/are used.

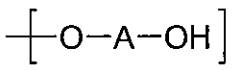
14. Process according to either of Claims 12 and 13, characterized in that the amount of functionalization reagents, based on the amount of polymer having reactive polymer chain ends, is from 0.005 to 2% by weight, preferably from 0.01 to 1% by weight.

15. Process according to any of the preceding claims, characterized in that coupling reagents are used for the reaction with the reactive polymer chain ends.

16. Use of polymers functionalized by terminal groups, according to any of the preceding claims, for producing vulcanizable rubber compositions.

17. Vulcanizable rubber compositions according to Claim 16, characterized in that they comprise antioxidants, oils, fillers, rubbers and/or rubber auxiliaries.

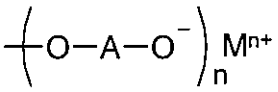
18. Vulcanizable rubber compositions comprising polymers functionalized by terminal groups having terminal groups of the formula (I)



(I)

where A is a divalent organic moiety which can comprise not only C and H but also heteroatoms, such as O, N, S, Si

or formula (II)



(II)

where

A is a divalent organic moiety which can comprise not only C and H but also heteroatoms, such as O, N, S, Si,

n is an integer from 1 to 4,

M is a metal or semimetal of valency from 1 to 4, preferably Li, Na, K, Mg, Ca, Fe, Co, Ni, Al, Nd, Ti, Si, Sn.

19. Use of the vulcanizable rubber compositions according to Claim 18 for producing tyres, in particular tyre treads.

20. Use of the vulcanizable rubber compositions according to Claim 19 for producing mouldings, in particular cable sheathing, hoses, drive belts, conveyor belts, roll coverings, shoe soles, sealing rings and damping elements.