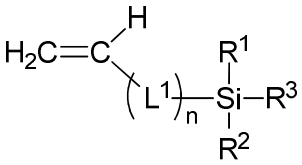
CLAIMS

[Claim 1] A method for producing a modified conjugated diene-based polymer, the method comprising:

polymerizing a monomer group X containing a vinylsilane compound (A) and a conjugated diene compound in the presence of a polymerization initiator, thereby preparing a polymer having an active terminal; and

reacting the polymer having the active terminal with a polyorganosiloxane (C), wherein

the vinylsilane compound (A) is a compound represented by formula (1):



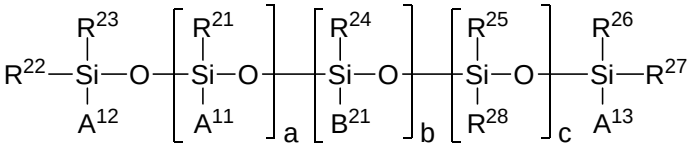
(1)

wherein R^1 represents a monovalent group having at least one atom selected from the group consisting of a nitrogen atom, an oxygen atom, a phosphorus atom, and a sulfur atom and having no active hydrogen, and R^2 and R^3 each represent a hydrocarbyl group or a monovalent group having at least one atom selected from the group consisting of a nitrogen atom, an oxygen atom, a phosphorus atom, and a sulfur atom and having no active hydrogen, and L^1 represents a hydrocarbylene group, and n is 0 or 1; and

the polyorganosiloxane (C) is a polyorganosiloxane having at least one specific functional group selected from the group consisting of an epoxy group, an alkoxy group, a

carbonyl group, a 2-pyrrolidonyl group, a vinyl group, and a halogen atom, wherein the total number of the specific functional groups is two or more.

[Claim 2] The method for producing a modified conjugated diene-based polymer according to claim 1, wherein the polyorganosiloxane (C) is a compound represented by formula (6):



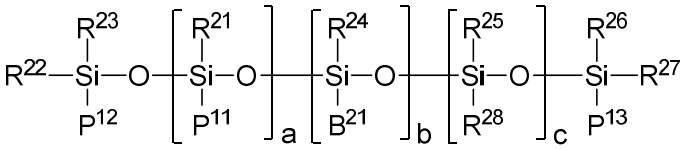
(6)

wherein R^{21} to R^{28} each represent a hydrocarbyl group; A^{11} represents a group having the specific functional group; A^{12} and A^{13} each represent a hydrocarbyl group or a group having the specific functional group; B^{21} represents a group having a polyether structure; a is an integer of 3 to 200; b is an integer of 0 to 200; c is an integer of 0 to 200; and R^{21} to R^{28}, A^{11}, and B^{21} may be identical to or different from one another between structural units.

[Claim 3] The method for producing a modified conjugated diene-based polymer according to claim 1 or 2, wherein the monomer group X further contains an aromatic vinyl compound having none of a nitrogen atom, a phosphorus atom, and a sulfur atom.

[Claim 4] A modified conjugated diene-based polymer

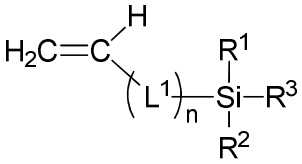
represented by formula (10):



(10)

wherein R^{21} to R^{28} each represent a hydrocarbyl group; P^{11} represents a group having at least one specific functional group selected from the group consisting of an epoxy group, an alkoxy group, a carbonyl group, a 2-pyrrolidonyl group, a vinyl group, and a halogen atom, or a group formed by reacting the specific functional group with a conjugated diene-based polymer chain having a monomer unit derived from a vinylsilane compound (A) and a monomer unit derived from a conjugated diene compound; P^{12} and P^{13} each represent the group having the specific functional group, the group formed by reacting the specific functional group with the conjugated diene-based polymer chain, or a hydrocarbyl group; B^{21} represents a group having a polyether structure; a is an integer of 3 to 200; b is an integer of 0 to 200; c is an integer of 0 to 200; R^{21} to R^{28}, P^{11}, and B^{21} may be identical to or different from one another between structural units; and the number of the group formed by reacting the specific functional group with the conjugated diene-based polymer chains present in the molecule is two or more, wherein

the vinylsilane compound (A) is a compound represented by formula (1):

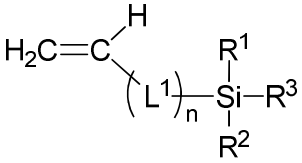


(1)

wherein R^1 represents a monovalent group having at least one atom selected from the group consisting of a nitrogen atom, an oxygen atom, a phosphorus atom, and a sulfur atom and having no active hydrogen, and R^2 and R^3 each represent a hydrocarbyl group or a monovalent group having at least one atom selected from the group consisting of a nitrogen atom, an oxygen atom, a phosphorus atom, and a sulfur atom and having no active hydrogen, and L^1 represents a hydrocarbylene group, and n is 0 or 1.

[Claim 5] A modified conjugated diene-based polymer produced by polymerizing a monomer group X containing a vinylsilane compound (A) and a conjugated diene compound in the presence of a polymerization initiator to thereby prepare a polymer having an active terminal, and reacting the polymer having the active terminal with a polyorganosiloxane (C), wherein

the vinylsilane compound (A) is a compound represented by formula (1):



(1)

wherein R^1 represents a monovalent group having at least one atom selected from the group consisting of a nitrogen atom,

an oxygen atom, a phosphorus atom, and a sulfur atom and having no active hydrogen, and R^2 and R^3 each represent a hydrocarbyl group or a monovalent group having at least one atom selected from the group consisting of a nitrogen atom, an oxygen atom, a phosphorus atom, and a sulfur atom and having no active hydrogen, and L^1 represents a hydrocarbylene group; and n is 0 or 1; and

the polyorganosiloxane (C) is a polyorganosiloxane having at least one specific functional group selected from the group consisting of an epoxy group, an alkoxy group, a carbonyl group, a 2-pyrrolidonyl group, a vinyl group, and a halogen atom, wherein the total number of the specific functional groups is two or more.

[Claim 6] A polymer composition comprising a modified conjugated diene-based polymer produced by a method according to any one of claims 1 to 3 or a modified conjugated diene-based polymer according to claim 4 or 5, an inorganic filler, and a crosslinking agent.

[Claim 7] A crosslinked polymer produced through crosslinking of a polymer composition according to claim 6.

[Claim 8] A tire obtained by employing a crosslinked polymer according to claim 7 as a tread material, a sidewall material, or both.