CLAIMS

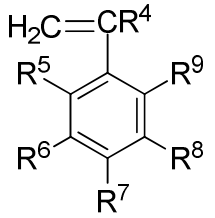
[Claim 1] A modified conjugated diene-based polymer comprising, at one terminal of a conjugated diene-based polymer chain, a polymer block having a structure derived from at least one compound selected from the group consisting of the following vinylsilane compound (A) and aromatic vinyl compound (B),

wherein the polymer block has a side chain including a structure derived from at least one compound selected from the group consisting of the vinylsilane compound (A) and the aromatic vinyl compound (B):

(A) a vinylsilane compound having a group "$-SiR^1R^2R^3$", 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

(B) an aromatic vinyl compound containing at least one atom selected from the group consisting of a nitrogen atom, a phosphorus atom, and a sulfur atom, wherein active hydrogen is not bonded to the nitrogen atom, the phosphorus atom, or the sulfur atom.

[Claim 2] The modified conjugated diene-based polymer according to claim 1, wherein the polymer block comprises a monomer unit derived from a styrene-based compound represented by formula (3):



(3)

wherein R^4 represents a hydrogen atom or a methyl group, R^5 to R^9 each represent a hydrogen atom or a

hydrocarbyl group, and at least one of R^5 to R^9 has a hydrogen atom at a benzylic position; and

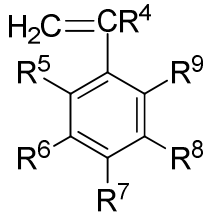
a structure derived from at least one compound selected from the group consisting of the vinylsilane compound (A) and the aromatic vinyl compound (B) is bonded to a benzylic position included in the monomer unit derived from the styrene-based compound.

[Claim 3] The modified conjugated diene-based polymer according to claim 1 or 2, wherein the polymer block comprises a monomer unit derived from at least one compound selected from the group consisting of the vinylsilane compound (A) and the aromatic vinyl compound (B).

[Claim 4] The modified conjugated diene-based polymer according to any one of claims 1 to 3, wherein the terminal of the conjugated diene-based polymer chain not having the polymer block is bonded to a structure derived from a compound containing at least one element selected from the group consisting of nitrogen, oxygen, silicon, phosphorus, sulfur, and tin.

[Claim 5] A method for producing a modified conjugated diene-based polymer, the method comprising:

polymerizing a monomer group Z containing a styrene-based compound represented by formula (3) in the presence of a polymerization initiator, thereby preparing a polymer block having an active terminal:



(3)

wherein R^4 represents a hydrogen atom or a methyl group, R^5 to R^9 each represent a hydrogen atom or a hydrocarbyl group, and at least one of R^5 to R^9 has a hydrogen atom at a benzylic position;

polymerizing a monomer group Y containing a conjugated diene compound in the presence of the polymer block having the active terminal, thereby forming a conjugated diene-based polymer chain bonded to the polymer block; and

reacting the polymer block, at a benzylic position of a monomer unit derived from the styrene-based compound, with at least one compound selected from the group consisting of the following vinylsilane compound (A) and aromatic vinyl compound (B):

(A) a vinylsilane compound having a group "$-SiR^1R^2R^3$", 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

(B) an aromatic vinyl compound containing at least one atom selected from the group consisting of a nitrogen atom, a phosphorus atom, and a sulfur atom, wherein active hydrogen is not bonded to the nitrogen atom, the phosphorus atom, or the sulfur atom.

[Claim 6] The method for producing a modified conjugated diene-based polymer according to claim 5, wherein a monomer group X containing at least one compound selected from the group consisting of the vinylsilane compound (A) and the aromatic vinyl compound (B) and a conjugated diene compound is reacted with the polymer block at a benzylic position of the monomer unit derived from the styrene-based compound.

[Claim 7] The method for producing a modified conjugated diene-based polymer according to claim 5 or 6, wherein the monomer group Y is polymerized, thereby a conjugated diene-based polymer chain having the polymer block at one terminal of the polymer chain, wherein the other terminal of the polymer chain is an active terminal is prepared; and

the method further comprising:

reacting the conjugated diene-based polymer chain having the active terminal with the following compound (E):

(E) a compound containing at least one specific element which is selected from the group consisting of nitrogen, oxygen, silicon, phosphorus, sulfur, and tin, and which is not bonded to active hydrogen, and having a functional group capable of reacting with the active terminal of the conjugated diene-based polymer chain.

[Claim 8] A polymer composition comprising a modified

conjugated diene-based polymer according to any one of claims 1 to 4, an inorganic filler, and a crosslinking agent.

[Claim 9] A crosslinked polymer produced through crosslinking of a polymer composition according to claim 8.

[Claim 10] A tire obtained by employing a crosslinked polymer according to claim 9 as a tread material, a sidewall material, or both.