Claims

[Claim 1]

A conjugated diene-based polymer having an absolute molecular weight measured by viscosity detector-equipped GPC-light scattering measurement, of 100 x 10^4 or more and 5000 x 10^4 or less, and having a branching number (Bn) measured by the viscosity detector-equipped GPC-light scattering measurement, of 8 or more.

[Claim 2]

The conjugated diene-based polymer according to claim 1, having a modification ratio of 60% by mass or more.

[Claim 3]

The conjugated diene-based polymer according to claim 1 or 2, wherein the conjugated diene-based polymer is a conjugated diene-based polymer having a star polymer structure having 3 or more branches, wherein

at least one branched chain of the star structure comprises a portion derived from a vinyl-based monomer containing an alkoxysilyl group or a halosilyl group, and

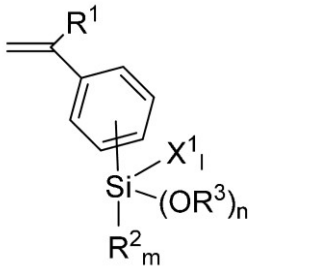
the portion derived from the vinyl-based monomer containing an alkoxysilyl group or a halosilyl group further comprises a main chain branch structure.

[Claim 4]

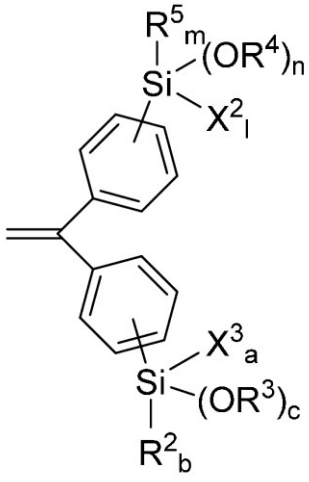
The conjugated diene-based polymer according to any one of claims 1 to 3, wherein

the portion derived from the vinyl-based monomer containing an alkoxysilyl group or a halosilyl group is a monomer unit based on a compound represented by the following formula (1) or (2), and contains a branch point of a polymer chain containing the monomer unit based on the compound represented by the formula (1) or (2), and

at least one end of the conjugated diene-based polymer is coupled by using a coupling agent:



(1)



(2)

wherein in the formula (1), R^1 represents a hydrogen atom, an alkyl group having 1 to 20 carbon atoms, or an aryl group having 6 to 20 carbon atoms, and may have a branch structure in a part thereof;

R^2 and R^3 each independently represent an alkyl group having 1 to 20 carbon atoms, or an aryl group having 6 to

20 carbon atoms, and may have a branch structure in a part thereof;

each of R^1 to R^3, if present in a plural number, is respectively independent;

X^1 represents an independent halogen atom;

m represents an integer of 0 to 2, n represents an integer of 0 to 3, l represents an integer of 0 to 3, and (m + n + l) is 3;

in the formula (2), R^2 to R^5 each independently represent an alkyl group having 1 to 20 carbon atoms, or an aryl group having 6 to 20 carbon atoms, and may have a branch structure in a part thereof, and each of R^2 to R^5, if present in a plural number, is respectively independent;

X^2 and X^3 represent an independent halogen atom;

m represents an integer of 0 to 2, n represents an integer of 0 to 3, l represents an integer of 0 to 3, and (m + n + l) is 3; and

a represents an integer of 0 to 2, b represents an integer of 0 to 3, c represents an integer of 0 to 3, and (a + b + c) is 3.

[Claim 5]

The conjugated diene-based polymer according to claim 4, containing a monomer unit based on a compound represented by the formula (1) wherein R^1 is a hydrogen atom, and m is 0.

[Claim 6]

The conjugated diene-based polymer according to claim 4, containing a monomer unit based on a compound represented by the formula (2) wherein m is 0 and b is 0.

[Claim 7]

The conjugated diene-based polymer according to claim 4, containing a monomer unit based on a compound represented by the formula (1) wherein R^1 is a hydrogen atom, m is 0, and l is 0.

[Claim 8]

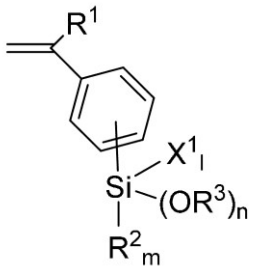
The conjugated diene-based polymer according to claim 4, containing a monomer unit based on a compound represented by the formula (2) wherein m is 0, l is 0, a is 0, and b is 0.

[Claim 9]

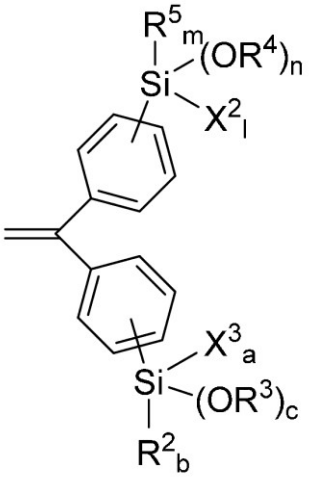
The conjugated diene-based polymer according to claim 4, containing a monomer unit based on a compound represented by the formula (1) wherein R^1 is a hydrogen atom, l is 0, and n is 3.

[Claim 10]

A branching agent for the conjugated diene-based polymer according to claim 4, wherein the branching agent is a compound represented by the following formula (1) or (2):



(1)



(2)

wherein in the formula (1), R^1 represents a hydrogen atom, an alkyl group having 1 to 20 carbon atoms, or an aryl group having 6 to 20 carbon atoms, and may have a branch structure in a part thereof;

R^2 and R^3 each independently represent an alkyl group having 1 to 20 carbon atoms, or an aryl group having 6 to 20 carbon atoms, and may have a branch structure in a part thereof;

each of R^1 to R^3, if present in a plural number, is respectively independent;

X^1 represents an independent halogen atom;

m represents an integer of 0 to 2, n represents an integer of 0 to 3, l represents an integer of 0 to 3, and (m + n + l) is 3;

in the formula (2), R^2 to R^5 each independently represent an alkyl group having 1 to 20 carbon atoms, or an aryl group having 6 to 20 carbon atoms, and may have a branch structure in a part thereof, and each of R^2 to R^5,

if present in a plural number, is respectively independent;

X^2 and X^3 represent an independent halogen atom;

m represents an integer of 0 to 2, n represents an integer of 0 to 3, l represents an integer of 0 to 3, and (m + n + l) is 3; and

a represents an integer of 0 to 2, b represents an integer of 0 to 3, c represents an integer of 0 to 3, and (a + b + c) is 3.

[Claim 11]

The branching agent according to claim 10, wherein the branching agent is a compound represented by the formula (1) wherein R^1 is a hydrogen atom and m is 0.

[Claim 12]

The branching agent according to claim 10, wherein the branching agent is a compound represented by the formula (2) wherein m is 0, and b is 0.

[Claim 13]

The branching agent according to claim 10, wherein the branching agent is a compound represented by the formula (1) wherein R^1 is a hydrogen atom, m is 0, and l is 0.

[Claim 14]

The branching agent according to claim 10, wherein the branching agent is a compound represented by the formula (2) wherein m is 0, l is 0, a is 0, and b is 0.

[Claim 15]

The branching agent according to claim 10, wherein the branching agent is a compound represented by the formula (1) wherein R^1 is a hydrogen atom, l is 0, and n is 3.

[Claim 16]

An extended conjugated diene-based polymer comprising:

100 parts by mass of the conjugated diene-based polymer according to any one of claims 1 to 9; and

1 to 60 parts by mass of at least one selected from the group consisting of an extender oil, a liquid rubber, and a resin.

[Claim 17]

A rubber composition comprising:

a rubber component; and

5.0 parts by mass or more and 150 parts by mass or less of a filler based on 100 parts by mass of the rubber component,

wherein the rubber component contains, based on a total amount of the rubber component, 10% by mass or more of the conjugated diene-based polymer according to any one of claims 1 to 9, or the extended conjugated diene-based polymer according to claim 16.

[Claim 18]

A tire comprising the rubber composition according to claim 17.