What is claimed is:

1. A conjugated diene based polymer comprising a monomer unit derived from at least one conjugated diene selected from 1,3-butadiene and isoprene and a monomer unit derived from a compound having two conjugated carbon-carbon double bonds and one or more non-conjugated carbon-carbon double bond.

2. The conjugated diene based polymer according to claim 1, wherein the content of the monomer unit derived from the compound having two conjugated carbon-carbon double bonds and one or more non-conjugated carbon-carbon double bond is not less than 0.01% by weight and not more than 30% by weight where the total amount of the monomer units contained in the conjugated diene based polymer is taken as 100% by weight.

3. The conjugated diene based polymer according to claim 1, wherein the compound having two conjugated carbon-carbon double bonds and one or more non-conjugated carbon-carbon double bond is 7-methyl-3-methylene-1,6-octadiene.

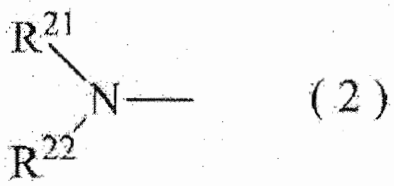
4. A polymer composition comprising the conjugated diene based polymer according to claim 1 and a reinforcing agent, wherein the content of the reinforcing agent is not less than 10 parts by weight and not more than 150 parts by weight per 100 parts by weight of the conjugated diene based polymer.

5. A method for producing a conjugated diene based polymer, wherein the method comprises a step of polymerizing monomer components in a hydrocarbon solvent with an alkali metal catalyst, the monomer components comprising at least one conjugated diene selected from 1,3-butadiene and isoprene and a compound having two conjugated carbon-carbon double bonds and one or more non-conjugated carbon-carbon double bond.

6. The method according to claim 5, wherein the amount of the compound having two conjugated carbon-carbon double bonds and one or more non-conjugated carbon-carbon double bond to be used is not less than 0.01% by weight and not more than 30% by weight where the total amount of the monomer components to be used is taken as 100% by weight.

What is claimed is:

1. A conjugated diene based polymer comprising a monomer unit derived from at least one conjugated diene selected from 1,3-butadiene and isoprene, and not more than 5% by weight of a monomer unit derived from a compound having two conjugated carbon-carbon double bonds and one or more non-conjugated carbon-carbon double bonds, and wherein the conjugated diene based polymer is modified with a group represented by the following formula (2):



(2)

wherein R^{21} and R^{22} are each independently selected from the group consisting of an optionally substituted hydrocarbyl group and a trihydrocarbylsilyl group, or R^{1} and R^{22} are bonded together and a group in which R^{21} is bonded to R^{22} represents a hydrocarbylene group optionally having one or more atoms selected from the group consisting of a nitrogen atom and an oxygen atom.

2. The conjugated diene based polymer according to claim 1, wherein the content of the monomer unit derived from the compound having two conjugated carbon-carbon double bonds and one or more non-conjugated carbon-carbon double bonds is not less than 0.01% by weight and not more than 5% by weight where the total amount of the monomer units contained in the conjugated diene based polymer is taken as 100% by weight.

3. The conjugated diene based polymer according to claim 1, wherein the compound having two conjugated carbon-carbon

double bonds and one or more non-conjugated carbon-carbon double bond is 7-methyl-3-methylene-1,6-octadiene.

4. A polymer composition comprising the conjugated diene based polymer according to claim 1 and a reinforcing agent, wherein the content of the reinforcing agent is not less than 10 parts by weight and not more than 150 parts by weight per 100 parts by weight of the conjugated diene based polymer.

5. A method for producing a conjugated diene based polymer, wherein the method comprises:

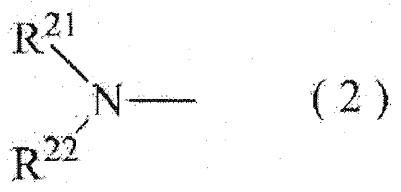
(a) a step of polymerizing monomer components comprising at least one conjugated diene selected from 1,3-butadiene and isoprene, and a compound having two conjugated carbon-carbon double bonds and one or more non-conjugated carbon-carbon double bonds in a solvent to form a conjugated diene based polymer, a step of adding a compound having a group represented by the following formula (2) to the solvent, and a step of reacting an active terminal of the conjugated diene based polymer with the compound having a group represented by the following formula (2); or

(b) a step of polymerizing monomer components comprising the at least one conjugated diene and a compound having two conjugated carbon-carbon double bonds and one or more non-conjugated carbon-carbon double bonds using an organic alkali metal compound having a group represented by the following formula (2); or

(c) a step of polymerizing monomer components comprising the at least one conjugated diene and a compound having two conjugated carbon-carbon double bonds and one or more non-conjugated carbon-carbon double bonds using a secondary amino compound and an organic alkali metal compound having a group represented by the following formula (2); or

(d) a step of polymerizing monomer components comprising the at least one conjugated diene, a compound having two

conjugated carbon-carbon double bonds and one or more non-conjugated carbon-carbon double bonds, and a vinyl-based monomer having a group, represented by the following formula (2):



(2)

,

wherein R^{21} and R^{22} are each independently selected from the group consisting of an optionally substituted hydrocarbyl group and a trihydrocarbylsilyl group, or R^{21} and R^{22} are bonded together and a group in which R^{21} is bonded to R^{22} represents a hydrocarbylene group optionally having one or more atoms selected from the group consisting of a nitrogen atom and an oxygen atom, and

wherein the amount of the compound having two conjugated carbon-carbon double bonds and one or more non-conjugated carbon-carbon double bonds to be used is not more than 5% by weight where the total amount of the monomer components to be used is taken as 100% by weight.

6. The method according to claim 5, wherein the amount of the compound having two conjugated carbon-carbon double bonds and one or more non-conjugated carbon-carbon double bonds to be used is not less than 0.01% by weight and not more than 5% by weight where the total amount of the monomer components to be used is taken as 100% by weight.