DESCRIPTION

TITLE OF INVENTION: STABILIZED CONJUGATED DIENE-BASED POLYMER

TECHNICAL FIELD

[0001] The present invention relates to a stabilized conjugated diene polymer.

BACKGROUND ART

[0002] Due to recent increasing environmental concerns, a polymer for use in tires for automobiles which can provide excellent fuel efficiency is required. Tires prepared from a rubber composition containing a conjugated diene polymer and silica as a filler have lower heat buildup than that of tires prepared from traditional rubber compositions containing carbon black, and thus have more excellent fuel efficiency.

[0003] As a conjugated diene polymer which is used to form such a tire, Patent Document 1 discloses a conjugated diene rubber having a modifying structure derived from a siloxane compound at at least one terminal of a polymer chain containing a conjugated diene monomer unit and a monomer unit of a vinyl compound having a functional group interactive with silica.

RELATED ART DOCUMENT

PATENT DOCUMENT

[0004] Patent Document 1: WO 2019/073829

SUMMARY

PROBLEMS TO BE SOLVED

[0005] The conjugated diene rubber prepared by the technique disclosed in Patent Document 1 can provide a cross-linked rubber having

excellently low heat buildup, high wet grip, and high operation stability, and also has excellent processability. However, there is a room for improvement in the Mooney viscosity stability during storage.

[0006] The present invention has been made in consideration of the above problems, and an object of the present invention is to provide a stabilized conjugated diene polymer having excellent Mooney viscosity stability during storage.

MEANS FOR SOLVING PROBLEMS

[0007] The present inventor, who has conducted extensive research to achieve the above object, has found that the above object can be achieved by adding specific stabilizers in combination to a conjugated diene polymer (A) containing a tin atom and/or a silicon atom, and has completed the present invention.

[0007a] In an aspect, there is provided a stabilized conjugated diene polymer comprising a conjugated diene polymer containing at least one of a tin atom and a silicon atom, two or more hindered phenol-based stabilizers, and an aromatic amine-based stabilizer.

[0007b] In another aspect, there is provided a rubber composition comprising the stabilized conjugated diene polymer as defined above and a filler.

[0007c] In another aspect, there is provided a cross-linkable rubber composition comprising the rubber composition as defined above and a cross-linking agent.

[0007d] In another aspect, there is provided a cross-linked rubber prepared by cross-linking the cross-linkable rubber composition as defined above.

[0007e] In another aspect, there is provided a tire comprising the cross-linked rubber as defined above.

[0008] Specifically, the present disclosure provides a stabilized conjugated diene polymer as described below.

[1] A stabilized conjugated diene polymer comprising a conjugated diene polymer containing at least one of a tin atom and a silicon atom, two or more hindered phenol-based stabilizers, and an aromatic amine-based stabilizer.

[2] The stabilized conjugated diene polymer according to [1], wherein the conjugated diene polymer contains a tin atom.

[3] The stabilized conjugated diene polymer according to [1] or [2], wherein the conjugated diene polymer contains a functional group interactive with silica.

[4] The stabilized conjugated diene polymer according to any one of [1] to [3], wherein the conjugated diene polymer contains a unit of a vinyl compound containing a functional group interactive with silica.

[5] The stabilized conjugated diene polymer according to [4], wherein the unit of a vinyl compound containing a functional group

based stabilizers (B) to the content of the aromatic amine-based stabilizer (C) is 10:1 to 0.1:1 as a weight ratio represented by "hindered phenol-based stabilizers (B):aromatic amine-based stabilizer (C)".

[0009] The present disclosure also provides a rubber composition, a cross-linkable rubber composition, a cross-linked rubber, and a tire as described below.

[11] A rubber composition comprising the stabilized conjugated diene polymer according to any one of [1] to [10] and a filler.

[12] A cross-linkable rubber composition comprising the rubber composition according to [11] and a cross-linking agent.

[13] A cross-linked rubber prepared by cross-linking the cross-linkable rubber composition according to [12].

[14] A tire comprising the cross-linked rubber according to [13].

EFFECTS

[0010] The present disclosure provides a stabilized conjugated diene polymer having excellent Mooney viscosity stability during storage.

DESCRIPTION OF EMBODIMENTS

[0011] <Stabilized conjugated diene polymer>

The stabilized conjugated diene polymer according to the present invention is characterized by comprising a conjugated diene polymer containing a tin atom and/or a silicon atom, two or more hindered phenol-based stabilizers, and an aromatic amine-based stabilizer.

[0012] [Conjugated diene polymer (A)]

The conjugated diene polymer (A) used in the present invention contains at least a conjugated diene monomer unit as a monomer unit, and also contains a tin atom and/or a silicon atom in the polymer chain.

[0013] The conjugated diene polymer (A) may contain either a tin atom