(3) A total value of an area of the peak (A) and an area of the peak (B) is 70% or more of a total area of the molecular weight distribution curve; and

(4) An absolute value of difference between a glass transition temperature (Tg(A)) of a conjugated diene-based polymer in the peak (A) and a glass transition temperature (Tg(B)) of a conjugated diene-based polymer in the peak (B) is 2°C to 30°C.

RELATED ART DOCUMENTS

PATENT DOCUMENTS

[0004] Patent Document 1: WO 2018/147312

SUMMARY

PROBLEM TO BE SOLVED

[0005] The conjugated diene-based polymer obtained by the technique disclosed in Patent Document 1 has insufficient processability, and a cross-linked rubber prepared from this has wet grip properties having room for improvement.

[0006] The present disclosure has been made in consideration of such problems. An object of the present disclosure is to provide a conjugated diene-based polymer which has high processability and can provide a cross-linked rubber having high wet grip properties, high driving stability, high tensile strength, and excellent elongation. Another object of the present disclosure is to provide a conjugated diene-based polymer composition, a cross-linked rubber, and a tire prepared from such a conjugated diene-based polymer, and a method of producing such a conjugated diene-based polymer.

MEANS FOR SOLVING PROBLEMS

[0007] The present inventors, who have conducted extensive research to achieve the above objects, have found that the above objects can be

achieved by a conjugated diene-based polymer comprising a conjugated diene

monomer unit and an aromatic vinyl monomer unit by controlling a difference ΔA between an aromatic vinyl monomer unit content (A_L) in a low molecular weight component (L) contained in the conjugated diene-based polymer and an aromatic vinyl monomer unit content (A_H) in a high molecular weight component (H) contained in the conjugated diene-based polymer to fall within a specific range, and thus have completed the present disclosure.

[0007a] In an aspect, there is provided a conjugated diene-based polymer comprising a conjugated diene monomer unit and an aromatic vinyl monomer unit,

wherein a difference ΔA between an aromatic vinyl monomer unit content (A_L) in a low molecular weight component (L) contained in the conjugated diene-based polymer and an aromatic vinyl monomer unit content (A_H) in a high molecular weight component (H) contained in the conjugated diene-based polymer "difference ΔA = aromatic vinyl monomer unit content (A_L) - aromatic vinyl monomer unit content (A_H)" is 2% by weight or more.

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

[0007c] In another aspect, there is provided a cross-linked rubber prepared by cross-linking the conjugated diene-based polymer composition as defined above.

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

[0007e] In another aspect, there is provided a method of producing the conjugated diene-based polymer as defined above, the method comprising:

a first step of copolymerizing monomers containing a conjugated diene monomer and an aromatic vinyl monomer in a solvent in the presence of a polymerization initiator;

a second step of deactivating part of polymerization active terminals contained in a polymerization reaction system by adding a polymerization reaction terminator in such an amount that it deactivates 10 to 95 mol% of the polymerization active terminals when a polymerization conversion ratio reaches 5% or more and less than 95%, and then continuing a polymerization reaction; and

a third step of terminating the polymerization reaction by adding a polymerization reaction terminator after the polymerization conversion ratio reaches 95% or more.

[0008] Specifically, the present disclosure provides the following modes.

[1] A conjugated diene-based polymer comprising a conjugated diene monomer unit and an aromatic vinyl monomer unit,

wherein a difference ΔA between an aromatic vinyl monomer unit content (A_L) in a low molecular weight component (L) contained in the conjugated diene-based polymer and an aromatic vinyl monomer unit content (A_H) in a high molecular weight component (H) contained in the conjugated diene-based polymer "difference ΔA = aromatic vinyl monomer unit content (A_L) - aromatic vinyl monomer unit content (A_H)" is 2% by weight or more.

[2] The conjugated diene-based polymer according to [1], wherein the conjugated diene-based polymer shows two or more peaks in a molecular weight distribution curve obtained with measurement by gel permeation chromatography,

the two or more peaks include a low molecular weight molecule peak (LP) having a peak top molecular weight of 80,000 to 200,000, and

the conjugated diene-based polymer has an ionic strength index of 70% or less.

[3] The conjugated diene-based polymer according to [2], wherein the peak top molecular weight of the low molecular weight molecule peak (LP) is 100,000 to 190,000.

[4] The conjugated diene-based polymer according to [2] or [3], wherein the proportion of a polymer component corresponding to the low molecular weight molecule peak (LP) is 10 to 65% by weight.

weight, 40 to 70% by weight of the total amount of the conjugated diene monomer and the aromatic vinyl monomer copolymerizable with the conjugated diene monomer is added to the polymerization reaction system before the start of the polymerization reaction.

[12] The method of producing the conjugated diene-based polymer according to any one of [9] to [11], wherein the polymerization reaction terminator is added in the second step in such an amount that it deactivates 20 to 95 mol% of polymerization active terminals contained in the polymerization reaction system.

[13] The method of producing the conjugated diene-based polymer according to any one of [9] to [12], wherein the polymerization reaction terminator is added in the second step at a timing at which the polymerization conversion ratio is 15 to 75%.

EFFECTS

[0009] The present disclosure provides a conjugated diene-based polymer which has high processability and can provide a cross-linked rubber having high wet grip properties, high driving stability, high tensile strength, and excellent elongation. The present disclosure also provides a conjugated diene-based polymer composition, a cross-linked rubber, and a tire prepared from such a conjugated diene-based polymer and a method of producing such a conjugated diene-based polymer.

DESCRIPTION OF EMBODIMENTS

[0010] <Conjugated diene-based polymer>

The conjugated diene-based polymer according to the present invention is a conjugated diene-based polymer comprising a conjugated diene monomer unit and an aromatic vinyl monomer unit,

wherein a difference ΔA between an aromatic vinyl monomer unit content (A_L) in a low molecular weight component (L) contained in the conjugated