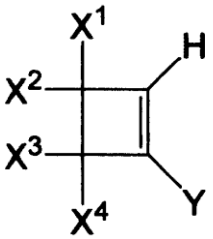
The method according to Item 1, wherein X^5 represents a hydrogen atom, X^6 represents a halogen atom, and the elimination reaction is a dehydrohalogenation reaction.

[0013]

Item 3.

A composition comprising a cyclobutene represented by formula (1):

[0014]



(1)

[0015]

wherein X^1, X^2, X^3, and X^4 are the same or different and represent a hydrogen atom, a halogen atom, or a perfluoroalkyl group, and Y represents a halogen atom, wherein the cyclobutene represented by formula (1) is present in an amount of 95 mol% or more based on the total amount of the composition taken as 100 mol%.

[0016]

Item 4.

The composition according to Item 3, wherein 1H-perfluorocyclobutene (1H-cC_4F_5H) is present in an amount of 99 mol% or more, and 3H-perfluorocyclobutene (3H-cC_4F_5H) is present in an amount of 1 mol% or less.

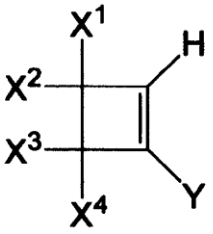
[0017]

Item 5.

The composition according to Item 3 or 4, which is for use in cleaning gas, etching gas, deposit gas, or a building block for organic synthesis.

[0017a]

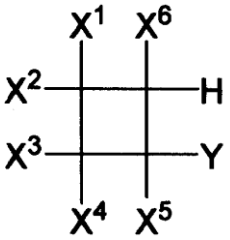
In one aspect, there is provided a method for producing a cyclobutene represented by formula (1):



(1)

wherein X^1, X^2, X^3, and X^4 are the same or different and represent a hydrogen atom, a halogen atom, or a perfluoroalkyl group, and Y represents a halogen atom,

the method comprising subjecting to an elimination reaction a cyclobutane represented by formula (2):



(2)

wherein X^1, X^2, X^3, X^4, and Y are as defined above, and X^5 and X^6 are the same or different and represent a hydrogen atom, a halogen atom, or a perfluoroalkyl group,

wherein the elimination reaction is performed in the presence of catalyst in a gas phase,

wherein the catalyst is at least one member selected from the group consisting of:

(i) activated carbon;

(ii) at least one metal catalyst selected from the group consisting of chromium oxide, fluorinated chromium oxide, chromium fluoride, aluminum oxide, fluorinated aluminum oxide, iron oxide, fluorinated iron oxide, nickel oxide, fluorinated nickel oxide, magnesium oxide, and fluorinated magnesium oxide;

(iii) at least one metal catalyst supported on a carrier:

the carrier is at least one member selected from the group consisting of at least one carbon selected from the group consisting of activated carbon, amorphous carbon, graphite, and diamond; alumina; zirconia; silica; and titania,

the metal catalyst supported on the carrier is at least one member selected from the group consisting of chromium oxide, fluorinated chromium oxide, chromium fluoride, aluminum oxide, fluorinated aluminum oxide, aluminum fluoride, iron oxide, fluorinated iron oxide, iron fluoride, nickel oxide, fluorinated nickel oxide, nickel fluoride, magnesium oxide, fluorinated magnesium oxide, and magnesium fluoride.

Advantageous Effects of Invention

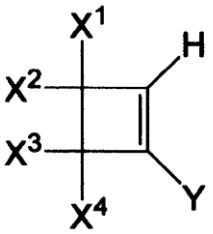
[0018]

The present disclosure enables the production of a

CLAIMS

[Claim 1]

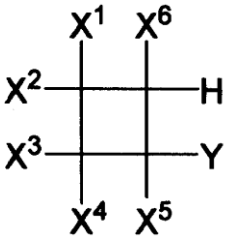
A method for producing a cyclobutene represented by formula (1):



(1)

wherein X^1, X^2, X^3, and X^4 are the same or different and represent a hydrogen atom, a halogen atom, or a perfluoroalkyl group, and Y represents a halogen atom,

the method comprising subjecting to an elimination reaction a cyclobutane represented by formula (2):



(2)

wherein X^1, X^2, X^3, X^4, and Y are as defined above, and X^5 and X^6 are the same or different and represent a hydrogen atom, a halogen atom, or a perfluoroalkyl group,

wherein the elimination reaction is performed in the presence of catalyst in a gas phase,

wherein the catalyst is at least one member selected from the group consisting of:

(i) activated carbon;

(ii) at least one metal catalyst selected from the group consisting of chromium oxide, fluorinated chromium oxide, chromium fluoride, aluminum oxide, fluorinated aluminum oxide,

iron oxide, fluorinated iron oxide, nickel oxide, fluorinated nickel oxide, magnesium oxide, and fluorinated magnesium oxide;

(iii) at least one metal catalyst supported on a carrier:

the carrier is at least one member selected from the group consisting of at least one carbon selected from the group consisting of activated carbon, amorphous carbon, graphite, and diamond; alumina; zirconia; silica; and titania,

the metal catalyst supported on the carrier is at least one member selected from the group consisting of chromium oxide, fluorinated chromium oxide, chromium fluoride, aluminum oxide, fluorinated aluminum oxide, aluminum fluoride, iron oxide, fluorinated iron oxide, iron fluoride, nickel oxide, fluorinated nickel oxide, nickel fluoride, magnesium oxide, fluorinated magnesium oxide, and magnesium fluoride.

[Claim 2]

The method according to claim 1, wherein X^5 represents a hydrogen atom, X^6 represents a halogen atom, and the elimination reaction is a dehydrohalogenation reaction.

[Claim 3]]

The method according to claim 1 or 2, wherein the elimination reaction is performed in gas-phase continuous flow mode.