Non patent literature 3: Journal of Natural Gas Chemistry, 2008, Vol. 17, p. 69

Non patent literature 4: Applied Catalysis A: General, 2005, Vol. 295, p. 79

Non patent literature 5: Journal of Catalysis, 1999, Vol. 185, p. 386

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Non patent literature 7: Journal of Catalysis, 1999, Vol. 188, p. 393

Non patent literature 8: Applied Catalysis A: General, 2004, Vol. 275, p. 183

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Non patent literature 10: Catalysis Letter, 1998, Vol. 50, p. 31

Summary

[0015a]

In a first aspect of the present disclosure, there is provided a catalyst composition for producing an aromatic hydrocarbon by contacting at least one hydrocarbon with the catalyst composition, comprising molybdenum, a second metal that is ~~not molybdenum but is a metal capable of forming a composite oxide together with molybdenum~~

~~oxide~~ at least one metal selected from the group consisting of Sc, Y and lanthanoids (La, Ce, Pr, Nd, Pm, Sm, Gd, Tb, Dy, Ho, Er, Tm, Yb or Lu), and a crystalline metallosilicate,

wherein;

the content of molybdenum is 1 to 20% by weight in terms of a molybdenum atom and the content of the second metal is 5 to 20% by weight in terms of a metal atom and

a ratio (y/x) of the content (y mol) of the second metal atom to the content (x mol) of the molybdenum atom is 0.4 to 15.

[0015b]

In a second aspect of the present disclosure, there is provided a process for producing an aromatic hydrocarbon comprising a step of contacting at least one hydrocarbon with the catalyst composition according to the first aspect.

Technical Problem

[0016]

It is an object of the present invention to provide a catalyst composition which is excellent in stability under the conditions of catalyst regeneration wherein the catalyst composition is heated in an oxygen-containing atmosphere. It is another object of the present

CLAIMS

1. A catalyst composition for producing an aromatic hydrocarbon by contacting at least one hydrocarbon with the catalyst composition, comprising molybdenum, a second metal that is ~~not molybdenum but is a metal capable of forming a composite oxide together with molybdenum oxide~~ at least one metal selected from the group consisting of Sc, Y and lanthanoids (La, Ce, Pr, Nd, Pm, Sm, Gd, Tb, Dy, Ho, Er, Tm, Yb or Lu), and a crystalline metallosilicate,

wherein;

the content of molybdenum is 1 to 20% by weight in terms of a molybdenum atom and

the content of the second metal is 5 to 20% by weight in terms of a metal atom and

a ratio (y/x) of the content (y mol) of the second metal atom to the content (x mol) of the molybdenum atom is 0.4 to 15.

~~2. The catalyst composition according to Claim 1, wherein the second metal is at least one metal selected from the group consisting of Sc, Y and lanthanoids (La, Ce, Pr, Nd, Pm, Sm, Gd, Tb, Dy, Ho, Er, Tm, Yb or Lu).~~

~~3~~2. The catalyst composition according to Claim 1 ~~or 2~~, wherein a relative weight reduction ratio (C) defined by the following formula is 60% or less;

C=100 A/B;

wherein;

A is a weight variation in terms of %, which is defined as a deviation in weight at a temperature of 900 °C based on a weight measured at a temperature of 650 °C wherein the measurement is conducted by heating the catalyst composition with a differential thermogravimetric

analyzer at a temperature increase rate of 5 °C per minute from a room temperature to 900 °C in air atmosphere, wherein the weight of

the catalyst composition is normalized such that the weight of the catalyst composition at 650 °C is 100 %, and

B is molybdenum oxide content in terms of wt% to the total wt% of a catalyst composition (100 wt%) in which both of the molybdenum and the second metal are in the form of oxides.

43. The catalyst composition according to Claim 1 ~~or 2~~, wherein in an X-ray diffraction analysis of said catalyst composition, at least one peak attributed to a composite oxide phase of molybdenum and the second metal, which is different from a peak attributed to a single phase of each of molybdenum oxide and the second metal oxide, is observed.

54. The catalyst composition according to Claim 1 ~~or 2~~, wherein in a Raman spectroscopy the ratio (Y/X) of a maximum peak strength of the spectrum in the range of 980 to 1020 cm^{-1} (Y) to a maximum peak strength of the spectrum in the range of 900 to 970 cm^{-1} (X) is 0.8 or lower.

65. The catalyst composition according to any one of Claims ~~1 to~~ 51 to 4, wherein the second metal is at least one metal selected from the group consisting of Ce, Pr, Tb and Y.

76. The catalyst composition according to any one of Claims ~~1 to~~

~~5~~1 to 4, wherein the second metal is at least one metal selected from the group consisting of Ce, Pr and Tb.

~~8. The catalyst composition according to any one of Claims 1 to~~

~~6, wherein the ratio (y/x) of the content (y mol) of the second metal atom to the content (x mol) of the molybdenum atom is 0.4 to 15.~~

~~97~~. A process for producing an aromatic hydrocarbon comprising a step of contacting at least one hydrocarbon with the catalyst composition according to any one of Claims ~~1 to 9~~1 to 6.

~~10~~8. The process for producing an aromatic hydrocarbon according to Claim ~~9~~7, wherein the hydrocarbon is an aliphatic hydrocarbon having 1 to 6 carbon atoms.

~~11~~9. The process for producing an aromatic hydrocarbon according to Claim ~~9 or 10~~7 or 8, which further comprises a regeneration step of heating the catalyst under an oxygen-containing atmosphere to a temperature of 400 to 700°C.

~~12~~10. The process for producing an aromatic hydrocarbon according to Claim ~~9 or 10~~7 or 8, which further comprises a regeneration step of heating the catalyst under an oxygen-containing atmosphere to a temperature of 600 to 700°C.