CLAIMS

1. A method for producing aromatic hydrocarbons, the method comprising the steps of:

obtaining a thermally cracked heavy oil from an ethylene production apparatus;

hydrogenation-treating the thermally cracked heavy oil to obtain a hydrogenation-treated oil; and

bringing a feedstock containing the hydrogenation-treated oil into contact with a catalyst for monocyclic aromatic hydrocarbon production containing a crystalline aluminosilicate to induce a cracking reforming reaction,

wherein a raw material having an end point of the distillation characteristics of 400°C or lower is used as the feedstock, and

the reaction pressure employed when the feedstock is brought into contact with the catalyst for monocyclic aromatic hydrocarbon production to react therewith in the cracking reforming reaction step is set to 0.1 MPaG to 1.5 MPaG.

2. The method for producing aromatic hydrocarbons according to Claim 1, wherein the hydrogenation-treated oil has a content of polycyclic aromatic hydrocarbons with 2 or more rings of 50 mass% or less, and a content of monocyclic aromatic hydrocarbons of 30 mass% or more.

3. The method for producing aromatic hydrocarbons according to Claim 1 or 2, wherein the hydrogenation-treated oil has a content of hydrocarbons having an indane skeleton and an indene skeleton of 5 mass% or more.

4. The method for producing aromatic hydrocarbons according to any one of Claims 1 to 3, wherein the step of obtaining a hydrogenation-treated oil comprises the steps of:

separating by distillation the thermally cracked heavy oil; and

hydrogenation-treating the thermally cracked heavy oil thus separated by distillation in the presence of hydrogen by using a catalyst for hydrogenation treatment, under the conditions of a hydrogen partial pressure of 0.7 MPa to 20 MPa, a LHSV of 0.05 h^{-1} to 2 h^{-1}, a reaction temperature of 200°C to 450°C, and a hydrogen/oil ratio of 100 NL/L to 2000 NL/L.

5. The method for producing aromatic hydrocarbons according to any one of Claims 1 to 3, wherein the step of obtaining a hydrogenation-treated oil comprises the steps of:

hydrogenation-treating the thermally cracked heavy oil in the presence of hydrogen by using a catalyst for hydrogenation treatment, under the conditions of a hydrogen partial pressure of 0.7 MPa to 20 MPa, a LHSV of 0.05 h^{-1} to 2 h^{-1}, a reaction temperature of 200°C to 450°C, and a hydrogen/oil ratio of 100 NL/L to 2000 NL/L; and

separating by distillation the hydrogenation-treated thermally cracked heavy oil.

6. The method for producing aromatic hydrocarbons according to Claim 4 or 5, wherein the catalyst for hydrogenation treatment is a catalyst obtainable by supporting at least one metal selected from the metals of Group 6 of the Periodic Table of Elements in an amount of 10 mass% to 30 mass%, and at least one metal selected from the metals of Group 8 to Group 10 of the Periodic Table of Elements in an amount of 1 mass% to 7 mass%, relative to the total catalyst mass, on an inorganic carrier containing aluminum

oxide.

7. The method for producing aromatic hydrocarbons according to Claim 6, wherein the at least one metal selected from the metals of Group 6 of the Periodic Table of Elements is molybdenum and/or tungsten, and the at least one metal selected from the metals of Group 8 to Group 10 of the Periodic Table of Elements is cobalt and/or nickel.

8. The method for producing aromatic hydrocarbons according to any one of Claims 1 to 7, wherein the catalyst for monocyclic aromatic hydrocarbon production contains gallium and/or zinc.

9. The method for producing aromatic hydrocarbons according to any one of Claims 1 to 8, wherein the catalyst for monocyclic aromatic hydrocarbon production contains phosphorus.

CLAIMS

1. A method for producing aromatic hydrocarbons in which a feedstock containing a hydrogenation-treated oil, which is generated from a thermally-cracked heavy oil obtained from an ethylene production apparatus, is brought into contact with a catalyst for monocyclic aromatic hydrocarbon production containing a crystalline aluminosilicate, wherein

a raw material having an end point of the distillation characteristics of 400°C or lower is used as the feedstock, and

the feedstock is brought into contact with the catalyst for monocyclic aromatic hydrocarbon production under a reaction pressure of 0.1 MPaG to 1.0 MPaG.

2. The method for producing aromatic hydrocarbons according to Claim 1, wherein the hydrogenation-treated oil, which is generated from the thermally-cracked heavy oil obtained from the ethylene production apparatus, has a content of polycyclic aromatic hydrocarbons with 2 or more rings of 50 mass% or less, and a content of monocyclic aromatic hydrocarbons of 30 mass% or more.

3. The method for producing aromatic hydrocarbons according to Claim 1 or 2, wherein the hydrogenation-treated oil, which is generated from the thermally-cracked heavy oil obtained from the ethylene production apparatus, has a content of hydrocarbons having an indane skeleton and an indene skeleton of 5 mass% or more.

4. The method for producing aromatic hydrocarbons according to any one of Claims 1 to 3, wherein the hydrogenation-treated oil, which is generated from the thermally-cracked heavy oil obtained from the ethylene production apparatus, is obtained through:

separating by distillation the thermally-cracked heavy oil obtained from the ethylene

production apparatus; and then

hydrogenation-treating the thermally-cracked heavy oil in the presence of hydrogen by using a catalyst for hydrogenation treatment, under the conditions of a hydrogen partial pressure of 2 MPa to 20 MPa, a LHSV of 0.05 h^{-1} to 2 h^{-1}, a reaction temperature of 200°C to 450°C, and a hydrogen/oil ratio of 100 NL/L to 2000 NL/L.

5. The method for producing aromatic hydrocarbons according to any one of Claims 1 to 3, wherein the hydrogenation-treated oil, which is generated from the thermally-cracked heavy oil obtained from the ethylene production apparatus, is obtained through:

hydrogenation-treating the thermally-cracked heavy oil obtained from the ethylene production apparatus in the presence of hydrogen by using a catalyst for hydrogenation treatment, under the conditions of a hydrogen partial pressure of 2 MPa to 20 MPa, a LHSV of 0.05 h^{-1} to 2 h^{-1}, a reaction temperature of 200°C to 450°C, and a hydrogen/oil ratio of 100 NL/L to 2000 NL/L; and then

separating by distillation the hydrogenation-treated thermally-cracked heavy oil.

6. The method for producing aromatic hydrocarbons according to Claim 4 or 5, wherein the catalyst for hydrogenation treatment is a catalyst obtainable by supporting at least one metal selected from the elements in Group 6 of the Periodic Table in an amount of 10 mass% to 30 mass%, and at least one metal selected from the elements in Group 8 to Group 10 of the Periodic Table in an amount of 1 mass% to 7 mass%, relative to the total catalyst mass, on an inorganic carrier containing aluminum oxide.

7. The method for producing aromatic hydrocarbons according to Claim 6, wherein the at least one metal selected from the elements in Group 6 of the Periodic Table is molybdenum and/or tungsten, and the at least one metal selected from the elements in Group 8 to Group 10 of the Periodic Table is cobalt and/or nickel.

8. The method for producing aromatic hydrocarbons according to any one of Claims 1 to 7, wherein the catalyst for monocyclic aromatic hydrocarbon production contains gallium and/or zinc.

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9. The method for producing aromatic hydrocarbons according to any one of Claims 1 to 8, wherein the catalyst for monocyclic aromatic hydrocarbon production contains phosphorus.