CLAIMS

[Claim 1] A method for producing a liquid hydrocarbon fuel comprising a first reaction step and a second reaction step given below:

the first reaction step: hydrocracking a raw material oil in the presence of a hydrocracking reaction catalyst

at a feeding pressure of hydrogen of from 0.2 to 0.95 MPa,

a liquid hourly space velocity of a liquid volume of the raw material oil of from 0.05 to 0.5 hr^{-1}, and

a ratio of a flow rate of the hydrogen to a flow rate of the raw material oil of from 100 to 1,000 NL of the hydrogen per 1 L of the raw material oil,

wherein the hydrocracking reaction catalyst is a catalyst comprising one or more members selected from Group 1 and/or Group 2 given below:

Group 1: a solid acid catalyst including zeolite and/or silica-alumina; and

Group 2: a catalyst in which one or more metal components selected from the group consisting of ruthenium, nickel, molybdenum, and copper are supported to the solid acid catalyst, to give a cracked solution; and

the second reaction step: hydrogenating the cracked solution in the presence of a hydrogenation reaction catalyst

at a feeding pressure of hydrogen of from 0.2 to 0.95 MPa,

a liquid hourly space velocity of a liquid volume of the cracked solution of from 0.2 to 5 hr^{-1}, and

a ratio of a flow rate of the hydrogen to a flow rate of the cracked solution of

from 100 to 1,000 NL of the hydrogen per 1 L of the cracked solution, wherein the hydrogenation reaction catalyst is a catalyst comprising one or more members selected from Group 3 and/or Group 4 given below:

Group 3: a solid acid catalyst comprising silica, zeolite and/or silica-alumina to which one or more metal components selected from the group consisting of nickel, palladium, and copper are supported; and

Group 4: an MgO-containing silica to which one or more metal components selected from the group consisting of nickel, palladium, and copper are supported, to give a liquid hydrocarbon fuel.

[Claim 2] The method for producing a liquid hydrocarbon fuel according to claim 1, wherein the raw material oil is one or more members selected from the group consisting of rapeseed oil, cottonseed oil, palm oil, coconut oil, sunflower oil, soybean oil, corn oil, rice oil, oil palm oil, coconut oil, Jatropha oil, olive oil, waste cooking oils, dark oils, animal oils, fats and oils from seaweeds and algae, biomass retort oils, a hydrocarbon component in petroleum oil having the number of carbon atoms larger than gas oil, and various waste oils.

[Claim 3] The method for producing a liquid hydrocarbon fuel according to claim 1 or 2, wherein the solid acid catalyst is one or more solid acid catalysts selected from the group consisting of silica, silica-alumina, zeolite, silica-zirconia, alumina-zirconia, and titania.

[Claim 4] The method for producing a liquid hydrocarbon fuel according to any one of claims 1 to 3, wherein the hydrocracking reaction catalyst or hydrogenation reaction catalyst further comprises a metal supported thereto, wherein the metal is one or more members selected from the group

consisting of platinum, iridium, iron, cobalt, rhenium, and magnesium.

[Claim 5] The method for producing a liquid hydrocarbon fuel according to any one of claims 1 to 4, wherein the liquid hydrocarbon fuel is a mixture ~~of the kerosene equivalent products and the gas oil equivalent products~~comprising:

a kerosene equivalent product including more than 50% by weight of a first hydrocarbons having a first range of carbon atoms from C8 to C14, and

a gas oil equivalent product including more than 50% by weight of second hydrocarbons having a second range of carbon atoms from C15 to C20.