consumption, compared to a process converting C18 hydrocarbons to C17 hydrocarbons by hydrocracking.

SUMMARY

In one aspect, there is provided a method for producing a hydrocarbon mixture having an end-boiling point according to ASTM D86 below 300°C and being suitable for use as an aviation fuel from a decarboxylation feedstock comprising fatty acid esters and/or triglycerides and wherein at least 40% of the carbon atoms of the decarboxylation feedstock are contained in C18 side-chains, by converting said decarboxylation feedstock in the presence of a material catalytically selective towards decarboxylation, such that the ratio between deoxygenation by formation of carbon oxides and deoxygenation by formation of water is at least 1.5:1, as measured by the ratio of C17 paraffins to C18 paraffins in the deoxygenated hydrocarbon mixture,
where decarboxylation conditions involve a temperature in the interval 250-400°C, a pressure in the interval 30-150 bar, and a liquid hourly space velocity (LHSV) in the interval 0.1-2 and wherein the material catalytically active in decarboxylation comprises nickel, supported on a carrier comprising one or more refractory oxides and
wherein the material catalytically active in decarboxylation comprises more than 5 wt% Ni and less than 70 wt% Ni and less than 1 wt% Co, Mo and W.

DETAILED DESCRIPTION

In the following the term stage shall be used for a section of the process, in which no separation is performed.

In the following the abbreviation ppm_{molar} shall be used to signify atomic parts per million.

In the following the abbreviation ppm_v shall be used to signify volumetric parts per million, e.g. molar gas concentration.

In the following the abbreviation %wt shall be used to signify weight percentage.

In the following the term renewable feedstock or hydrocarbon shall be used to indicate a feedstock or hydrocarbon originating from biological sources or waste recycle. Recycled waste of fossil origin such as plastic shall also be construed as renewable.

In the following the term deoxygenation shall be used to signify removal of oxygen from oxygenates by formation of water in the presence of hydrogen, as well as removal of oxygen from oxygenates by formation of carbon oxides in the presence of hydrogen.

In the following the term hydrodeoxygenation shall be used to signify removal of oxygen from oxygenates by formation of water in the presence of hydrogen.

In the following the term decarboxylation shall be used to signify removal of oxygen from oxygenates by formation of carbon oxides in the presence of hydrogen.

In the following, the term topology of a molecular sieve is used in the sense described in the "Atlas of Zeolite Framework Types," Sixth Revised Edition, Elsevier, 2007, and three letter framework type codes are used in accordance herewith.

Claims:

1. A method for producing a hydrocarbon mixture having an end-boiling point according to ASTM D86 below 300°C and being suitable for use as an aviation fuel from a decarboxylation feedstock comprising fatty acid esters and/or triglycerides and wherein at least 40% of the carbon atoms of the decarboxylation feedstock are contained in C18 side-chains, by converting said decarboxylation feedstock in the presence of a material catalytically selective towards decarboxylation, such that the ratio between deoxygenation by formation of carbon oxides and deoxygenation by formation of water is at least 1.5:1, as measured by the ratio of C17 paraffins to C18 paraffins in the deoxygenated hydrocarbon mixture,
where decarboxylation conditions involve a temperature in the interval 250-400°C, a pressure in the interval 30-150 bar, and a liquid hourly space velocity (LHSV) in the interval 0.1-2 and wherein the material catalytically active in decarboxylation comprises nickel, supported on a carrier comprising one or more refractory oxides and
wherein the material catalytically active in decarboxylation comprises more than 5 wt% Ni and less than 70 wt% Ni and less than 1 wt% Co, Mo and W.

2. A method according to claim 1, wherein the material catalytically active in decarboxylation comprises less than 0.1 wt% Co, Mo and W.

3. A method according to claim 1 or 2, wherein the refractory oxide is alumina, silica or titania.

4. A method according to claim 1, 2 or 3, wherein at least 60% of the carbon atoms of said decarboxylation feedstock is contained in C18 side chains.

5. A method according to claim 1, 2, 3 or 4, wherein said decarboxylation feedstock is a saturated decarboxylation feedstock, comprising less than 10 wt% olefinic oxygenates.

6. A method according to claim 5, wherein said saturated decarboxylation feedstock is provided as the product of a hydrogenation reaction, receiving a raw

oxygenate feedstock comprising at least 10 wt% olefinic oxygenates and selectively hydrogenating olefinic oxygenates under olefin pre-hydrogenation conditions, to provide said saturated decarboxylation feedstock.

7. A method according to claim 6, where pre-hydrogenation conditions involve a temperature in the interval from 150 °C to 220°C, a pressure in the interval 30-150 bar, and a liquid hourly space velocity (LHSV) in the interval 0.1-2 and wherein the material catalytically active in pre-hydrogenation comprises 5 wt% to 20 wt% molybdenum or tungsten, in combination with 1 wt% to 5 wt% nickel and/or cobalt, supported on a carrier comprising one or more refractory oxides.

8. A method according to claim 1, 2, 3, 4, 5, 6 or 7 comprising separating the deoxygenated hydrocarbon mixture according to boiling point, to provide a hydrocracked intermediate aviation fuel having T10 below 205°C and final boiling point below 300°C according to ASTM D86.

9. A method according to claim 1, 2, 3, 4, 5, 6, 7 or 8, wherein the total volume of hydrogen sulfide relative to the volume of molecular hydrogen in the gas phase of the total stream directed to contact the material catalytically active in decarboxylation is at least 50 ppm_v, 100 ppm_v or 200 ppm_v.

10. A method according to claim 9, wherein the total volume of hydrogen sulfide is at least 100 ppm_v.

11. A method according to claim 9 or 10, wherein the total volume of hydrogen sulfide is at least 200 ppm_v.

12. A method according to claim 9, 10 or 11, wherein the hydrogen sulfide originates from an added stream comprising one or more sulfur compounds.

13. A method according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 or 12, wherein said decarboxylation feedstock comprises at least 50%wt triglycerides or fatty acids.

14. A method according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 or 13, further comprising a hydrocracking step, under active hydrocracking conditions, where the deoxygenated hydrocarbon mixture or a mixture derived therefrom is directed to contact a material catalytically active in hydrocracking.

15. A method according to claim 14, wherein hydrocracking conditions involve a temperature in the interval 300-450°C, a pressure in the interval 30-150 bar, and a liquid hourly space velocity (LHSV) in the interval 0.5-8 and wherein the material catalytically active in hydrocracking comprises an active metal taken from the group comprising platinum, palladium, nickel, cobalt, tungsten and molybdenum, an acidic support being one or more of an amorphous acidic oxides being silica-alumina or a molecular sieve showing cracking activity, having a topology taken from the group of MFI, BEA and FAU and an amorphous refractory support comprising one or more oxides taken from the group comprising alumina, silica and titania.

16. A method according to claim 15, wherein the material catalytically active in hydrocracking comprises one or more elemental noble metals taken from the group comprising platinum or palladium.

17. A method according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 or 16, further comprising subjecting the deoxygenated hydrocarbon mixture to an isomerization step, under active isomerization conditions involves a temperature in the interval 250-350°C, a pressure in the interval 30-150 bar, and a liquid hourly space velocity (LHSV) in the interval 0.5-8 and wherein the material catalytically active in isomerization comprises an active metal taken from the group comprising platinum, palladium, nickel, cobalt, tungsten and molybdenum, a molecular sieve showing isomerization selectivity, having a topology taken from the group of MOR, FER, MRE, MWW, AEL, TON and MTT and an amorphous refractory support comprising one or more oxides taken from the group comprising alumina, silica and titania.

18. A method according to claim 17, wherein the material catalytically active in isomerization comprises one or more elemental noble metals taken from the group comprising platinum or palladium.

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