Claims

1. A method for combined production of aviation fuel and base oil both of biological origin, the method comprising

providing feedstock of biological origin containing fatty acids and/or esters of fatty acids, and

subjecting the feedstock to hydrotreatment for removal of oxygen, and to isomerization for branching of hydrocarbon chain of hydrotreated feedstock to obtain a paraffinic hydrocarbon intermediate having a carbon number distribution in the range of C10 to C20, and wherein the hydrotreatment is performed in the presence of one or more catalyst(s) selected from hydrogenation metal on a support, such as a catalyst selected from a group consisting of Pd, Pt, Ni, Co, Mo, Ru, Rh, W or any combination thereof, under hydrogen pressure from 10 to 150 bar, and at a temperature from 200-400 °C, and wherein the isomerization is performed in the presence of one or more catalyst(s) comprising a Group VIII metal on a support, and the support is selected from silica, alumina, clays, titanium oxide, boron oxide, zirconia, which can be used alone or as a mixture, preferably silica and/or alumina, at a temperature from 200-500 °C, and at a pressure of 10-150 bar, and

fractionating said paraffinic hydrocarbon intermediate into at least two fractions,

a lighter fraction fulfilling the specification ASTM D7566-20 Annex A2 for aviation fuel, and

a heavier fraction fulfilling the following specifications for a base oil component, comprising

- saturates (ASTM D2007) more than 90 wt-%;
- sulfur content (ASTM D 1552/D2622/D3120/D4294/D4927) 0.03 wt-% or less;
- kinematic viscosity 100 °C (EN ISO 3104/ASTMD445) between 1.3-3.5 mm^2/s;
- kinematic viscosity 40 °C (EN ISO 3104/ASTMD445) between 3.4-13 mm2/s;

- pour point (ASTM D 97) less than -24 °C;
- flash point (ENISO2719/ASTMD93) more than 120 °C; and

wherein the production capacity of the lighter fraction and the production capacity of the heavier fraction are adjusted by selection of process conditions, preferably the isomerization process conditions, wherein yield of the lighter fraction is 60-90 wt-% of the total weight of the formed fractions, and yield of the heavier fraction is 10-40 wt-% of the total weight of the formed fractions, and

wherein a combined yield of the two fractions is at least 98 wt-% of the paraffinic hydrocarbon intermediate of biological origin.

2. The method according to claim 1, wherein the hydrotreatment, preferably hydrodeoxygenation, is performed under a hydrogen pressure from 20-120 bar, such as 30-100 bar, and at a temperature 250-380 °C, such as 280-360 °C.

3. The method according to claim 1 or 2, wherein the hydrotreatment is performed in the presence of a catalyst comprising one or more catalyst(s) selected from CoMo, NiMo, NiW, CoNiMo on a support, for example an alumina support.

4. The method according to any one of the claims 1-3, wherein the isomerization, preferably hydroisomerization, is performed at a temperature of 280-370 °C, and at a pressure of 20-50 bar.

5. The method according to any one of claims 1-4, wherein the feedstock is subjected, after hydrotreatment and isomerization, to stabilization at a pressure lower than the isomerization pressure.

6. The method according to claim 5, wherein during stabilization an overhead fraction comprising hydrocarbons in the naphtha range (C4-C8) is formed, and preferably an amount of 60 wt-% or more, such as 90 wt-% or more, such as from 90 to 95 wt-%, of the formed hydrocarbons in the naphtha range at the stabilization column overhead, is recycled back to the stabilization.

7. A base oil component of biological origin obtained by the method according to any one of claims 1-6, comprising 0-5 wt-% of n-paraffins in C16-C20 range and 90-97 wt-% isoparaffins in C16-C20 range, from 21 wt-% to 45 wt-% of C17 paraffins and from 50 wt-% to 75 wt-% of C18 paraffins.

8. The base oil component of biological origin according to claim 7, wherein the base oil component comprises 0-8 wt-% of n-paraffins in C17-C19 range, preferably 0-5 wt-%.

9. The base oil component of biological origin according to claim 7 or 8, wherein the base oil component comprises 85-95 wt-% isoparaffins in C17-C20 range, preferably 88-95 wt-%.

10. The base oil component of biological origin according to any one of claims 7-9, wherein the base oil component comprises from 21 wt-% to 43 wt-% of C17 paraffins.

11. The base oil component of biological origin according to any one of claims 7 -10, wherein the base oil component comprises from 45 wt-% to 75 wt-% of C18 paraffins, preferably from 53 wt% to 75 wt-%.

12. The base oil component of biological origin according to any one of claims 7 -11, wherein the base oil component comprises 0-4 wt-% of n-paraffins in C17-C18 range and 85-90 wt% isoparaffins in C17-C18 range.

13. The base oil component of biological origin according to any one of claims 7-12, wherein the base component has one or more of the following properties

- Aromatic hydrocarbon content less than 1.5 wt-%, such as less than 0.5 wt% as determined by IR spectroscopy;
- Sulphur content (ASTM D 3120) less than 100 ppm, such as less than 50 ppm, or even less than 5 ppm;
- Saturate (ASTM D2007) content more than 99 wt-%, such as more than 99.5 wt-% or even more than 99.6 wt-%;
- Polycyclic aromatic (IP 346) content less than 0.5 wt-%, such as less than 0.3 wt-%;
- Kinematic viscosity at 100 °C (KV100, ASTM D445) between 1.35-3.0 mm^2/s, such as between 1.35-2.9 mm^2/s;
- Kinematic viscosity at 40 °C (KV40, ASTM D445) between 3.5-10 mm^2/s, such as between 3.5-7.0 mm^2/s, such as between 3.5-5.0;

- Kinematic viscosity at -20 °C (KV-20, ASTM D445) less than 135 mm^2/s, such as less than 125 mm^2/s, such as less than 40 mm^2/s;
- Pour point (ASTM D 93) less than -35 °C, less than -42 °C; less than -48 °C, or even less than -50 °C;
- Flash point (ASTM D 93) more than 130 °C, such as more than 135 °C;
- Percentage of modern carbon (pMC, ASTM 6866) more than 95%.

14. Use of the base oil component of biological origin of any one of the claims 7-13, for manufacturing a base oil blend fulfilling the API Group II or III or V specifications for base oil.

15. Use of the base oil component according to any one of claims 7-13 for manufacturing a base oil blend comprising said base oil component and at least one additional base oil component selected from fossil base oil, and synthetic base oil and combination thereof.

16. The use according to claim 15, wherein the blend comprises from 5 wt-% to 20 wt-% of said base oil component, the remainder comprising at least one additional base oil component selected from fossil base oil and synthetic base oil; or the remainder comprising at least one fossil base oil and at least one synthetic base oil.

17. Use of the base oil component of biological origin according to any one of claims 7-13 or the blend according to any one of the claims 14-16 for manufacturing a lubricating oil formulation, comprising at least one auxiliary agent; wherein the lubricating oil formulation preferably comprises 80-99.8 wt-% of the base oil component of biological origin or the base oil blend.

18. A lubricating oil composition comprising the base oil component of biological origin according to any one of the claims 7-13 and/or the base oil blend according to any one of claims 14-16, and at least one auxiliary agent.