CLAIMS

1. A system for producing diesel fuel and jet fuel using Fischer-Tropsch synthetic oil, the system comprising a hydrofining reactor (A), a hot high-pressure separator (B), a first rectifying column (C), a hydrocracking reactor (D), a hydroisomerization reactor (E), a second rectifying column (F), a first mixing chamber (I), a second mixing chamber (H), and a condensation fractionating column (G); wherein

the hydrofining reactor (A) comprises a raw material inlet (A1) and a hydrofining product outlet (A2);

the hot high-pressure separator (B) comprises a separated oil outlet (B2) and a hydrofining product inlet (B1) which is connected to the hydrofining product outlet (A2);

the first rectifying column (C) comprises a tail oil fraction outlet (C2), a diesel fraction outlet (C3) and a separated oil inlet (C1) which is connected to the separated oil outlet (B2);

the first mixing chamber (I) comprises a circulating hydrogen inlet (I2), a first mixture outlet (I1) and a tail oil fraction inlet (I3) which is connected to the tail oil fraction outlet (C2);

the hydrocracking reactor (D) comprises a hydrocracking product outlet (D1) and a first mixture inlet (D2) which is connected to the first mixture outlet (I1);

the second mixture chamber (H) comprises a renewal hydrogen inlet (H2), a second mixture outlet (H1) and a diesel fraction inlet (H3) connected to the diesel fraction outlet (C3);

the hydroisomerization reactor (E) comprises a hydroisomerization product outlet (E1) and a second mixture inlet which connects (E2) with the second mixture outlet (H1);

the second rectifying column (F) comprises an aviation kerosene outlet (F4), a diesel outlet (F5) and a hydrogenation product mixture inlet (F1) which is connected to hydrocracking product outlet (D1) and the hydroisomerization product outlet (E1);

the condensation fractionating column (G) comprises a gas inlet (G1), a fourth gas outlet (G2) and a liquid outlet (G3);

the hot high-pressure separator (B) further comprises a first gas outlet (B3); the first rectifying column (C) further comprises a second gas outlet (C5); the second rectifying column (F) further comprises a third gas outlet (F2);

the first gas outlet (B3) of the hot high-pressure separator (B), the second gas outlet (C5) of the first rectifying column (C) and the third gas outlet (F2) of the second rectifying column (F) each connect to the gas inlet (G1) of the condensation fractionating column (G); the fourth gas outlet (G2) of the condensation fractionating column (G) is connected to the raw material inlet (A1) of the hydrofining reactor (A);

the second rectifying column (F) further comprises a naphtha fraction outlet (F3) and a discharge pipe (F6) for cyclic utilization of the tail oil fraction and paraffin; the first rectifying column (C) further comprises a naphtha fraction outlet (C4); the discharge pipe (F6) of the tail oil fraction and paraffin is connected to the tail oil inlet (I3) of the first mixing chamber (I); the discharge pipe (F6) of the tail oil fraction and paraffin is connected to a paraffin outlet (F7) through a tee joint; and

a pipe M between the fourth gas outlet (G2) and the raw material inlet (A1) of the hydrofining reactor (A) is connected to an oil mixture inlet pipe (J) and a circulating hydrogen inlet pipe (K).

2. A method for producing diesel fuel and jet fuel using the system of claim 1, the method comprising:

1) transporting Fischer-Tropsch synthetic oil to the pipe (M) through the

oil mixture inlet pipe (J), introducing circulating hydrogen to the pipe (M) through the circulating hydrogen inlet pipe (K), mixing and inputting the circulating hydrogen and the Fischer-Tropsch synthetic oil to the hydrofining reactor (A) via the raw material inlet (A1) for a hydrofining reaction in the presence of a hydrofining catalyst to produce hydrofining products;

2) allowing the hydrofining products to enter the hot high-pressure separator (B) via the hydrofining product inlet (B1) to produce separated oil and cracking oil gas; discharging the separated oil via the separated oil outlet (B2) and introducing the separated oil to the first rectifying column (C) via the separated oil inlet (C1), discharging the cracking oil gas via the first gas outlet (B3) of the hot high-pressure separator (B);

3) rectifying the separated oil in 2) to yield tail oil, diesel and naphtha fractions and cracking oil gas in the first rectifying column (C); discharging the tail oil fraction through the tail oil fraction outlet (C2) and allowing the tail oil fraction to enter the first mixing chamber (I) through the tail oil fraction inlet(I3); allowing the circulating hydrogen to enter the first mixing chamber (I) through the circulating hydrogen inlet (I2); mixing the tail oil fraction and the circulating hydrogen in the first mixing chamber (I) and allowing a resulting mixture to enter the hydrocracking reactor (D) through the first mixture outlet (I1) and the first mixture inlet (D2); discharging the diesel fraction through the diesel fraction outlet (C3) and allowing the diesel fraction to enter the second mixing chamber (H) through the diesel fraction inlet (H3); introducing renewal hydrogen to enter the second mixing chamber (H) through the renewal hydrogen inlet (H2); mixing the diesel fraction and the renewal hydrogen in the second mixing chamber (H) and allowing a resulting mixture to enter the hydroisomerization reactor (E) through the second mixture outlet (H1) and the second mixture inlet (E2); and discharging the cracking oil gas through the second gas outlet (C5);

4) hydrocracking the tail oil fraction and the circulating hydrogen in the hydrocracking reactor (D) to produce hydrocracking products; hydroisomerizing the diesel fraction and the renewal hydrogen in the hydroisomerization reactor (E)

to produce hydroisomerization products;

5) discharging the hydrocracking products through the hydrocracking product outlet (D1); discharging the hydroisomerization products through the hydroisomerization product outlet (E1); mixing the hydrocracking products and the hydroisomerization products and allowing a resulting mixture to enter the second rectifying column (F) through the hydrogenation product mixture inlet (F1); rectifying the mixture of the hydrocracking products and the hydroisomerization products to produce cracking oil gas, aviation kerosene, diesel, paraffin, the tail oil fraction and the naphtha fraction in the second rectifying column (F); guiding the aviation kerosene to an aviation kerosene tank through the aviation kerosene outlet (F4), guiding the diesel to a diesel tank through the diesel outlet (F5); guiding the naphtha fraction to a naphtha fraction tank through the naphtha fraction outlet (F3);

when aviation kerosene and diesel are the main products, guiding a mixture of the tail oil fraction and paraffin along the discharge pipe (F6) of the tail oil fraction and paraffin to enter the first mixing chamber (I) via the tail oil fraction inlet (I3) to mix with the circulating hydrogen, and then enter the hydrocracking reactor (D); when paraffin is the main product, discharging the mixture of the tail oil fraction and paraffin through the paraffin outlet (F7); and discharging the produced cracking oil gas through the third gas outlet (F2) of the second rectifying column (F); and

6) mixing and introducing the discharged cracking oil gas in 2), 3) and 5) to the condensation fractionating column (G) via the gas inlet (G1), to yield gas and liquid; discharging the gas via the fourth gas outlet (G2) and then allowing the gas to enter the hydrofining reactor (A) via the raw material inlet (A1) for cyclic utilization; and discharging the liquid via the liquid outlet (G3) and then converging the liquid with the naphtha fraction to yield ethylene pyrolysis materials.

3. The method of claim 2, **characterized in that** the Fischer-Tropsch synthetic oil

used in 1) comprises the low-temperature Fischer-Tropsch synthetic oil, or high-temperature Fischer-Tropsch synthetic oil, or part and/or full-range distillates of the oil mixture of the low-temperature Fischer-Tropsch synthetic oil and high-temperature Fischer-Tropsch synthetic oil.

4. The method of claim 2, **characterized in that** in 1), reaction conditions in the hydrofining reactor (A) are as follows: a reaction temperature ranges between 260□ and 400□; a reaction pressure ranges between 2.0 MPa and 20.0 MPa; a liquid hourly space velocity ranges between 0.5 h^{-1} and 3.0 h^{-1}; and a volume ratio of hydrogen to oil ranges between 500: 1 and 2000: 1.

5. The method of claim 2, **characterized in that** in 4), reaction conditions in the hydroisomerization reactor (E) are as follows: a reaction temperature ranges between 280□ and 400□; a reaction pressure ranges between 4.0 MPa and 15.0 MPa; a liquid hourly space velocity ranges between 0.5 h^{-1} and 3.0 h^{-1}; and a volume ratio of hydrogen to oil ranges between 500: 1 and 2000: 1.

6. The method of claim 2, **characterized in that** in 4), reaction conditions in the hydrocracking reactor (D) are as follows: a reaction temperature ranges between 280□ and 450□; a reaction pressure ranges between 5.0 MPa and 20.0 MPa; a liquid hourly space velocity ranges between 0.5 h^{-1} and 3.0 h^{-1}; and a volume ratio of hydrogen to oil ranges between 500: 1 and 2000: 1.

7. The method of claim 4, **characterized in that** in 1), the reaction conditions in the hydrofining reactor (A) are as follows: the reaction temperature ranges between 280□ and 390□; the reaction pressure ranges between 4.0 MPa and 15.0 MPa; the liquid hourly space velocity ranges between 0.5 h^{-1} and 2.0 h^{-1}; and the volume ratio of hydrogen to oil ranges between 500: 1 and 1500: 1.

8. The method of claim 5, **characterized in that** in 4), the reaction conditions in the

hydroisomerization reactor (E) are as follows: the reaction temperature ranges between 280□ and 370□; the reaction pressure ranges between 5.0 MPa and 12.0 MPa; the liquid hourly space velocity ranges between 0.5 h^{-1} and 2.0 h^{-1}; and the volume ratio of hydrogen to oil ranges between 500: 1 and 1500: 1.

9. The method of claim 6, **characterized in that** the in 4), reaction conditions in the hydrocracking reactor (D) are as follows: the reaction temperature ranges between 320□ and 400□; the reaction pressure ranges between 5.0 MPa and 15.0 MPa; the liquid hourly space velocity ranges between 0.5 h^{-1} and 2.0 h^{-1}; and the volume ratio of hydrogen to oil ranges between 700: 1 and 1500: 1.