

CLAIMS:

1. A process for producing C_4^+ hydrocarbons, the process comprising:
 - (a) in a reforming stage, contacting a gaseous mixture comprising methane and CO_2 with a reforming catalyst to produce a synthesis gas product; and
 - (b) converting H_2 and CO in the synthesis gas product to hydrocarbons, including the C_4^+ hydrocarbons, provided in a Fischer-Tropsch (FT) product,wherein the C_4^+ hydrocarbons in the FT product include a wax fraction comprising normal C_{20}^+ hydrocarbons.
2. The process of claim 1, wherein step (b) is carried out with an FT feed having a substantially same molar $H_2:CO$ molar ratio as in the synthesis gas product, produced in step (a).
3. The process of claim 1, wherein, prior to step (b), water is condensed from the synthesis gas product, produced in step (a).
4. The process of claim 1, wherein the process further comprises:
 - (c) converting at least about 75% of the normal C_{20}^+ hydrocarbons to normal or branched C_4-C_{19} hydrocarbons, provided in a hydroisomerization/hydrocracking product.
5. The process of claim 1, wherein the gaseous mixture further comprises H_2O and step (a) is carried out in a CO_2 -steam reforming reactor at a temperature from about $677^\circ C$ ($1250^\circ F$) to about $788^\circ C$ ($1450^\circ F$), a gauge pressure from about 0 kPa (0 psig) to about 517 kPa (75 psig), and a weight hourly space velocity (WHSV) from about 0.1 hr^{-1} to about 2.5 hr^{-1} .
6. The process of claim 4, wherein the hydroisomerization/hydrocracking product comprises less than about 1 wt-% hydrocarbons that are solid at room temperature.
7. The process of claim 4, wherein step (c) is carried out in a finishing reactor comprising a dewaxing catalyst having hydroisomerization and/or hydrocracking activity with respect to normal C_{20}^+ hydrocarbons.

8. The process of claim 7, wherein the dewaxing catalyst comprises a dewaxing active metal deposited on a solid acidic support.
9. The process of claim 8, wherein the dewaxing active metal is selected from Group 13 or Group 14 of the Periodic Table.
10. The process of claim 9, wherein the dewaxing active metal is gallium.
11. The process of claim 8, wherein the acidic support is a zeolitic or non-zeolitic molecular sieve having at least about 15 mmol/gram of acid sites, measured by temperature programmed desorption (TPD) of ammonia.
12. The process of claim 11, wherein the acidic support is a zeolitic molecular sieve having a silica to alumina molar framework ratio of less than about 50.
13. The process of claim 12, wherein the zeolitic molecular sieve is ZSM-5.
14. The process of claim 4, wherein the finishing reactor is at a temperature from about 232°C (450°F) to about 399°C (750°F).
15. The process of claim 1, wherein at least a portion of the gaseous mixture comprises a hydrocarbon-containing feedstock component selected from the group consisting of a hydropyrolysis gaseous mixture, natural gas comprising CO₂, biogas obtained from bacterial digestion of organic waste, a hydrogen-depleted PSA tail gas, or a gaseous effluent from a bacterial fermentation stage.
16. A process for producing a renewable hydrocarbon fuel, the process comprising:
 - hydropyrolyzing a biomass-containing feedstock or biomass-derived feedstock with a hydrogen-containing feed gas stream in a hydropyrolysis section to generate (i) a hydropyrolysis gaseous mixture comprising methane and CO₂, and (ii) a substantially fully deoxygenated hydrocarbon liquid, and
 - contacting the hydropyrolysis gaseous mixture with a reforming catalyst comprising a noble metal on a solid support comprising cerium oxide to produce a synthesis gas product comprising H₂ and CO.

17. The process of claim 16, further comprising recycling at least a portion of (i) the synthesis gas product or (ii) an H₂-enriched portion thereof, to provide at least a portion of the hydrogen-containing feed gas stream.
18. The process of claim 16, further comprising converting the H₂ and CO in the synthesis gas product to hydrocarbons, including C₄⁺ hydrocarbons, in a Fischer-Tropsch (FT) product, to increase a yield of C₄⁺ hydrocarbons from the biomass-containing feedstock or biomass-derived feedstock, relative to a baseline yield in the absence of converting the H₂ and CO in the synthesis gas product to hydrocarbons.
19. The process of claim 16, wherein the hydropyrolysis section includes stages of both
- (i) catalytic hydropyrolysis of the biomass-containing feedstock or biomass-derived feedstock in the presence of the hydrogen-containing feed gas stream and a deoxygenating catalyst to provide a hydropyrolysis reactor vapor, and
 - (ii) catalytic hydroconversion of at least a portion of the hydropyrolysis reactor vapor in the presence of a hydroconversion catalyst to provide the hydropyrolysis gaseous mixture and the substantially fully deoxygenated hydrocarbon liquid.
20. A system for producing C₄⁺ hydrocarbons from methane, the apparatus comprising:
- a reforming reactor configured to connect, via a system input, to a source of a gaseous mixture comprising methane and CO₂;
 - a synthesis gas product cooler configured to receive the synthesis gas product from the reforming reactor;
 - a compressor configured to receive a cooled synthesis gas product from the synthesis gas product cooler;
 - an FT reactor configured to receive an FT feed from the compressor;
 - an optional FT product heater configured to receive an FT product from the FT reactor;
 - a finishing reactor configured to receive a heated FT product from the FT product heater;
 - and
 - a separator configured to receive a finishing product from the finishing reactor and further configured to provide, via a system vapor output and a system liquid output, vapor and liquid fractions, respectively, of the finishing product.

21. The system of claim 20, further comprising a condenser configured to condense liquid water from the cooled synthesis gas product, wherein the compressor is configured for receiving the cooled synthesis gas product from the condenser.
22. The system of claim 20, wherein the system is transportable.