CLAIMS:

1. A method for processing a hydrocarbon feedstock comprised of a mineral oil component and a biomass oil component to form at least one liquid motor fuel product, such method comprising:

a) contacting the hydrocarbon feedstock and a first hydrogen treat gas stream with a hydrodesulfurization/deoxygenation catalyst in a first reaction zone of a hydroprocessing reactor under first hydroprocessing conditions sufficient to produce a first reaction zone effluent which contains less organically bound sulfur than the hydrocarbon feedstock and less organically bound oxygen than the hydrocarbon feedstock;

b) contacting the first reaction zone effluent with a dewaxing catalyst in a second reaction zone of the hydroprocessing reactor under second hydroprocessing conditions sufficient to produce a second reaction zone effluent;

c) separating a gas phase product stream from the second reaction zone effluent to produce a reactor effluent product which has a lower sulfur content and a lower oxygen content than the hydrocarbon feedstock; and

d) producing at least one liquid motor fuel product from at least a portion of the reactor effluent product;

wherein the dewaxing catalyst comprises a zeolitic support, at least one active metal compound comprising one or more of Group VIB metals and Group VIII metals deposited thereon, and a hydrophilic, hydrothermally-stable binder comprising one or more of: (A) an oxide, carbide, nitride, phosphide, sulfide, or combination thereof of one or more metals selected from titanium, zirconium, vanadium, molybdenum, manganese, and cerium, (B) activated carbon, and (C) carbon on which is deposited one or more metals selected from titanium,

~~zirconium, vanadium, molybdenum, manganese, and cerium.~~

2. The method of claim 1, wherein the binder of the dewaxing catalyst comprises zirconia, vanadia, titania, molybdenum oxide, manganese oxide, cerium oxide, carbon, or a combination thereof.

3. The method of claim 1, wherein the binder of the dewaxing catalyst comprises one or metals selected from titanium, zirconium, vanadium, molybdenum, manganese, and cerium.

4. The method of claim 3, wherein the binder of the dewaxing catalyst comprises one or metals selected from titanium, zirconium, and cerium.

5. The method of claim 4, wherein the binder of the dewaxing catalyst consists essentially of one or metals selected from titanium, zirconium, and cerium.

6. The method of claim 3, wherein the binder of the dewaxing catalyst comprises titanium.

7. The method of claim 6, wherein the binder of the dewaxing catalyst consists essentially of titanium.

8. The method of any prior claim, wherein the zeolitic support of the dewaxing catalyst comprises ZSM-5, ZSM-22, ZSM-23, ZSM-35, ZSM-48, zeolite Beta, zeolite Y, USY, mordenite, ferrierite, or a combination thereof.

9. The method of any prior claim, wherein the hydrodesulfurization/deoxygenation catalyst comprises at least one Group VIII metal oxide selected from Fe, Co and Ni, and at least one Group VIB metal oxide ~~selected from Mo and W.~~

10. The method of any prior claim, wherein the hydrodesulfurization/deoxygenation catalyst further comprises a support selected from alumina, silica, and silica-alumina.

11. The method of any prior claim, wherein the first hydroprocessing conditions include one or more of: a weight average bed temperature (WABT) from about 500°F (about 260°C) to about 800°F (about 427°C); a total pressure from about 300 psig (about 2.1 MPag) to about 3000 psig (about 20.7 MPag); an LHSV from about 0.1 hr^{-1} to about 20 hr^{-1}; a hydrogen treat gas rate from about 500 scf/bbl (about 89 m^3/m^3) to about 10000 scf/bbl (about 1781 m^3/m^3), and a water partial pressure of greater than 2 psia.

12. The method of any prior claim, wherein the second hydroprocessing conditions include one or more of: a weight average bed temperature (WABT) from about 500°F (about 260°C) to about 800°F (about 427°C); a total pressure from about 300 psig (about 2.1 MPag) to about 3000 psig (about 20.7 MPag); an LHSV from about 0.1 hr^{-1} to about 20 hr^{-1}, and a water partial pressure of greater than 2 psia.

13. The method of any prior claim, wherein the hydrocarbon feedstock contains from 80 wt% to about 98 wt% of the mineral oil component and from 2 wt% to about 20 wt% of the biomass oil component, the mineral oil component contains at least 500 ppmw sulfur, and the reactor effluent product contains less than 100 ppmw sulfur.

14. The method of any prior claim, wherein the biomass oil component is derived from algae.

15. The method of any prior claim, wherein the hydrocarbon feedstock has a T5 boiling point of at least about 200°F (93°C) and a T95 boiling point of less than about 800°F (427°C).

16. The method of any prior claim, wherein the at least one liquid motor fuel product is produced from a diesel boiling range fraction of the reactor effluent product wherein the cloud point of the diesel boiling range fraction is less than 0°C, wherein the reactor effluent product has a branched (iso-) paraffin content that is at least 20 wt% higher than the branched (iso-) paraffin content of the hydrocarbon feedstock.

17. The method of any one of claims 1 and 8-16, wherein the dewaxing catalyst is comprised of ZSM-48, and a Group VIII metal selected from palladium and platinum with a metal content from about 0.1 wt% to about 3.0 wt% based on the weight of the ZSM-48, and a titania binder.

18. The method of any one of claims 1 and 8-16, wherein the dewaxing catalyst is comprised of ZSM-48, a Group VIII non-noble metal selected from nickel, cobalt, and iron with a Group VIII metals content from about 0.5 wt% to about 20 wt% based on the weight of the ZSM-48, a Group VIB metal selected from molybdenum and tungsten with a Group VIB metals content from about 3 wt% to about 25 wt%, based on the weight of the ZSM-48, and a titania binder.

CLAIMS:

1. A method for processing a hydrocarbon feedstock comprised of a mineral oil component and a biomass oil component to form at least one liquid motor fuel product, such method comprising:

a) contacting the hydrocarbon feedstock having a branched (iso-) paraffin content and a first hydrogen treat gas stream with a hydrodesulfurization/deoxygenation catalyst in a first reaction zone of a hydroprocessing reactor under first hydroprocessing conditions sufficient to produce a first reaction zone effluent which contains less organically bound sulfur than the hydrocarbon feedstock and less organically bound oxygen than the hydrocarbon feedstock;

b) contacting the first reaction zone effluent with a dewaxing catalyst in a second reaction zone of the hydroprocessing reactor under second hydroprocessing conditions sufficient to produce a second reaction zone effluent;

c) separating a gas phase product stream from the second reaction zone effluent to produce a reactor effluent product which has a lower sulfur content and a lower oxygen content than the hydrocarbon feedstock; and

d) producing at least one liquid motor fuel product from at least a portion of the reactor effluent product, wherein the at least one liquid motor fuel product is produced from a diesel boiling range fraction of the reactor effluent product wherein the cloud point of the diesel boiling range fraction is less than 0°C and which reactor effluent product has a branched (iso-) paraffin content that is at least 20 wt% higher than the branched (iso-) paraffin content of the hydrocarbon feedstock;

wherein the dewaxing catalyst comprises a zeolitic support selected from ZSM-5, ZSM-22, ZSM-23, ZSM-35, ZSM-48, zeolite Beta, zeolite Y, USY, mordenite, ferrierite, or a combination thereof, at least one active metal compound comprising one or more of Group VIB metals and Group VIII metals deposited thereon, and a hydrophilic, hydrothermally-stable binder comprising titanium and optionally activated carbon,

wherein the hydrodesulfurization/deoxygenation catalyst comprises at least one Group VIII metal oxide selected from Fe, Co and Ni, at least one Group VIB metal oxide selected from Mo and W, and a support selected from alumina, silica, and silica-alumina,

wherein the first hydroprocessing conditions include one or more of: a weight average bed temperature (WABT) from about 500°F (about 260°C) to about 800°F (about 427°C); a

total pressure from about 300 psig (about 2.1 MPag) to about 3000 psig (about 20.7 MPag); an LHSV from about 0.1 hr^{-1} to about 20 hr^{-1}; and a hydrogen treat gas rate from about 500 scf/bbl (about 89 m^3/m^3) to about 10000 scf/bbl (about 1781 m^3/m^3),

wherein the second hydroprocessing conditions include one or more of: a weight average bed temperature (WABT) from about 500°F (about 260°C) to about 800°F (about 427°C); a total pressure from about 300 psig (about 2.1 MPag) to about 3000 psig (about 20.7 MPag); an LHSV from about 0.1 hr^{-1} to about 20 hr^{-1}.

2. The method of claim 1, wherein the binder of the dewaxing catalyst consists essentially of titanium.

3. The method of claim 1 or 2, wherein the water partial pressure in the first reaction zone effluent is greater than 2 psia.

4. The method of any one of claims 1 to 3, wherein the second hydroprocessing conditions further include a water partial pressure of greater than 5 psia.

5. The method of claim 4, wherein the second hydroprocessing conditions include the introduction of a second hydrogen treat gas at a treat gas rate from about 200 scf/bbl (about 36 m^3/m^3) to about 5000 scf/bbl (about 890 m^3/m^3).

6. The method of any one of the preceding claims, wherein the second reaction zone effluent is separated in a flash drum to produce the gas phase product stream and the reactor effluent product.

7. The method of any one of claims 1 to 5, wherein the second reaction zone effluent is separated in a fractionator tower to produce the gas phase product stream and the reactor effluent product.

8. The method of any one of the preceding claims, wherein the hydrocarbon feedstock contains from 80 wt% to about 98 wt% of the mineral oil component and from 2 wt% to about 20 wt% of the biomass oil component, the mineral oil component contains at least 500 ppmw sulfur, and the reactor effluent product contains less than 100 ppmw sulfur.

9. The method of claim 8, wherein the biomass oil component contains at least 2 wt% oxygen, and the reactor effluent product contains less than 1,000 ppmw oxygen.

10. The method of any one of the preceding claims, wherein the biomass oil component is derived from algae.

11. The method of any one of the preceding claims, wherein the hydrocarbon feedstock has a T5 boiling point of at least about 200°F (93°C) and a T95 boiling point of less than about 800°F (427°C).

12. The method of any one of the preceding claims, wherein the dewaxing catalyst is comprised of ZSM-48, and a Group VIII metal selected from palladium and platinum with a metal content from about 0.1 wt% to about 3.0 wt% based on the weight of the ZSM-48, and a titania binder.

13. The method of any one of the preceding claims, wherein the dewaxing catalyst is comprised of (i) ZSM-48, (ii) a Group VIII non-noble metal selected from nickel, cobalt, and iron with a Group VIII metals content from about 0.5 wt% to about 20 wt% based on the weight of the ZSM-48, (iii) a Group VIB metal selected from molybdenum and tungsten with a Group VIB metals content from about 3 wt% to about 25 wt%, based on the weight of the ZSM-48, and (iv) a titania binder.

14. The method of claim 7, wherein a naphtha boiling range fraction and a distillate boiling range fraction are drawn from the fractionator tower.

15. The method of claim 14, wherein the naphtha boiling range fraction from the fraction tower has a higher octane value than the naphtha boiling range fraction of the hydrocarbon feedstock.

16. The method of claim 15, wherein the distillate boiling range fraction from the fraction tower has a lower cloud point and a lower pour point than the distillate boiling range fraction of the hydrocarbon feedstock.

17. The method of claim 16, wherein the distillate boiling range fraction contains a diesel boiling range fraction with a cloud point of less than 0°C.