

CLAIMS:

1. A Group III base stock comprising:
at least about 30 wt % of naphthenes;
a viscosity index of from 120 up to 133; and
a ratio of molecules with multi-ring naphthenes to single ring naphthenes, $2R+N/1RN$, of less than 0.46.
2. The base stock of claim 1, wherein an amount of saturated hydrocarbons is 95 wt. % or higher.
3. The base stock of claims 1 or 2, wherein the Group III base stock comprises a KV100 of from 2 cSt to 14 cSt.
4. The base stock of any of claims 1-3, wherein the KV100 is from 4.0 cSt to 5.0 cSt.
5. The base stock of claims 1 or 2, wherein the KV100 is from 5.0 cSt to 12.0 cSt.
6. The base stock of claims 1, 2 or 5, wherein the KV100 is from 5.5 cSt to 11.0 cSt.
7. The base stock of any of claims 1-4, wherein the viscosity index is from 120-140 and is less than or equal to $142 \cdot (1 - 0.0025 \exp(8 \cdot (2R+N/1RN)))$.
8. The base stock of any of claims 1, 2, 5, or 6, wherein the viscosity index is from 120-145 and is less than or equal to $150.07 \cdot (1 - 0.0106 \cdot \exp(4.5 \cdot (2R+N/1RN)))$.
9. A lubricating composition comprising the base stock of any of claims 1-8 and an additive.
10. The lubricating composition of claim 9, wherein the base stock has a viscosity index that is from 120-140 and is less than or equal to $142 \cdot (1 - 0.0025 \exp(8 \cdot (2R+N/1RN)))$.
11. The lubricating composition of claim 10, wherein the base stock has a viscosity index that is from 120-145 and is less than or equal to $150.07 \cdot (1 - 0.0106 \cdot \exp(4.5 \cdot (2R+N/1RN)))$.
12. A method for producing a diesel fuel and a base stock, comprising:
providing a feed stock comprising a vacuum gas oil;
hydrotreating the feed stock under first effective hydrotreating conditions to produce a first hydrotreated effluent;
hydrotreating the first hydrotreated effluent under second effective hydrotreating conditions to produce a second hydrotreated effluent;
fractionating the second hydrotreated effluent to produce at least a first diesel product fraction and a bottoms fraction;
hydrocracking the bottoms fraction under effective hydrocracking conditions to produce a hydrocracked effluent;
dewaxing the hydrocracked effluent under effective catalytic dewaxing conditions to produce a dewaxed effluent, the dewaxing catalyst including at least one non-dealuminated,

unidimensional, 10-member ring pore zeolite, and at least one Group VI metal, Group VIII metal or combination thereof;

hydrotreating the dewaxed effluent under third effective hydrotreating conditions to produce a third hydrotreated effluent; and

fractionating the third hydrotreated effluent to form at least a second diesel product fraction and a base stock product fraction, wherein the Group III lubricant base stock product fraction includes greater than or equal to 90 wt. % saturates, less than 10 wt. % aromatics, a kinematic viscosity at 100°C between about 4 and about 6 cSt and has a ratio of molecules with multi-ring naphthenes to single ring naphthenes (2R+N/1RN) of less than about 0.46.

13. The method of claim 12, wherein the feedstock has a solvent dewaxed oil feed viscosity index of from about 60 to about 150.

14. The method of claim 12, wherein the effective hydrotreating conditions include a temperature of from 300° C. to 450° C., hydrogen partial pressure of from 1500 psi to 5000 psi (~10.3 MPa to ~34.6 MPa), a liquid hourly space velocity of from 0.2 to 10 hr⁻¹, and a hydrogen circulation rate of from 35.6 to 1781 m³/m³ (200 scf/B to 10,000 scf/B).

15. The method of claim 12, wherein the effective hydrocracking conditions include a temperature of 288°C to 450°C, a hydrogen partial pressure of 1000 psig to 5000 psig (~6.9 MPa to 34.6 MPa), a liquid hourly space velocity of 0.05 h⁻¹ to 10 h⁻¹, and a hydrogen treat gas rate of from 35.6 m³/m³ to 1781 m³/m³ (200 scf/bbl to 10,000 scf/bbl).

16. The method of claim 12, wherein the dewaxing catalyst comprises a molecular sieve having a SiO₂:Al₂O₃ ratio of 200:1 to 30:1 and comprises from 0.1 wt. % to 3.33 wt. % framework Al₂O₃ content, the dewaxing catalyst including from 0.1 wt. % to 5 wt. % platinum.

17. The method of claim 16, wherein the molecular sieve is EU-1, ZSM-35, ZSM-11, ZSM-57, NU-87, ZSM-22, EU-2, EU-11, ZBM-30, ZSM-48, ZSM-23, or a combination thereof.

18. The method of claim 17, wherein the molecular sieve is ZSM-48, ZSM-23, or a combination thereof.

19. The method of claim 13, wherein the dewaxing catalyst comprises at least one low surface area metal oxide, refractory binder, the binder being silica, alumina, titania, zirconia, or silica-alumina.

20. The method of claim 19, wherein the metal oxide, refractory binder further comprises a second metal oxide, refractory binder different from the first metal oxide, refractory binder.

21. The method of claim 20, wherein the dewaxing catalyst comprises a micropore surface area to total surface area ratio of greater than or equal to 25%, wherein the total surface area equals the

surface area of the external zeolite plus the surface area of the binder, the surface area of the binder being 100 m²/g or less.

22. The method of claim 21, wherein the hydrocracking catalyst is a zeolite Y based catalyst.
23. The method of claim 22, wherein the effective dewaxing conditions include a temperature of from 200° C. to 450° C., a hydrogen partial pressure of from 250 to 5000 psi (1.8 MPa to 34.6 MPa), a liquid hourly space velocity of from 0.2 to 10 hr⁻¹, and a hydrogen circulation rate of from 35.6 m³/m³ to 1781 m³/m³ (200 scf/bbl to 10,000 scf/bbl).
24. The method of claim 13, wherein the total conversion of the hydrocracked, dewaxed bottoms relative to the feedstock is 30% to 90%.
25. The method of claim 13, wherein the feed stock is a solvent dewaxed oil.
26. A Group III base stock comprising: at least about 30 wt % of naphthenes; a viscosity index of from 120 up to 145 that is less than or equal to $142 \cdot (1 - 0.0025 \exp(8 \cdot (2R + N/1RN)))$.
27. The base stock of claim 26, wherein the pour point is from -10°C to -30°C, the Noack volatility is from 0.5 wt.% to 20 wt.% and has a CCS value at -35°C of from 100 cP up to 70,000 cP.
28. A Group III base stock comprising: at least about 30 wt % of naphthenes; a viscosity index of from 120 up to 145 that is less than or equal to $150.07 \cdot (1 - 0.0106 \cdot \exp(4.5 \cdot (2R + N/1RN)))$.
29. The base stock of claim 28, wherein the pour point is from -10°C to -30°C, the Noack volatility is from 0.5 wt.% to 20 wt.% and has a CCS value at -35°C of from 100 cP up to 70,000 cP.