

CLAIMS:

1. A Group III base stock comprising:
at least 90 wt.% saturated hydrocarbons;
kinematic viscosity at 100°C of 4.0 cSt to 5.0 cSt; a viscosity index of 120 up to 140;
a ratio of multi-ring naphthenes to single ring naphthenes (2R+N/1RN) of less than 0.52;
and
a ratio of branched carbons to straight chain (BC/SC) carbons less than or equal to 0.21.
2. The base stock of claim 1, wherein the base stock has a ratio of branched chain carbons to terminal carbons (BC/TC) less than or equal to 2.3.
3. The base stock of claim 1 or 2, wherein the kinematic viscosity at 100°C of 4.0 cSt to 4.7 cSt.
4. A Group III base stock comprising:
at least 90 wt.% saturates;
kinematic viscosity at 100°C of from 5.0 cSt up to 7.0 cSt; a viscosity index of 120 to 140;
a ratio of multi-ring naphthenes to single ring naphthenes (2R+N/1RN) of less than 0.59;
and
a ratio of branched carbons to straight chain carbons (BC/SC) less than or equal to 0.216.
5. The base stock of claim 4, wherein the base stock has a ratio of branched chain carbons to terminal carbons (BC/TC) less than or equal to 2.3.
6. The base stock of claims 4 or 5, wherein the K_{V100} is from 5.5 cSt to 7.0 cSt.
7. A lubricating oil composition comprising the lube base stock of any of clauses 1-6 and an effective amount of one or more lubricant additives.
8. A method for producing a diesel fuel and an API Group III base stock, comprising:
providing a feed stock comprising a vacuum gas oil feed; 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, a kinematic viscosity at 100°C between 5cSt and 7 cSt, a ratio of multi-ring naphthenes to single ring naphthenes (2R+N/1RN) of less than 0.52 and a ratio of branched carbons to straight chain (BC/SC) carbons less than or equal to 0.21.

9. The method of claim 8, wherein the feedstock has a solvent dewaxed oil feed viscosity index of 60 to 150.

10. The method of claim 8 or 9, wherein the base stock has a ratio of branched chain carbons to terminal carbons (BC/TC) less than or equal to 2.1.

11. A method for producing a diesel fuel and a base stock, comprising:

providing a feed stock comprising a vacuum gas oil feed;

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 95 wt. % saturates, a kinematic viscosity at 100°C between 4 cSt and 6 cSt, a ratio of multi-ring naphthenes to single ring naphthenes (2R+N/1RN) of less than 0.59 and a ratio of branched carbons to straight chain (BC/SC) carbons less than or equal to 0.26.

12. The method of claim 11, wherein the feedstock has a solvent dewaxed oil feed viscosity index of 60 to 150.
13. The base stock of claim 11 or 12, wherein the base stock has a ratio of branched chain carbons to terminal carbons (BC/TC) less than or equal to 2.3.
14. The method of any of claims 8-13, wherein the effective hydrotreating conditions include a temperature of 300°C. to 450° C., hydrogen partial pressure of 1500 psi to 5000 psi (10.3MPa to 34.6 MPa), a liquid hourly space velocity of 0.2 hr^{-1} to 10 hr^{-1} , and a hydrogen circulation rate of $35.6 \text{ m}^3/\text{m}^3$ to $1781 \text{ m}^3/\text{m}^3$ (200 scf/B to 10,000 scf/B).
15. The method of any of claims 8-14, wherein the effective hydrocracking conditions include a temperature of 280°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 0.5 h^{-1} to 10 h^{-1} , and a hydrogen treat gas rate of $35.6 \text{ m}^3/\text{m}^3$ to $1781 \text{ m}^3/\text{m}^3$ (200 scf/B to 10,000 scf/B).
16. The method of any of claims 8-15, wherein the dewaxing catalyst comprises a molecular sieve having a $\text{SiO}_2:\text{Al}_2\text{O}_3$ ratio of 200:1 to 30:1 and comprises from 0.1 wt % to 3.33 wt % framework Al_2O_3 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 any of claims 8-15, 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 19, 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 $100 \text{ m}^2/\text{g}$ or less.
22. The method of claim 19, 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 200°C. to 450° C., a hydrogen partial pressure of 250 psi to 5000 psi (1.8 MPa to 34.6 MPa), a liquid hourly space velocity of 0.2 hr^{-1} to 10 hr^{-1} , and a hydrogen circulation rate of $35.6 \text{ m}^3/\text{m}^3$ to $1781 \text{ m}^3/\text{m}^3$ (200 scf/B to 10,000 scf/B).

24. The method of claim 8 or 11, wherein the total conversion of the hydrocracked, dewaxed bottoms relative to the feedstock is 30% to 90%.
25. The method of claim 8 or 11, wherein the feed stock is a solvent dewaxed oil.
26. The method of claim 8 or 11, wherein the feed stock is a vacuum gas oil.