IT IS CLAIMED:

1. A process for producing base oil, comprising oligomerizing one or more olefins having a boiling point less than 82°C (180°F) in a presence of an ionic liquid catalyst and one or more C5+ alpha olefins in a reactor to produce a base oil having a kinematic viscosity at 100°C of 36 mm^2/s or higher and a viscosity index (VI) greater than 55; and wherein the one or more olefins having the boiling point less than 82°C (180°F) comprise greater than 50 wt% of a total mixture of olefins fed to the reactor.

2. The process of claim 1, wherein the kinematic viscosity at 100°C is greater than 40 mm^2/s.

3. The process of claim 1, wherein the kinematic viscosity at 100°C is 45 mm^2/s or higher.

4. The process of claim 1, wherein the base oil has a kinematic viscosity at 40°C of 300 mm^2/s or higher.

5. The process of claim 4, wherein the kinematic viscosity at 40°C is greater than 1100 mm^2/s.

6. The process of claim 1, wherein the base oil has a cloud point less than -20°C.

7. The process of claim 6, wherein the cloud point is less than -30°C.

8. The process of claim 1, wherein the base oil has a pour point less than -10°C.

9. The process of claim 8, wherein the base oil is not dewaxed.

10. The process of claim 1, wherein at least 80 wt% of the base oil boils within a range from 482°C (900°F) to 815.6°C (1500°F).

11. The process of claim 1, wherein the one or more C5+ alpha olefins comprise less than 40 wt% of the total mixture of olefins fed to the reactor.

12. The process of claim 1, wherein the one or more olefins having the boiling point less than 82°C (180°F) comprise at least 60 wt% of the total mixture of olefins fed to the reactor.

13. The process of claim 12, wherein the one or more olefins having the boiling point less than 82°C (180°F) comprise at least 70 wt% of the total mixture of olefins fed to the reactor.

14. The process of claim 1, wherein the oligomerizing is completed in a single step.

15. The process of claim 1, wherein the one or more olefins having the boiling point less than 82°C (180°F) comprise propylene, a butene, or a mixture thereof.

16. The process of claim 1, wherein the viscosity index (VI) is at least 80.

17. The process of claim 16, wherein the viscosity index (VI) is at least 90.

18. The process of claim 1, wherein the one or more C5+ alpha olefins comprise one or more C8+ alpha olefins.

19. The process of claim 1, wherein a yield of products boiling at 482°C+ (900°F+) is greater than 70 wt% from the oligomerizing.

20. The process of claim 1, wherein the one or more C5+ alpha olefins are made by ethylene polymerization, thermal cracking of heavier hydrocarbons, pyrolysis of waste plastic, Fischer-Tropsch processes, metathesis of fatty acids, catalytic cracking of heavier hydrocarbons, or combinations thereof.

21. The process of claim 1, wherein the oligomerizing is conducted in a fixed bed contactor reactor.

22. The process of claim 1, wherein the oligomerizing is conducted in a static mixer loop reactor.

23. A process to make base oil, comprising oligomerizing one or more olefins having a boiling point less than 82°C (180°F) in a presence of an ionic liquid catalyst and a mixture of C5+ alpha olefins derived from waste plastic to produce a base oil having a kinematic viscosity at 40°C greater than 1100 mm^2/s and a viscosity index (VI) greater than 55.

24. The process of claim 23, wherein the viscosity index (VI) is at least 80.

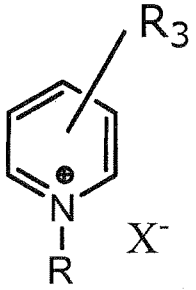
25. The process of claim 23, wherein the viscosity index (VI) is at least 90.

26. A base oil, comprising one or more oligomers of a mixture of olefins, wherein the mixture of olefins comprises propylene and one or more C5+ olefins derived from waste plastic; and wherein the base oil has a kinematic viscosity at 40°C greater than 1100 mm^2/s, and a viscosity index (VI) of at least 70.

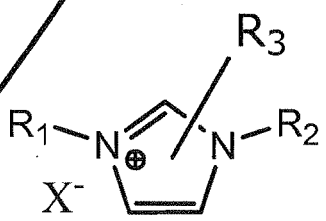
AMENDED CLAIMS
received by the International Bureau on 24 April 2012 (24.04.12)

What is claimed is:

1. A process for producing base oil, comprising oligomerizing one or more olefins having a boiling point less than 82°C (180°F) in a presence of an ionic liquid catalyst and one or more C8+ alpha olefins in a reactor to produce a base oil having a kinematic viscosity at 100°C of 36 mm^2/s or higher; a kinematic viscosity at 40°C of 1200 mm^2/s or higher, and a viscosity index (VI) greater than 55; wherein:
   a. the ionic liquid catalyst is an alkyl substituted pyridinium chloroaluminate or an alkyl substituted imidazolium chloroaluminate of the general formulas A and B, respectively:



A



B

where R, R_1, R_2, and R_3 are methyl, ethyl, propyl, butyl, pentyl or hexyl, and X is a chloroaluminate; and

   b. the one or more olefins having the boiling point less than 82°C (180°F) comprise greater than 50 wt% of a total mixture of olefins fed to the reactor.

2. The process of claim 1, wherein the kinematic viscosity at 100°C is greater than 40 mm^2/s.

3. The process of claim 1, wherein the kinematic viscosity at 100°C is 45 mm^2/s or higher.

4. The process of claim 1, wherein the base oil has a kinematic viscosity at 40°C of 300 mm^2/s or higher.

5. The process of claim 4, wherein the kinematic viscosity at 40°C is greater than 1100 mm^2/s.

6. The process of claim 1, wherein the base oil has a cloud point less than -20°C.

7. The process of claim 6, wherein the cloud point is less than -30°C.

8. The process of claim 1, wherein the base oil has a pour point less than -10°C.

9. The process of claim 8, wherein the base oil is not dewaxed.

10. The process of claim 1, wherein at least 80 wt% of the base oil boils within a range from 482°C (900°F) to 815.6°C (1500°F).

11. The process of claim 1, wherein the one or more C8+ alpha olefins comprise less than 40 wt% of the total mixture of olefins fed to the reactor.

12. The process of claim 1, wherein the one or more olefins having the boiling point less than 82°C (180°F) comprise at least 60 wt% of the total mixture of olefins fed to the reactor.

13. The process of claim 12, wherein the one or more olefins having the boiling point less than 82°C (180°F) comprise at least 70 wt% of the total mixture of olefins fed to the reactor.

14. The process of claim 1, wherein the oligomerizing is completed in a single step.

15. The process of claim 1, wherein the one or more olefins having the boiling point less than 82°C (180°F) comprise propylene, a butene, or a mixture thereof.

16. The process of claim 1, wherein the viscosity index (VI) is at least 80.

17. The process of claim 16, wherein the viscosity index (VI) is at least 90.

18. The process of claim 1, wherein the one or more C8+ alpha olefins comprise 1-decene, 1-dodecene, or a mixture thereof.

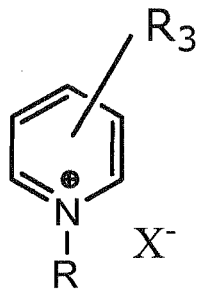
19. The process of claim 1, wherein a yield of products boiling at 482°C+ (900°F+) is greater than 70 wt% from the oligomerizing.

20. The process of claim 1, wherein the one or more C8+ alpha olefins are made by ethylene polymerization, thermal cracking of heavier hydrocarbons, pyrolysis of waste plastic, Fischer-Tropsch processes, metathesis of fatty acids, catalytic cracking of heavier hydrocarbons, or combinations thereof.

21. The process of claim 1, wherein the oligomerizing is conducted in a fixed bed contactor reactor.

22. The process of claim 1, wherein the oligomerizing is conducted in a static mixer loop reactor.

23. A process to make base oil, comprising oligomerizing one or more olefins having a boiling point less than 82°C (180°F) in a presence of an ionic liquid catalyst and a mixture of C8+ alpha olefins derived from waste plastic to produce a base oil having a kinematic viscosity at 40°C greater than [[1100]]1200 mm^2/s and a viscosity index (VI) greater than 55; wherein the ionic liquid catalyst is an alkyl substituted pyridinium chloroaluminate or an alkyl substituted imidazolium chloroaluminate of the general formulas A and B, respectively:



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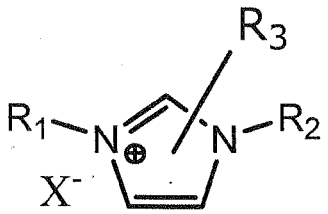

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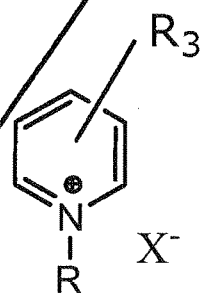
where R, R_1, R_2, and R_3 are methyl, ethyl, propyl, butyl, pentyl or hexyl, and X is a chloroaluminate.

24. The process of claim 23, wherein the viscosity index (VI) is at least 80.

25. The process of claim 23, wherein the viscosity index (VI) is at least 90.

26. A base oil, comprising one or more oligomers of a mixture of olefins, wherein the mixture of olefins comprises propylene and one or more C5+ olefins derived from waste plastic; wherein the base oil has a kinematic viscosity at 40°C greater than 1200 mm^2/s, and a viscosity index (VI) of at least 70; and wherein the ionic liquid catalyst is an alkyl substituted pyridinium chloroaluminate or an alkyl substituted imidazolium chloroaluminate of the general formulas A and B, respectively:



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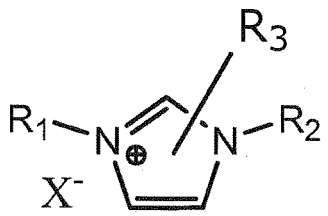

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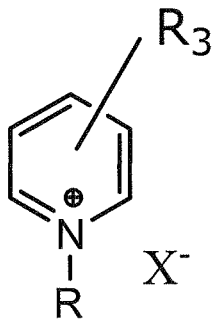
where R, R_1, R_2, and R_3 are methyl, ethyl, propyl, butyl, pentyl or hexyl, and X is a chloroaluminate.

What is claimed is:

1. A process for producing base oil, comprising oligomerizing one or more olefins having a boiling point less than 82°C (180°F) in a presence of an ionic liquid catalyst and one or more C8+ alpha olefins in a reactor to produce a base oil having a kinematic viscosity at 100°C of 36 mm^2/s or higher; a kinematic viscosity at 40°C of 300 mm^2/s or higher, and a viscosity index (VI) greater than 55; wherein:
    a. the ionic liquid catalyst is an alkyl substituted pyridinium chloroaluminate or an alkyl substituted imidazolium chloroaluminate of the general formulas A and B, respectively:



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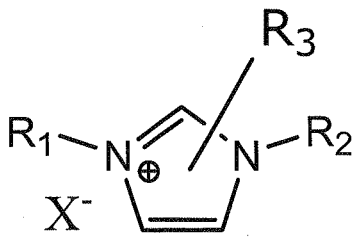


B

where R, R_1, R_2, and R_3 are methyl, ethyl, propyl, butyl, pentyl or hexyl, and X is a chloroaluminate; and

    b. the one or more olefins having the boiling point less than 82°C (180°F) comprise greater than 50 wt% of a total mixture of olefins fed to the reactor.

2. The process of claim 1, wherein the kinematic viscosity at 100°C is greater than 40 mm^2/s.

3. The process of claim 1, wherein the kinematic viscosity at 100°C is 45 mm^2/s or higher.

4. The process of claim 1, wherein the base oil has a kinematic viscosity at 40°C of 1200 mm^2/s or higher.

5. The process of claim 1, wherein the kinematic viscosity at 40°C is greater than 1100 mm^2/s.

6. The process of any one of the preceding claims, wherein the base oil has a cloud point less than -20°C.

7. The process of claim 6, wherein the cloud point is less than -30°C.

8. The process of any one of the preceding claims, wherein the base oil has a pour point less than -10°C.

9. The process of claim 8, wherein the base oil is not dewaxed.

10. The process of any one of the preceding claims, wherein at least 80 wt% of the base oil boils within a range from 482°C (900°F) to 815.6°C (1500°F).

11. The process of any one of the preceding claims, wherein the one or more C8+ alpha olefins comprise less than 40 wt% of the total mixture of olefins fed to the reactor.

12. The process of any one of the preceding claims, wherein the one or more olefins having the boiling point less than 82°C (180°F) comprise at least 60 wt% of the total mixture of olefins fed to the reactor.

13. The process of claim 12, wherein the one or more olefins having the boiling point less than 82°C (180°F) comprise at least 70 wt% of the total mixture of olefins fed to the reactor.

14. The process of any one of the preceding claims, wherein the oligomerizing is completed in a single step.

15. The process of any one of the preceding claims, wherein the one or more olefins having the boiling point less than 82°C (180°F) comprise propylene, a butene, or a mixture thereof.

16. The process of any one of the preceding claims, wherein the one or more C8+ alpha olefins comprise 1-decene, 1-dodecene, or a mixture thereof.

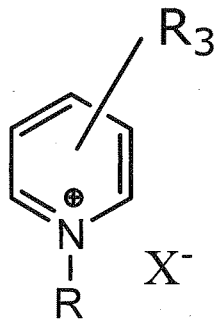
17. The process of any one of the preceding claims, wherein a yield of products boiling at 482°C+ (900°F+) is greater than 70 wt% from the oligomerizing.

18. The process of any one of the preceding claims, wherein the one or more C8+ alpha olefins are made by ethylene polymerization, thermal cracking of heavier hydrocarbons, pyrolysis of waste plastic, Fischer-Tropsch processes, metathesis of fatty acids, catalytic cracking of heavier hydrocarbons, or combinations thereof.

19. The process of any one of the preceding claims, wherein the oligomerizing is conducted in a fixed bed contactor reactor.

20. The process of any one of claims 1 to 18, wherein the oligomerizing is conducted in a static mixer loop reactor.

21. A process to make base oil, comprising oligomerizing one or more olefins having a boiling point less than 82°C (180°F) in a presence of an ionic liquid catalyst and a mixture of C8+ alpha olefins derived from waste plastic to produce a base oil having a kinematic viscosity at 40°C greater than 1200 mm^2/s and a viscosity index (VI) greater than 55; wherein the ionic liquid catalyst is an alkyl substituted pyridinium chloroaluminate or an alkyl substituted imidazolium chloroaluminate of the general formulas A and B, respectively:



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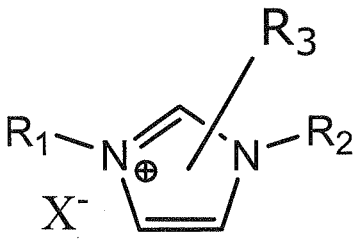

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where R, R_1, R_2, and R_3 are methyl, ethyl, propyl, butyl, pentyl or hexyl, and X is a chloroaluminate.

22. The process of any one of the preceding claims, wherein the viscosity index (VI) is at least 80.

23. The process of claim 22, wherein the viscosity index (VI) is at least 90.

24. A base oil, comprising one or more oligomers of a mixture of olefins, wherein the mixture of olefins comprises propylene and one or more C5+ olefins derived from waste plastic; wherein the base oil has a kinematic viscosity at 40°C greater than 1200 mm^2/s, and a viscosity index (VI) of at least 70.