CLAIMS

1. A method of making a biomass-based diesel fuel comprising:

a. producing paraffins by hydrodeoxygenation of a lipid feedstock;

b. producing iso-paraffins from a sugar by:

i. fermenting the sugar to an alcohol;

ii. dehydrating the alcohol to an olefin;

iii. oligomerizing the olefin to a distribution of iso-olefins; and

iv. hydrogenating the iso-olefins to iso-paraffins; and

c. blending the paraffins and the iso-paraffins to produce the biomass-based diesel fuel;

d. wherein the iso-paraffins have a derived cetane number (DCN) less than 40;

e. wherein the biomass-based diesel fuel has a DCN of 49 or higher.

2. The method of claim 1, wherein the biomass-based diesel fuel has a DCN greater than 55.

3. The method of claim 1, wherein the biomass-based diesel fuel has a cloud point less than 0 °C.

4. The method of claim 1, wherein the biomass-based diesel fuel has a cloud point less than -10 °C.

5. The method of claim 1, wherein the alcohol is ethanol or isobutanol.

6. The method of claim 1, wherein the olefin is propylene or butenes.

7. A biomass-based diesel fuel product produced by the method of claim 1.

8. A method for producing a renewable diesel fuel, comprising the steps of;

a. combining a lipid with a hydrocarbon liquid to provide a combined feed;

b. subjecting the combined feed to hydrodeoxygenation and hydrogenation in a hydrodeoxygenation reactor to provide a reactor effluent comprising C3-C24

hydrocarbons; and

c. separating a C9-C24 hydrocarbon fraction from the reactor effluent;

wherein the C9-C24 hydrocarbon fraction has a derived cetane number of 49 or higher and a cloud point less than 0 °C;

wherein the hydrocarbon liquid comprises iso-olefins produced by olefin oligomerization.

9. The method of claim 8, further comprising producing the iso-olefins by oligomerization of isobutene.

10. The method of claim 9, wherein the isobutene is the product of isobutanol dehydration.

11. The method of claim 10, further comprising preparing the isobutanol by fermentation of sugars.

12. The method of claim 9, further comprising producing the iso-olefins by oligomerization of propylene.

13. The method of claim 12, wherein the propylene is the product of propane dehydrogenation.

14. The method of claim 8, wherein the product from the hydrodeoxygenation reaction is not used as diluent for reactor feed.

15. A method for producing a renewable diesel fuel, comprising the steps of;

a. combining a lipid with a hydrocarbon liquid to provide a combined feed;

b. subjecting the combined feed to hydrodeoxygenation and hydrogenation in a hydrodeoxygenation reactor to provide a reactor effluent comprising hydrocarbons, said hydrocarbons including a propane coproduct;

c. separating a C9-C24 hydrocarbon fraction from the reactor effluent;

d. subjecting the propane coproduct to dehydrogenation to produce a vapor stream having propylene and hydrogen; and

e. oligomerizing the propylene to produce iso-olefins;

wherein the C9-C24 hydrocarbon fraction has a derived cetane number of 49 or higher and the hydrocarbon liquid comprises the iso-olefins.

16. The method of claim 15, further comprising producing the iso-olefins by oligomerization of butenes.

17. The method of claim 16, wherein the butenes are derived from ethanol and/or isobutanol.

18. The method of claim 9, further comprising producing the iso-olefins by oligomerization of propylene.

19. The method of claim 8, wherein the product from the hydrodeoxygenation reaction is not used as diluent for reactor feed.

20. The method of claim 15 wherein the C9-C24 hydrocarbon fraction is distilled to provide a C9-C15 fraction kerosene.

ABSTRACT

The present technology relates to biofuels, and more particularly, to biomass-based diesel from olefin oligomers. Diesel fuels with cetane number of 49 or greater are prepared by blending hydrocarbons produced by olefin oligomerization with renewable diesel, resulting in a blended fuel that has a lower cloud point than the cloud point of the renewable diesel. A different aspect relates to an integrated process for lipid HDO and olefin oligomerization wherein the propane coproduct of lipid HDO is subjected to dehydrogenation to produce a vapor stream having propylene and hydrogen. The propylene is subsequently oligomerized to iso-olefins and the iso-olefins are combined with the lipid feed for hydrogenation in the HDO reactor.