~~CLAIMS:~~

1. A process of producing an estolide base oil comprising:

providing at least one triglyceride having at least one fatty acid residue with at least one internal site of unsaturation;

providing at least one alpha olefin having at least three carbon atoms;

contacting the at least one triglyceride with the at least one alpha olefin in the presence of a metathesis catalyst to provide an olefin product and a metathesized fatty acid product;

hydrolyzing the metathesized fatty acid product into at least one first fatty acid product, wherein the at least one first fatty acid product comprises at least one fatty acid having an internal site of unsaturation and at least one fatty acid having a terminal site of unsaturation;

providing an oligomerization catalyst; and

oligomerizing the at least one first fatty acid product in the presence of the oligomerization catalyst to produce an estolide base oil.

2. The process according to claim 1, wherein the oligomerization catalyst is selected from a Bronsted acid and a Lewis acid.

3. The process according to claim 1, wherein the oligomerization catalyst is a Bronsted acid.

4. The process according to claim 1, wherein the at least one alpha olefin is selected from propene, 1-butene, 1-pentene, 1-hexene, 1-heptene, and 1-octene.

5. The process according to claim 1, wherein the metathesis catalyst is an osmium or ruthenium alkylidene metathesis catalyst.

6. The process according to claim 5, wherein the metathesis catalyst is a first generation or second generation Grubbs'-type metathesis catalyst.

7. The process according to claim 1, wherein the at least one triglyceride comprises at least ~~one fatty acid residue selected from oleic acid, linoleic acid, and linolenic acid.~~

8. The process according to claim 1, wherein the olefin product comprises at least one terminal olefin and at least one internal olefin.

9. The process according to claim 8, wherein the at least one internal olefin is 3-dodecene.

10. The process according to claim 8, wherein the at least one terminal olefin is 1-decene.

11. The process according to claim 1, wherein the metathesized fatty acid product comprises at least one fatty acid residue having a terminal site of unsaturation.

12. The process according to claim 11, wherein the metathesized fatty acid product is a triglyceride comprising at least one 9-decenoic acid residue.

13. The process according to claim 1, wherein the metathesized fatty acid product comprises at least one fatty acid residue having an internal site of unsaturation.

14. The process according to claim 13, wherein a metathesized fatty acid product is a triglyceride comprising at least one 9-dodecenoic acid residue.

15. The process according to claim 1, further comprising esterifying the resulting estolide base oil with at least one alcohol to provide an esterified estolide base oil.

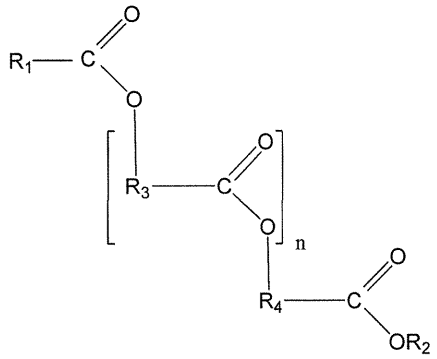
16. The process according to claim 1, wherein the at least one first fatty acid having an internal site of unsaturation is 9-dodecenoic acid.

17. The process according to claim 1, wherein the at least one first fatty acid product having a terminal site of unsaturation is 9-decenoic acid.

18. The process according to claim 1, wherein the oligomerizing comprises forming a covalent bond between an oxygen of a carboxylic group of one fatty acid residue and a carbon of a site of unsaturation of a second fatty acid residue.

CLAIMS:

1. At least one compound according to Formula III:



Formula III

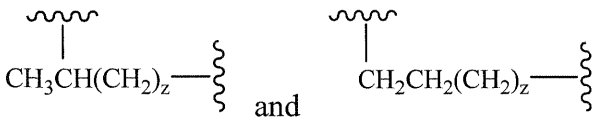
wherein

n is an integer selected from 0 to 20;

R_1 is an unsubstituted, branched or unbranched C_1 to C_{22} alkyl that is saturated or unsaturated;

R_2 is hydrogen; and

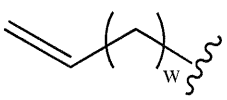
R_3 and R_4, independently for each occurrence, are selected from



and

wherein R_3 and R_4 are unsubstituted and z is 7.

2. The at least one compound according to claim 1, wherein R_1 is selected from the structure of Formula IV:



Formula IV

wherein w is an integer selected from 0 to 13.

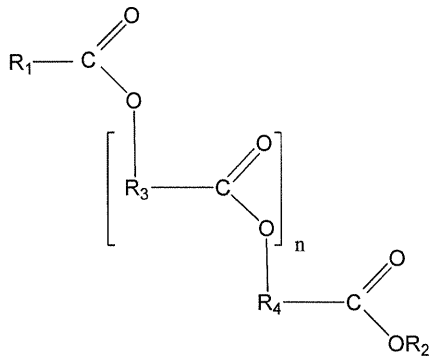
3. The at least one compound according to claim 2, wherein w is an integer selected from 5 to 7.

4. The at least one compound according to claim 3, wherein w is 7.

5. The at least one compound according to claim 1, wherein R_1 is saturated and unbranched.

6. The at least one compound according to claim 1, wherein n is an integer selected from 1 to 20.

7. At least one compound according to Formula III:



Formula III

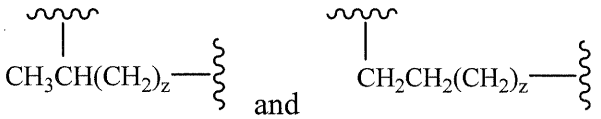
wherein

n is an integer selected from 1 to 20;

R_1 is an unsubstituted, branched or unbranched C_1 to C_{22} alkyl that is saturated or unsaturated;

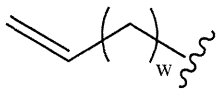
R_2 is an unsubstituted, branched or unbranched C_1 to C_{22} alkyl that is saturated or unsaturated; and

R_3 and R_4, independently for each occurrence, are selected from



wherein R_3 and R_4 are unsubstituted and z is, independently for each occurrence, an integer selected from 7 and 8.

8. The at least one compound according to claim 7, wherein R_1 is selected from the structure of Formula IV:



Formula IV

wherein w is an integer selected from 0 to 13.

9. The at least one compound according to claim 8, wherein w is an integer selected from 5 to 7.

10. The at least one compound according to claim 9, wherein w is 7.

11. The at least one compound according to claim 7, wherein R_1 is saturated and unbranched.

12. The at least one compound according to claim 7, wherein z is 7.

13. The at least one compound according to claim 12, wherein R_1 is an unsubstituted, branched or unbranched C_7 to C_{17} alkyl that is saturated or unsaturated.

14. The at least one compound according to claim 13, wherein R_1 is saturated and unbranched.

15. The at least one compound according to claim 14, wherein R_1 is a C_9 alkyl.

16. The at least one compound according to claim 7, wherein z is 8.

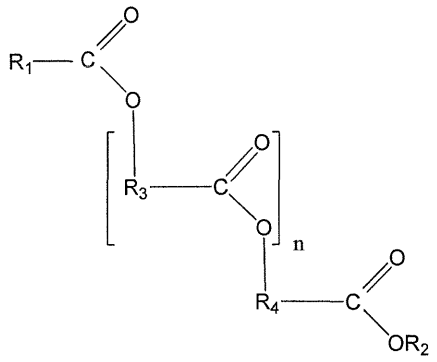
17. The at least one compound according to claim 16, wherein R_1 is an unsubstituted, branched or unbranched C_7 to C_{17} alkyl that is saturated or unsaturated.

18. The at least one compound according to claim 17, wherein R_1 is saturated and unbranched.

19. The at least one compound according to claim 18, wherein R_1 is a C_{10} alkyl.

20. The at least one compound according to claim 7, wherein R_2 is a branched C_6 to C_{12} alkyl that is saturated.

21. At least one compound according to Formula III:



Formula III

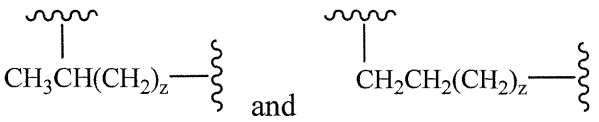
wherein

n is an integer selected from 0 to 20;

R_1 is an unsubstituted, branched or unbranched C_7 to C_{17} alkyl that is saturated or unsaturated;

R_2 is an unsubstituted, branched or unbranched C_1 to C_{22} alkyl that is saturated or unsaturated; and

R_3 and R_4, independently for each occurrence, are selected from



wherein R_3 and R_4 are unsubstituted and z is an integer selected from 7 and 8.

22. The at least one compound according to claim 21, wherein R_1 is a C_7 to C_{17} alkyl having at least one terminal site of unsaturation.

23. The at least one compound according to claim 22, wherein R_1 is a C_{10} alkyl.

24. The at least one compound according to claim 21, wherein R_1 is saturated and unbranched.

25. The at least one compound according to claim 21, wherein n is 0.

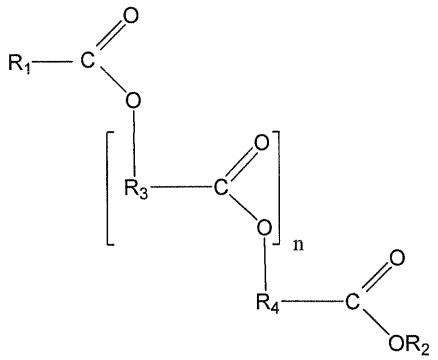
26. The at least one compound according to claim 21, wherein n is 1.

27. The at least one compound according to claim 21, wherein R_2 is a branched C_6 to C_{12} alkyl that is saturated.

28. A composition comprising:

an additive selected from at least one of a polyalphaolefin, a polyalkylene glycol, a mineral oil, a pour point depressant, a viscosity modifier, an anti-corrosive, an antiwear agent, a detergent, a dispersant, a colorant, an antifoaming agent, or a demulsifier; and

at least one compound selected from compounds of Formula III:



Formula III

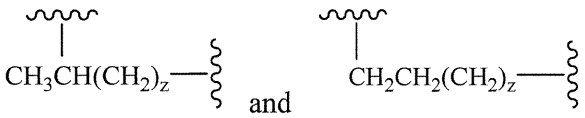
wherein

n is an integer selected from 0 to 20;

R_1 is an unsubstituted, branched or unbranched C_1 to C_{22} alkyl that is saturated or unsaturated;

R_2 is selected from hydrogen and an unsubstituted, branched or unbranched C_1 to C_{22} alkyl that is saturated or unsaturated; and

R_3 and R_4, independently for each occurrence, are selected from



and

wherein R_3 and R_4 are unsubstituted and z is, independently for each occurrence, an integer selected from 7 and 8.

29. The composition according to claim 28, wherein R_1 is a C_7 to C_{17} alkyl having at least one terminal site of unsaturation.

30. The composition according to claim 29, wherein R_1 is a C_9 alkyl.

31. The composition according to claim 29, wherein R_1 is a C_{10} alkyl.

32. The composition according to claim 28, wherein R_1 is saturated and unbranched.

33. The composition according to claim 28, wherein R_1 is an unsubstituted, branched or unbranched C_7 to C_{17} alkyl that is saturated.

34. The composition according to claim 28, R_2 is an unsubstituted, branched or unbranched C_1 to C_{22} alkyl that is saturated or unsaturated.

35. The composition according to claim 28, wherein R_2 is a branched C_6 to C_{12} alkyl that is saturated.

36. The composition according to claim 28, wherein n is 0.

37. The composition according to claim 28, wherein n is 1.

38. The at least one compound according to claim 21, wherein z is 8.

39. The at least one compound according to claim 22, wherein R_1 is a C_9 alkyl.

40. The at least one compound according to claim 21, wherein z is 7.