CLAIMS

1. An olefin oligomerization process comprising: a) contacting i) a metal compound, ii) a diphosphino aminyl ligand, and iii) a metal alkyl to form a mixture; b) aging the mixture in the substantial absence of an olefin monomer to form an aged mixture; c) contacting the aged mixture with an olefin monomer; and d) forming an olefin oligomer product under conditions suitable for forming an olefin oligomer product.

2. The process of claim 1, wherein the mixture is aged at a temperature from 10 °C to 130 °C.

3. The process of claim 1, wherein the mixture is aged for at least 20 minutes.

4. The process of claim 1, wherein the metal compound comprises chromium.

5. The process of claim 1, wherein the metal compound is a chromium(III) chloride or chromium(III) acetylacetonate.

6. The process of claim 1, wherein the metal alkyl comprises an aluminoaxane.

7. The process of claim 1, wherein the metal alkyl and metal compound are present in a molar ratio amount of from about 50 to about 1000.

8. The process of claim 1, wherein the conditions suitable for forming an olefin oligomer product comprise a temperature that is increased when compared to an otherwise similar process wherein the mixture is aged in the presence of an olefin monomer.

9. The process of claim 1, wherein the olefin comprises ethylene and a liquid oligomer product mixture comprises at least 60 wt. % C_6 and C_8 olefins.

10. The process of claim 9, wherein the C_6 olefins comprises greater than or equal to 90 wt. % 1-hexene and the C_8 olefins comprises greater than or equal to 97 wt. % 1-octene.

11. The process of claim 1, wherein the olefin oligomer product has a polymer amount that is reduced when compared to an otherwise similar process wherein the mixture is aged in the presence of an olefin monomer.

12. The process of claim 1, wherein the process produces a C_6 olefin fraction containing more 1-hexene than when compared to an otherwise similar process wherein the mixture is aged in the presence of the olefin monomer.

13. The process of claim 1, wherein the diphosphino aminyl ligand comprises one diphosphino aminyl moiety.

14. The process of claim 1, wherein the the metal compound is complexed to the diphosphino aminyl ligand comprising at least two diphosphino aminyl moieties and a linking group linking each aminyl nitrogen atom of the diphosphino aminyl moieties.

15. The process of claim 14, wherein the linking group comprises at least one cyclic group, and the aminyl nitrogen atoms of the two diphosphino aminyl moieties are attached to a ring carbon of the linking group.

16. A process for reducing an amount of polymer produced in an olefin oligomerization process comprising:
    a) contacting a metal compound, a diphosphino aminyl ligand metal complex, and a metal alkyl form a mixture;
    b) aging the mixture in the substantial absence of an olefin monomer for at least 20 minutes to form a aged mixture;
    c) contacting the aged mixture with an olefin monomer; and
    d) forming an olefin oligomer product wherein the olefin oligomer product has a reduced polymer formation when compared to an otherwise similar process wherein the mixture is aged in the presence of the olefin monomer.

17. The process of claim 16, wherein the mixture is aged at a temperature from 10 °C to 130 °C.

18. The process of claim 16, wherein the metal compound comprises chromium.

19. The process of claim 16, wherein the metal alkyl and metal compound are present in a molar ratio amount of from about 50 to about 1000.

20. The process of claim 16, wherein the olefin comprises ethylene and a liquid olefin oligomer product comprises comprises at least 60 wt. % C_6 and C_8 olefins.

21. The process of claim 16, wherein the process produces a C_6 olefin fraction containing more 1-hexene than when compared to an otherwise similar process wherein the mixture is aged in the presence of the olefin monomer.

22. A process for preparing a catalyst system comprising: a) forming a catalyst system mixture comprising i) a metal compound, ii) a diphosphino aminyl ligand, and iii) a metal alkyl; b) aging the catalyst system mixture in the substantial absence of an olefin monomer.

23. The process of claim 23, wherein the catalyst system mixture is aged at a temperature at a temperature from 10 °C to 130 °C.

CLAIMS

1. An olefin oligomerization process comprising: a) contacting i) a metal compound, ii) a diphosphino aminyl ligand, and iii) a metal alkyl comprising an aluminoxane to form a mixture; b) aging the mixture for at least 20 minutes in the substantial absence of an olefin monomer to form an aged mixture; c) contacting the aged mixture with an olefin monomer; and d) forming an olefin oligomer product under conditions suitable for forming an olefin oligomer product, wherein "substantial absence of an olefin monomer" means a molar ratio of olefin monomer to the metal compound up to 5:1, and wherein the mixture consists essentially of the metal compound, the diphosphino aminyl ligand, the metal alkyl comprising an aluminoxane and optionally a hydrocarbon solvent.

2. The process of claim 1, wherein the mixture is aged for at least 30 minutes, or for at least 40 minutes.

3. The process of claim 1, wherein the conditions suitable for forming an olefin oligomer product comprise a temperature that is increased when compared to an otherwise similar process wherein the mixture is aged in the presence of an olefin monomer.

4. The process of claim 1, wherein the olefin oligomer product has a polymer amount that is reduced when compared to an otherwise similar process wherein the mixture is aged in the presence of an olefin monomer.

5. The process of claim 1, wherein the diphosphino aminyl ligand comprises one diphosphino aminyl moiety.

6. The process of claim 1, wherein the the metal compound is complexed to the diphosphino aminyl ligand comprising at least two diphosphino aminyl moieties and a linking group linking each aminyl nitrogen atom of the diphosphino aminyl moieties.

7. The process of claim 6, wherein the linking group comprises at least one cyclic group, and the aminyl nitrogen atoms of the two diphosphino aminyl moieties are attached to a ring carbon of the linking group.

8. A process for reducing an amount of polymer produced in an olefin oligomerization process comprising:
   a) contacting a metal compound, a diphosphino aminyl ligand, and a metal alkyl comprising an aluminoxane to form a mixture;

b) aging the mixture in the substantial absence of an olefin monomer for at least 20 minutes to form a aged mixture;

c) contacting the aged mixture with an olefin monomer; and

d) forming an olefin oligomer product wherein the olefin oligomer product has a reduced polymer formation when compared to an otherwise similar process wherein the mixture is aged in the presence of the olefin monomer;

wherein "substantial absence of an olefin monomer" means a molar ratio of olefin monomer to the metal compound up to 5:1; and

wherein the mixture consists essentially of the metal compound, the diphosphino aminyl ligand, the metal alkyl comprising an aluminoxane and optionally a hydrocarbon solvent.

9. The process of claim 1 or 8, wherein the mixture is aged at a temperature from 10 °C to 130 °C.

10. The process of claim 1 or 8, wherein the metal compound comprises chromium.

11. The process of claim 1 or 8, wherein the metal compound is a chromium(III) chloride or chromium(III) acetylacetonate.

12. The process of claim 1 or 8, wherein the metal alkyl and metal compound are present in a molar ratio amount of from about 50 to about 1000.

13. The process of claim 1or 8, wherein the olefin comprises ethylene and a liquid olefin oligomer product comprises comprises at least 60 wt. % C_6 and C_8 olefins.

14. The process of claim 13, wherein the C_6 olefins comprises greater than or equal to 90 wt. % 1-hexene and the C_8 olefins comprises greater than or equal to 97 wt. % 1-octene.

15. The process of claim 1 or 8, wherein the process produces a C_6 olefin fraction containing more 1-hexene than when compared to an otherwise similar process wherein the mixture is aged in the presence of the olefin monomer.

16. A process for preparing a catalyst system comprising: a) forming a catalyst system mixture consisting essentially of i) a metal compound, ii) a diphosphino aminyl ligand, iii) a metal alkyl comprising an aluminoxane, and optionally (iv) a hydrocarbon solvent; b) aging the catalyst system mixture for at least 20 minutes in the substantial absence of an olefin

monomer, wherein “substantial absence of an olefin monomer” means a molar ratio of olefin monomer to the metal compound up to 5:1.

17. The process of claim 16, wherein the catalyst system mixture is aged at a temperature from 10 °C to 130 °C.

18. The use of a catalyst system prepared in accordance with claim 16 or 17, consisting essentially of i) a metal compound, ii) a diphosphino aminyl ligand, iii) a metal alkyl comprising an aluminoxane, and optionally iv) a hydrocarbon solvent, as an olefin oligomerization catalyst.