30. The process according to claim 1, wherein said feed comprises from 5 wt% to 85 wt% 1-hexene, based on the combined weight of alpha-olefins in said feed.

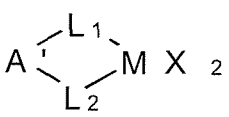
31. The process according to claim 1, wherein said feed comprises from 5 wt% to 85 wt% 1-hexene, and less than 80 wt % of any one of 1-octene and 1-decene, based on the combined weight of alpha-olefins in said feed.

32. The process according to claim 1, wherein said feed comprises from 5 wt% to 85 wt% 1-hexene, and less than 55 wt % of any one of 1-octene and 1-decene, based on the combined weight of alpha-olefins in said feed.

33. The process according to claim 1, wherein said feed comprises from 5 wt% to 85 wt% 1-hexene, and less than 25 wt % of any one of 1-octene and 1-decene, based on the combined weight of alpha-olefins in said feed.

34. The process according to claim 1, wherein said feed comprises from 60 wt% to 75 wt% of alpha-olefins selected from 1-hexene, 1-heptene and/or 1-octene and mixtures thereof and 25 wt% to 40 wt% of alpha-olefins selected from 1-dodecene, 1-tetradecene, and mixture thereof, based on the combined weight of alpha-olefins in said feed, and said product is characterized by a viscosity index of from 140 to 375, a KV at 100°C of from 10 to 1000 cSt, and a pour point of less than -10°C.

35. A process comprising contacting a metallocene compound, an activator, and a feed having an average carbon number of between 5.5 and 14, said feed comprising at least two different alpha-olefin monomers selected from C_4 to C_{24} alpha-olefins, under conditions suitable to obtain an essentially random polymer comprising said at least two alpha-olefins, wherein said metallocene compound is characterized by the formula 1:



Formula 1

wherein M is selected from Zr, Hf, Ti; each X is independently selected from the group consisting of halide and branched or unbranched C_1 to C_{20} hydrocarbyls, L_1 and L_2 are independently selected from cyclopentadienyl, indenyl, tetrahydroindenyl, fluorenyl, and their alkyl substituted analogs, and A can be present or absent and when present is selected from R_1R_2Si, R_1R_2C, $(R_1R_2C)_2$, $(R_1R_2Si)_2$; wherein R_1 and R_2 are independently selected from hydrogen, branched or unbranched C_1 to C_{20} hydrocarbyl radicals, phenyl, and substituted phenyl, and when A is bridged, the catalyst represented can be in the racemic or meso form, and wherein said activator is selected from among Lewis acid activators and ionic activators, and obtaining thereby a polymer characterized by:

(a) M_n = 200-50,000;

(b) M_w = 200-80,000;

(c) MWD = 1 to 5;

(d) a pour point less than 10°C;

(e) a KV at 100°C = 1.5 to 5,000;

(h) a VI greater than or equal to 100;

(i) having no distinct melting point above 0°C;

(j) by having the ratio of the amount of any alpha-olefin monomer incorporated in said polymer to the amount of said any alpha-olefin in said feed being from 0.5 to 3; and

(k) a stereo-arrangement of each monomer that is (i) atactic; (ii) syndiotactic; or (iii) a combination of atactic and syndiotactic.

36. The process of claim 35, wherein ethylene and/or propylene, if present in said feed, are present in the combined amount of less than 50 wt%, based on the combined weight of alpha-olefins in said feed.

37. The process of claim 35, wherein 1-octene and/or 1-decene, if present in said feed, are present in the amount of 66 wt% or less individually, based on the combined weight of alpha-olefins in said feed.

38. The process of claim 35, wherein 1-octene and/or 1-decene and/or 1-dodecene, if present in said feed, are present in the amount of less than 70 wt% individually, based on the combined weight of alpha-olefins in said feed.

39. The process of claim 35, wherein 1-octene and/or 1-decene and/or 1-dodecene, if present in said feed, are present in the amount of less than 55 wt% individually, based on the combined weight of alpha-olefins in said feed.

40. The process of claim 35, wherein 1-octene and/or 1-decene and/or 1-dodecene, if present in said feed, are present in the amount of less than 25 wt% individually, based on the combined weight of alpha-olefins in said feed.

41. The process of claim 35, wherein the average carbon number of said feed is from 5.7 to less than 12.

42. The process according to claim 1, wherein said activators are selected from methylaluminoxane, alkylanilinium tetrakis(perfluorophenyl)borate, tris(pentafluorophenyl)boron, their analogs and derivatives, and mixtures thereof.

43. The process according to claim 1, wherein said activator is N,N-dimethylanilinium tetrakis(perfluorophenyl)borate.

44. The process according to claim 1, wherein said co-activators are present and at least one is a co-activator selected from triethyl aluminum, tri-isobutylaluminum, tri-n-hexylaluminum, tri-n-octylaluminum, tri-n-decylaluminum, and tri-n-dodecylaluminum.

45. The process according to claim 1, wherein said catalyst has a productivity of less than 1,000 gram of product per gram of metallocene component.

46. The process according to claim 1, wherein said feed comprises from 5 wt% to 85 wt% 1-hexene, and less than 25 wt % of any one of 1-octene, 1-decene, and 1-dodecene, based on the combined weight of alpha-olefins in said feed.

47. The process of claim 1, wherein said feed further comprises at least 20 wt% 1-hexene, based on the combined weight of alpha-olefins in said feed.

48. The process according to claim 1, wherein said feed comprises from 20 wt% to 75 wt% of alpha-olefins selected from 1-hexene, 1-heptene and 1-octene and mixtures thereof, and 25 wt% to 75 wt% of alpha-olefins selected from 1-dodecene, 1-tetradecene, and mixture thereof, based on the combined weight of alpha-olefins in said feed and said product is characterized by a viscosity index of from 140 to 375, a KV at 100°C of from 10 to 1000 cSt, and a pour point of less than -10°C.

49. The process of claim 35, wherein said feed comprises from 5 wt% to 85 wt% 1-hexene, and less than 55 wt % of any one of 1-octene and 1-decene and less than 80% of any one of 1-tetradecene and 1-hexadecene, based on the combined weight of alpha-olefins in said feed.

50. The process according to claim 35, further comprising treating said polymer with hydrogen and hydrogenation catalyst to give fully saturated polymer with low bromine number of less than 2.