CLAIMS

What is claimed is:

1. A supported olefin polymerization catalyst composition comprising one or more particulate supports, one or more catalyst compounds, a continuity additive and one or more activator compounds, wherein the supported catalyst composition is formed by drying a suspension including the one or more particulate supports, the one or more catalyst compounds, the continuity additive, the one or more activator compounds, and a diluent and has a macro pore volume, as determined by ISO 15901-1, of less than or equal to 1.23 cm^3/g, wherein the drying is performed at a temperature of less than or equal to 65°C and at a pressure that is less than or equal to 8 psia.

2. A supported olefin polymerization catalyst composition according to claim 1, wherein the supported catalyst composition has a macro pore volume of less than or equal to 1.20 cm^3/g, or less than or equal to 1.10 cm^3/g, or less than or equal to 1.00 cm^3/g; or

wherein the supported catalyst composition has a tapped bulk density of greater than or equal to 0.30 g/cm^3, or greater than or equal to 0.35 g/cm^3, or greater than or equal to 0.40 g/cm^3 or greater than or equal to 0.45 g/cm^3.

3. A supported olefin polymerization catalyst composition according to claim 1, wherein the particulate support is a particulate Group 2, 3, 4, 5, 13 and 14 oxide or chloride; or

wherein the particulate support is a particulate silica; or

wherein the particulate support a particulate silica having an average particle size in the range of from about 0.1 to about 500 μm, or from about 1 to about 200 μm, or from about 1 to about 50 μm, or from about 5 to about 50 μm.

4. A supported olefin polymerization catalyst composition according to claim 1, wherein the one or more activator compounds is an alumoxane or a neutral or ionic stoichiometric activator; or

wherein the supported catalyst composition has a ratio of Al/Si on the external surface area of the support to Al/Si on the internal surface area of the support is less than or equal to 3.0, or less than or equal to 2.5; or

wherein the one or more activator compounds is a methylalumoxane or modified methylalumoxane.

5. A supported olefin polymerization catalyst composition according to any one of claims 1 to 4, wherein the one or more catalyst compounds comprise a titanium, a zirconium, or a hafnium atom; or

wherein the supported catalyst composition comprises two or more catalyst compounds comprising a titanium, a zirconium, or a hafnium atom; or

wherein the catalyst compound comprises:

(pentamethylcyclopentadienyl)(propylcyclopentadienyl)MX_2,

(tetramethylcyclopentadienyl)(propylcyclopentadienyl)MX_2,

(tetramethylcyclopentadienyl)(butylcyclopentadienyl)MX_2,

$Me_2Si(indenyl)_2MX_2$,

$Me_2Si(tetrahydroindenyl)_2MX_2$,

(n-propyl cyclopentadienyl)$_2MX_2$,

(n-butyl cyclopentadienyl)$_2MX_2$,

(1-methyl, 3-butyl cyclopentadienyl)$_2MX_2$,

$HN(CH_2CH_2N(2,4,6\text{-}Me_3phenyl))_2MX_2$,

$HN(CH_2CH_2N(2,3,4,5,6\text{-}Me_5phenyl))_2MX_2$,

(propyl cyclopentadienyl)(tetramethylcyclopentadienyl)MX_2,

(butyl cyclopentadienyl)$_2MX_2$,

(propyl cyclopentadienyl)$_2MX_2$, and mixtures thereof,

wherein M is Zr or Hf, and X is selected from F, Cl, Br, I, Me, benzyl, CH_2SiMe_3, and C_1 to C_5 alkyls or alkenyls.

6. A method for producing a supported olefin polymerization catalyst composition comprising the steps of:

a) forming a suspension comprising one or more particulate supports, one or more catalyst compounds, a continuity additive, and one or more activator compounds in one or more liquid diluents; and

b) drying the suspension to form the supported catalyst composition;

wherein the supported catalyst composition has a macro pore volume, as determined by ISO 15901-1, of less than or equal to 1.23 cm^3/g and step b) is performed at a temperature of less than or equal to 65°C and at a pressure which is greater than or equal to the vapor pressure of the one or more diluents, wherein the pressure is less than or equal to 8 psia.

7. A method according to claim 6 wherein substantially no gas bubbles of diluent are formed in the pores of the support; or

wherein the drying is performed at a temperature of less than or equal to 60°C, or less than or equal to 55°C, or less than or equal to 50°C, or less than or equal to 45°C; or

wherein the drying is performed at a pressure of less than or equal to 2 psia, or less than or equal to 3 psia, or less than or equal to 4 psia, or less than or equal to 5 psia, or less than or equal to 6 psia; or

wherein the supported catalyst composition has a macro pore volume of less than or equal to 1.23 cm^3/g; or

wherein the liquid diluent comprises an aliphatic or aromatic hydrocarbon; or

wherein the liquid diluent comprises toluene.

8. A method according to any one of claims 13 to 19, wherein the supported catalyst composition has a macro pore volume of less than or equal to 1.20 cm^3/g, or less than or equal to 1.10 cm^3/g, or less than or equal to 1.00 cm^3/g; or

wherein the supported catalyst composition has a tapped bulk density of greater than or equal to 0.30 g/cm^3, or greater than or equal to 0.35 g/cm^3, or greater than or equal to 0.40 g/cm^3 or greater than or equal to 0.45 g/cm^3.

wherein the particulate support is a particulate Group 2, 3, 4, 5, 13 and 14 oxide or chloride; or

wherein the particulate support is a particulate silica; or

wherein the particulate support is a particulate silica having an average particle size in the range of from about 0.1 to about 500 μm, or from about 1 to about 200 μm, or from about 1 to about 50 μm, or from about 5 to about 50 μm.

9. A method according to any one of claims 6 to 8, wherein the one or more activator compounds is an alumoxane or a neutral or ionic stoichiometric activator; or

wherein the supported catalyst composition has a ratio of Al/Si on the external surface area of the support to Al/Si on the internal surface area of the support of less than or equal to 3.0, or less than or equal to 2.5; or

wherein the one or more activator compounds is a methylalumoxane or modified methylalumoxane; or

wherein the one or more catalyst compounds comprise a titanium, a zirconium, or a hafnium atom; or

wherein the supported catalyst composition comprises two or more catalyst compounds comprising a titanium, a zirconium, or a hafnium atom; or

wherein the catalyst compound comprises:

(pentamethylcyclopentadienyl)(propylcyclopentadienyl)MX_2,

(tetramethylcyclopentadienyl)(propylcyclopentadienyl)MX_2,

(tetramethylcyclopentadienyl)(butylcyclopentadienyl)MX_2,

$Me_2Si(indenyl)_2MX_2$,

$Me_2Si(tetrahydroindenyl)_2MX_2$,

(n-propyl cyclopentadienyl)$_2MX_2$,

(n-butyl cyclopentadienyl)$_2MX_2$,

(1-methyl, 3-butyl cyclopentadienyl)$_2MX_2$,

$HN(CH_2CH_2N(2,4,6\text{-}Me_3phenyl))_2MX_2$,

$HN(CH_2CH_2N(2,3,4,5,6\text{-}Me_5phenyl))_2MX_2$,

(propyl cyclopentadienyl)(tetramethylcyclopentadienyl)MX_2,

(butyl cyclopentadienyl)$_2MX_2$,

(propyl cyclopentadienyl)$_2MX_2$, and mixtures thereof,

wherein M is Zr or Hf, and X is selected from F, Cl, Br, I, Me, benzyl, CH_2SiMe_3, and C_1 to C_5 alkyls or alkenyls.

10. A process for polymerizing olefins, the process comprising:

contacting olefins with one or more supported catalyst compositions according to any one of claims 1 to 5 in a reactor under polymerization conditions to produce an olefin polymer or copolymer.