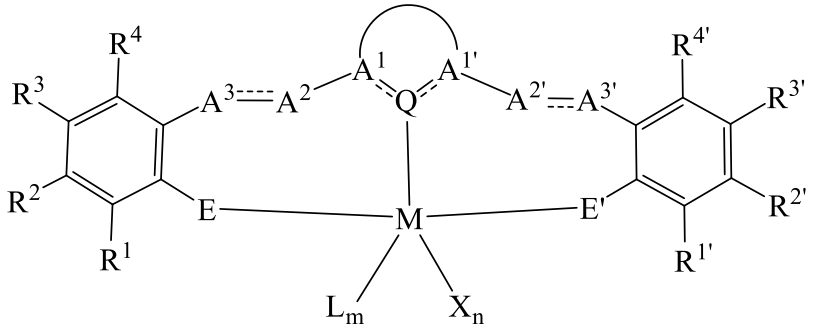
CLAIMS

What is claimed is

1. A polymerization process comprising contacting a cyclic olefin monomer and optional comonomer selected from C_2 to C_{20} alpha olefins with a catalyst system comprising activator and catalyst compound represented by the Formula (**I**):



(**I**)

wherein:

M is Hf, Zr or Ti;

E and E' are each O;

Q is group 14, 15, or 16 atom that forms a dative bond to metal M;

$A^1QA^{1'}$ are part of a heterocyclic Lewis base containing 4 to 40 non-hydrogen atoms that links A^2 to $A^{2'}$ via a 3-atom bridge with Q being the central atom of the 3-atom bridge, A^1 and $A^{1'}$ are independently C, N, or C(R^{22}), where R^{22} is selected from hydrogen, C_1-C_{20} hydrocarbyl, C_1-C_{20} substituted hydrocarbyl;

A^3----A^2 is a divalent group containing 2 to 40 non-hydrogen atoms that links A^1 to the E-bonded aryl group via a 2-atom bridge;

$A^{2'}$=---$A^{3'}$ is a divalent group containing 2 to 40 non-hydrogen atoms that links $A^{1'}$ to the E'-bonded aryl group via a 2-atom bridge;

L is a Lewis base;

X is an anionic ligand;

n is 1, 2 or 3;

m is 0, 1, or 2;

n+m is not greater than 4;

R^1 and $R^{1'}$ are independently a C_4-C_{40} tertiary hydrocarbyl group, a C_4-C_{40} cyclic tertiary hydrocarbyl group, or a C_4-C_{40} polycyclic tertiary hydrocarbyl group;

each of R^2, R^3, R^4, $R^{2'}$, $R^{3'}$, and $R^{4'}$ is independently hydrogen, a C_1-C_{40} hydrocarbyl, a C_1-C_{40} substituted hydrocarbyl, a heteroatom or a heteroatom-containing group,

and one or more of R^2 and R^3, R^3 and R^4, $R^{2'}$ and $R^{3'}$, $R^{3'}$ and $R^{4'}$ may be joined to form

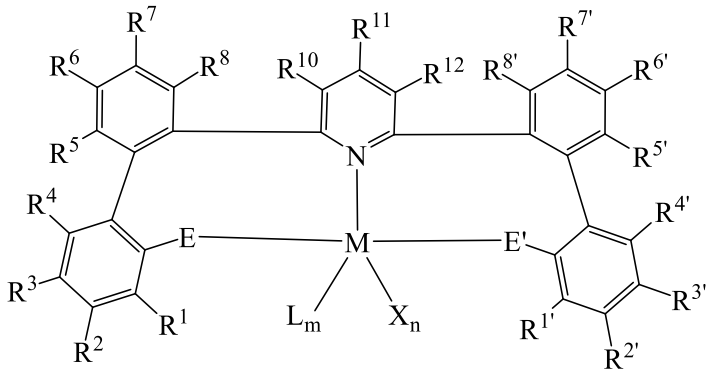
one or more substituted hydrocarbyl rings, unsubstituted hydrocarbyl rings, substituted heterocyclic rings, or unsubstituted heterocyclic rings each having 5, 6, 7, or 8 ring atoms, and where substitutions on the ring can join to form additional rings;

any two L groups may be joined together to form a bidentate Lewis base;

an X group may be joined to an L group to form a monoanionic bidentate group;

any two X groups may be joined together to form a dianionic ligand group.

2. The process of claim 1 where the catalyst compound represented by the Formula (**II**):



(**II**)

wherein:

M is a Hf, Zr or Ti;

E and E' are each O;

each L is independently a Lewis base;

each X is independently an anionic ligand;

n is 1, 2 or 3;

m is 0, 1, or 2;

n+m is not greater than 4;

R^1 and $R^{1'}$ are independently a C_4-C_{40} tertiary hydrocarbyl group, a C_4-C_{40} cyclic tertiary hydrocarbyl group, or a C_4-C_{40} polycyclic tertiary hydrocarbyl group;

each of R^2, R^3, R^4, $R^{1'}$, $R^{2'}$, $R^{3'}$, and $R^{4'}$ is independently hydrogen, C_1-C_{40} hydrocarbyl, C_1-C_{40} substituted hydrocarbyl, a heteroatom or a heteroatom-containing group, or one or more of R^2 and R^3, R^3 and R^4, $R^{2'}$ and $R^{3'}$, $R^{3'}$ and $R^{4'}$ may be joined to form one or more substituted hydrocarbyl rings, unsubstituted hydrocarbyl rings, substituted heterocyclic rings, or unsubstituted heterocyclic rings each having 5, 6, 7, or 8 ring atoms, and where substitutions on the ring can join to form additional rings;

any two L groups may be joined together to form a bidentate Lewis base;

an X group may be joined to an L group to form a monoanionic bidentate group;

any two X groups may be joined together to form a dianionic ligand group;

each of R^5, R^6, R^7, R^8, $R^{5'}$, $R^{6'}$, $R^{7'}$, $R^{8'}$, R^{10}, R^{11}, and R^{12} is independently hydrogen, a C_1-C_{40} hydrocarbyl, a C_1-C_{40} substituted hydrocarbyl, a heteroatom or a heteroatom-containing group, or one or more of R^5 and R^6, R^6 and R^7, R^7 and R^8, $R^{5'}$ and $R^{6'}$, $R^{6'}$ and $R^{7'}$, $R^{7'}$ and $R^{8'}$, R^{10} and R^{11}, or R^{11} and R^{12} may be joined to form one or more substituted hydrocarbyl rings, unsubstituted hydrocarbyl rings, substituted heterocyclic rings, or unsubstituted heterocyclic rings each having 5, 6, 7, or 8 ring atoms, and where substitutions on the ring can join to form additional rings.

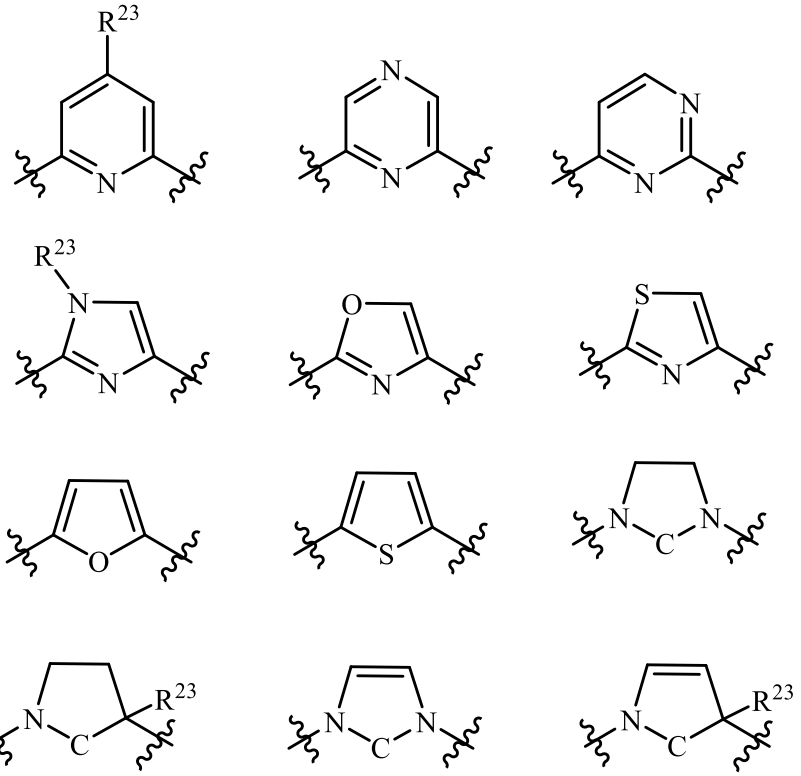
3. The process any of claims 1 to 2 wherein each X is, independently, selected from the group consisting of substituted or unsubstituted hydrocarbyl radicals having from 1 to 20 carbon atoms, hydrides, amides, alkoxides, sulfides, phosphides, halides, and a combination thereof, (two X's may form a part of a fused ring or a ring system), and wherein each L is, independently, selected from the group consisting of: ethers, thioethers, amines, phosphines, ethyl ether, tetrahydrofuran, dimethylsulfide, triethylamine, pyridine, alkenes, alkynes, allenes, and carbenes and combinations thereof, optionally two or more L's may form a part of a fused ring or a ring system).

4. The process of claim 1, wherein M is Zr or Hf, Q is nitrogen, both A^1 and $A^{1'}$ are carbon, and both R^1 and $R^{1'}$ are C_4-C_{20} cyclic tertiary alkyls, adamantan-1-yl or substituted adamantan-1-yl.

5. The process of claim 1, wherein M is Zr or Hf, Q is nitrogen, both A^1 and $A^{1'}$ are carbon, and X is methyl or chloro, and n is 2.

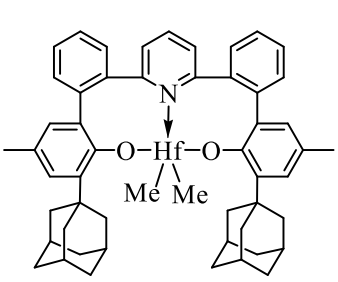
6. The process of claim 1, wherein Q is carbon and A^1 and $A^{1'}$ are both nitrogenor wherein Q is carbon, A^1 is nitrogen and $A^{1'}$ is $C(R^{22})$, where R^{22} is selected from hydrogen, C_1-C_{20} hydrocarbyl, C_1-C_{20} substituted hydrocarbyl.

7. The process of claim 1, wherein the heterocyclic Lewis base is selected from the groups represented by the following formulas:

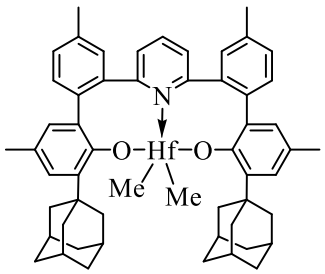


where each R^{23} is independently selected from hydrogen, C_1-C_{20} alkyls, and C_1-C_{20} substituted alkyls.

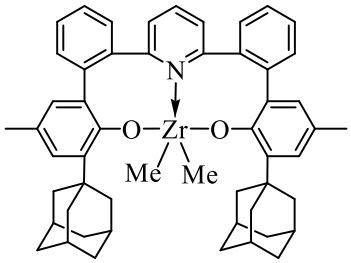
8. The process of claim 1 wherein the catalyst compound is represented by one or more of the following formulas:



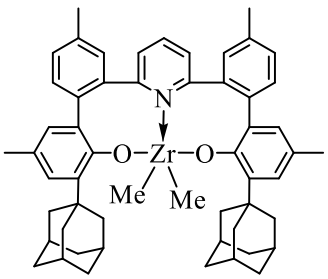
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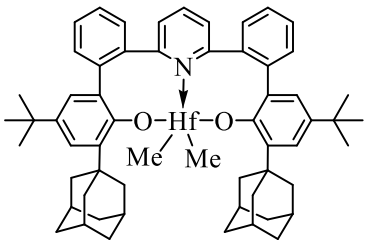
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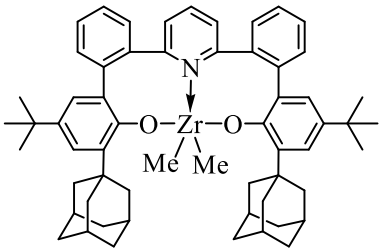
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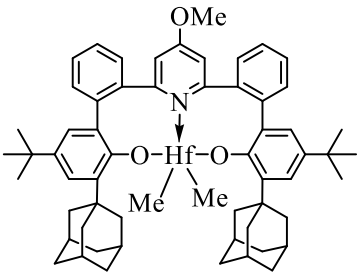
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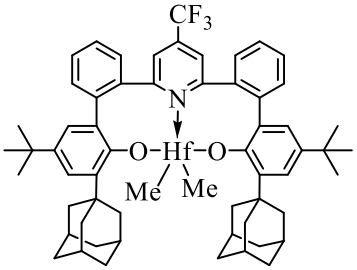
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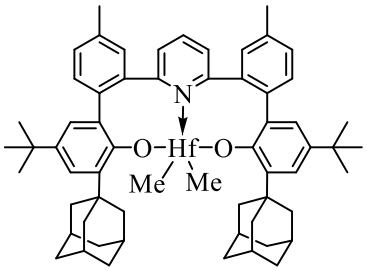
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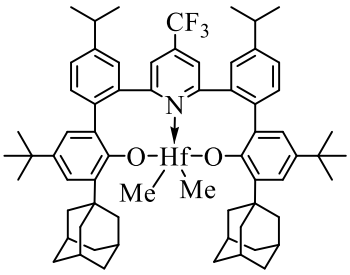
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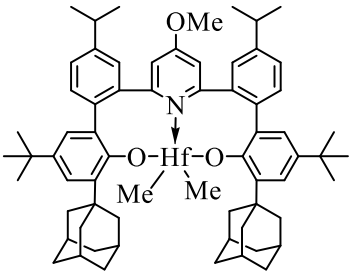
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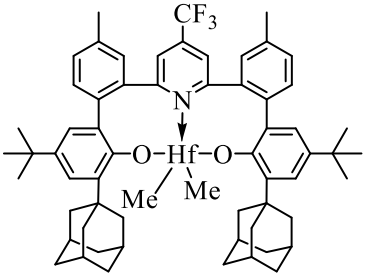
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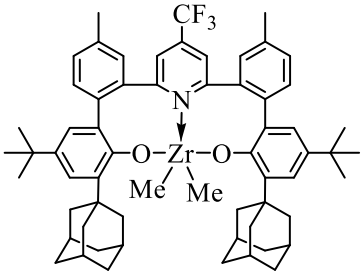
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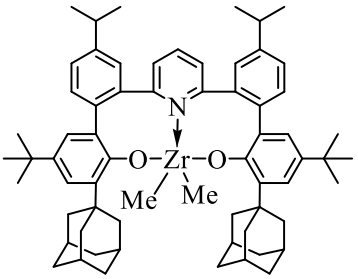
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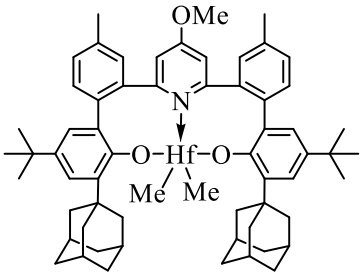
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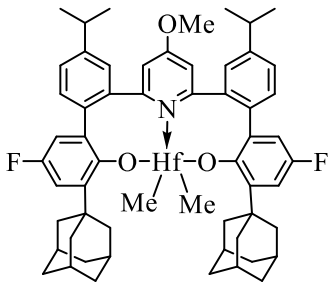
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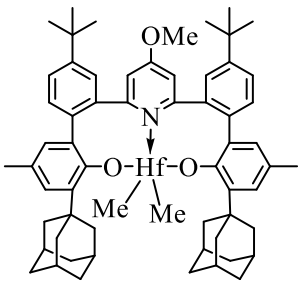
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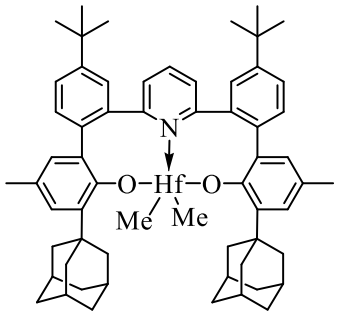
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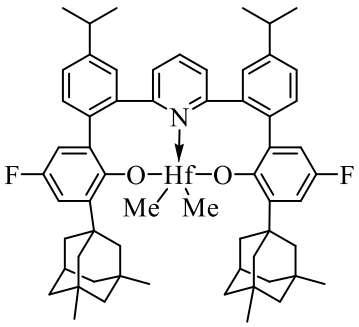
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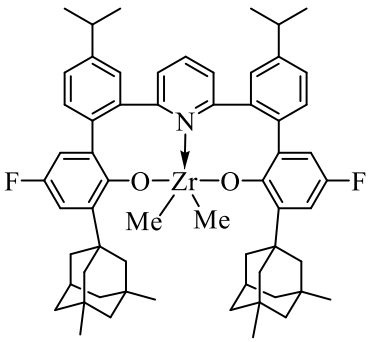
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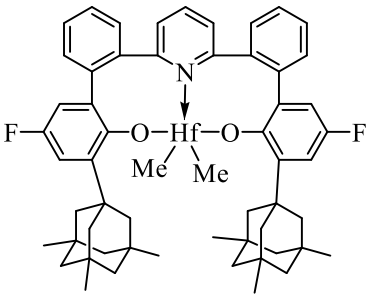
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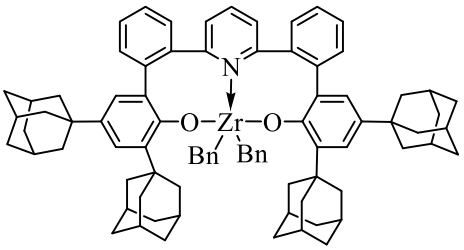
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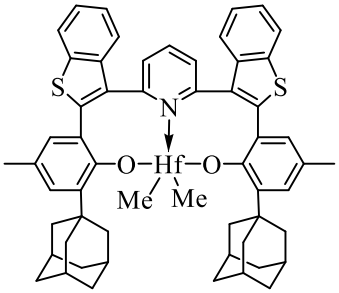
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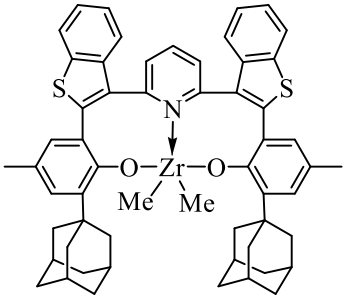
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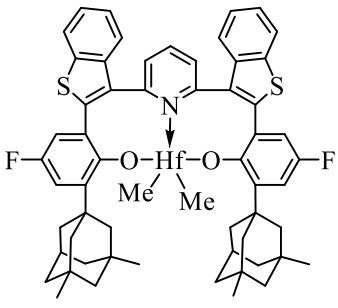
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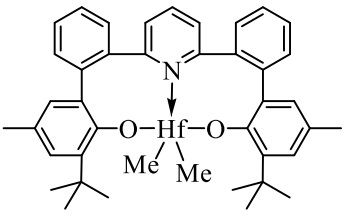
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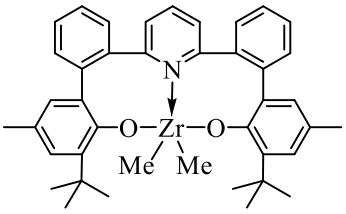
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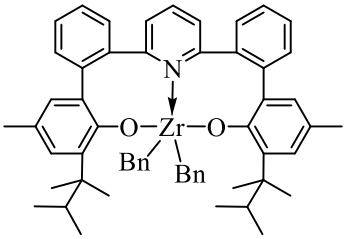
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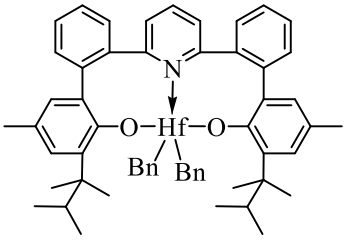
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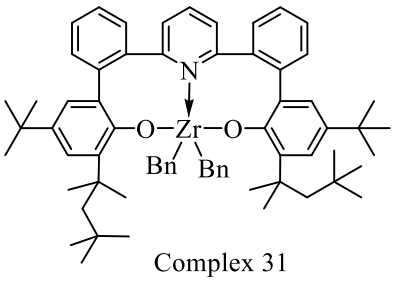
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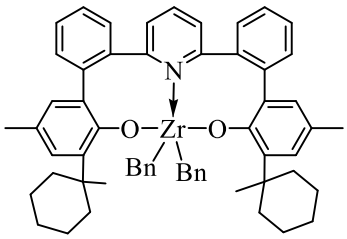
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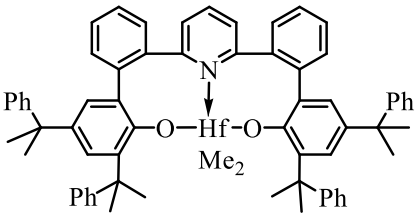
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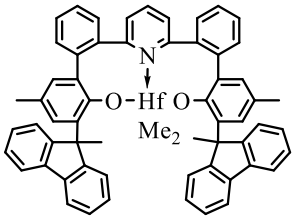
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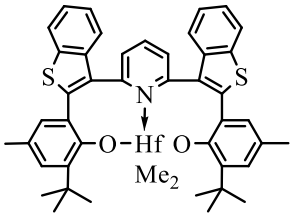
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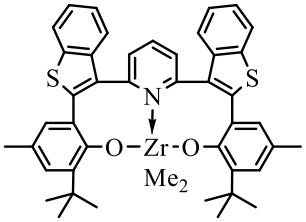
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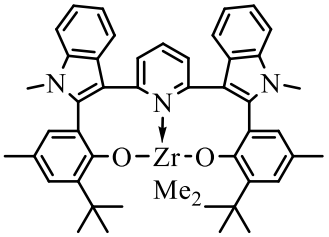
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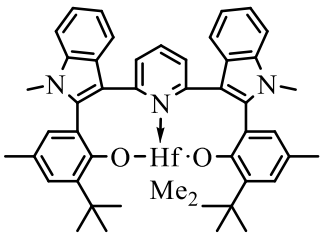
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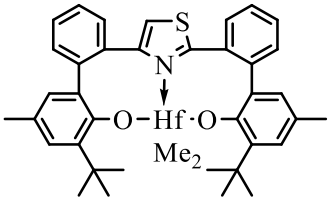
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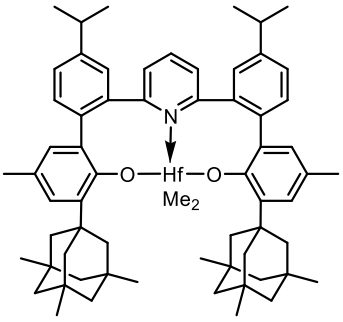
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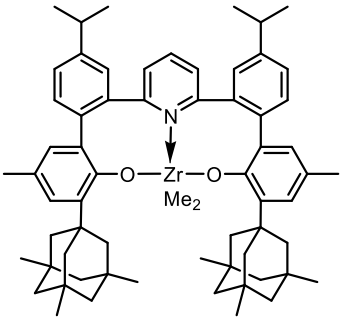
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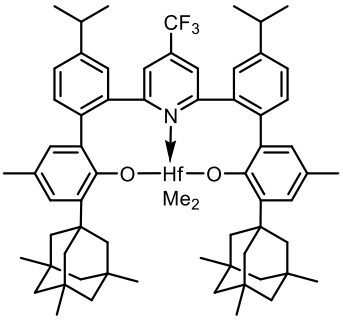
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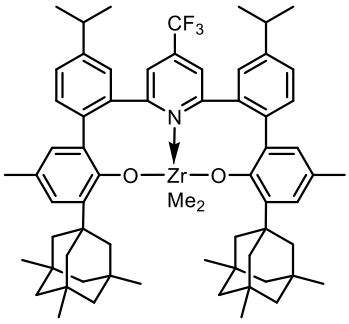
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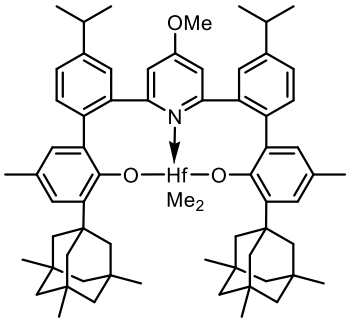
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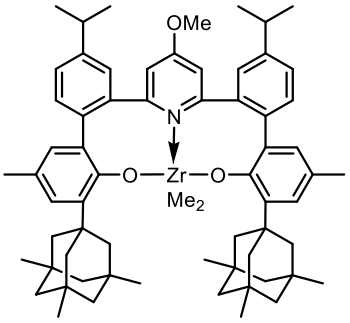
Complex 42



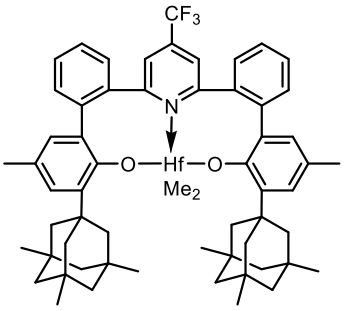
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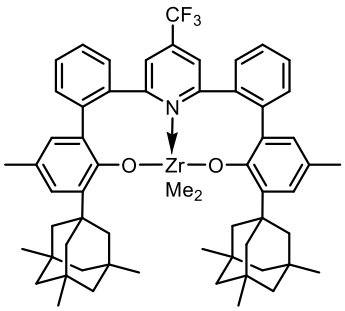
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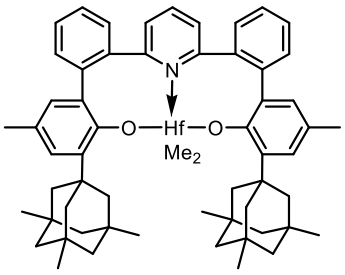
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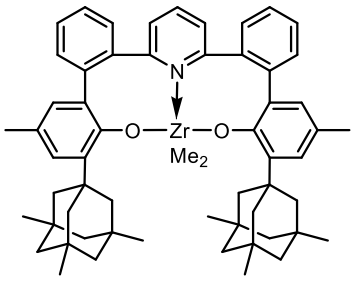
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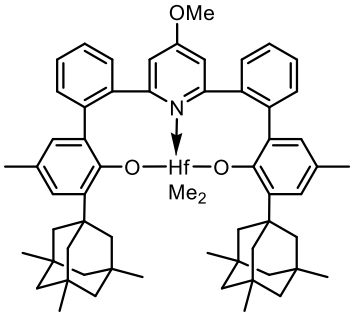
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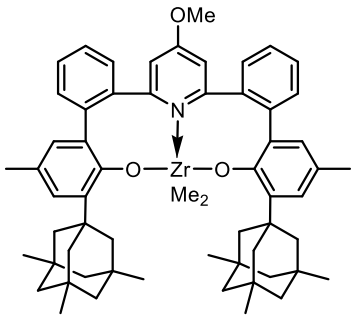
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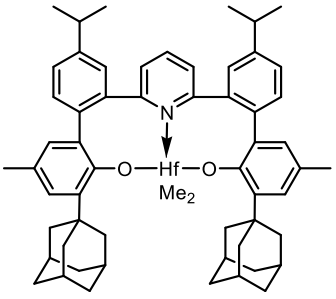
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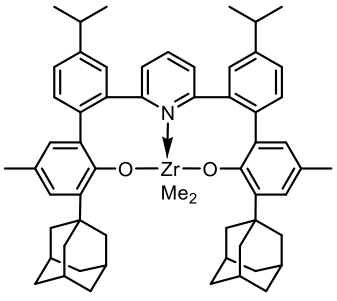
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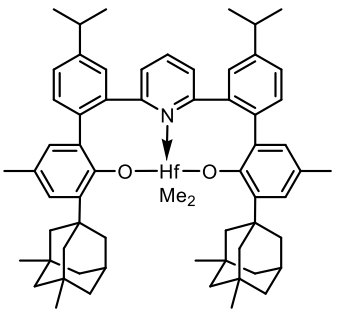
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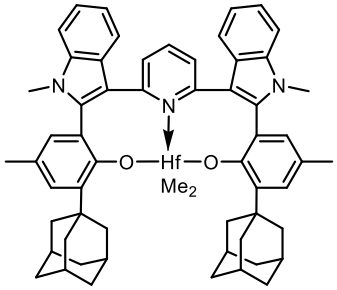
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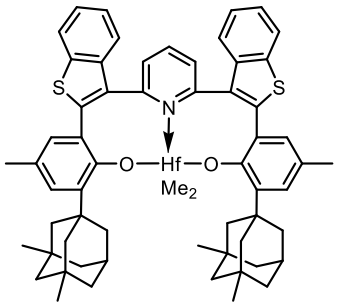
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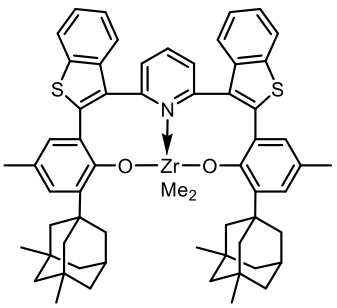
Complex 54



Complex 56

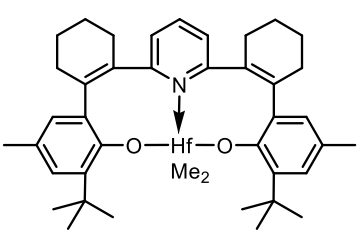


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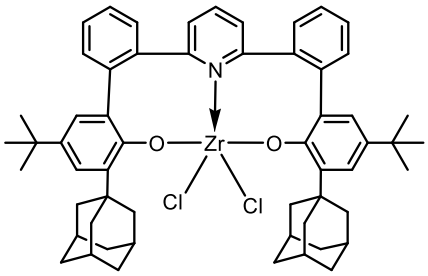


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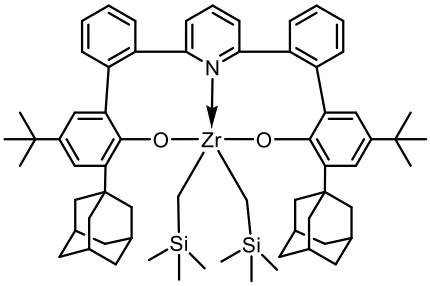
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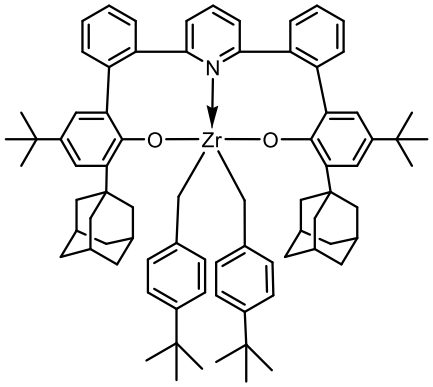
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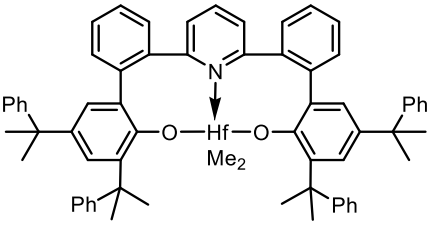
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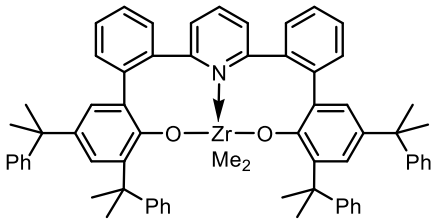
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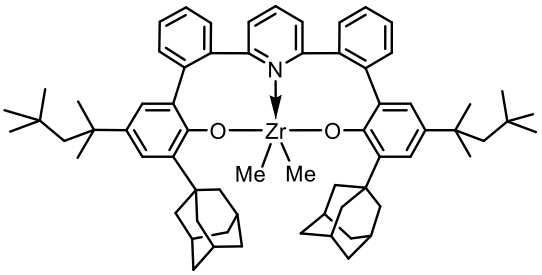
Complex 63



Complex 64



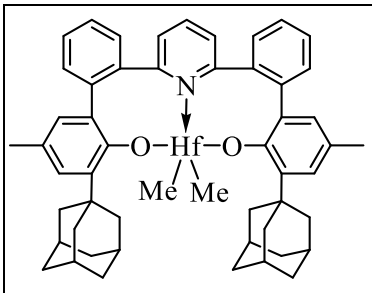
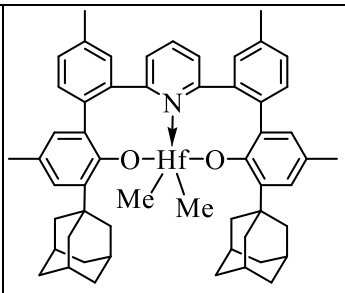
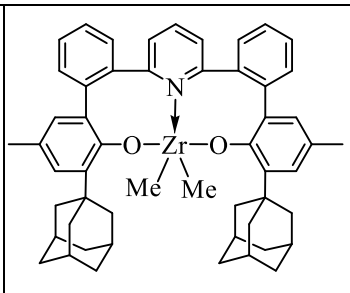
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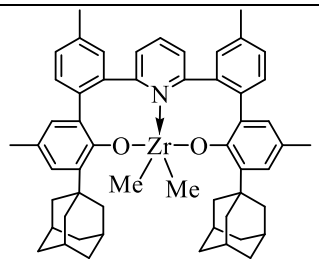
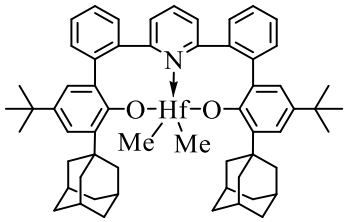
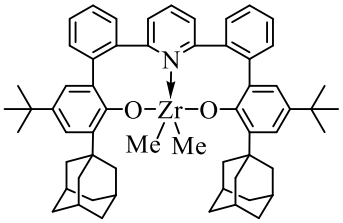
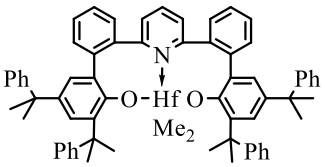
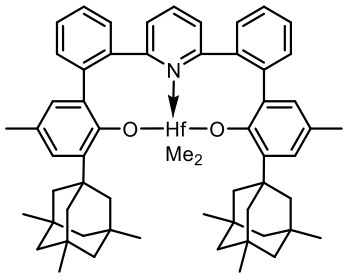
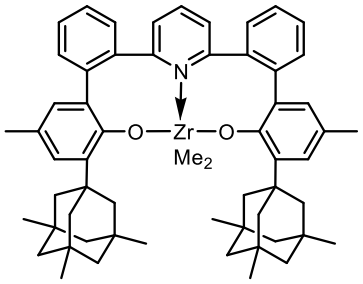
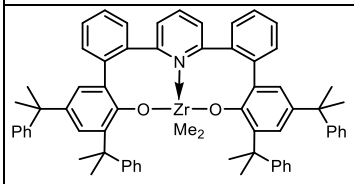
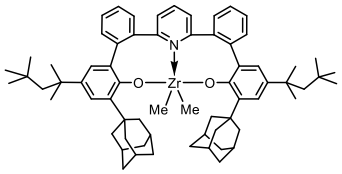


Complex 66

5

9. The process of claim 1 wherein the catalyst compound is one or more of

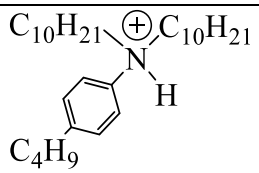
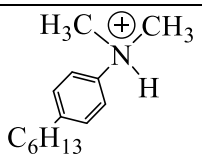
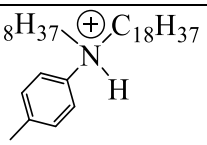
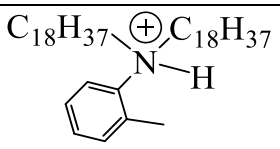
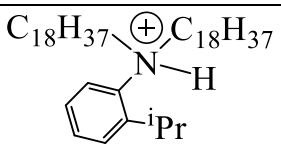
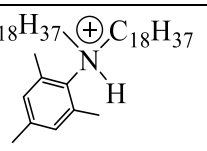
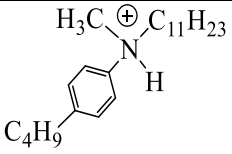
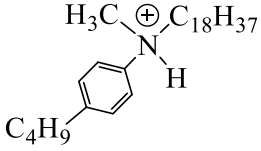
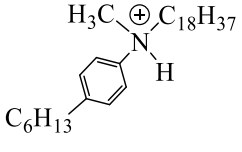
 Complex 1	 Complex 2	 Complex 3

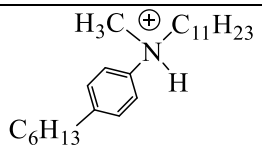
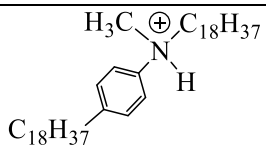
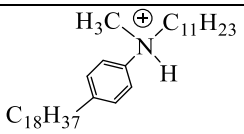
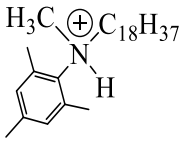
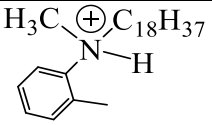
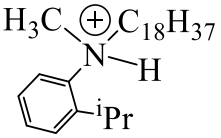
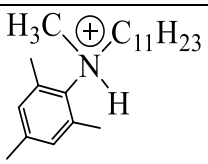
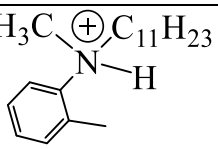
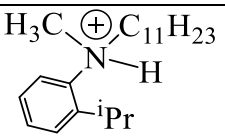
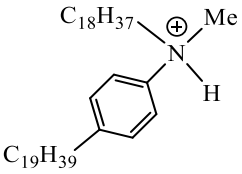
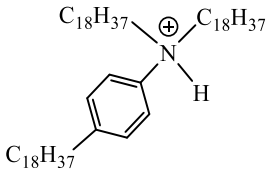
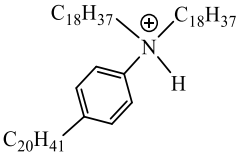
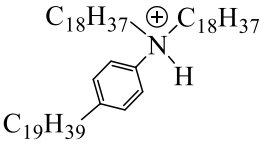
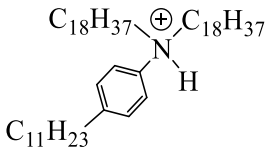
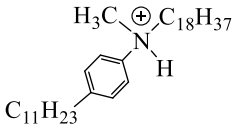
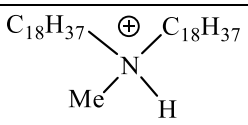
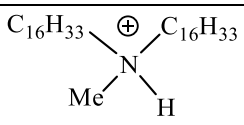
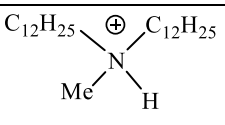
 Complex 4	 Complex 5	 Complex 6
 Complex 33	 Complex 48	 Complex 49
 Complex 65	 Complex 66	

10. The process of any of claims 1 to 9, wherein the activator is represented by the formula:

$$(Z)_d^+ (A^{d-})$$

wherein A^{d-} is a non-coordinating anion having the charge d-; and d is an integer from 1 to 3 and $(Z)_d^+$ is represented by one or more of:

10		**11**		**12**	
13		**14**		**15**	
16		**17**		**18**	

19		**20**		**21**	
22		**23**		**24**	
25		**26**		**27**	
29		**28**		**30**	
31		**32**		**33**	
34		**35**		**36**	

11. The process of any of claims 1 to 2, further comprising recovering a polymer, wherein the polymer comprises at least 0.1 mol% cyclic olefin.

12. The process of any of claims 1 to 2, further comprising recovering a polymer, wherein the polymer comprises at least 1 mol% cyclic olefin and at least 20 mol% ethylene or at least 20 mol% propylene.

13. The process of any of claims 1 to 2, further comprising recovering a polymer, wherein the polymer is a homopolymer of substituted or unsubstituted cyclopentene, preferably wherein the polymer is a homopolymer of cyclopentene.

14. The process of any of claims 1 to 13, further comprising recovering a polymer, wherein the polymer is one of the following:

(i) an ethylene cyclopentene copolymer having:

a Mn greater than 5,000 g/mole;

a Mw greater than 10,000 g/mole;

a Mw/Mn of about 1 to 10;

a cyclopentene content of 0.1 mole% or greater, with an upper limit of 50 mole%; and

having cyclopentene 1,2 linkages at about 90% or greater of the total cyclopentene units incorporated into the polymer, or

(ii) an ethylene norbornene copolymer having:

a Mn greater than 50,000 g/mole;

a Mw greater than 100,000 g/mole;

a Mw/Mn of about 1.2 to 5.0; and

having norbornene units that are from 10 to 80% isolated, from 10 to 80% alternating, and from 1 to 50% blocked wherein the total of isolated, alternating and blocked equals 100%, or

(iii) a propylene cyclopentene copolymer having:

a Mn greater than 3,000 g/mole;

a Mw greater than 6,000 g/mole;

a Mw/Mn of about 1 to 10;

a cyclopentene content of 0.1 mole% or greater, with an upper limit of 50 mole%; and

having cyclopentene 1,2 linkages at about 90% or greater of the total cyclopentene units incorporated into the polymer, or

(iv) a propylene norbornene copolymer having:

a Mn greater than 3,000 g/mole;

a Mw greater than 6,000 g/mole;

a Mw/Mn of about 1.2 to 5.0:

a norbornene content of 1 mole% or greater, with an upper limit of 50 mole% or less.