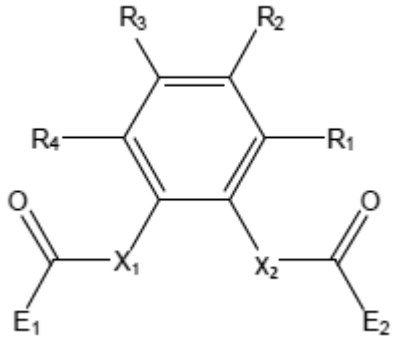
Claims

1. A catalyst composition for stereoselective polymerization of propylene comprising:

a combination of a magnesium moiety, a titanium moiety, and an internal electron donor,

the internal electron donor comprising:



wherein:

R_1 and R_4 are each a hydrocarbyl group having from 1 to 20 carbon atoms;

R_2 is hydrogen;

R_3 is a substituted or unsubstituted hydrocarbyl group having from 5 to 15 carbon atoms, the hydrocarbyl group having a branched or linear structure or comprising a cycloalkyl group having from 7 to 15 carbon atoms;

E_1 and E_2 are the same or different and selected from the group consisting of an alkyl having 1 to 20 carbon atoms, a substituted alkyl having 1 to 20 carbon atoms, an aryl having 6 to 20 carbon atoms, a substituted aryl having 6 to 20 carbon atoms, or an inert functional group having 1 to 20 carbon atoms and optionally containing heteroatoms;

X_1 is NR_5 and X_2 is O, S, or NR_5, or X_2 is NR_5 and X_1 is O, S, or NR_5; and

R_5 is a hydrocarbyl group having 1 to 20 carbon atoms or is hydrogen.

2. The catalyst composition of claim 1, wherein R_3 is a branched alkyl or alkenyl group.

3. A catalyst composition as defined in claim 2, wherein the branched alkyl or alkenyl group contains from 5 to 10 carbon atoms.

4. A catalyst composition as defined in any of the preceding claims, wherein R_3 is a 3-pentyl group, a 2-pentyl group, a cycloheptyl group, or a cyclooctyl group.

5. A catalyst composition as defined in any of the preceding claims, wherein R_1 and R_4 are the same.

6. A catalyst composition as defined in any of the preceding claims, wherein R_1 and R_4 are linear hydrocarbyl groups.

7. A catalyst composition as defined in any of the preceding claims, wherein R_1 and R_4 comprise a C1 to C8 alkyl group, a C2 to C8 alkenyl group, or mixtures thereof.

8. A catalyst composition as defined in any of the preceding claims, wherein the magnesium moiety comprises a magnesium halide.

9. A catalyst composition as defined in any of the preceding claims, wherein E_1 and E_2 both comprise phenyl groups.

10. A catalyst composition as defined in any of the preceding claims, further comprising a cocatalyst, optionally an activity limiting agent and optionally a selectivity control agent.

11. A catalyst composition as defined in claim 10, wherein the cocatalyst comprises a hydrocarbon aluminum cocatalyst.

12. A catalyst composition as defined in claim 10, wherein the selectivity control agent is present and comprises an alkoxysilane.

13. A catalyst composition as defined in claim 10 or 12, wherein the selectivity control agent comprises dicyclopentyldimethoxysilane, di-tert-butyldimethoxysilane, methylcyclohexyldimethoxysilane, methylcyclohexyldiethoxysilane, ethylcyclohexyldimethoxysilane, diphenyldimethoxysilane, diisopropyldimethoxysilane, di-n-propyldimethoxysilane, diisobutyldimethoxysilane, diisobutyldiethoxysilane, isobutylisopropyldimethoxysilane, di-n-butyldimethoxysilane, cyclopentyltrimethoxysilane, isopropyltrimethoxysilane, n-propyltrimethoxysilane, n-

propyltriethoxysilane, ethyltriethoxysilane, tetramethoxysilane, tetraethoxysilane, diethylaminotriethoxysilane, cyclopentylpyrrolidinodimethoxysilane, bis(pyrrolidino)dimethoxysilane, bis(perhydroisoquinolino)dimethoxysilane, dimethyldimethoxysilane or mixtures thereof.

14. A catalyst composition as defined in claim 1, wherein the magnesium moiety comprises a spray crystallized magnesium halide compound comprising ethanol and magnesium chloride in a weight ratio of from about 1.5:1 to about 3.1:1.

15. A polymerization process comprising: polymerizing an olefin in the presence of a catalyst composition comprising as defined in any of the preceding claims.

16. A process as defined in claim 15, wherein the olefin comprises propylene for forming a propylene homopolymer or comprises propylene and ethylene for forming a propylene and ethylene copolymer.

17. A process as defined in claim 16, wherein the process produces a heterophasic polymer.

18. A process as defined in claim 17, wherein the heterophasic polymer comprises a first polymer phase comprising a polypropylene homopolymer or a polypropylene random copolymer, the heterophasic polymer further comprising a second polymer phase combined with the first polymer phase, the second polymer phase comprising an elastomeric propylene ethylene copolymer.

19. A process as defined in claim 18, wherein the first polymer phase is formed in a first reactor and the second polymer phase is formed in a second reactor, the catalyst composition remaining active in both the first reactor and the second reactor.

20. An olefin polymer containing the catalyst composition as defined in any of claims 1-14.

21. The catalyst composition of claim 11, wherein the hydrocarbon aluminum cocatalyst comprises triethylaluminum.