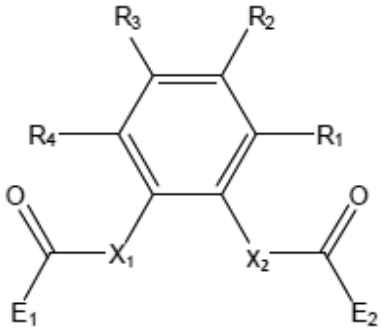
Claims

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, or a substituted aryl having 6 to 20 carbon atoms;

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

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

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

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

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

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

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

13. The 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. The 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 1.5:1 to 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. The 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. The process as defined in claim 16, wherein the process produces a heterophasic polymer.

18. The 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. The 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 obtained by a polymerization process wherein the catalyst composition as defined in any of claims 1-14 is used.

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