[0004a] In another aspect, there is provided a method for forming a catalyst system comprising:

forming a mixture of a support material that can be fluorinated and a fluoride donor;

adding the mixture to a fluidized bed reactor;

fluidizing the mixture in the fluidized bed reactor with a fluidizing gas by maintaining a flow rate of the fluidizing gas of 0.1 ft. / sec at less than 370°C and greater than 0.35 ft./ sec at temperatures greater than 370°C;

calcining the mixture to decompose the fluoride donor, forming the fluorinated catalyst support;

and either:

combining a catalyst compound with the fluorinated catalyst support, and an aluminoxane, wherein the aluminoxane is present in an amount of 10 mmol or less per gram of the catalyst support; or

combining a catalyst compound and an aluminoxane to produce a first mixture; and adding the fluorinated catalyst support to the first mixture and drying, to produce the catalyst system.

[0004b] In another aspect, there is provided a catalyst system, comprising:

a catalyst compound;

a support comprising a fluorinated support, wherein the fluorinated support is generated by heating a mixture of a catalyst support that can be fluorinated and a fluoride donor compound in a fluidized bed reactor that is fluidized by maintaining a flow rate of a fluidizing gas of 0.1 ft. / sec at less than 370°C and greater than 0.35 ft./ sec at temperatures greater than 370°C, wherein the support has a fluoride concentration ranging from 1 wt. % to 10 wt. %, based on a weight of the support and an aluminum concentration ranging from 3 wt. % to 40 wt. % based on the weight of the support; and

an aluminoxane, wherein the aluminoxane is present in an amount of 10 mmol or less per gram of the support.

DESCRIPTION OF THE DRAWINGS

[0005] The advantages of the present techniques are better understood by referring to the following detailed description and the attached drawings, in which:

[0006] Figure 1 is a simplified process flow diagram of a catalyst activator system that may be used in embodiments;

[0007] Figure 2 is a simplified process flow diagram of another catalyst activator that may be used in embodiments;

[0008] Figure 3 is a plot showing the bed expansion of raw Siral 40 versus the flow of the fluidizing gas (SGV);

a support comprising a fluorinated support, wherein the fluorinated support is generated by heating a mixture of a catalyst support that can be fluorinated and a fluoride donor compound in a fluidized bed reactor that is fluidized by maintaining a flow rate of a fluidizing gas of 0.1 ft. / sec at less than 370 °C and greater than 0.35 ft./ sec at temperatures greater than 370 °C, wherein the support has a fluoride concentration ranging from 1 wt. % to 10 wt. %, based on a weight of the support and an aluminum concentration ranging from 3 wt. % to 40 wt. % based on the weight of the support; and

an aluminoxane, wherein the aluminoxane is present in an amount of 10 mmol or less per gram of the support.

11. The catalyst system of claim 10, wherein a ratio of a pressure drop across a distributor plate to a pressure drop across the fluidized bed is maintained at greater than 7 %.

12. The catalyst system of claim 10, wherein a flow rate of the fluidizing gas is increased from 0.1 ft. / sec. to 0.4 ft./ sec starting at a temperature of between 350 °C and 370 °C.

13. The catalyst system of claim 10, wherein the support is generated in a fluidized bed reactor with a height to depth ratio of a fluidized bed of at least 2.3.

14. The catalyst system of claim 10, wherein the support has a fluoride concentration ranging from 4 wt. % to 8 wt. %, based on a weight of the support and an aluminum concentration ranging from 20 wt. % to 40 wt. % based on the weight of the support.

15. The catalyst system of claim 10, wherein the support has a fluoride concentration ranging from 2 wt. % to 4 wt. %, based on a weight of the support and an aluminum concentration ranging from 3 wt. % to 10 wt. % based on the weight of the support.

16. The catalyst system according to claim 10, wherein the concentration on metal from the catalyst compound ranges from 0.2 wt. % to 1.3 wt. %, based on a total weight of the catalyst system.

17. The catalyst system according to claim 10, wherein the aluminoxane is present:
in an amount of 4 mmol or less per gram of the support; or
in an amount of 2.7 mmol or less per gram of the support, wherein the aluminoxane comprises methylaluminoxane, modified methylaluminoxane, or a combination thereof.

18. The catalyst system according to claim 10, wherein the support further comprises silica.

19. The catalyst system according to claim 10, wherein the catalyst compound comprises a metallocene catalyst; or

$$Cp^ACp^BMX_n \text{ or } Cp^A(A)Cp^BMX_n,$$

wherein M is a Group 4, 5 or 6 atom; Cp^A and Cp^B are each bound to M and are independently selected from the group consisting of cyclopentadienyl ligands, substituted cyclopentadienyl ligands, ligands isolobal to cyclopentadienyl and substituted ligands isolobal to cyclopentadienyl; (A) is a divalent bridging group bound to both Cp^A and Cp^B selected from the group consisting of divalent C_1 to C_{20} hydrocarbyls and C_1 to C_{20} heteroatom containing hydrocarbonyls, wherein the heteroatom containing hydrocarbonyls comprise from one to three heteroatoms; X is a leaving group selected from the group consisting of chloride ions, bromide ions, C_1 to C_{10} alkyls, and C_2 to C_{12} alkenyls, carboxylates, acetylacetonates, and alkoxides; and n is an integer from 1 to 4.