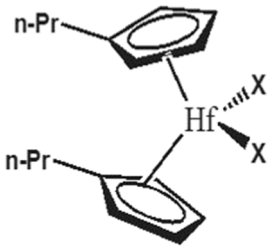
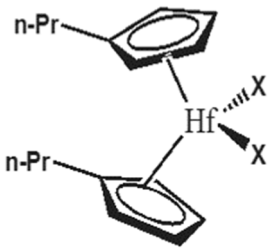
[0005] One or more examples provide that the activated metallocene complex of the gas-phase activated metallocene complex polymerization is provided by activating a metallocene complex represented by Formula I:



Formula I

[0006] wherein each n-Pr is n-propyl, and each X is independently CH3, Cl, Br, or F.

[0006a] In one aspect, the present disclosure refers to a method for controlling a polymerization reaction, the method comprising: determining an instantaneous density model for a gas-phase activated metallocene complex polymerization, wherein the instantaneous density model incorporates: a hydrogen concentration for the activated metallocene complex gas-phase polymerization and comonomer concentration for the gas-phase activated metallocene complex polymerization; and utilizing the instantaneous density model to monitor the polymerization reaction to determine if a threshold instantaneous density is reached; wherein the activated metallocene complex of the gas-phase activated metallocene complex polymerization is provided by activating a metallocene complex represented by Formula I:



Formula I

wherein each n-Pr is n-propyl, and each X is independently CH_3, Cl, Br, or F.

[0007] One or more examples provide that the instantaneous density incorporates instantaneous process conditions determined from a mass balance in-between analyzer updates.

[0008] One or more examples provide that the threshold instantaneous density is determined from a stickiness model.

[0009] One or more examples provide that the threshold instantaneous density is determined from a stickiness model using instantaneous process conditions determined from a mass balance in-between analyzer updates.

[0010] One or more examples provide that the threshold instantaneous density is a preset value.

[0011] One or more examples provide killing the polymerization reaction when the threshold instantaneous density is reached.

[0012] One or more examples provide that killing the polymerization reaction includes slowing and/or stopping the polymerization reaction.

[0013] One or more examples provide that killing the polymerization reaction includes injecting a kill material into a polymerization reactor.

[0014] One or more examples provide that the kill material is carbon monoxide.

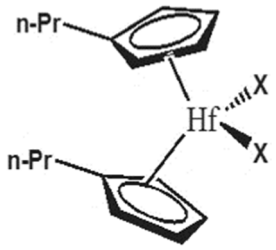
[0015] The above summary of the present disclosure is not intended to describe each disclosed example or every implementation of the present disclosure. The

description that follows more particularly exemplifies illustrative examples. In several places throughout the application, guidance is provided through lists of examples, which examples can be used in various combinations. In each instance, the recited list serves only as a representative group and should not be interpreted as an exclusive list.

Detailed Description

[0016] Polymers can have a variety of properties, such as density, melt index, and melt index ratio, among others. These properties may be varied by changes to polymerization parameters such as hydrogen concentration, monomer concentration, reaction temperature, comonomer flow ratio, and/or reaction temperature, among others. However, a number of values for some polymer properties may be more sensitive, e.g. more apt to vary and/or having a greater variance, when utilizing a particular polymer catalyst, as compared to other polymer catalysts.

[0017] Activated metallocenes may be utilized as catalysts for the production of a number of various polymers. It has been found that metallocene complex of Formula I,



Formula I

[0018] where each n-Pr is n-propyl, and each X is independently CH_3, Cl, Br, or F, when activated and utilized as a polymerization catalyst, has an increased hydrogen response, as compared to a number of other activated metallocenes.

[0019] This increased hydrogen response can have significant implications for polymerizations utilizing the activated metallocene complex of Formula I. For instance, a reduction of hydrogen concentration, for a polymerization that utilizes the activated metallocene complex of Formula I, can result in a polymer that has a correspondingly, significantly lower density. This lower density can result in undesirable increased bed stickiness, which can result in chuck formation in the polymerization reactor.

Claims

What is claimed:

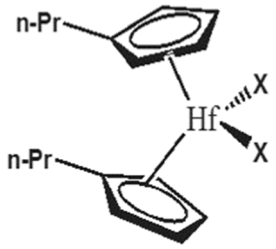
1. A method for controlling a polymerization reaction, the method comprising:

determining an instantaneous density model for a gas-phase activated metallocene complex polymerization, wherein the instantaneous density model incorporates:

a hydrogen concentration for the activated metallocene complex gas-phase polymerization and comonomer concentration for the gas-phase activated metallocene complex polymerization; and

utilizing the instantaneous density model to monitor the polymerization reaction to determine if a threshold instantaneous density is reached;

wherein the activated metallocene complex of the gas-phase activated metallocene complex polymerization is provided by activating a metallocene complex represented by Formula I:



Formula I

wherein each n-Pr is n-propyl, and each X is independently CH_3, Cl, Br, or F.

2. The method of claim 1, wherein the instantaneous density incorporates instantaneous process conditions determined from a mass balance in-between analyzer updates.

3. The method of claim 1, where the threshold instantaneous density is determined from a stickiness model.

4. The method of claim 1, where the threshold instantaneous density is determined from a stickiness model using instantaneous process conditions determined from a mass balance in-between analyzer updates.

5. The method of claim 1, where the threshold instantaneous density is a preset value.

6. The method of claim 1, comprising killing the polymerization reaction when the threshold instantaneous density is reached.

7. The method of claim 6, wherein killing the polymerization reaction includes slowing and/or stopping the polymerization reaction.

8. The method of claim 6, wherein killing the polymerization reaction includes injecting a kill material into a polymerization reactor.

9. The method of claim 8, wherein the kill material is carbon monoxide.