up, and needs to be cooled down, before the next and /or final compression stage. This thermal effect could lead to premature formation of radicals, and consequently, polymer in the cylinder packing and/or valves, leading potentially to disturbed lubrication in the cylinder packing and/or higher cylinder discharge temperatures, by recompression of the ethylene due to leaking cylinder valves.

As discussed above, there remains a need for new ethylene-based polymers that have higher melt strengths and higher densities, and which can be polymerized with minimal reactor fouling and good process and reactor stability. These needs have been met by the following invention.

SUMMARY ~~OF THE INVENTION~~

The ~~invention~~ disclosure provides a process to form an ethylene-based polymer, said process comprising polymerizing ethylene and at least one asymmetrical polyene, comprising an "alpha, beta unsaturated – carbonyl end" and a "C-C double bond end," and

wherein the polymerization takes place in the presence of at least one free-radical initiator; and wherein the polymerization takes place in a reactor configuration comprising at least two reaction zones, reaction zone 1 and reaction zone i ($i \geq 2$), wherein reaction zone i is downstream from reaction zone 1; and

wherein at least one chain transfer agent (CTA) is added to the polymerization, and wherein the CTA is a saturated hydrocarbon or an unsaturated hydrocarbon.

In one aspect, there is provided a process to form an ethylene-based polymer, said process comprising polymerizing ethylene and at least one asymmetrical polyene, comprising an "alpha, beta unsaturated – carbonyl end" and a "C-C double bond end," and

wherein the polymerization takes place in the presence of at least one free-radical initiator, and wherein the polymerization takes place in a reactor configuration comprising at least two reaction zones, reaction zone 1 and reaction zone i ($i \geq 2$), wherein reaction zone i is downstream from reaction zone 1; and

wherein at least one chain transfer agent (CTA) is added to the polymerization, and wherein the CTA is a saturated hydrocarbon or an unsaturated hydrocarbon.

In another aspect, there is provided an ethylene-based polymer formed from the process as defined herein.

In another aspect, there is provided a composition comprising the ethylene-based polymer as defined herein.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 depicts a flow scheme of a high pressure polymerization configuration.

Figure2 shows a flow diagram used for Comparative Example A', Inventive Examples 1' and 2'.

DETAILED DESCRIPTION

As discussed above, the invention provides a process to form an ethylene-based polymer, said process comprising polymerizing ethylene and at least one asymmetrical polyene, comprising an "alpha, beta unsaturated – carbonyl end" and a "C-C double bond end," and wherein the polymerization takes place in the presence of at least one free-radical initiator; and