polymerization includes the polymerization of propylene and optional comonomer. When the desired quantity of the first polymer product has been made, the conditions are changed to those necessary for producing the second product. The second polymerization includes the polymerization of propylene and comonomer(s) the sum of which contains less propylene. The present process includes introducing the propane into the reactor during transition from commercial-scale production of a first propylene-based polymer product (Product 1) to commercial-scale production of a different second product that is a propylene interpolymer (Product 2).

**[0011]** In an embodiment, the process includes producing a propylene-based polymer (or Product 1) in a gas-phase polymerization reactor under polymerization conditions. The combined propylene-plus-propane partial pressure in the reactor during steady-state Product 1 production is from 290 psia to 450 psia. The term "combined propylene plus-propylene partial pressure" is the sum of the propylene partial pressure and the propane partial pressure. The process includes transitioning to the production of a second polymer product, or propylene interpolymer (Product 2) in the same polymerization reactor. The process includes maintaining (during the transition phase) the combined propylene-plus-propane partial pressure in the range from 290 psia to 450 psia in the reactor while simultaneously:

(i) reducing the propylene partial pressure in the gas-phase polymerization reactor;

(ii) adding propane to the gas-phase polymerization reactor; and

(iii) introducing at least one $C_4$-$C_{10}$ comonomer into the gas-phase polymerization reactor. The process further includes forming a propylene/$C_4$-$C_{10}$ interpolymer in the gas-phase polymerization reactor.

The process includes contacting the propane rich stream with water to neutralize catalyst residual, passing the propane stream through a filter 50 to remove the solids produced in catalyst neutralization, then passing the propane stream from the VRS 24 through a dryer 52 which removes excess water from catalyst neutralization. From the dryer 52, the propane is fed into a propane storage tank 54. The vent recovery separator 24 recovers propylene while simultaneously allowing controlled removal of propane from the system. The VRS 24 maintains the dew point of the recycle stream at a temperature below the temperature of the fluidized bed 102. When propane is needed to charge the gas-phase polymerization (during transition, for example), a pump 56 discharges the propane into the reaction zone 12 through recycle line 22A. The propane, a component of the recycle stream, is then returned to reactor 10 at its base c and to fluidize the bed of polymer particles through gas distributor plate 28.

**[0033]** In an embodiment, the process includes transitioning from production of Product 1 to production of Product 2, in the gas-phase polymerization reactor 10. The second polymerization includes feeding propylene monomer and one or more $C_4$-$C_{10}$ comonomer(s) into the reaction zone 12, resulting in the polymerization of propylene and the $C_4$-$C_{10}$ comonomer(s). In a further embodiment, the second polymerization includes feeding propylene monomer, ethylene comonomer, and butene comonomer into the reaction zone 12, resulting in the polymerization of propylene, ethylene, and butene.

**[0034]** In an embodiment, the process includes terminating the first polymerization; *i.e.*, termination of the gas-phase polymerization described above prior to the transition. The gas-phase termination can be accomplished by terminating the catalyst feed to the reactor via line 42 and letting the reaction die off in a controlled manner. Alternately, the

CLAIMS

1. A process comprising:

(A) producing a propylene-based polymer in a gas-phase polymerization reactor under polymerization conditions comprising a combined propylene-plus-propane partial pressure from 290 psia to 450 psia;

(B) maintaining the combined propylene-plus-propane partial pressure in the range from 290 psia to 450 psia while simultaneously:

(i) reducing propylene partial pressure in the gas-phase polymerization reactor;

(ii) adding propane to the gas-phase polymerization reactor;

(iii) introducing at least one $C_4$-$C_{10}$ comonomer into the gas-phase polymerization reactor; and

(C) forming a propylene/$C_4$-$C_{10}$ interpolymer in the gas-phase polymerization reactor.

2. The process of claim 1 comprising maintaining the combined propylene-plus-propane partial pressure from 290 psi to 450 psi during the forming of the propylene/ $C_4$-$C_{10}$ interpolymer.

3. The process of claim 1 comprising collecting propane during the producing step and adding the collected propane to the gas-phase polymerization reactor during the adding step (ii).

4. The process of claim 1 comprising performing the forming step within 30 seconds to 48 hours after reducing the propylene partial pressure.

5. The process of claim 1, comprising producing the propylene-based polymer at a rate from 60% to at least 100% of nameplate rate.

6. The process of claim 1 comprising producing the propylene/$C_4$-$C_{10}$ interpolymer at greater than 60% of nameplate rate.

7. The process of claim 1 wherein the introducing step comprises introducing butene comonomer into the gas-phase polymerization reactor and forming a propylene/butene copolymer.

8. The process of claim 1 wherein the introducing step comprises introducing ethylene comonomer and butene comonomer in the gas-phase polymerization reactor and forming a propylene/ethylene/butene terpolymer.

9. The process of claim 8 comprising forming propylene/ethylene/butene terpolymer at a rate from 60% to at least 100% of nameplate within 1 hour to 20 hours from performance of the introducing step.

polymerization includes the polymerization of propylene and optional comonomer. When the desired quantity of the first polymer product has been made, the conditions are changed to those necessary for producing the second product. The second polymerization includes the polymerization of propylene and comonomer(s) the sum of which contains less propylene. The present process includes introducing the propane into the reactor during transition from commercial-scale production of a first propylene-based polymer product (Product 1) to commercial-scale production of a different second product that is a propylene interpolymer (Product 2).

**[0011]** In an embodiment, the process includes producing a propylene-based polymer (or Product 1) in a gas-phase polymerization reactor under polymerization conditions. The combined propylene-plus-propane partial pressure in the reactor during steady-state Product 1 production is from 290 psia to 450 psia. The term "combined propylene plus-propane partial pressure" is the sum of the propylene partial pressure and the propane partial pressure. The process includes transitioning to the production of a second polymer product, or propylene interpolymer (Product 2) in the same polymerization reactor. The process includes maintaining (during the transition phase) the combined propylene-plus-propane partial pressure in the range from 290 psia to 450 psia in the reactor while simultaneously:

(i) reducing the propylene partial pressure in the gas-phase polymerization reactor;

(ii) adding propane to the gas-phase polymerization reactor; and

(iii) introducing at least one $C_4$-$C_{10}$ comonomer into the gas-phase polymerization reactor. The process further includes forming a propylene/$C_4$-$C_{10}$ interpolymer in the gas-phase polymerization reactor.

The process includes contacting the propane rich stream with water to neutralize catalyst residual, passing the propane stream through a filter 50 to remove the solids produced in catalyst neutralization, then passing the propane stream from the VRS 24 through a dryer 52 which removes excess water from catalyst neutralization. From the dryer 52, the propane is fed into a propane storage tank 54. The vent recovery separator 24 recovers propylene while simultaneously allowing controlled removal of propane from the system. The VRS 24 maintains the dew point of the recycle stream at a temperature below the temperature of the fluidized bed 102. When propane is needed to charge the gas-phase polymerization (during transition, for example), a pump 56 discharges the propane into the reaction zone 12 through recycle line 22A. The propane, a component of the recycle stream, is then returned to reactor 10 at its base 26 and to fluidize the bed of polymer particles through gas distributor plate 28.

**[0033]** In an embodiment, the process includes transitioning from production of Product 1 to production of Product 2, in the gas-phase polymerization reactor 10. The second polymerization includes feeding propylene monomer and one or more $C_4$-$C_{10}$ comonomer(s) into the reaction zone 12, resulting in the polymerization of propylene and the $C_4$-$C_{10}$ comonomer(s). In a further embodiment, the second polymerization includes feeding propylene monomer, ethylene comonomer, and butene comonomer into the reaction zone 12, resulting in the polymerization of propylene, ethylene, and butene.

**[0034]** In an embodiment, the process includes terminating the first polymerization; *i.e.*, termination of the gas-phase polymerization described above prior to the transition. The gas-phase termination can be accomplished by terminating the catalyst feed to the reactor via line 42 and letting the reaction die off in a controlled manner. Alternately, the

**CLAIMS**

1. A process for producing a propylene-based polymer comprising one or more $C_4$-$C_{10}$ comonomers said process comprising:

(A) producing a propylene-based polymer in a gas-phase polymerization reactor under polymerization conditions comprising a combined propylene-plus-propane partial pressure from 290 psia to 450 psia;

(B) maintaining the combined propylene-plus-propane partial pressure in the range from 290 psia to 450 psia while simultaneously:

(i) reducing propylene partial pressure in the gas-phase polymerization reactor;

(ii) adding propane to the gas-phase polymerization reactor ;

(iii) introducing at least one $C_4$-$C_{10}$ comonomer into the gas-phase polymerization reactor; and

(C) forming a propylene/$C_4$-$C_{10}$ interpolymer in the gas-phase polymerization reactor.

2. The process of claim 1 comprising maintaining the combined propylene-plus-propane partial pressure from 290 psia to 450 psia during the forming of the propylene/$C_4$-$C_{10}$ interpolymer.

3. The process of claim 1 comprising collecting propane during the producing step and adding the collected propane to the gas-phase polymerization reactor during the adding step (ii).

4. The process of claim 1 comprising performing the forming step within 30 seconds to 48 hours after reducing the propylene partial pressure.

5. The process of claim 1, comprising producing the propylene-based polymer at a rate from 60% to at least 100% of nameplate rate.

6. The process of claim 1 comprising producing the propylene/$C_4$-$C_{10}$ interpolymer at greater than 60% of nameplate rate.

7. The process of claim 1 wherein the introducing step comprises introducing butene comonomer into the gas-phase polymerization reactor and forming a propylene/butene copolymer.

8. The process of claim 1 wherein the introducing step comprises introducing ethylene comonomer and butene comonomer in the gas-phase polymerization reactor and forming a propylene/ethylene/butene terpolymer.

9. The process of claim 8 comprising forming propylene/ethylene/butene terpolymer at a rate from 60% to at least 100% of nameplate within 1 hour to 20 hours from performance of the introducing step.