

Claims

1. A process for polymerizing ethylene-1-octene copolymers in a solution
polymerization process by firstly modelling polymer systems for solution
5 polymerization of ethylene-1-octene copolymers and then transferring
pressure and temperature conditions from said modelled polymer systems to a
solution polymerization process, comprising the steps of
 - a) Determining the cloud points on the LCST curve for two or more model
compositions of a specific ethylene-1-octene copolymer grade
10 comprising ethylene monomer, 1-octene monomer, ethylene-1-octene
copolymer of a specific grade and solvent, whereby the model
compositions differ in their weight amounts of at least one of ethylene
monomer, 1-octene monomer, ethylene-1-octene copolymer;
 - b) Developing a correlation for interpolating cloud points for compositions
15 of said specific ethylene-1-octene copolymer grade comprising ethylene
monomer, 1-octene monomer, ethylene-1-octene copolymer of said
specific grade and solvent with different weight amounts of at least one
of the ethylene monomer, 1-octene monomer, ethylene-1-octene
copolymer of said specific grade from the cloud points determined for
20 said model compositions;
 - c) Predicting phase separation for said specific ethylene-1-octene
copolymer grade by interpolating the cloud points from said correlation
for a composition of said specific ethylene-1-octene copolymer grade
comprising ethylene monomer, 1-octene monomer, ethylene-1-octene
25 copolymer of said specific grade with given weight amounts of at least
one of ethylene monomer, 1-octene monomer, ethylene-1-octene
copolymer;
 - d) Selecting pressure and temperature conditions, which in the predicted
phase separation data show that the ethylene-1-octene copolymer is
30 completely solved in the solvent;

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- e) Adjusting at least one parameter selected from the process temperature and pressure in at least one solution polymerization reactor, and optionally the first heat exchanger downstream from the at least one solution polymerization reactor, to said selected pressure and temperature conditions during a solution polymerization process of an ethylene-1-octene copolymer of said specific grade, and
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- f) Polymerizing ethylene monomer and 1-octene monomer in a solvent in said at least one solution polymerization reactor at the adjusted process temperature and/or pressure in the presence of a polymerization catalyst to obtain an ethylene-1-octene copolymer of said specific grade, which is completely solved in said solvent.
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2. The process according to claim 1, wherein the cloud points on the LCST curve is determined by varying one of the parameters of temperature and pressure of each model composition, while keeping the other of said parameters constant and detecting phase separation.
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3. The process according to claims 1 or 2, cloud points for each model composition over a temperature span of from 150°C to 250°C are determined.
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4. The process according to any one of the preceding claims, wherein the amount of ethylene-1-octene copolymer in the model composition is in the range of from 10 wt% to 45 wt%, based on the total amount of the model composition.
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5. The process according to any one of the preceding claims, wherein the amount of ethylene monomer in the model composition is in the range of from 0.1 wt% to 5.0 wt%, based on the total amount of the model composition.

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6. The process according to any one of the preceding claims, wherein the amount of 1-octene monomer in the model composition is in the range of from 1.0 wt% to 30.0 wt%, based on the total amount of the model composition.
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7. The process according to any one of the preceding claims, wherein the model compositions further comprise different weight amounts of nitrogen.
8. The process according to any one of the preceding claims, wherein the correlation is established from models selected from free energy models, equation of state (EoS) models or polynomial models.
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9. The process according to any one of the preceding claims, wherein the correlation is established from a polynomial model, which is developed from the trend lines of the determined cloud points.
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10. The process according to any one of the preceding claims, wherein the correlation is established from a polynomial model in which the cloud point pressure is given as a polynomial function of the temperature and the weight amount of ethylene-1-octene copolymer.
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11. The process according to any one of the preceding claims, wherein phase separation is predicted using the developed correlation for different weight amounts of ethylene-1-octene copolymer over a temperature span of from 150 to 250°C.
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12. The process according to any one of the preceding claims, wherein the weight amounts of ethylene-1-octene copolymer are within the range of from 14 to 30 wt%, based on the total amount of the composition of said specific ethylene-1-octene copolymer grade.
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13. The process according to any one of the preceding claims, wherein the ethylene-1-octene copolymer of said specific grade is a linear low density ethylene-1-octene copolymer.
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14. The process according to any one of the preceding claims, wherein the polymerization temperature is in the range of from higher than 100°C to up to 250°C and/or the polymerization pressure is in the range of 10 to 300 bar.
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15. Use of a correlation for interpolating cloud points from the cloud points on the LCST curve determined for two or more model compositions of a specific ethylene-1-octene copolymer grade comprising ethylene monomer, 1-octene monomer, ethylene-1-octene copolymer of a specific grade and solvent, whereby the model compositions differ in their weight amounts of at least
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- one of ethylene monomer, 1-octene monomer, ethylene-1-octene copolymer for adjusting at least one of the parameters selected from the process temperature and pressure, and maintaining a single phase liquid system during a solution polymerization process for polymerizing an ethylene-1-octene copolymer of said specific grade.
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