relative viscosity is at least 10% greater than the initial relative viscosity. In some cases, the base polyamide composition has a melting point ranging from 180ºC to 255ºC. In some cases, the nylon mixture of the base polyamide composition comprises: from 1 wt% to 80 wt% nylon-6; and from 20 wt% to 99 wt% nylon-6/6. In some cases, processing comprises solid state polymerization, which comprises heating the base polyamide. In some cases, the base polyamide composition is produced by melt polymerizing a polyamide composition and pelletizing the melted polyamide composition to form polyamide pellets. In some cases, the catalyst composition comprises phosphorous acid; phosphonic acid; alkyl- and aryl- substituted phosphonic acids; 2-pyridylethyl phosphonic acid; hypophosphorous acid; alkyl-, aryl- and alkyl-/aryl- substituted phosphinic acids; phosphoric acid; esters and salts of these phosphorous-containing acids; manganese hypophosphite; sodium hypophosphite; benzene phosphinic acid; monosodium phosphate; or any combinations thereof. In some cases, the base polyamide composition comprises from 0.1 wppm to 30 wppm catalyst composition, from 1 wt% to 8 wt% residual caprolactam, has a delta end group level ranging from 50 μeq/gram to 75 μeq/gram, and has initial relative viscosity less than 35, and the final polyamide composition comprises less than 0.6 wt% residual caprolactam and has a final relative viscosity greater than 45. In some cases, the base polyamide composition comprises from 1 wppb to 35 wppm phosphorus, greater than 1.5 wt% residual caprolactam, a delta end group level greater than 50 μeq/gram and has initial relative viscosity less than 33, wherein the processing is conducted at a pressure less than atmospheric pressure and a temperature ranging from 175ºC to 185ºC, and wherein the final polyamide composition comprises less than 0.4 wt% residual caprolactam and has a final relative viscosity greater than 55, e.g., greater than 75. In some cases, during processing, the RV build rate ranges from 1 to 30 RV units/hour.

[0018] In some examples, the present disclosure relates to a base polyamide composition comprising: a nylon mixture having caprolactam units; from 1 wppb to 50 wppm catalyst composition; and greater than 0.75 wt% residual caprolactam; wherein the base polyamide composition has a delta end group level ranging from 30 μeq/gram to 90 μeq/gram. In some cases, the base polyamide composition has a delta end group level greater than or equal to 45 μeq/gram. In some cases, the base polyamide comprises greater than 1.4 wt% caprolactam units, based on the total weight of the base polyamide composition, and wherein the base polyamide has a relative viscosity less than 55. In some cases, the nylon mixture of the base polyamide composition comprises: from 1 wt% to 50 wt% nylon-6; and from 20 wt% to 99 wt% nylon-6/6, wherein the catalyst composition comprises phosphorous acid; phosphonic acid; alkyl- and aryl- substituted phosphonic acids; 2-

We Claim:

1. A process for producing a polyamide composition having a low residual caprolactam concentration, the process comprising the steps of:

(a) providing a base polyamide composition, wherein the base polyamide composition has a delta end group level ranging from 30 μeq/gram to 90 μeq/gram, comprising:

a nylon mixture having caprolactam units;

from 1 wppb to 50 wppm of a catalyst composition; and

residual caprolactam, and having an initial residual caprolactam concentration and an initial relative viscosity;

(b) processing the base polyamide composition to form the final polyamide composition having a final residual caprolactam concentration and a final relative viscosity, wherein the final residual caprolactam concentration is less than the initial residual caprolactam concentration and the final relative viscosity is larger than the initial relative viscosity.

2. The process of claim 1, wherein the initial residual caprolactam concentration is greater than 0.75 wt%, based on the total weight of the base polyamide composition, and wherein the final residual caprolactam concentration is less than 0.75 wt%, based on the total weight of the final polyamide composition.

3. The process of any one of claims 1 or 2, wherein the final relative viscosity ranges from 40 to 350.

4. The process of any one of claims 1-3, wherein the processing is conducted for a build time ranging from 2 hours to 30 hours, and a temperature ranging from 150°C – 250°C.

5. The process of any one of claims 1-4, wherein the final polyamide composition has a color index ranging from -6 to 5, as measured by ASTM E313 (2018).

6. The process of any one of claims 1-5, wherein the final relative viscosity is greater than the initial relative viscosity, wherein the final relative viscosity is at least 10% greater than the initial relative viscosity and the final residual caprolactam concentration is at least 5% less than the initial residual caprolactam concentration.

7. The process of any one of claims 1-6, wherein the base polyamide composition has a melting point ranging from 180ºC to 255ºC.

8. The process of any one of claims 1-7, wherein the nylon mixture of the base polyamide composition comprises:

from 1 wt% to 80 wt% nylon-6; and

from 20 wt% to 99 wt% nylon-6/6.

9. The process of any one of claims 1-8, wherein processing comprises solid state polymerization, which comprises heating the base polyamide.

10. The process of any one of claims 1-9, wherein the base polyamide composition is produced by melt polymerizing a polyamide composition and pelletizing the melted polyamide composition to form polyamide pellets.

11. The process of any one of claims 1-10, wherein the catalyst composition comprises phosphorous acid; phosphonic acid; alkyl- and aryl- substituted phosphonic acids; 2-pyridylethyl phosphonic acid; hypophosphorous acid; alkyl-, aryl- and alkyl-/aryl- substituted phosphinic acids; phosphoric acid; esters and salts of these phosphorous-containing acids; manganese hypophosphite; sodium hypophosphite; benzene phosphinic acid; monosodium phosphate; or any combinations thereof.

12. The process of any one of claims 1-11, wherein the base polyamide composition comprises from 0.1 wppm to 35 wppm catalyst composition, from 1 wt% to 8 wt% residual caprolactam, has a delta end group level ranging from 50 μeq/gram to 75 μeq/gram, and has initial relative viscosity less than 35, and

wherein the final polyamide composition comprises less than 0.6 wt% residual caprolactam and has a final relative viscosity greater than 45.

13. The process of any one of claims 1-12, wherein the base polyamide composition comprises from 1 wppb to 15 wppm phosphorus, greater than 1.5 wt% residual caprolactam, a delta end group level greater than 50 μeq/gram and has initial relative viscosity less than 33,

wherein the processing is conducted at a pressure less than atmospheric pressure and a temperature ranging from 175ºC to 185ºC, and

wherein the final polyamide composition comprises less than 0.4 wt% residual caprolactam and has a final relative viscosity greater than 55.

14. The process of any one of claims 1-13, wherein, during processing, the RV build rate ranges from 1 to 30 RV units/hour.