Claims

1. A process for the preparation of a hollow filament (F) based on one or several molten or dissolved hyperbranched polymers (P) and potentially one or several further polymers (FP), characterized in that the molten or dissolved hyperbranched polymer (P) or the mixture of the hyperbranched polymer (P) with the further polymer (FP) is passed through one or several spinnerets (S), wherein the ratio between the spinneret die-length (L) and the die-channel (deltaD) is between 0.1 and 9.5.

2. The process according to claim 1, characterized in that the hyperbranched polymer (P) is selected from the group consisting of polyethersulfone, polyester, polyamide, polyolefin, polyurethane, polyimide, polyimide-amide, polyetherimide, polysulfone and polyacrylnitril.

3. The process according to claim 1 or 2, characterized in that the hyperbranched polymer (P) is a hyperbranched polyethersulfone.

4. The process according to any one of the claims 1 to 3, characterized in that the degree of hyperbranching in the hyperbranched polymer (P) is between 0.2 and 8 %.

5. The process according to any one of the claims 1 to 4, characterized in that the hyperbranched polymer (P) is dissolved in a protic solvent with a polymer concentration in the solution between 10 and 40 wt% and then passed through one or several spinnerets (S).

6. The process according to any one of the claims 1 to 5, characterized in that the spinneret (S) has a geometry (G) that is selected from the group consisting of:
   a) a straight channel geometry (GI),
   b) a double-cone form geometry with an enlarged channel with an angle (α^{II}) of 60° (GII),
   c) a cone-form geometry with a conical exit with an angle (α^{III}) of 60° (GIII),
   d) a round form geometry with a round exit channel with an angle (α^{IV}) of 30° (GIV).

7. The process according to any one of the claims 1 to 6, characterized in that the spinneret (S) with geometry (GI) has a die-length (L^{I}) between 0.2 to 4.5 mm and a L^{I}/Delta-D^{I} ratio between 0.8 to 2.0.

8. The process according to any one of the claims 1 to 6, characterized in that the spinneret (S) with geometry (GII) has a die-length (L^{II}) between 0.2 to 4.5 mm and a L^{II}/Delta-D^{II} ratio between 1.2 to 3.0.

9. The process according to any one of the claims 1 to 6, characterized in that the spinneret (S) with geometry (GIII) has a die-length (L^{III}) between 0.2 to 4.5 mm and a L^{III}/Delta-D^{III} ratio between 1.1 to 2.

10. The process according to any one of the claims 1 to 6, characterized in that the spinneret (S) with geometry (GIV) has a die-length (L^{IV}) between 0.2 to 4.5 mm and a L^{IV}/Delta-D^{IV} ratio between 1.1 to 2.

11. The process according to any one of the claims 1 to 10, characterized in that the process includes the following steps:

a) dissolving of a hyperbranched polymer (P) in a polar solvent with or without the addition of polyvinylpyrollidone (PVP),

b) transferring the dissolved hyperbranched polymer (P) into the vessel (V) of a dry-jet-wet-spinning apparatus (W),

c) passing the dissolved hyperbranched polymer (P) through one or several spinnerets (S) of the geometry (GI), (GII), (GIII) or (GIV),

d) leading the extruded hyperbranched polymer (P) through an air gap (A) between 0.1 and 25 cm,

e) leading the extruded hyperbranched polymer (P) into a precipitation bath (B) and converting the extruded dissolved hyperbranched polymer (P) to a primary hollow filament (F1),

f) diverting of the primary hollow filament (F1) in the precipitation bath (B),

g) diverting of the hollow filament (F) outside of the precipitation bath (B),

h) drying of the hollow filament (F).

12. The process according to any one of the claims 1 to 11, characterized in that the viscosity of the molten or dissolved hyperbranched polymer (P) during the process is between 15 and 30 Pa.s.

13. Use of hollow filaments (F) prepared according to a process as described in any one of the patent claims 1 to 12 for the preparation of polymer products.

14. Use of hollow filaments (F) prepared according to a process as described in any one of the claims 1 to 12 for the preparation of fibres and/or membranes.

15. Hollow filaments (F) prepared by a process according to any one of the patent claims 1 to 12.

Claims

1. A process for the preparation of a hollow filament (F) based on one or several molten or dissolved hyperbranched polymers (P) and potentially one or several further polymers (FP), **characterized in that** the molten or dissolved hyperbranched polymer (P) or the mixture of the hyperbranched polymer (P) with the further polymer (FP) is passed through one or several spinnerets (S), having a spinneret die-length (L) and a die-channel (delta-D), wherein the spinneret (S) has a geometry (G) that is selected from the group consisting of

   - a double-cone form geometry with an enlarged channel with an angle (α^{II}) of 60° (GII) having a die-length (L^{II}) between 0.2 to 4.5 mm and a L"/Delta-D" ratio between 1.2 to 3.0;
   - a cone-form geometry with a conical exit with an angle (α^{III}) of 60° (G^{III}) having a die-length (L^{III}) between 0.2 to 4.5 mm and a L^{III}/Delta-D^{III} ratio between 1.1 to 2;
   - or a round form geometry with a round exit channel with an angle (α^{IV}) of 30° (GIV), having a die-length (L^{IV}) between 0.2 to 4.5 mm and a L^{IV}/Delta-D^{IV} ratio between 1.1 to 2.

2. The process according to claim 1, **characterized in that** the hyperbranched polymer (P) is selected from the group consisting of polyethersulfone, polyester, polyamide, polyolefin, polyurethane, polyimide, polyimide-amide, polyetherimide, polysulfone and polyacryinitril.

3. The process according to claim 1 or 2, **characterized in that** the hyperbranched polymer (P) is a hyperbranched polyethersulfone.

4. The process according to any one of the claims 1 to 3, **characterized in that** the degree of hyperbranching in the hyperbranched polymer (P) is between 0.2 and 8 %.

5. The process according to any one of the claims 1 to 4, **characterized in that** the hyperbranched polymer (P) is dissolved in a protic solvent with a polymer concentration in the solution between 10 and 40 wt% and then passed through one or several spinnerets (S).

6. The process according to any one of the claims 1 to 5, **characterized in that** the process includes the following steps:

   a) dissolving of a hyperbranched polymer (P) in a polar solvent with or without the addition of polyvinylpyrollidone (PVP),
   b) transferring the dissolved hyperbranched polymer (P) into the vessel (V) of a dry-jet-wet-spinning apparatus (W),
   c) passing the dissolved hyperbranched polymer (P) through one or several spinnerets (S) of the geometry (GI), (GII), (GIII) or (GIV),
   d) leading the extruded hyperbranched polymer (P) through an air gap (A) between 0.1 and 25 cm,

   e) leading the extruded hyperbranched polymer (P) into a precipitation bath (B) and converting the extruded dissolved hyperbranched polymer (P) to a primary hollow filament (F1),
   f) diverting of the primary hollow filament (F1) in the precipitation bath (B),
   g) diverting of the hollow filament (F) outside of the precipitation bath (B),
   h) drying of the hollow filament (F).

7. The process according to any one of the claims 1 to 6, **characterized in that** the viscosity of the molten or dissolved hyperbranched polymer (P) during the process is between 15 and 30 Pa.s.