

CLAIMS

1. An organic solvent-free method of producing a polyester, the method comprising
5 providing a mixture comprising at least one precursor of the polyester, wherein the at least one precursor is a liquid; and
contacting the mixture with a gaseous inorganic acid to produce the polyester.
2. The method of claim 1, wherein the at least one precursor comprises at least
10 one monomer of the polyester or at least one oligomer of the polyester.
3. The method of claim 1 or 2, wherein providing the mixture comprises removing water from the at least one precursor.
- 15 4. The method of claim 3, wherein removing the water comprises contacting the at least one precursor with a drying agent.
5. The method of claim 4, wherein the drying agent comprises activated silica, calcium chloride, calcium hydride, or an inert gas.
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6. The method of any one of claims 1 to 5, wherein the mixture comprises a polymerization initiator.
7. The method of claim 6, wherein the polymerization initiator comprises an
25 alcohol, water, or a polyethylene glycol having one or more terminal hydroxyl groups.
8. The method of any one of claims 1 to 7, wherein the polyester comprises a homopolymer, a random copolymer, or a block copolymer.
- 30 9. The method of claim 8, wherein the homopolymer comprises poly(ϵ -caprolactone), poly(lactic acid), or poly(glycolic acid).

10. The method of claim 8, wherein the random copolymer or the block copolymer comprises polyethylene glycol co-polycaprolactone, poly(lactic-co-glycolic acid), polyethylene glycol co-polyvalerolactone, or a polyester appended to polyethylene glycol.
- 5 11. The method of any one of claims 1 to 10, wherein contacting the mixture with the gaseous inorganic acid comprises generating the gaseous inorganic acid from a chemical agent capable of generating the gaseous inorganic acid.
- 10 12. The method of claim 11, wherein generating the gaseous inorganic acid comprises mixing (i) sulfuric acid with sodium chloride or (ii) mixing an alcohol with an acetyl chloride or an acid chloride.
13. The method of any one of claims 1 to 11, wherein the gaseous inorganic acid
15 comprises gaseous hydrochloric acid or gaseous nitric acid.
14. The method of any one of claims 1 to 13, further comprising drying the gaseous inorganic acid prior to contacting the mixture with the gaseous inorganic acid.
- 20 15. The method of claim 14, wherein drying the gaseous inorganic acid comprises removing water from the gaseous inorganic acid.
16. The method of claim 15, wherein removing the water from the gaseous inorganic acid comprises contacting the gaseous inorganic acid with a drying agent.
- 25 17. The method of claim 16, wherein the drying agent comprises activated silica, calcium chloride, or anhydrous sulfuric acid.
18. The method of any one of claims 1 to 17, wherein contacting the mixture with
30 the gaseous inorganic acid is carried out in an inert environment.

19. The method of claim 18, wherein the inert environment comprises argon or nitrogen.
20. The method of any one of claims 1 to 19, wherein contacting the mixture with
5 the gaseous inorganic acid is carried out at a temperature which maintains the polyester in a liquid state.
21. The method of claim 20, wherein the temperature is at least 60°C.
- 10 22. The method of claim 20 or 21, wherein the temperature is 100°C or less.
23. The method of any one of claims 1 to 22, further comprising subjecting the mixture to an inert gas flow to remove the gaseous inorganic acid after the polyester is produced.
- 15 24. A polyester obtained according to any one of claims 1 to 23.