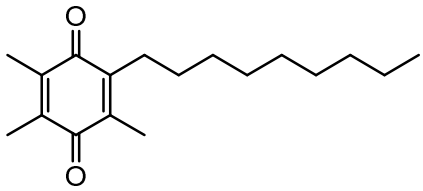
CLAIMS

1. A method of treating or suppressing a disorder selected from the group consisting of an α-synucleinpathy, a tauopathy, Amyotrophic lateral sclerosis (ALS), traumatic brain injury, and ischemic-reperfusion related injury, comprising administering to a subject in need thereof a therapeutically effective amount of a compound of the formula:



or the hydroquinone form thereof; or a solvate or hydrate thereof.

2. The method of claim 1, wherein the compound is not a solvate or hydrate.

3. The method of claim 1 or 2, wherein the compound is in the quinone form.

4. The method of claim 1 or 2, wherein the compound is in the hydroquinone form.

5. The method of claim 1, wherein the method is for treating or suppressing an α-synucleinpathy.

6. The method of claim 5, wherein the α-synucleinpathy is selected from the group consisting of: Parkinson's Disease, Parkinson's Disease with dementia (PDD), multisystem atrophy (MSA), Frontotemporal Dementia, Dementia with Lewy Bodies (DLB), Gaucher's disease (GD), Neurodegeneration with Brain Iron Accumulation (NBIA), and neuroaxonal dystrophies (PLA2G6-associated neurodegeneration).

7. The method of claim 6, wherein the Parkinson's Disease is genetic.

8. The method of claim 6, wherein the Parkinson's Disease is idiopathic.

9. The method of claim 1, wherein the method is for treating or suppressing a tauopathy.

10. The method of claim 9, wherein the tauopathy is selected from the group consisting of: Alzheimer's disease, dementia pugilistica, Guam Amyotrophic lateral sclerosis-Parkinsonism-Dementia (Guam ALS/PD), Pick Disease, Argyrophilic grain dementia, Nieman-Pick type C, Subacute sclerosing panencephalitis (SSPE), Progressive supranuclear palsy (PSP), multisystem atrophy (MSA), Corticobasoganlionic degeneration, Frontotemporal dementia with parkinsonism-17 (FTDP-17), Postencephalitic Parkinsonism (PEP), and Autosomal recessive Parkinsonism.

11. The method of any one of claims 1-4, wherein the method is for treating or suppressing Alzheimer's Disease.

12. The method of any one of claims 1-4, wherein the method is for treating or suppressing Parkinson's Disease.

13. The method of any one of claims 1-4, wherein the method is for treating or suppressing traumatic brain injury.

14. The method of any one of claims 1-4, wherein the method is for treating or suppressing ischemic-reperfusion related injury.

15. The method of any one of claims 1-4, wherein the method is for treating or suppressing stroke.

16. The method of any one of claims 1-4, wherein the method is for treating or suppressing Amyotrophic lateral sclerosis (ALS).

17. The method of any one of claims 1-16, wherein the method is for treating the disorder.

18. The method of any one of claims 1-16, wherein the method is for suppressing the disorder.

19. The method of any one of claims 1-18, wherein the compound is administered orally.

20. The method of any one of claims 1-18, wherein the compound is administered intravenously.

21. A polymorph of an anhydrate of 2,3,5-trimethyl-6-nonylcyclohexa-2,5-diene-1,4-dione, wherein a powder X-ray diffraction pattern for the polymorph comprises characteristic peaks at least at the following angular positions, wherein the angular positions may vary by ± 0.2: 4.10, 12.12, and 16.14.

22. The polymorph of claim 21, comprising characteristic peaks at least at the following angular positions, wherein the angular positions may vary by ± 0.2: 4.10, 11.77, 12.12, and 16.14.

23. The polymorph of claim 21, comprising characteristic peaks at least at the following angular positions, wherein the angular positions may vary by ± 0.2: 4.10, 11.77, 12.12, 16.14, and 22.41.

24. The polymorph of any one of claims 21-23, wherein the angular positions may vary by ± 0.1.

25. The polymorph of any one of claims 21-23, wherein the angular positions may vary by ± 0.05.

26. The polymorph of any one of claims 21-25, wherein the polymorph has a powder x-ray diffraction pattern substantially as shown in any one of Figures 5, 11, 14, and 16.

27. The polymorph of any one of claims 21-26, having a differential scanning calorimetry (DSC) thermogram substantially as shown in Figure 7.

28. The polymorph of any one of claims 21-27, wherein a DSC thermogram has a single endothermic peak at about 47 to about 53°C.

29. The polymorph of any one of claims 21-28, having a thermogravimetric analysis (TGA) thermogram substantially as shown in Figure 8.

30. The polymorph of any one of claims 21-29, having a ^{1}H NMR spectrum substantially as shown in Figure 6.

31. A composition comprising the polymorph of any one of claims 21-30, wherein at least about 95% by mole of the 2,3,5-trimethyl-6-nonylcyclohexa-2,5-diene-1,4-dione is the polymorph, exclusive of any solvents, carriers or excipients.

32. A composition comprising the polymorph of any one of claims 21-30, wherein at least about 99% by mole of the 2,3,5-trimethyl-6-nonylcyclohexa-2,5-diene-1,4-dione is the polymorph, exclusive of any solvents, carriers or excipients.

33. A composition comprising the polymorph of any one of claims 21-30, or the composition of claim 31 or 32, wherein at least about 95% a/a as measured by HPLC of the composition is the 2,3,5-trimethyl-6-nonylcyclohexa-2,5-diene-1,4-dione, exclusive of any solvents, carriers or excipients.

34. A composition comprising the polymorph of any one of claims 21-30, or the composition of claim 31 or 32, wherein at least about 99% a/a as measured by HPLC of the composition is the 2,3,5-trimethyl-6-nonylcyclohexa-2,5-diene-1,4-dione, exclusive of any solvents, carriers or excipients.

35. A composition comprising the polymorph of any one of claims 21-30, or the composition of any one of claims 31-34, wherein the potency of the 2,3,5-trimethyl-6-nonylcyclohexa-2,5-diene-1,4-dione is at least about 95%.

36. A composition comprising the polymorph of any one of claims 21-30, or the composition of any one of claims 31-34, wherein the potency of the 2,3,5-trimethyl-6-nonylcyclohexa-2,5-diene-1,4-dione is at least about 99%.

37. A composition comprising the polymorph of any one of claims 21-30, or the composition of any one of claims 31-36, wherein the polymorph is present as a plurality of particles, wherein the particles have a ratio of D90:D10 less than about 11:1.

38. A composition comprising the polymorph of any one of claims 21-30, or the composition of any one of claims 31-36, wherein the polymorph is present as a plurality of particles, wherein the particles have a ratio of D90:D10 less than about 7:1.

39. A composition comprising the polymorph of any one of claims 21-30, or the composition of any one of claims 31-38, wherein the polymorph was recrystallized by a solvent comprising about 75-85% IPA/water.

40. A composition comprising the polymorph of any one of claims 21-30, or the composition of any one of claims 31-39, wherein the polymorph was recrystallized by a solvent comprising about 80-85% IPA/water.

41. A composition comprising the polymorph of any one of claims 21-30, or the composition of any one of claims 31-39, wherein the polymorph was recrystallized by a solvent comprising about 85% IPA/water.

42. A pharmaceutical composition comprising the polymorph of any one of claims 21-30, or the composition of any one of claims 31-41, and a pharmaceutically acceptable solvent, carrier, or excipient, or a pharmaceutical composition prepared with the polymorph of any one of claims 21-30, or the composition of any one of claims 31-41, and a pharmaceutically acceptable solvent, carrier, or excipient.

43. A method of treating or suppressing an α-synucleinpathy, a tauopathy, Amyotrophic lateral sclerosis (ALS), traumatic brain injury, or ischemic-reperfusion related injury, comprising administering to an individual in need thereof a therapeutically effective amount the polymorph of any one of claims 21-30, or the composition of any one of claims 31-42.

44. A method of recrystallizing 2,3,5-trimethyl-6-nonylcyclohexa-2,5-diene-1,4-dione from a composition, comprising:

a) contacting the composition with IPA and water such that the resulting ratio of IPA to water is about 75-87% isopropanol (IPA)/25-13% water (v:v), at a temperature of about 40-45°C;

b) cooling the mixture to about 32°C; and

c) filtering the 2,3,5-trimethyl-6-nonylcyclohexa-2,5-diene-1,4-dione from the mixture.

45. The method of claim 44, wherein step (a) comprises:

a1) contacting the composition with IPA;

a2) warming the mixture to about 40-45°C; and

a3) adding water to the mixture such that the ratio of IPA to water is about 75-85% IPA:25-15% water (v:v).

46. The method of claim 44, wherein step (a) comprises stirring to dissolve the composition.

47. The method of any one of claims 44-46, wherein the ratio of IPA:water is about 80-85% IPA:20-15% water (v:v).

48. The method of any one of claims 44-46, wherein the ratio of IPA:water is about 85% IPA:15% water (v:v).

49. The method of any one of claims 44-48, wherein step (a3) comprises returning the temperature of the mixture to about 40-45°C.

50. The method of any one of claims 44-48, comprising polish filtering the mixture after step (a).

51. The method of any one of claims 44-49, wherein step (b) comprises cooling to about 32°C over about 2-10 hours.

52. The method of any one of claims 44-49, wherein step (b) comprises cooling to about 32°C over about 6 hours.

53. The method of any one of claims 44-51, wherein the method comprises a step (b1) after step (b), comprising holding the mixture at about 32°C for about 2-24 hours.

54. The method of any one of claims 44-51, wherein the method comprises a step (b1) after step (b), comprising holding the mixture at about 32°C for about 6 hours.

55. The method of any one of claims 44-53, comprising a step (b2) after step (b) or (b1), when present, comprising cooling the mixture to about 0°C.

56. The method of any one of claims 44-53, wherein step (b2) comprises cooling the mixture to about 0°C over about 3-24 hours.

57. The method of any one of claims 54-55, wherein step (b2) further comprises holding the mixture at about 0°C for about one hour.

58. A composition comprising 2,3,5-trimethyl-6-nonylcyclohexa-2,5-diene-1,4-dione as made according to any one of claims 44-57.

59. A method of making a pharmaceutical composition, comprising converting the polymorph of any one of claims 21-30, or the composition of any one of claims 31-42 or 58, to a liquid or emulsion form.

60. The method of claim 59, wherein the liquid or emulsion form is provided as an oral solution, a liquid-filled capsule, or an injectable solution.

61. A pharmaceutical composition produced according to claim 59 or 60.

62. A metastable melted amorphous form of 2,3,5-trimethyl-6-nonylcyclohexa-2,5-diene-1,4-dione, having an XRPD plot substantially as shown in Figure 31.