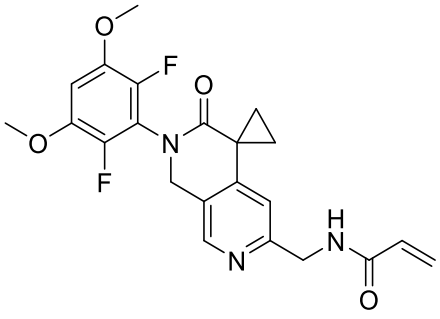
**WHAT IS CLAIMED IS:**

1. A solid form of Compound 1 having the formula:



(Compound 1), or a salt thereof.

2. The solid form of claim 1 wherein the solid form is crystalline.

3. The solid form of claim 2 having Form I.

4. The solid form of claim 3 having one or more characteristic XRPD peaks selected from about 8.1, about 9.0, and about 12.3 degrees 2-theta.

5. The solid form of claim 3 having at least one characteristic XRPD peaks selected from about 8.1, about 9.0, about 12.3, about 16.0, about 18.0, and about 23.3 degrees 2-theta.

6. The solid form of claim 3 having at least two characteristic XRPD peaks selected from about 8.1, about 9.0, about 11.5, about 12.3, about 15.1, about 16.0, about 18.0, about 19.6, about 20.0, about 20.4, about 21.0, about 23.3, about 24.2, about 24.7, and about 27.1 degrees 2-theta.

7. The solid form of claim 3 having at least three characteristic XRPD peaks selected from about 8.1, about 9.0, about 11.5, about 12.3, about 15.1, about 16.0, about 18.0, about 19.6, about 20.0, about 20.4, about 21.0, about 23.3, about 24.2, about 24.7, and about 27.1 degrees 2-theta.

8. The solid form of any one of claims 3-7 having an XRPD pattern with characteristic peaks as substantially shown in Figure 1.

9. The solid form of any one of claims 3-8 exhibits a DSC thermogram having an endotherm peak at a temperature of about 208 ºC.

10. The solid form of any one of claims 3-8 having a DSC thermogram substantially as depicted in Figure 2.

11. The solid form of any one of claims 3-10 having a TGA thermogram substantially as depicted in Figure 3.

12. The solid form of claim 2 having Form II, Form III, Form IV, Form V, Form VI, Form VII, Form VIII, Form IX, Form IXa, Form X, or Form XI.

13. A pharmaceutical composition comprising a solid form of any one of claims 1-12, and one or more pharmaceutically acceptable carriers or excipients.

14. Use of a solid form of any one of claims 1-12, or a composition of claim 13, in the manufacture of a medicament for the treatment of a disease associated with abnormal expression or activity of a FGFR4 enzyme.

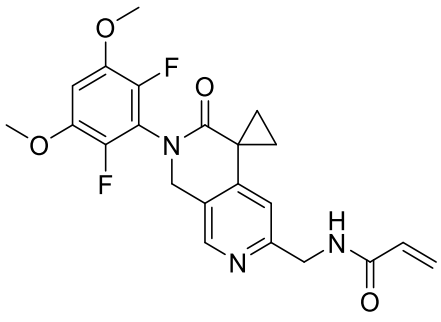
15. Use of a solid form of any one of claims 1-12, or a composition of claim 13, in the manufacture of a medicament for the treatment of cancer in a patient.

16. The use of claim 15, wherein the medicament is to be administered to the patient in combination with another therapy or therapeutic agent.

17. The use of claim 15 or 16, wherein said cancer is selected from hepatocellular cancer, bladder cancer, breast cancer, cervical cancer, colorectal cancer, endometrial cancer, gastric cancer, head and neck cancer, kidney cancer, liver cancer, lung cancer, ovarian cancer, prostate cancer, esophageal cancer, gall bladder cancer, pancreatic cancer, thyroid cancer, skin cancer, leukemia, multiple myeloma, chronic lymphocytic lymphoma, adult T cell leukemia, B-cell lymphoma, acute myelogenous leukemia, Hodgkin’s or non-Hodgkin’s lymphoma, Waldenstrom's Macroglubulinemia, hairy cell lymphoma, Burkett's lymphoma, glioblastoma, melanoma, and rhabdosarcoma.

18. The use of claim 15 or 16, wherein said cancer is selected from hepatocellular cancer, breast cancer, bladder cancer, colorectal cancer, melanoma, mesothelioma, lung cancer, prostate cancer, pancreatic cancer, testicular cancer, thyroid cancer, squamous cell carcinoma, glioblastoma, neuroblastoma, uterine cancer, and rhabdosarcoma.

19. A process for preparing Form I of Compound 1:

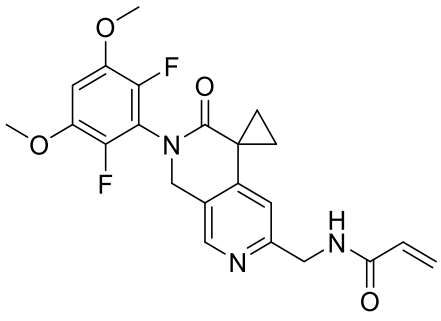


(Compound 1),

comprising dissolving Compound 1 in a solvent to form a solution; and isolating Form I from the solution.

20. The process of claim 19, wherein the solvent comprises acetone, water, or a mixture thereof.

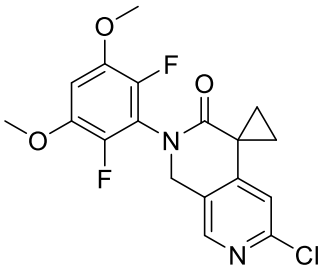
21. A process for preparing Compound 1:



(Compound 1),

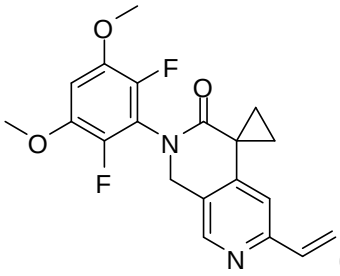
or a salt thereof, comprising:

converting Compound 8:

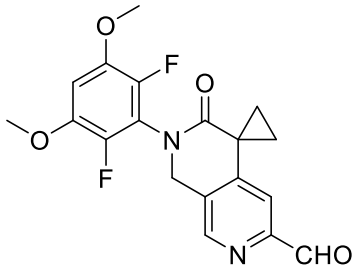


(Compound 8)

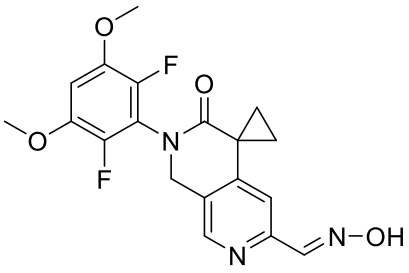
to Compound 9:


(Compound 9);

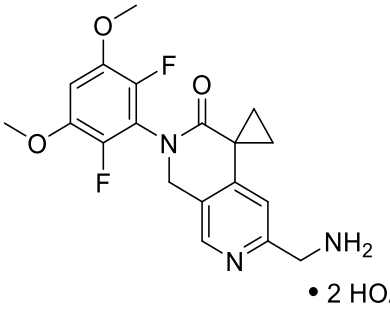
converting Compound 9 to Compound 10:


(Compound 10);

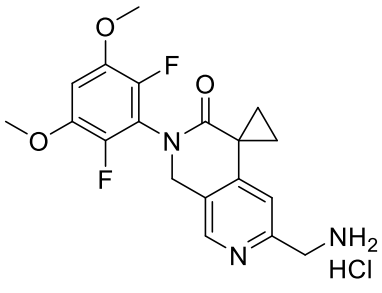
converting Compound 10 to Compound 11:


(Compound 11);

converting Compound 11 to Compound 12 diacetate:

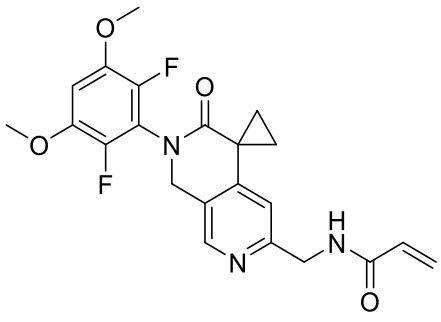

(Compound 12 diacetate);

converting Compound 12 diacetate to Compound 12 hydrochloride:


(Compound 12 hydrochloride); and

converting Compound 12 hydrochloride to Compound 1.

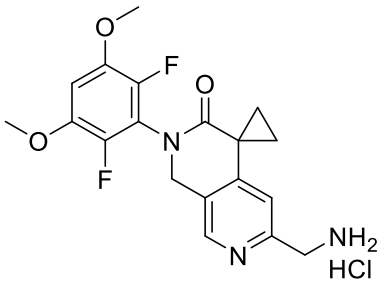
22. A process for preparing Compound 1:



(Compound 1),

or a salt thereof, comprising converting Compound 12 or a salt thereof to Compound 1.

23. The process of claim 22, wherein the salt of Compound 12 is Compound 12 hydrochloride:



(Compound 12 hydrochloride).

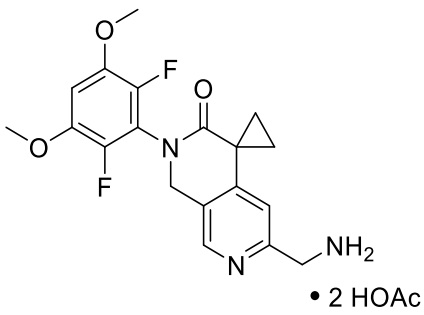
24. The process of claim 21 or 23, wherein the conversion of Compound 12 hydrochloride to Compound 1 comprises reacting Compound 12 hydrochloride with acryloyl chloride in the presence of B1 and S1, wherein B1 is a base and S1 is a solvent.

25. The process of claim 24, wherein B1 is an alkali metal hydroxide base.

26. The process of claim 24 or 25, wherein S1 comprises a halogenated solvent.

27. The process of any one of claims 21 and 23-26, wherein the conversion of Compound 12 hydrochloride to Compound 1 is carried out at a temperature of about 30 °C or lower.

28. The process of any one of claims 21 and 23-27 wherein Compound 12 hydrochloride is prepared by a process comprising converting Compound 12 diacetate:



(Compound 12 diacetate)

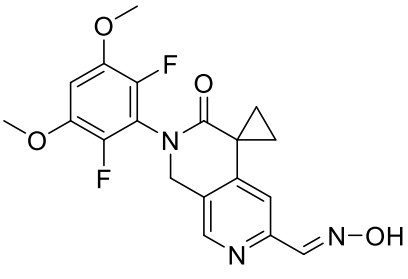
to Compound 12 hydrochloride.

29. The process of claim 28, wherein the conversion of Compound 12 diacetate to Compound 12 hydrochloride comprises reacting Compound 12 diacetate with B2 and hydrochloric acid in the presence of S2, wherein B2 is a hydroxide base and S2 is a solvent.

30. The process of claim 29, wherein B2 is an alkali metal hydroxide base.

31. The process of claim 29 or 30, wherein S2 comprises a halogenated solvent, protic solvent, or a mixture thereof.

32. The process of any one of claims 21 and 28-31 wherein Compound 12 diacetate is prepared by a process comprising converting Compound 11:

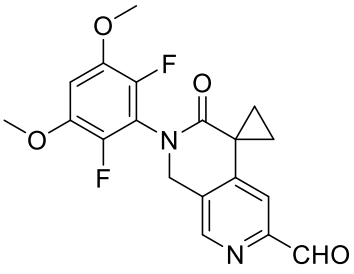


(Compound 11)

to Compound 12 diacetate.

33. The process of claim 32, wherein the conversion of Compound 11 to Compound 12 diacetate comprises reacting Compound 11 with acetic acid and zinc.

34. The process of any one of claims 21, 32 and 33, wherein Compound 11 is prepared by a process comprising converting Compound 10:



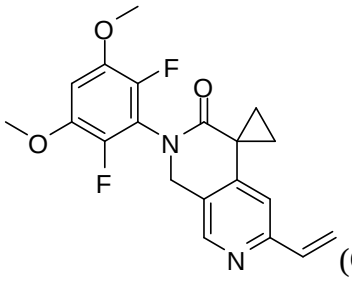
(Compound 10)

to Compound 11.

35. The process of claim 34 wherein the conversion of Compound 10 to Compound 11 comprises reacting Compound 11 with hydroxylamine hydrochloride in the presence of S3, wherein S3 is a solvent.

36. The process of claim 35, wherein S3 comprises a protic solvent, a basic solvent, or a mixture thereof.

37. The process of any one of claims 21 and 34-36, wherein Compound 10 is prepared by a process comprising converting Compound 9:



(Compound 9)

to Compound 10.

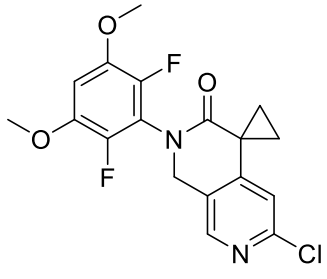
38. The process of claim 37 wherein the conversion of Compound 9 to Compound 10 comprises reacting Compound 10 with sodium periodate and osmium tetroxide in the presence of S4, wherein S4 is a solvent.

39. The process of claim 38, wherein the conversion of Compound 9 to Compound 10 further comprises B4, wherein B4 is a base.

40. The process of claim 39, wherein B4 is an alkali metal bicarbonate base.

41. The process of any one of claims 38-40, wherein S4 comprises an ether solvent, a protic solvent, an aprotic solvent, or a mixture thereof.

42. The process of any one of claims 21 and 37-41, wherein Compound 9 is prepared by a process comprising converting Compound 8:



(Compound 8)

to Compound 9.

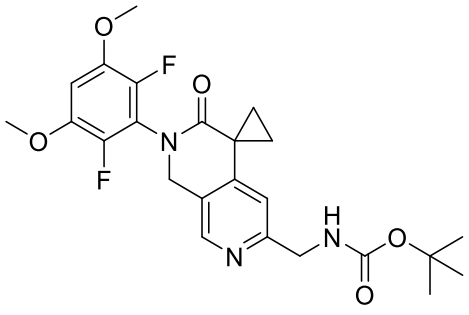
43. The process of claim 42 wherein the conversion of Compound 8 to Compound 9 comprises reacting Compound 8 with 4,4,5,5-tetramethyl-2-vinyl-1,3,2-dioxaborolane, P1, and B5 in the presence of S5, wherein P1 is a transition metal catalyst, B5 is a base, and S5 is a solvent.

44. The process of claim 43, wherein P1 is a palladium catalyst.

45. The process of claim 43, wherein B5 is cesium fluoride.

46. The process of any one of claims 43-45, wherein S5 comprises a protic solvent, an ether solvent, or a mixture thereof.

47. The process of any one of claims 21 and 23-27 wherein Compound 12 hydrochloride is prepared by a process comprising converting Compound 15:

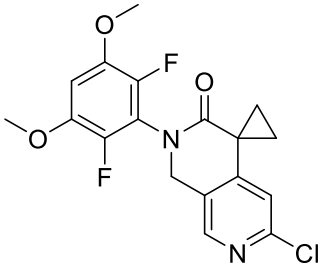

(Compound 15)

to Compound 12 hydrochloride.

48. The process of claim 47 wherein the conversion of Compound 15 to Compound 12 hydrochloride comprises reacting Compound 15 with hydrochloric acid in the presence of S6, wherein S6 is a solvent.

49. The process of claim 48, wherein S6 comprises an aprotic solvent, an ether solvent, or a mixture thereof.

50. The process of any one of claims 47-49 wherein Compound 15 is prepared by a process comprising converting Compound 8:


(Compound 8)

to Compound 15.

51. The process of claim 50 wherein the conversion of Compound 8 to Compound 15 comprises reacting Compound 8 with potassium N-Boc-aminomethyltrifluoroborate, P2, and B7, wherein P2 is a transitional metal catalyst and B7 is base.

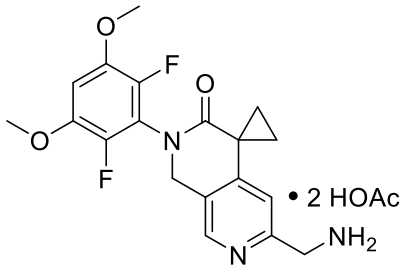
52. The process of claim 51, wherein P2 is a palladium catalyst.

53. The process of claim 51 or 52, wherein B7 is a carbonate base.

54. The process of any one of claims 50-53, wherein the conversion of Compound 8 to Compound 15 is carried out in S7, wherein S7 is a solvent.

55. The process of claim 54, wherein S7 comprises a protic solvent, an ether solvent, or a mixture thereof.

56. The process of any one of claims 47-49 wherein Compound 15 is prepared by a process comprising converting Compound 12 diacetate:



(Compound 12 diacetate)

to Compound 15.

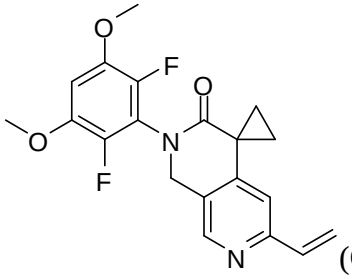
57. The process of any one of claims 56 wherein the conversion of Compound 12 diacetate to Compound 15 comprises reacting Compound 12 diacetate with di-tert-butyldicarbonate with B8.

58. The process of claim 57, wherein B8 is an alkali metal hydroxide base.

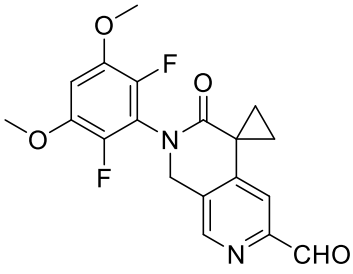
59. The process of any one of claims 56-58, wherein the conversion of Compound 12 diacetate to Compound 15 is carried out in S8, wherein S8 is a solvent.

60. The process of claim 59, wherein S8 comprises a protic solvent, an ether solvent, or a mixture thereof.

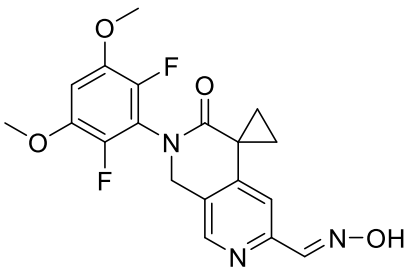
61. A compound which is selected from:



(Compound 9),



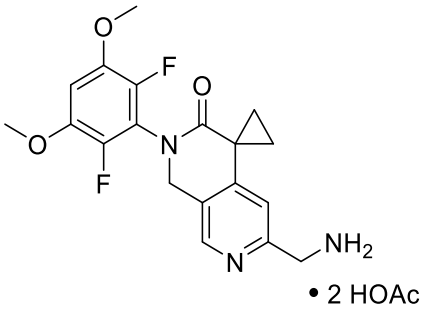
(Compound 10), and



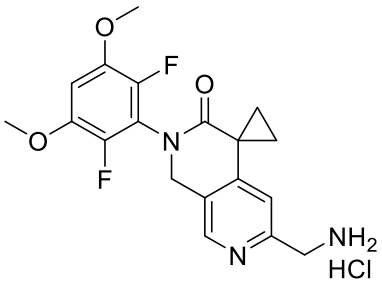
(Compound 11),

or a salt thereof.

62. A compound which is selected from:



(Compound 12 diacetate) and



(Compound 12 hydrochloride).