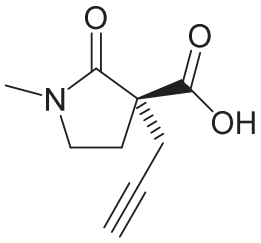
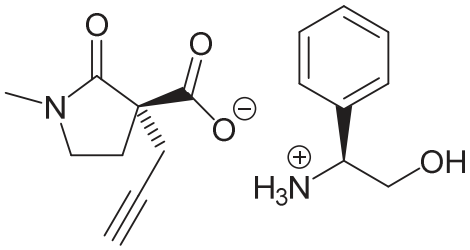
CLAIMS

1. A compound which is (S)-1-methyl-2-oxo-3-(prop-2-yn-1-yl)pyrrolidine-3-carboxylic acid (D6):



(D6).

2. A process of preparing the compound of D6 as defined in claim 1, from a compound which is (S)-1-methyl-2-oxo-3-(prop-2-yn-1-yl)pyrrolidine-3-carboxylic acid (S)-phenylglycinol salt (D5):



(D5).

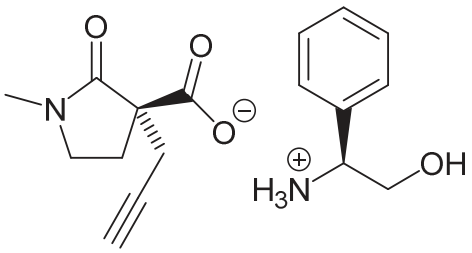
3. The process of claim 2, comprising eluting a solution comprising the compound of D5 through a resin.

4. The process of claim 3, wherein the solution comprises water or methanol.

5. The process of claim 3 or 4, wherein the resin is a cation-exchange resin.

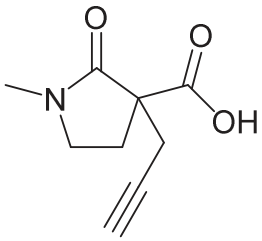
6. The process of claim 5, wherein the cation-exchange resin is Dowex (50WX4) resin.

7. The process of any one of claims 2-6, comprising preparing the compound of D5:



(D5)

from a compound of D4:



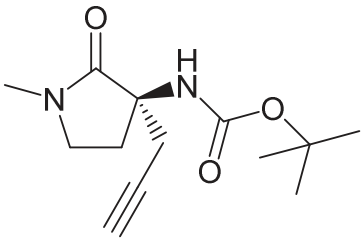
(D4).

8. The process of claim 7, comprising contacting the compound of D4 with S-(+)-2-phenylglycinol in a solution.

9. The process of claim 7 or 8, wherein the process further comprises a recrystallization step.

10. The process of claim 9, wherein the recrystallization step comprises seeding with crystalline (S)-1-methyl-2-oxo-3-(prop-2-yn-1-yl)pyrrolidine-3-carboxylic acid (S)-phenylglycinol salt.

11. The process of any one of claims 2-10, further comprising preparing a compound of D7:



(D7)

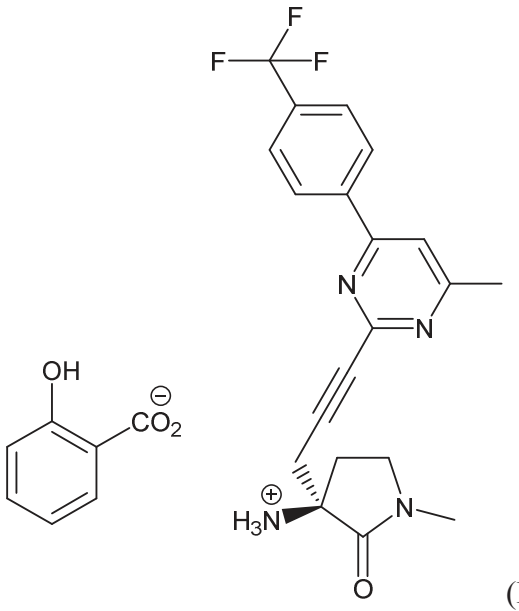
from the compound of D6.

12. The process of claim 11, comprising contacting the compound of D6 with a phosphoazide and a base.

13. The process of claim 12, wherein the phosphoazide is diphenylphosphorylazide.

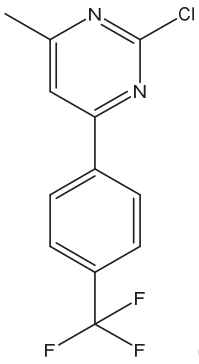
14. The process of claim 12 or 13, wherein the base is triethylamine.

15. The process of any one of claims 11-14, further comprising preparing a compound of D9:



(D9)

from the compound of D7 and a compound of D8:



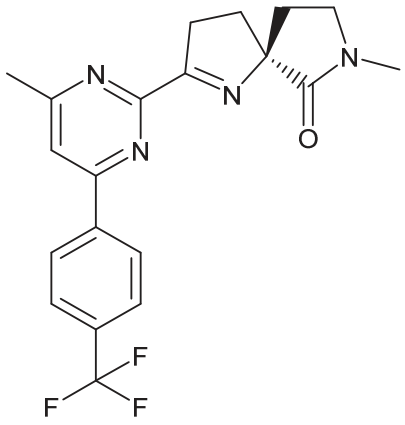
(D8).

16. The process of claim 15, comprising reacting the compound of D7 with the compound of D8 in the presence of a palladium catalyst, a copper salt, and a base.

17. The process of claim 16, wherein the palladium catalyst is dichloro{bis[2-(diphenylphosphino)phenyl]ether}palladium(II).

18. The process of claim 16 or 17, wherein the copper salt is copper(I) iodide.

19. The process of any one of claims 15-18, further comprising preparing a compound of D10:



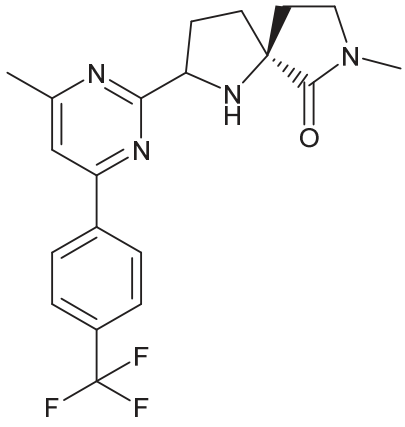
(D10)

from the compound of D9.

20. The process of claim 19, comprising contacting the compound of D9 with a base.

21. The process of claim 20, wherein the base is potassium phosphate.

22. The process of any one of claims 19-21, further comprising preparing a compound of formula (I):



(I)

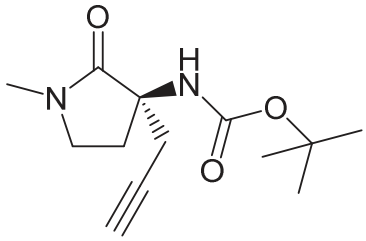
from the compound of D10.

23. The process of claim 22, comprising contacting the compound of D10 with a reducing agent.

24. The process of claim 23, wherein the reducing agent is a borane.

25. The process of claim 24, wherein the borane is borane *tert*-butylamine complex.

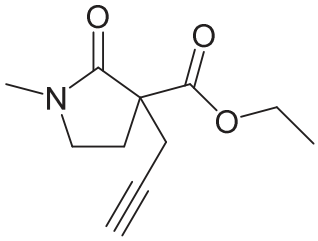
26. A process of preparing a compound which is (S) tert-Butyl (1-methyl-2-oxo-3-(prop-2-yn-1-yl)pyrrolidin-3-yl)carbamate (D7):



(D7)

which comprises:

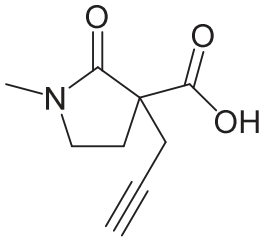
(i) preparing a compound of D1:



(D1)

from 1-methylpyrrolidin-2-one; followed by

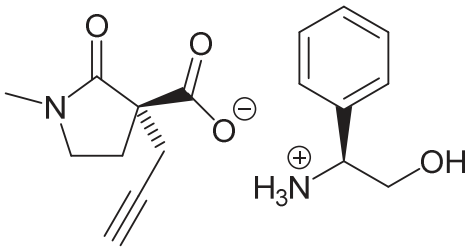
(ii) preparing a compound of D4:



(D4)

from a compound of D1; followed by

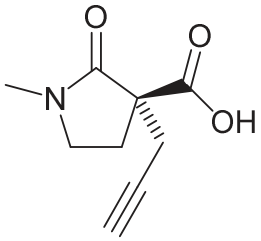
(iii) preparing a compound of D5:



(D5)

from a compound of D4; followed by

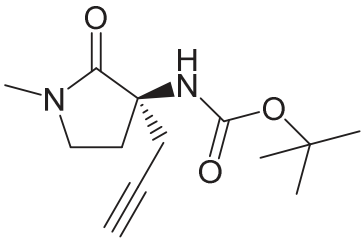
(iv) preparing a compound of D6:



(D6)

from a compound of D5; and followed by

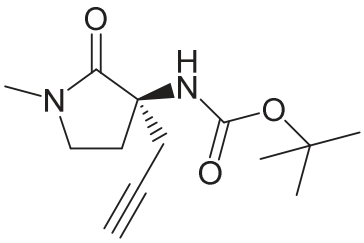
(v) preparing a compound of D7:



(D7)

from a compound of D6.

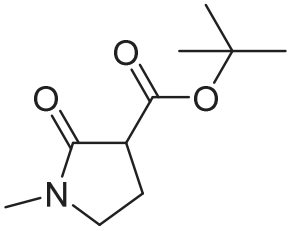
27. A process of preparing a compound which is (S) tert-Butyl (1-methyl-2-oxo-3-(prop-2-yn-1-yl)pyrrolidin-3-yl)carbamate (D7):



(D7)

which comprises:

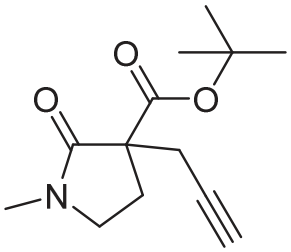
(a) preparing a compound of D2:



(D2)

from 1-methylpyrrolidin-2-one; followed by

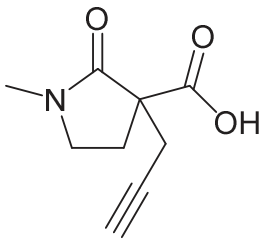
(b) preparing a compound of D3:



(D3)

from a compound of D2; followed by

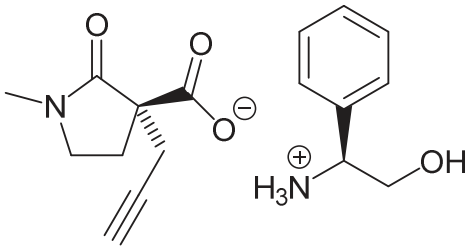
(c) preparing a compound of D4:



(D4)

from a compound of D3; followed by

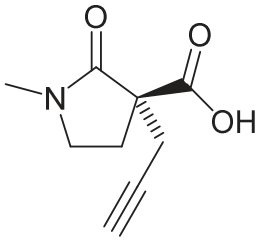
(iii) preparing a compound of D5:



(D5)

from a compound of D4; followed by

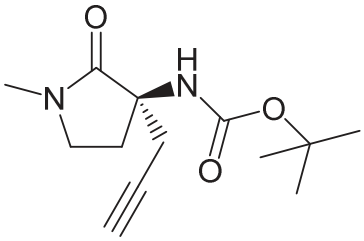
(iv) preparing a compound of D6:



(D6)

from a compound of D5; and followed by

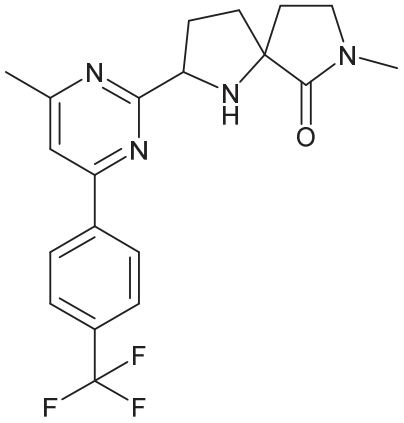
(v) preparing a compound of D7:



(D7)

from a compound of D6.

28. A process of preparing a compound which is 7-methyl-2-[4-methyl-6-[4-(trifluoromethyl)-phenyl]pyrimidin-2-yl]-1,7-diazaspiro[4.4]nonan-6-one, i.e. a compound of formula (I):

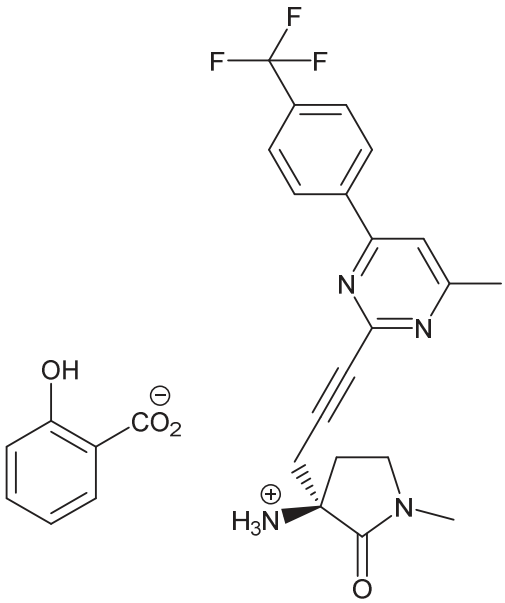


(I)

which comprises:

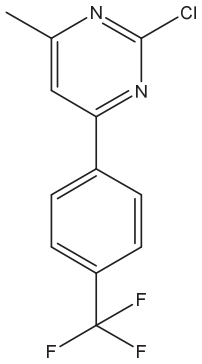
steps (i) to (v) as defined in claim 26; or steps (a) to (c) followed by steps (iii) to (v) as defined in claim 27; followed by:

(vi) preparing a compound of D9:



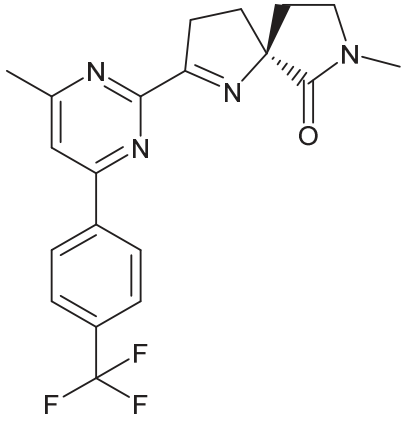
(D9)

from a compound of D7 and a compound of D8:



(D8); followed by

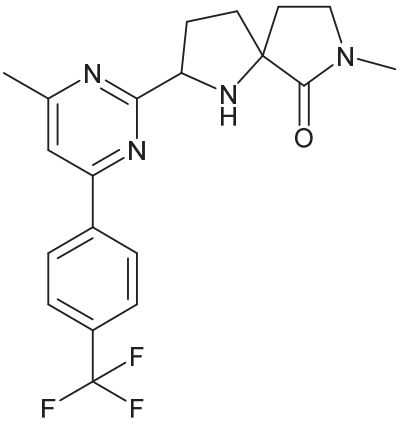
(vii) preparing a compound of D10:



(D10)

from a compound of D9; followed by

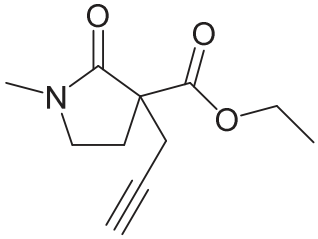
(viii) preparing a compound of formula (I):



(I)

from a compound of D10.

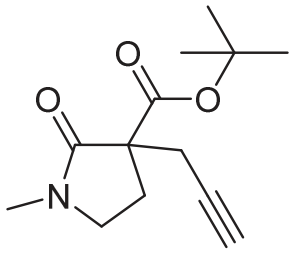
29. A process of preparing a compound which is D1:



(D1)

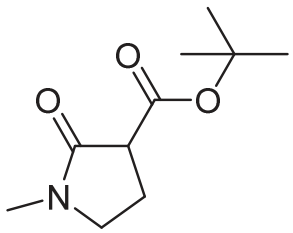
from 1-methylpyrrolidin-2-one.

30. A process of preparing a compound of D3:



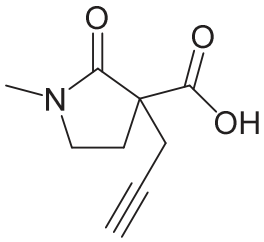
(D3)

from a compound of D2:



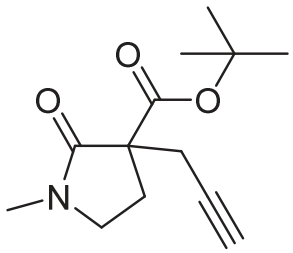
(D2).

31. A process of preparing a compound of D4:



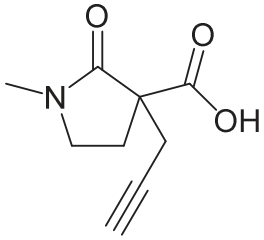
(D4)

from a compound of D3:



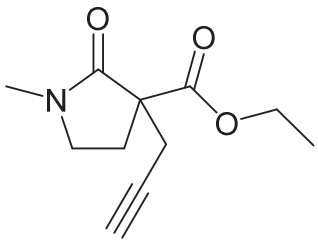
(D3).

32. A process of preparing a compound of D4:



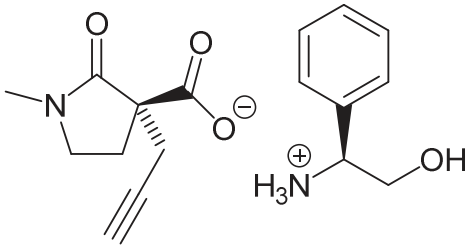
(D4)

from a compound of D1:



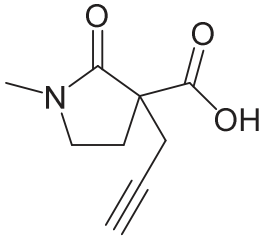
(D1).

33. A process of preparing a compound of D5:



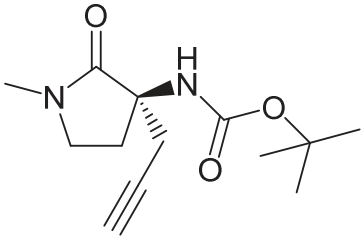
(D5)

from a compound of D4:



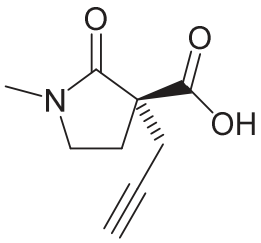
(D4).

34. A process of preparing a compound of D7:



(D7)

from a compound of D6:



(D6).