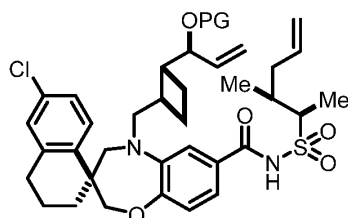


What is Claimed is:

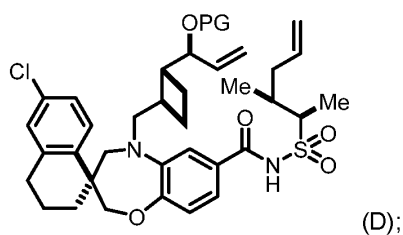
1. A compound having a structure of compound D:



(D), or a salt or solvate thereof, wherein PG is an alcohol protecting group.

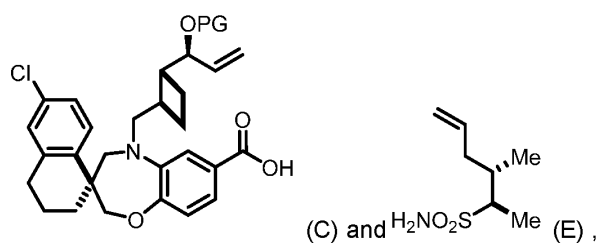
2. The compound of claim 1, wherein the PG is an ether, a silyl ether, an acetal or ketal, or an acyl.
3. The compound of claim 2, wherein the PG is an acyl.
4. The compound of claim 3, wherein the acyl is acetyl, pivaloyl, benzoyl (Bz), 4-bromobenzoyl (Br-Bz), 4-chlorobenzoyl, 4-iodobenzoyl, 4-fluorobenzoyl, 4-nitrobenzoyl, 4-phenylbenzoyl, 1-naphthoyl, or 2-naphthoyl.
5. The compound of claim 4, wherein PG is acetyl.
6. The compound of claim 4, wherein PG is pivaloyl.
7. The compound of claim 4, wherein PG is benzoyl, 4-bromobenzoyl, 4-nitrobenzoyl, 4-phenylbenzoyl, 1-naphthoyl, or 2-naphthoyl.
8. The compound of claim 7, wherein PG is 4-bromobenzoyl.
9. The compound of claim 2, wherein PG is an ether.
10. The compound of claim 9, wherein the ether is methoxy, ethoxy, propoxy, butoxy, methoxymethyl acetal (MOM), 2-methoxyethoxymethyl ester (MEM), ethoxyethyl acetal (EE), methoxypropyl ether (MOP), benzyloxymethyl acetal (BOM), benzyl ether (Bn), 4-methoxybenzyl ether (PMB), or 2-naphthylmethyl ether (Nap).
11. The compound of claim 2, wherein PG is an acetal or ketal.
12. The compound of claim 11, wherein PG is tetrahydropyranyl acetal (THP).
13. The compound of claim 2, wherein PG is a silyl ether.

14. The compound of claim 13, wherein PG is triethylsilyl ether (TES), triisopropylsilyl ether (TIPS), trimethylsilyl ether (TMS), *tert*-butyldimethylsilyl ether (TBS), or *tert*-butyldiphenylsilyl ether (TBDPS).
15. A process for synthesizing compound D, or a salt or solvate thereof:



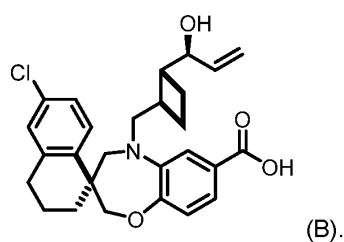
comprising:

admixing compound C, an activating agent, an amine base, and Compound E in the presence of a solvent to form compound D or a salt or solvate thereof



wherein PG is an alcohol protecting group.

16. The process of claim 15, further comprising synthesizing compound C by admixing compound B and a protecting group reagent to form compound C:



17. The process of claim 16, wherein compound B and the protecting group reagent are admixed with a base.
18. The process of claim 17, wherein the base comprises pyridine, trimethylamine, triethylamine, aniline, diisopropylethylamine, 1,8-diazabicyclo [5.4.0] undec-7-ene (DBU), 1,4-

diazabicyclo [2.2.2] octane (DABCO), NaH, KH, K₂CO₃, Na₂CO₃, Li₂CO₃, Cs₂CO₃, or a combination thereof.

19. The process of claim 18, wherein the base comprises pyridine, triethylamine, or a combination thereof.

20. The process of any one of claims 15-19, wherein the PG is an ether, a silyl ether, an acetal or ketal, or an acyl.

21. The process of claim 20, wherein the PG is an acyl.

22. The process of claim 21, wherein the acyl is acetyl, pivaloyl, benzoyl (Bz), 4-bromobenzoyl (Br-Bz), 4-chlorobenzoyl, 4-iodobenzoyl, 4-fluorobenzoyl, 4-nitrobenzoyl, 4-phenylbenzoyl, 1-naphthoyl, or 2-naphthoyl.

23. The process of claim 22, wherein PG is acetyl.

24. The process of claim 23, wherein PG is pivaloyl.

25. The process of claim 22, wherein PG is benzoyl, 4-bromobenzoyl, 4-nitrobenzoyl, 4-phenylbenzoyl, 1-naphthoyl, or 2-naphthoyl.

26. The process of claim 25, wherein PG is 4-bromobenzoyl.

27. The process of claim 20, wherein PG is an ether.

28. The process of claim 27, wherein the ether is methoxy, ethoxy, propoxy, butoxy, methoxymethyl acetal (MOM), 2-methoxyethoxymethyl ester (MEM), ethoxyethyl acetal (EE), methoxypropyl ether (MOP), benzyloxymethyl acetal (BOM), benzyl ether (Bn), 4-methoxybenzyl ether (PMB), or 2-naphthylmethyl ether (Nap).

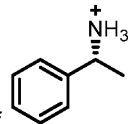
29. The process of claim 20, wherein PG is an acetal or ketal.

30. The process of claim 29, wherein PG is tetrahydropyranyl acetal (THP).

31. The process of claim 20, wherein PG is a silyl ether.

32. The process of claim 31, wherein PG is triethylsilyl ether (TES), triisopropylsilyl ether (TIPS), trimethylsilyl ether (TMS), *tert*-butyldimethylsilyl ether (TBS), or *tert*-butyldiphenylsilyl ether (TBDPS).

33. The process of any one of claims 16-32, wherein PG is acetyl and synthesizing compound C comprises admixing compound B, acetic anhydride, triethylamine, and 4-dimethylaminopyridine (DMAP) in the absence of solvent.

34. The process of any one of claims 16-32, wherein PG is 4-bromobenzoyl, and synthesizing compound C comprises admixing compound B, 4-bromobenzoyl chloride, and pyridine in a solvent.
35. The process of claim 34, wherein the solvent comprises tetrahydrofuran ("THF"), 2-methyltetrahydrofuran, cyclopentyl methyl ether, *tert*-butyl methyl ether, 1,2-dimethoxyethane, toluene, hexane, heptane, 1,4-dioxane, dichloromethane, 1,2-dichloroethylene, or a combination thereof.
36. The process of any one of claims 15-35, wherein the admixing of compound B and the protecting group reagent is for 30 minutes to 48 hours.
37. The process of claim 36, wherein the admixing is for 1.5 hours.
38. The process of any one of claims 16-37, wherein admixing compound B and the protecting group reagent is at a temperature of 0°C to 40°C.
39. The process of any one of claims 15-38, wherein compound B, prior to admixing with the protecting group reagent, is prepared as a free acid (compound B free acid) from a salt form (Compound B salt).
40. The process of claim 39, wherein compound B salt is an ammonium salt.
41. The process of claim 40, wherein compound B salt comprises a cation of .
42. The process of any one of claims 39-41, wherein compound B free acid is prepared by admixing compound B salt and phosphoric acid in a solvent to form the compound B free acid.
43. The process of claim 42, wherein the solvent comprises 2-methyltetrahydrofuran (2-MeTHF) or toluene.
44. The process of any one of claims 15-43, wherein the activating agent comprises an acid anhydride, acid chloride agent, carbodiimide agent, uronium agent, aminium agent, phosphonium agent, or a combination thereof.
45. The process of claim 44, wherein the activating agent is SOCl₂, oxalyl chloride, propanephosphonic acid anhydride, or a combination thereof.
46. The process of any one of claims 15-45, wherein the amine base for admixing compound C and compound E comprises pyridine, trimethylamine, triethylamine, aniline,

diisopropylethylamine, 1,8-diazabicyclo [5.4.0] undec-7-ene (DBU), 1,4-diazabicyclo [2.2.2] octane (DABCO), or a combination thereof.

47. The process of claim 46, wherein the amine base comprises diisopropylethylamine, triethylamine, or a combination thereof.

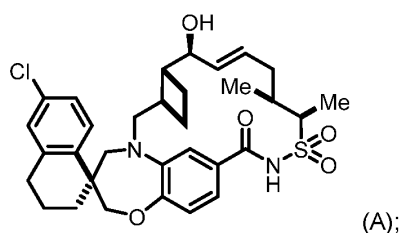
48. The process of any one of claims 15-47, wherein compound E and compound C are present in a molar ratio of 1:1 to 1.5:1 Compound C:Compound E.

49. The process of any one of claims 15-48, wherein admixing compound C, compound E, the activating agent and amine base occurs in a solvent.

50. The process of claim 49, wherein the solvent comprises tetrahydrofuran ("THF"), 2-methyltetrahydrofuran, cyclopentyl methyl ether, *tert*-butyl methyl ether, dichloromethane, dichloroethane, 1,2-dimethoxyethane, toluene, hexane, heptane, 1,4-dioxane, N,N'-dimethylformamide, N,N'-dimethylacetamide, N-methyl-2-pyrrolidone, or a combination thereof.

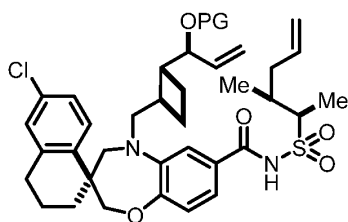
51. The process of claim 50, wherein the solvent comprises toluene.

52. A process for synthesizing compound A, or a salt or solvate thereof:

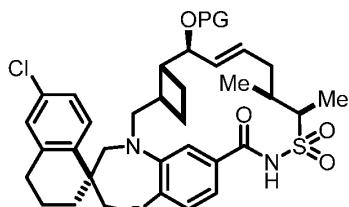


comprising:

admixing an organometallic catalyst and compound D



(D) or salt or solvate thereof in a solvent, to form compound F



(F) or a salt thereof, and

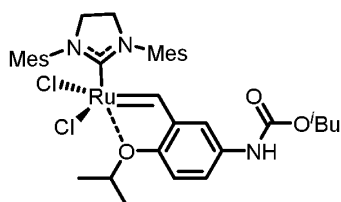
deprotecting compound F to form compound A.

53. The method of claim 52, wherein compound D is synthesized by the process of any one of claims 15-51.

54. The process of claim 52 or 53, wherein the organometallic catalyst comprises molybdenum or ruthenium.

55. The process of any one of claims 52-54, wherein the organometallic catalyst comprises a Grubbs' 1st generation catalyst, Grubbs' 2nd generation catalyst, Grubbs' 3rd generation catalyst, Hoveyda-Grubbs' 1st generation catalyst, Hoveyda-Grubbs' 2nd generation catalyst or a combination thereof.

56. The process of any one of claims 52-55, wherein the organometallic catalyst is



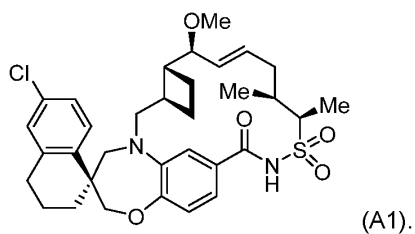
57. The process of any one of claims 52-56, wherein the solvent comprises a nonpolar organic solvent.

58. The process of claim 57, wherein the solvent is toluene, hexane, heptane, 1,4-dioxane, or a combination thereof.

59. The process of any one of claims 52-58, wherein the admixing of compound D and the organometallic catalyst is at a temperature of about 50°C to about 115°C.

60. The process of claim 59, wherein the admixing of compound D and the organometallic catalyst is at a temperature of about 80°C.

61. The process of any one of claims 52-60, wherein compound A is used to synthesize Compound A1 or a salt or solvate thereof



62. The process of any one of claims 52-60, wherein compound A is used to synthesize Compound A2 or a salt or solvate thereof

