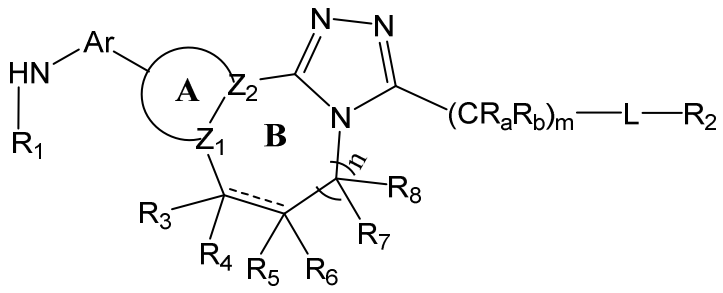
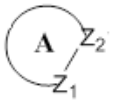
Claims

1. A compound of formula (I):



(I)

or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein



Z_1 and Z_2 are independently N or C, and is 5 membered heteroaryl containing 1, 2, 3, or 4 ring heteroatoms selected from N, O or S; said 5 membered heteroaryl is optionally substituted with one or more substituents independently selected from deuterium, halo, hydroxy, amino, -NH(C_{1-6} alkyl), -N(C_{1-6} alkyl)$_2$, -CN, mercapto, C_{1-6} alkyl, C_{2-6} alkenyl, C_{2-6} alkynyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, -(C_{1-6} alkyl)-OH, and -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), wherein each of said C_{1-6} alkyl, C_{1-6} alkoxyl, and C_{1-6} haloalkyl is optionally substituted with one or more deuterium;

L is absent, or L is -NR_c, O, or S;

R_c is hydrogen or C_{1-6} alkyl;

Ar is heteroaryl optionally substituted with one or more substituents independently selected from deuterium, halo, hydroxy, amino, -NH(C_{1-6} alkyl), -N(C_{1-6} alkyl)$_2$, -CN, mercapto, C_{1-6} alkyl, C_{2-6} alkenyl, C_{2-6} alkynyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), C_{3-8} cycloalkyl, 3-8 membered heterocyclyl, phenyl, and heteroaryl, wherein each of said C_{1-6} alkyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, C_{3-8} cycloalkyl, 3-8 membered heterocyclyl, phenyl, and heteroaryl is optionally substituted with one or more deuterium;

R_1 is selected from hydrogen, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{2-6} alkenyl, C_{2-6} alkynyl, C_{1-6} haloalkyl, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), -(C_{1-6} alkyl)-(C_{3-8} cycloalkyl), -(C_{1-6} alkyl)-(3-8 membered heterocyclyl), -(C_{1-6} alkyl)-phenyl, -(C_{1-6} alkyl)-heteroaryl, C_{3-8} cycloalkyl, 3-8 membered heterocyclyl, phenyl, and heteroaryl, wherein each of said C_{2-6} alkenyl, C_{2-6} alkynyl, C_{3-8} cycloalkyl, 3-8 membered heterocyclyl, phenyl, and heteroaryl is optionally substituted with one or more substituents independently selected from deuterium, halo, -CN, hydroxy, mercapto, amino, -NH(C_{1-6} alkyl), -N(C_{1-6} alkyl)$_2$, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), C_{3-8} cycloalkyl, 3-8 membered heterocyclyl, phenyl, heteroaryl, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} alkoxyl, and C_{1-6} haloalkyl;

R_2 is selected from hydrogen, deuterium, halo, hydroxy, amnio, -NH(C_{1-6} alkyl), -N(C_{1-6} alkyl)$_2$, -CN, mercapto, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{2-6} alkenyl,

C_{2-6} alkynyl, C_{1-6} haloalkyl, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), -(C_{1-6} alkyl)-(C_{3-8} cycloalkyl), -(C_{1-6} alkyl)-(3-8 membered heterocyclyl), -(C_{1-6} alkyl)-phenyl, -(C_{1-6} alkyl)-heteroaryl, C_{3-8} cycloalkyl, 3-8 membered heterocyclyl, phenyl, and heteroaryl, wherein each of said C_{2-6} alkenyl, C_{2-6} alkynyl, C_{3-8} cycloalkyl, 3-8 membered heterocyclyl, phenyl, and heteroaryl is optionally substituted with one or more substituents independently selected from deuterium, halo, -CN, hydroxy, mercapto, amino, -NH(C_{1-6} alkyl), -N(C_{1-6} alkyl)$_2$, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), C_{1-6} alkyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, and oxo;

R_a and R_b are independently selected from hydrogen, deuterium, halo, hydroxy, amino, -NH(C_{1-6} alkyl), -N(C_{1-6} alkyl)$_2$, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), -CN, mercapto, C_{1-6} alkyl, C_{1-6} alkoxyl, and C_{1-6} haloalkyl; or R_a and R_b together with the carbon atom they are attached to form C_{3-6} cycloalkyl or ~~4-6~~3-6 membered heterocyclyl, wherein each of said C_{3-6} cycloalkyl or ~~4-6~~3-6 membered heterocyclyl is optionally substituted with one or more substituents independently selected from deuterium, halo, -CN, hydroxy, mercapto, amino, -NH(C_{1-6} alkyl), -N(C_{1-6} alkyl)$_2$, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), C_{1-6} alkyl, C_{1-6} alkoxyl, and C_{1-6} haloalkyl;

------ is double bond or single bond, and when ------ is double bond, R_3 and R_5 are absent;

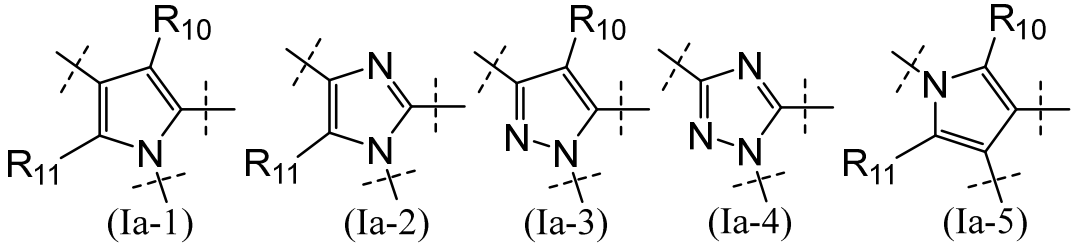
R_3, R_4, R_5, R_6, R_7, and R_8 are independently selected from hydrogen, deuterium, halo, hydroxy, -CN, mercapto, amino, -NH(C_{1-6} alkyl), -N(C_{1-6} alkyl)$_2$, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), C_{1-6} alkyl, -(C_{1-6} alkyl)-phenyl, C_{1-6} alkoxyl, and C_{1-6} haloalkyl; or any two of R_3, R_4, R_5, R_6, R_7, and R_8 together with the carbon atom they are attached to and the B ring form a 8-13 membered spirocyclic, fused, or bridged ring optionally containing 1-3 ring heteroatoms independently selected from N, O, or S; wherein said spirocyclic, fused, or bridged ring is optionally substituted with one or more substituents independently selected from deuterium, halo, -CN, hydroxy, mercapto, amino, -NH(C_{1-6} alkyl), -N(C_{1-6} alkyl)$_2$, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), C_{1-6} alkyl, C_{1-6} alkoxyl, and C_{1-6} haloalkyl; or R_3 and R_4 together, R_5 and R_6 together, or R_7 and R_8 together are oxo;

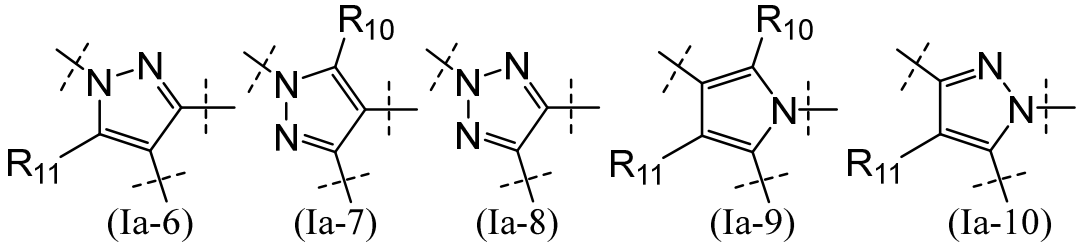
n is 0, 1, or 2;

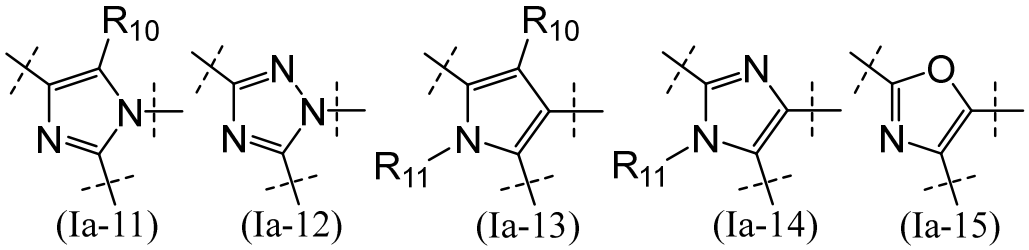
m is 0, 1, 2, 3, 4, or 5.

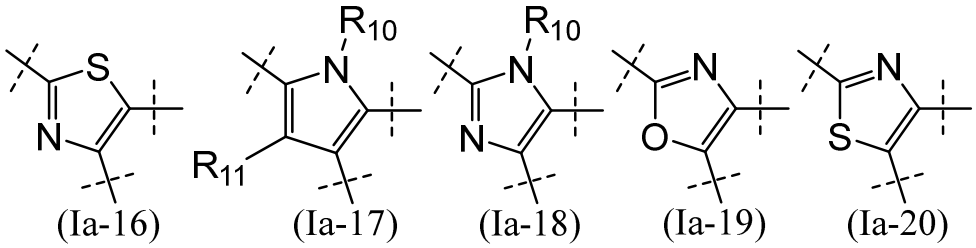
2. The compound of formula (I) according to claim 1, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein 

is selected from:





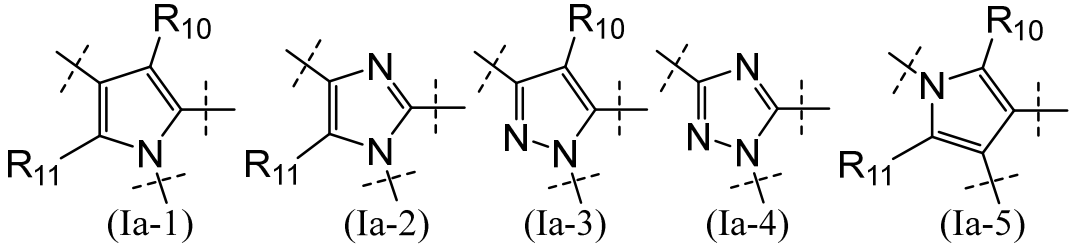


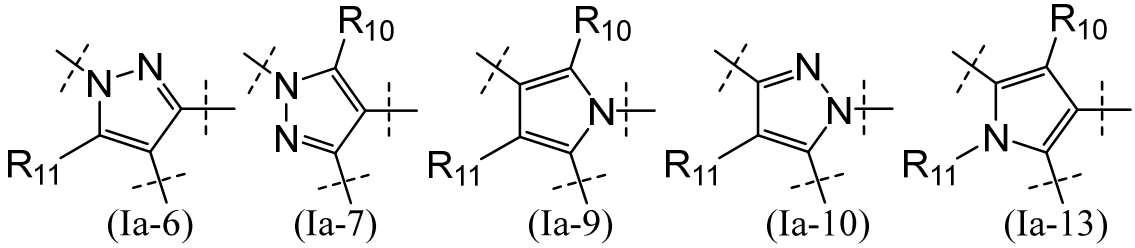


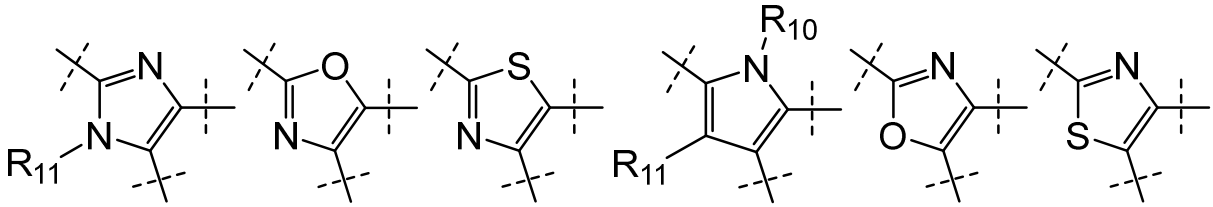
wherein R_{10} and R_{11} are independently selected from hydrogen, deuterium, halo, hydroxy, animo, -CN, mercapto, C_{1-6} alkyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, -(C_{1-6} alkyl)-OH, and -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), wherein each of said C_{1-6} alkyl, C_{1-6} alkoxyl, and C_{1-6} haloalkyl is optionally substituted with one or more deuterium.

3. The compound of formula (I) according to claim 1, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein 

is selected from:

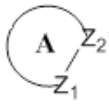
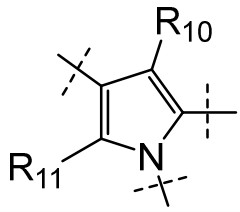






(Ia-14) (Ia-15) (Ia-16) (Ia-17) (Ia-19) (Ia-20)

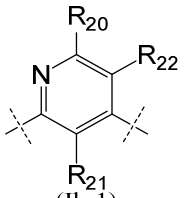
wherein R_{10} and R_{11} are independently selected from hydrogen, halo, -CN, C_{1-6} alkyl, C_{1-6} alkoxyl, and C_{1-6} haloalkyl.

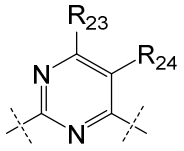
4. The compound of formula (I) according to claim 3, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein  is  (Ia-1), and R_{10} and R_{11} are independently selected from hydrogen, halo, and C_{1-6} alkyl.

5. The compound of formula (I) according to any one of claims 1-4, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein Ar is monocyclic heteroaryl having 5 or 6 ring atoms with 1, 2 or 3 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon; each of which is optionally substituted with one or more substituents independently selected from deuterium, halo, hydroxy, animo, -CN, mercapto, C_{1-6} alkyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), C_{3-8} cycloalkyl, 3-8 membered heterocyclyl, phenyl, and heteroaryl, wherein each of said C_{1-6} alkyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, C_{3-8} cycloalkyl, 3-8 membered heterocyclyl, phenyl, and heteroaryl is optionally substituted with one or more deuterium.

6. The compound of formula (I) according to claim 5, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein Ar is selected from pyridyl, pyrimidinyl, pyridazinyl, pyrazinyl, 1,3,5-triazinyl, 1,2,4-triazolyl, and thiazolyl (more preferably, Ar is selected from pyridyl, pyrimidinyl, and 1,3,5-triazinyl), each of which is optionally substituted with one or more substituents independently selected from halo, -CN, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} alkoxyl, and C_{1-6} haloalkyl.

7. The compound of formula (I) according to claim 6, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of

formula (I) or a pharmaceutically acceptable salt thereof, wherein Ar is  (Ib-1) or



(Ib-2), wherein R_{20}, R_{21}, R_{22}, R_{23}, and R_{24} are independently selected from hydrogen, halo, -CN, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} alkoxyl, and C_{1-6} haloalkyl.

8. The compound of formula (I) according to any one of claims 1-7, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein R_1 is selected from C_{1-6} alkyl, -(C_{1-6} alkyl)-OH, saturated monocyclic C_{3-8} cycloalkyl, saturated monocyclic 3-8 membered heterocyclyl containing 1 or 2 ring heteroatoms independently selected from N, O and S, and heteroaryl, wherein said heteroaryl is monocyclic aromatic hydrocarbon radical having 5 or 6 ring atoms with 1, 2 or 3 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, or bicyclic aromatic hydrocarbon radical having 8, 9 or 10 ring atoms with 1, 2, 3 or 4 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, wherein at least one of the rings is aromatic, and when the total number of S and O atoms in the heteroaryl group exceeds 1, said S and O heteroatoms are not adjacent to one another, and wherein each of said C_{3-8} cycloalkyl, 3-8 membered heterocyclyl, and heteroaryl is optionally substituted with one or more substituents independently selected from halo, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), 3-6 membered heterocyclyl, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} alkoxyl, or C_{1-6} haloalkyl.

9. The compound of formula (I) according to claim 8, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein R_1 is heteroaryl selected from pyrazolyl, pyridyl, isoxazolyl, 1,2,4-triazolyl, 1,3,4-thiadiazolyl, 2,4,5,6-tetrahydrocyclopentadieno[c]pyrazolyl, and 5,6,7,8-tetrahydro[1,2,4]triazolo[1,5-a]pyridyl, wherein said heteroaryl is each optionally substituted with one or more substituents independently selected from C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} haloalkyl, C_{1-6} alkoxyl, halo, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), and 3-6 membered heterocyclyl.

10. The compound of formula (I) according to claim 9, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein R_1 is pyrazolyl, which is

optionally substituted with one or more substituents independently selected from C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} haloalkyl, C_{1-6} alkoxyl, halo, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), and oxetanyl.

11. The compound of formula (I) according to any one of claims 1-10, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein R_2 is selected from halo, -CN, C_{1-6} alkyl, C_{1-6} haloalkyl, saturated monocyclic C_{3-8} cycloalkyl, phenyl, and heteroaryl, wherein said heteroaryl is monocyclic aromatic hydrocarbon radical having 5 or 6 ring atoms with 1, 2 or 3 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, or bicyclic aromatic hydrocarbon radical having 8, 9 or 10 ring atoms with 1, 2, 3 or 4 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, wherein at least one of the rings is aromatic, and when the total number of S and O atoms in the heteroaryl group exceeds 1, said S and O heteroatoms are not adjacent to one another, and wherein each of said C_{3-8} cycloalkyl, phenyl, and heteroaryl is optionally substituted with one or more substituents independently selected from halo, -CN, C_{1-6} alkyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, and oxo.

12. The compound of formula (I) according to claim 11, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein R_2 is phenyl, wherein said phenyl is optionally substituted with one or more substituents independently selected from halo, -CN, and C_{1-6} alkoxyl.

13. The compound of formula (I) according to claim 11, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein R_2 is heteroaryl selected from 1,2,5-oxadiazolyl, indolyl, indolinyl, quinolinyl, isoquinolinyl, tetrahydroquinolinyl, tetrahydroisoquinolinyl, pyrazolyl, oxazolyl, isoxazolyl, pyridyl, thiazolyl, isothiazolyl, benzo[d]isoxazolyl, thienyl, indazolyl, and pyrrolyl, each of which is optionally substituted with one or more substituents independently selected from C_{1-6} alkyl, halo, oxo, and -CN.

14. The compound of formula (I) according to claim 11, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein R_2 is saturated monocyclic C_{3-8} cycloalkyl optionally substituted with one or more substituents independently selected from C_{1-6} haloalkyl.

15. The compound of formula (I) according to any one of claims 1-14, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein m is 0, 1, or 2.

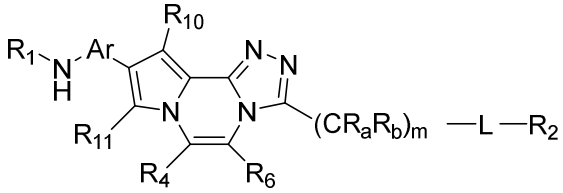
16. The compound of formula (I) according to any one of claims 1-15, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein R_a and R_b are independently selected from hydrogen, halo, hydroxy, and C_{1-6} alkyl; or R_a and R_b together with the carbon atom they are attached to form a saturated monocyclic C_{3-6} cycloalkyl or a 3-6 membered heterocyclyl, wherein said 3-6 membered heterocyclyl is a saturated monocyclic ring having 3-6 ring atoms with 1 or 2 of the ring atoms being ring heteroatoms independently selected from N, O and S, and the remaining ring atoms being carbon; wherein each of said saturated monocyclic C_{3-6} cycloalkyl or 3-6 membered heterocyclyl is optionally substituted with one or more substituents selected from halo.

17. The compound of formula (I) according to any one of claims 1-16, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein L is absent, or L is NH, O or S.

18. The compound of formula (I) according to claim 1, or a pharmaceutically acceptable salt thereof, wherein the compound of formula (I) is selected from Compounds 1-322.

19. The compound of formula (I) according to claim 1, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein n is 0, ------ is double bond, R_3 and R_5 are absent, R_4 and R_6 are independently selected from hydrogen and C_{1-6} alkyl.

20. The compound of formula (I) according to claim 19, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein the compound of formula (I) is the compound of formula (I-1),



(I-1)

wherein,

R_1 is heteroaryl optionally substituted with one or more substituents independently selected from C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} haloalkyl, C_{1-6} alkoxyl, halo, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), and 3-6 membered heterocyclyl;

Ar is heteroaryl optionally substituted with one or more substituents independently selected from halo, -CN, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} alkoxyl, and C_{1-6} haloalkyl;

R_2 is selected from halo, -CN, C_{1-6} alkyl, C_{1-6} haloalkyl, saturated monocyclic C_{3-8} cycloalkyl, phenyl, and heteroaryl, wherein each of said saturated monocyclic C_{3-8} cycloalkyl, phenyl, or heteroaryl is optionally substituted with one or more substituents independently selected from halo, -CN, C_{1-6} alkyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, and oxo;

R_4 and R_6 are independently selected from hydrogen and C_{1-6} alkyl;

R_{10} and R_{11} are independently selected from hydrogen, halo, C_{1-6} alkyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, and -(C_{1-6} alkyl)-OH;

m is 0, 1, or 2;

R_a and R_b are independently selected from hydrogen, halo, hydrogen, or C_{1-6} alkyl; or R_a and R_b together with the carbon atom they are attached to form a saturated monocyclic C_{3-6} cycloalkyl or a 3-6 membered heterocyclyl, wherein said 3-6 membered heterocyclyl is a saturated monocyclic ring having 3-6 ring atoms with 1 or 2 of the ring atoms being ring heteroatoms independently selected from N, O and S, and the remaining ring atoms being carbon; wherein each of said saturated monocyclic C_{3-6} cycloalkyl or 3-6 membered heterocyclyl is optionally substituted with one or more substituents selected from halo;

L is absent, or L is NH, O or S;

said heteroaryl is monocyclic aromatic hydrocarbon radical having 5 or 6 ring atoms with 1, 2 or 3 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, or bicyclic aromatic hydrocarbon radical having 8, 9 or 10 ring atoms with 1, 2, 3 or 4 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, wherein at least one of the rings is aromatic, and when the total number of S and O atoms in the heteroaryl group exceeds 1, said S and O heteroatoms are not adjacent to one another.

21. The compound of formula (I) according to claim 20, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein,

R_1 is pyrazolyl, which is optionally substituted with one or more substituents independently selected from C_{1-6} alkyl;

Ar is pyrimidinyl, wich is optionally substituted with one or more substituents independently selected from C_{1-6} alkyl optionally substituted with one or more deuterium, and halo;

R_2 is selected from C_{1-6} haloalkyl or phenyl, wherein said phenyl is optionally substituted with one or more substituents independently selected from halo;

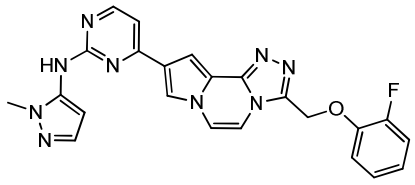
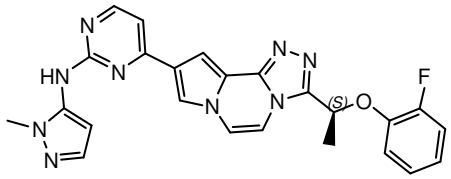
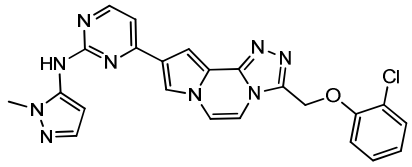
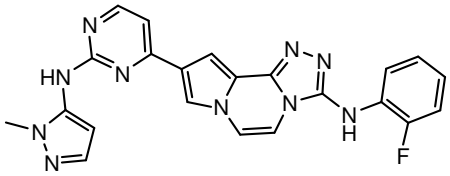
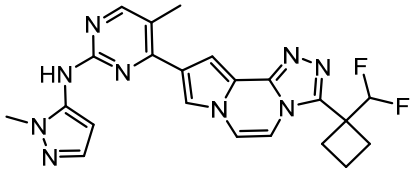
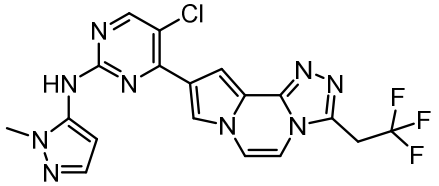
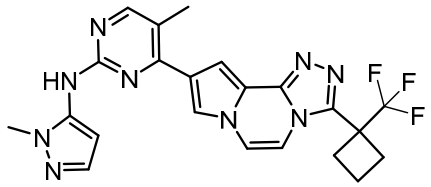
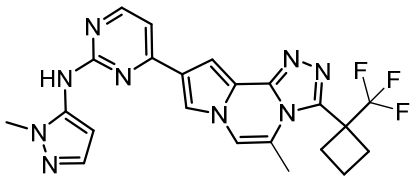
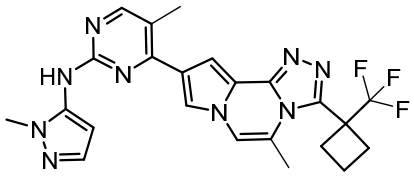
R_{10} and R_{11} are hydrogen;

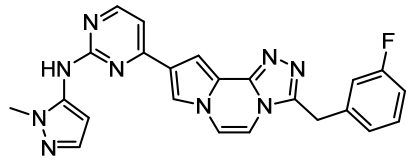
m is 0 or 1;

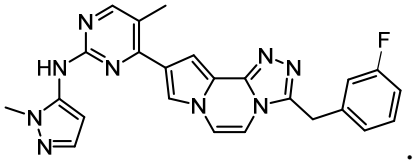
R_a and R_b are independently selected from hydrogen or C_{1-6} alkyl; or R_a and R_b together with the carbon atom they are attached to form a saturated monocyclic C_{3-6} cycloalkyl; and

L is absent, or L is NH or O.

22. The compound of formula (I) according to claim 20, or a pharmaceutically acceptable salt thereof, wherein, the compound of formula (I) is selected from the group consisting of:

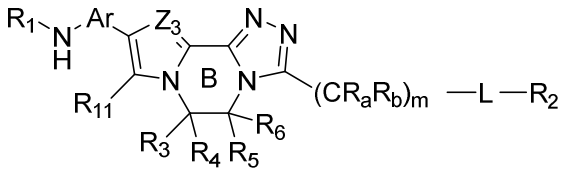
Compound	Structure
2	
39	
40	
41	
45	
212	
231	
232	
236	

282 

283 

23. The compound of formula (I) according to claim 1, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein n is 0, ------ is single bond, R_3, R_4, R_5, and R_6 are independently selected from hydrogen, C_{1-6} alkyl, C_{1-6} haloalkyl, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), and -(C_{1-6} alkyl)-phenyl; or any pair of R_3 and R_4, or R_5 and R_6, together with the carbon atom they are attached to form a saturated monocyclic C_{3-6} cycloalkyl or a saturated monocyclic 3-6 membered heterocyclyl having 1 or 2 ring heteroatoms selected from N, O and S, thereby together with the B ring forming a spirocyclic ring.

24. The compound of formula (I) according to claim 23, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein the compound of formula (I) is the compound of formula (I-2),



(I-2)

wherein,

R_1 is selected from C_{1-6} alkyl, -(C_{1-6} alkyl)-OH, saturated monocyclic C_{3-8} cycloalkyl, saturated 3-8 membered heterocyclyl containing 1 or 2 ring heteroatoms independently selected from N, O and S, and heteroaryl, wherein each of said C_{3-8} cycloalkyl, 3-8 membered heterocyclyl, and heteroaryl is optionally substituted with one or more substituents independently selected from halo, -(C_{1-6} alkyl)-OH, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), saturated 3-6 membered heterocyclyl containing 1 or 2 ring heteroatoms independently selected from N, O and S, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} alkoxyl, and C_{1-6} haloalkyl;

Ar is heteroaryl optionally substituted with one or more substituents independently selected from halo, -CN, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} alkoxyl, and C_{1-6} haloalkyl;

R_2 is selected from halo, -CN, C_{1-6} alkyl, C_{1-6} haloalkyl, saturated monocyclic C_{3-8} cycloalkyl, phenyl, or heteroaryl, wherein each of said C_{3-8} cycloalkyl, phenyl, or heteroaryl is optionally substituted with one or more substituents independently selected from halo, -CN, C_{1-6} alkyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, and oxo;

Z_3 is CR_{10} or N;

R_3, R_4, R_5, and R_6 are independently selected from hydrogen, C_{1-6} alkyl, C_{1-6} haloalkyl, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), and -(C_{1-6} alkyl)-phenyl; or any pair of R_3 and R_4, or R_5 and R_6, together with the carbon atom they are attached to form a saturated monocyclic C_{3-6} cycloalkyl or a saturated monocyclic 3-6 membered heterocyclyl having 1 or 2 ring heteroatoms selected from N, O and S, thereby together with the B ring forming a spirocyclic ring;

R_{10} and R_{11} are independently selected from hydrogen, halo, C_{1-6} alkyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, and -(C_{1-6} alkyl)-OH;

m is 0, 1, or 2;

R_a and R_b are independently selected from hydrogen, halo, hydroxy, or C_{1-6} alkyl; or R_a and R_b together with the carbon atom they are attached to form a saturated monocyclic C_{3-6} cycloalkyl or a 3-6 membered heterocyclyl, wherein said 3-6 membered heterocyclyl is a saturated monocyclic ring having 3-6 ring atoms with 1 or 2 of the ring atoms being ring heteroatoms independently selected from N, O and S, and the remaining ring atoms being carbon; wherein each of said saturated monocyclic C_{3-6} cycloalkyl or 3-6 membered heterocyclyl is optionally substituted with one or more substituents selected from halo;

L is absent, or L is NH, O or S;

said heteroaryl is monocyclic aromatic hydrocarbon radical having 5 or 6 ring atoms with 1, 2 or 3 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, or bicyclic aromatic hydrocarbon radical having 8, 9 or 10 ring atoms with 1, 2, 3 or 4 of ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, wherein at least one of the rings is aromatic, and when the total number of S and O atoms in the heteroaryl group exceeds 1, said S and O heteroatoms are not adjacent to one another.

25. The compound of formula (I) according to claim 24, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein,

R_1 is selected from saturated monocyclic 3-8 membered heterocyclyl containing 1 or 2 ring heteroatoms independently selected from N, O and S, and heteroaryl, wherein said heteroaryl is monocyclic aromatic hydrocarbon radical having 5 or 6 ring atoms with 1, 2 or 3 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, or bicyclic aromatic hydrocarbon radical having 8, 9 or 10 ring atoms with 1, 2, 3 or 4 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, wherein at least one of the rings is aromatic, and when the total number of S and O atoms in the heteroaryl group exceeds 1, said S and O heteroatoms are not adjacent to one another, and wherein each of said 3-8 membered heterocyclyl and heteroaryl is optionally substituted with one or more substituents independently selected from C_{1-6} alkyl, C_{1-6} haloalkyl, halo, -(C_{1-6} alkyl)-OH, C_{1-6} alkoxyl, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), and saturated monocyclic 3-6 membered heterocyclyl containing 1 or 2 ring heteroatoms independently selected from N, O and S;

Ar is heteroaryl, wherein said heteroaryl is monocyclic aromatic hydrocarbon radical having 5 or 6 ring atoms with 1, 2 or 3 of the ring atoms being heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, and when the total number of S and O atoms in the heteroaryl group exceeds 1, said S and O heteroatoms are not adjacent to one another, and wherein said heteroaryl is optionally substituted with one or more substituents independently selected from C_{1-6} alkyl optionally substituted with one or more deuterium, and halo;

R_2 is selected from halo, C_{1-6} alkyl, C_{1-6} haloalkyl, phenyl, and heteroaryl, wherein said heteroaryl is monocyclic aromatic hydrocarbon radical having 5 or 6 ring atoms with 1, 2 or 3 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, or bicyclic aromatic hydrocarbon radical having 8, 9 or 10 ring atoms with 1, 2, 3 or 4 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, wherein at least one of the rings is aromatic, and when the total number of S and O atoms in the heteroaryl group exceeds 1, said S and O heteroatoms are not adjacent to one another, and wherein each of said phenyl and heteroaryl is optionally substituted with one or more substituents independently selected from halo, C_{1-6} alkyl, C_{1-6} alkoxyl, and oxo;

Z_3 is CR_{10} or N;

R_3, R_4, R_5, and R_6 are independently selected from hydrogen, C_{1-6} alkyl, C_{1-6} haloalkyl, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), and -(C_{1-6} alkyl)-phenyl; or any pair of R_3 and R_4, or R_5 and R_6, together with the carbon atom they are attached to form a saturated monocyclic C_{3-6} cycloalkyl or a saturated monocyclic 3-6 membered heterocyclyl having 1 or 2 ring heteroatoms selected from N, O and S, thereby together with the B ring forming a spirocyclic ring;

m is 1 or 2;

R_a and R_b are independently selected from hydrogen and halo; or R_a and R_b together with the carbon atom they are attached to form a saturated monocyclic C_{3-6} cycloalkyl;

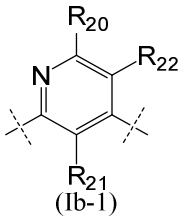
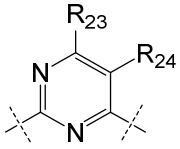
R_{10} and R_{11} are hydrogen;

L is absent, or L is O.

26. The compound of formula (I) according to claim 25, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein R_1 is selected from morpholinyl, thiomorpholinyl, and heteroaryl, wherein said heteroaryl is selected from pyrazolyl, 2,4,5,6-tetrahydrocyclopentadieno[c]pyrazolyl, 1,2,4-triazolyl, 5,6,7,8-tetrahydro[1,2,4]triazolo[1,5-a]pyridyl, 1,3,4-thiadiazolyl, and pyridyl, and said heteroaryl is each optionally substituted with one or more substituents independently selected from C_{1-6} alkyl, C_{1-6} haloalkyl, halo, -(C_{1-6} alkyl)-OH, C_{1-6} alkoxyl, -(C_{1-6} alkyl)-O-(C_{1-6} alkyl), and oxetanyl.

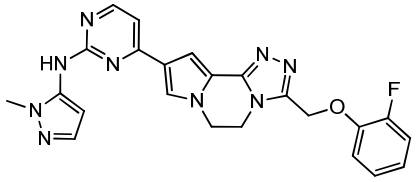
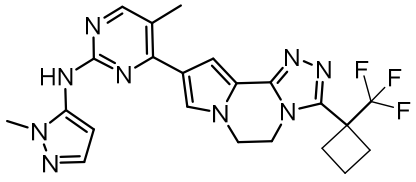
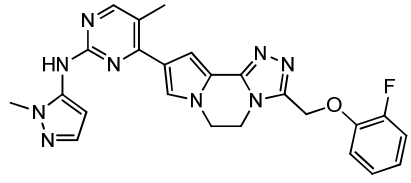
27. The compound of formula (I) according to claim 24, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein Ar is heteroaryl selected from pyridyl, pyrimidinyl, and 1,3,5-triazinyl; wherein said heteroaryl is each optionally substituted with one or more substituents selected from C_{1-6} alkyl optionally substituted with one or more deuterium,

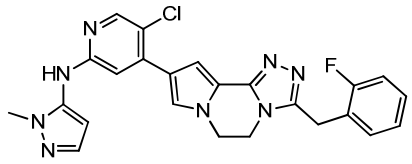
and halo.

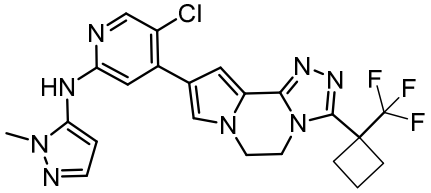
28. The compound of formula (I) according to claim 27, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein Ar is  (Ib-1) or  (Ib-2), wherein R_{20}, R_{21}, R_{22}, R_{23}, and R_{24} are independently selected from hydrogen, halo, and C_{1-6} alkyl optionally substituted with one or more deuterium.

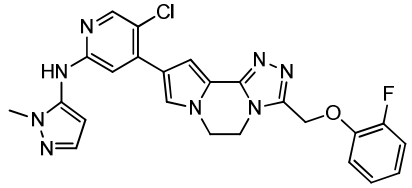
29. The compound of formula (I) according to claim 24, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein R_2 is selected from halo, C_{1-6} alkyl, C_{1-6} haloalkyl, phenyl, and heteroaryl, wherein said heteroaryl is selected from isoxazolyl, 1,2,5-oxadiazolyl, pyrazolyl, oxazolyl, pyridyl, thiazolyl, isothiazolyl, thienyl, and benzo[d]isoxazolyl; wherein each of said phenyl and heteroaryl is optionally substituted with one or more substituents independently selected from halo, C_{1-6} alkyl, C_{1-6} alkoxyl, and oxo.

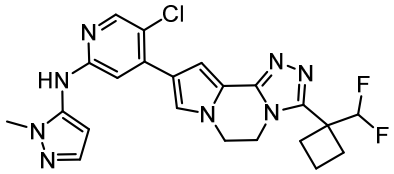
30. The compound of formula (I) according to claim 24, or a pharmaceutically acceptable salt thereof, wherein the compound of formula (I) is selected from:

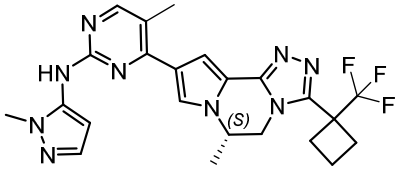
Compound	Structure
3	
5	
7	

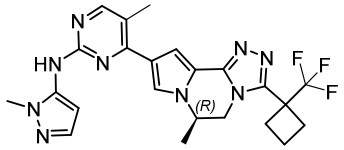
9 

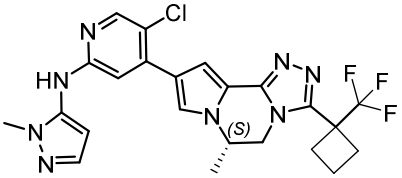
20 

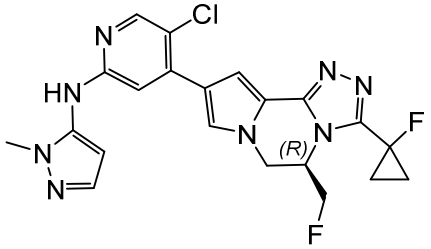
23 

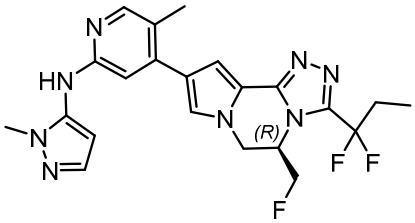
46 

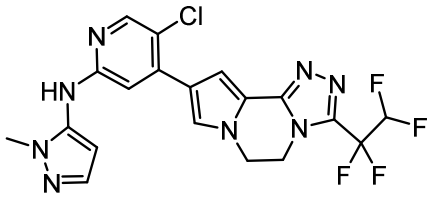
47 

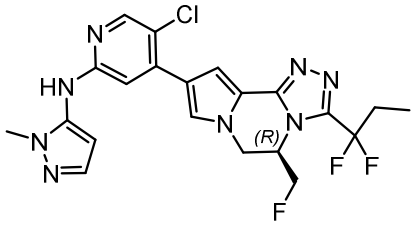
48 

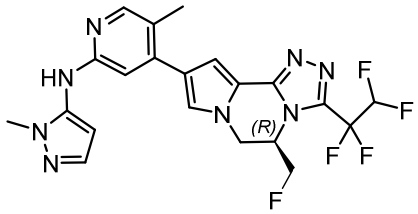
50 

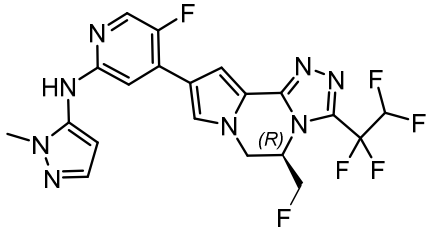
56 

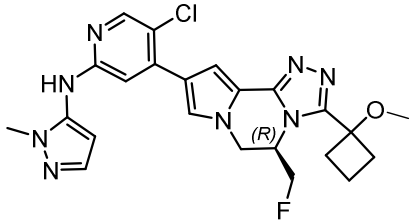
57 

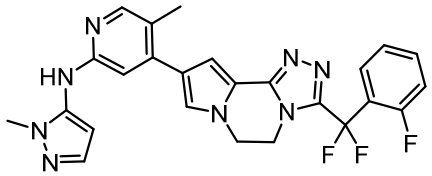
58 

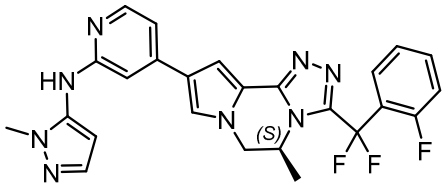
61 

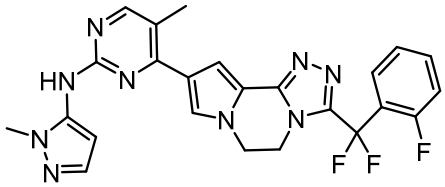
62 

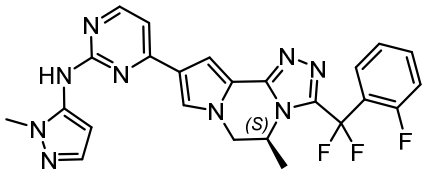
63 

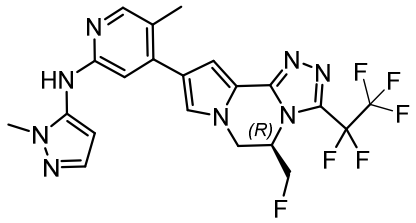
64 

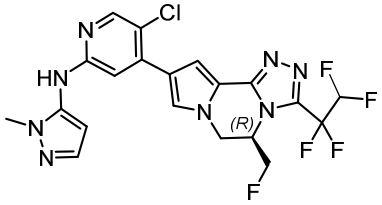
68 

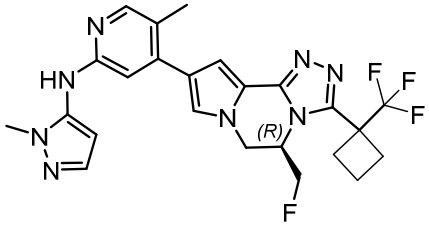
69 

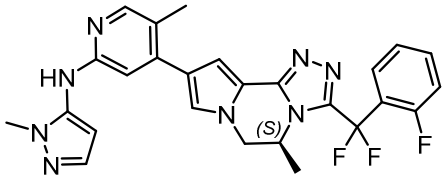
70 

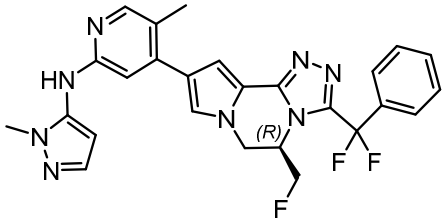
71 

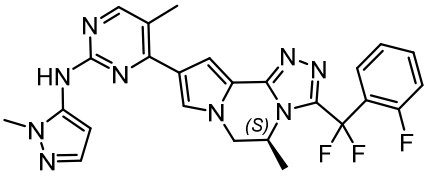
76 

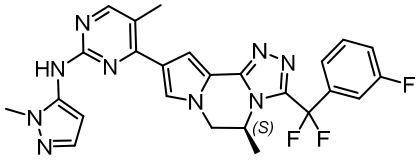
79 

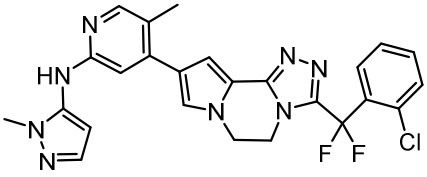
82 

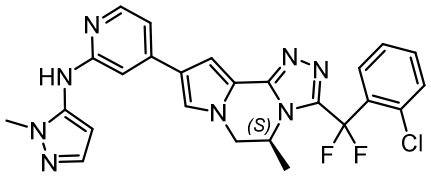
83 

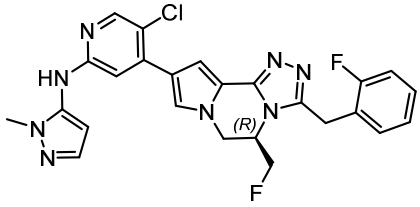
86 

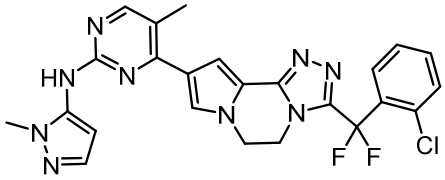
88 

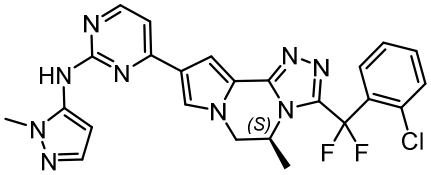
89 

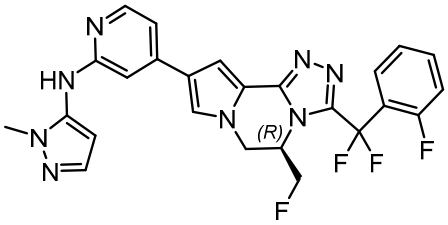
90 

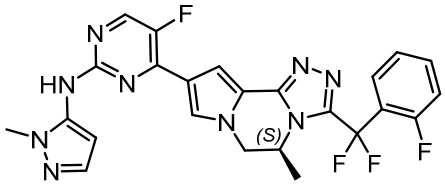
91 

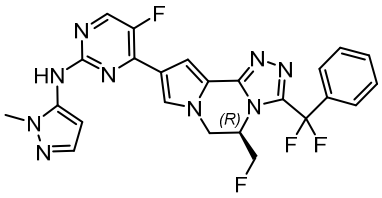
92 

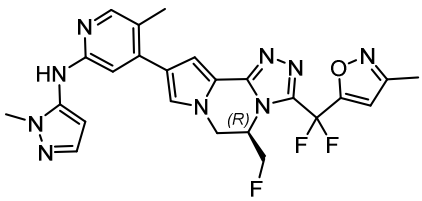
94 

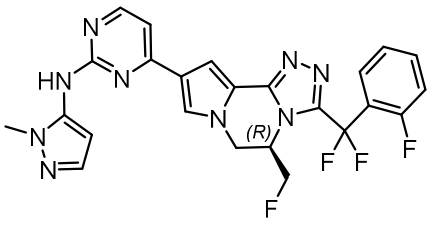
95 

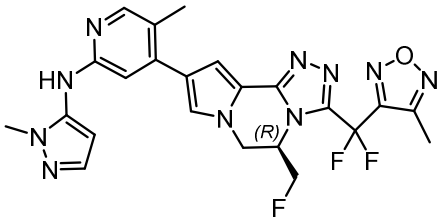
96 

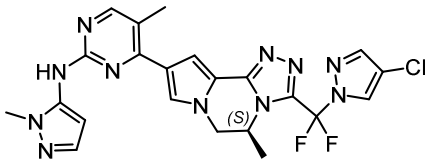
97 

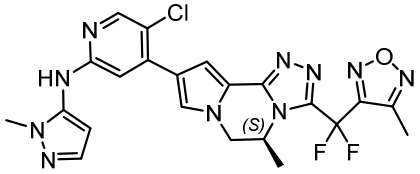
98 

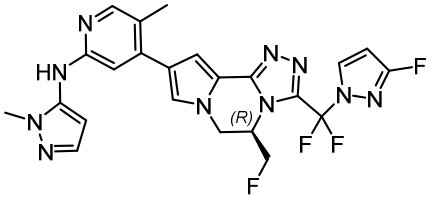
99 

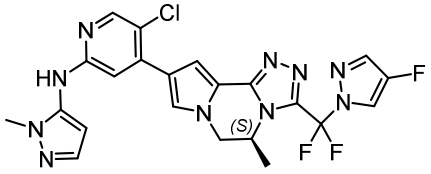
100 

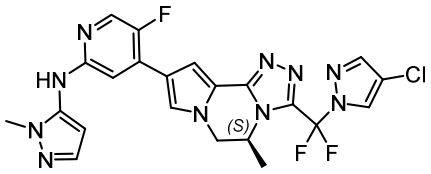
101 

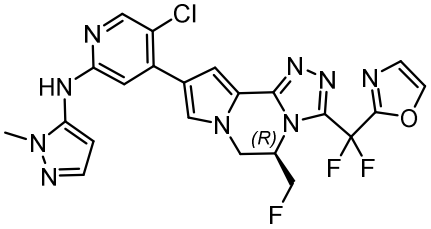
102 

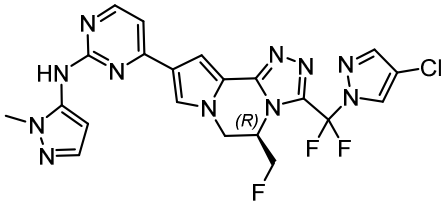
103 

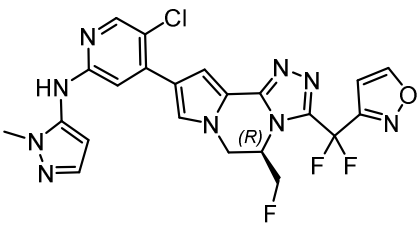
104 

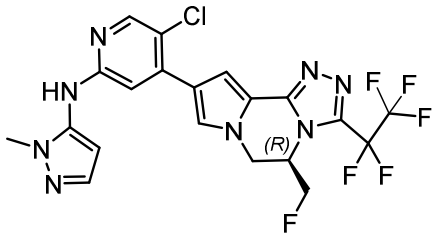
108 

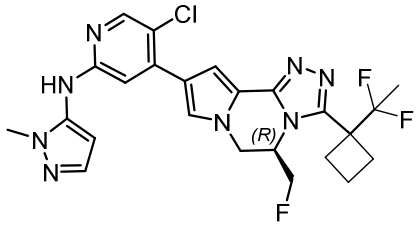
109 

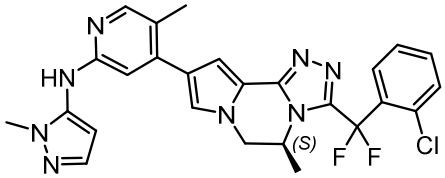
110 

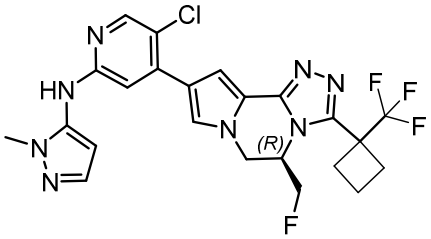
111 

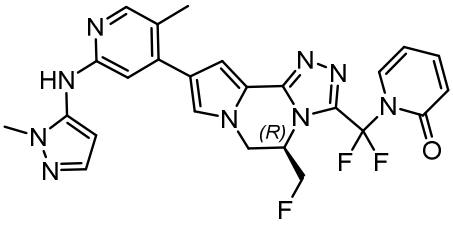
112 

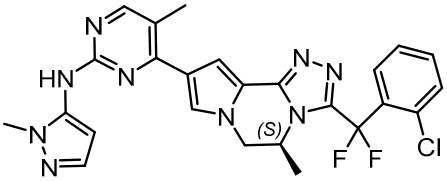
114 

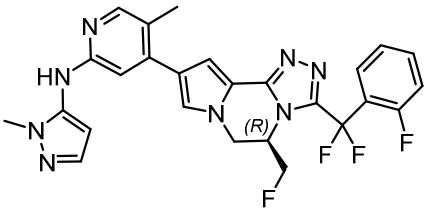
116 

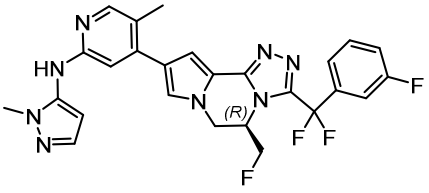
118 

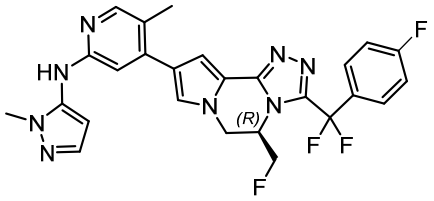
121 

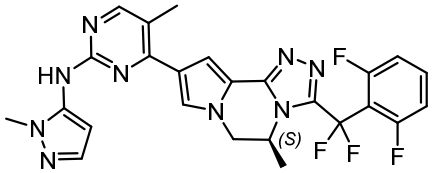
124 

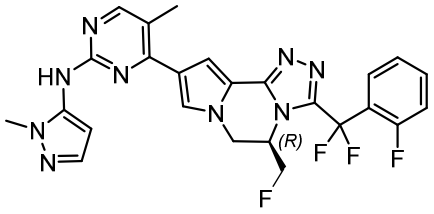
125 

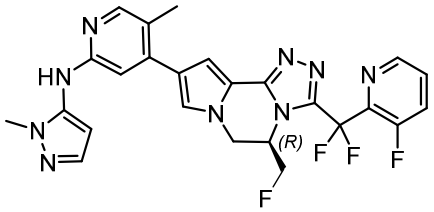
126 

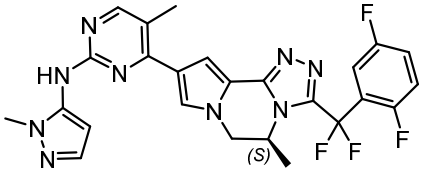
127 

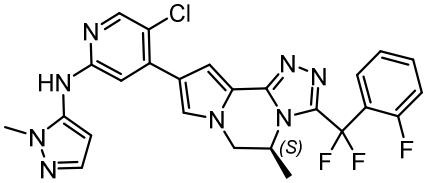
128 

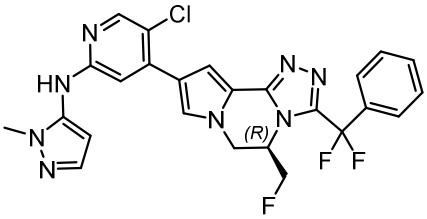
130 

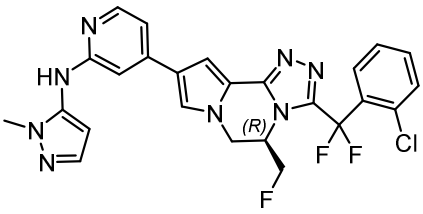
131 

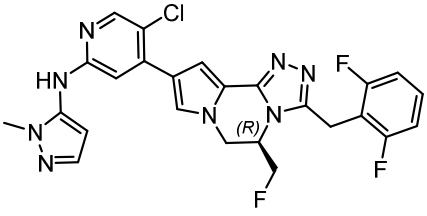
133 

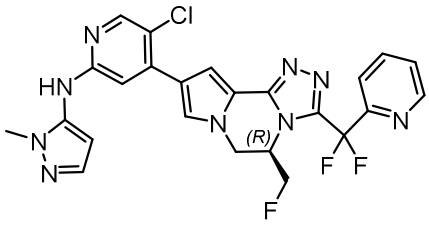
134 

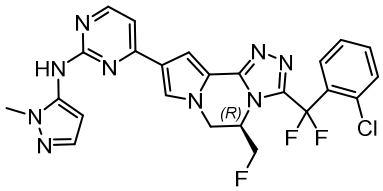
135 

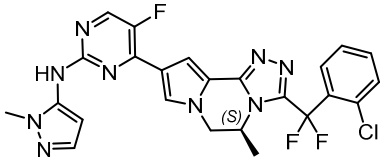
137 

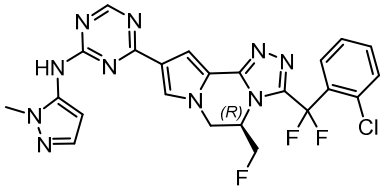
138 

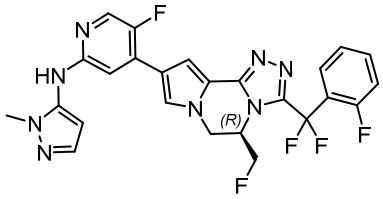
139 

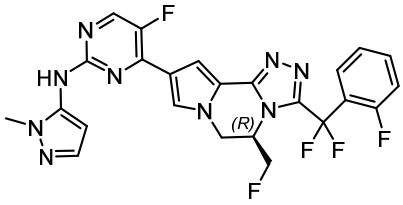
141 

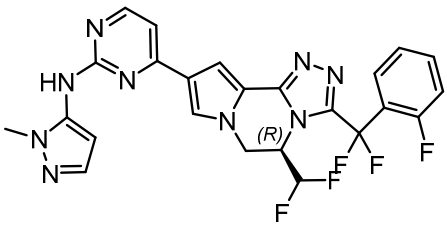
142 

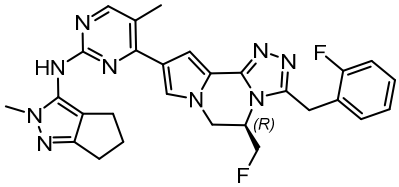
143 

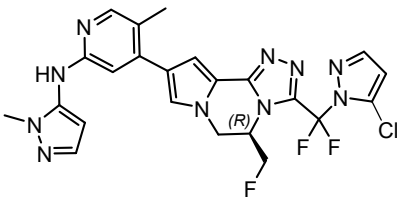
144 

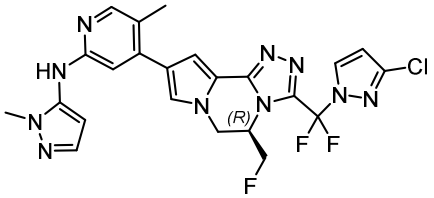
145 

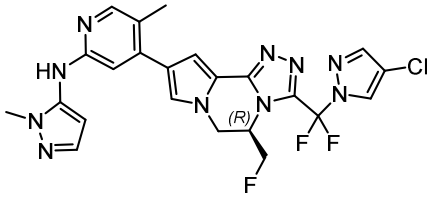
148 

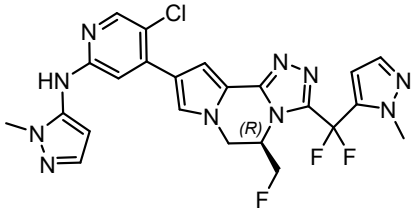
149 

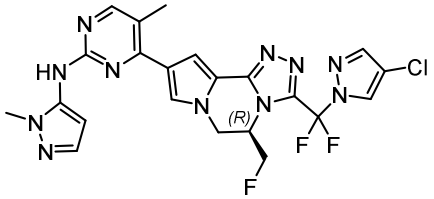
150 

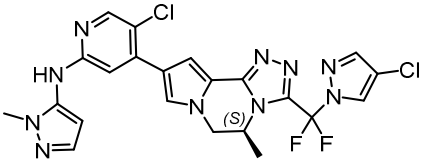
151 

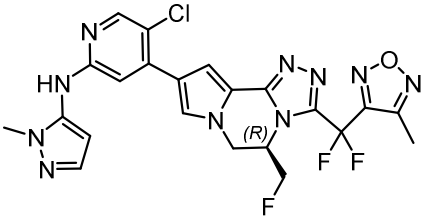
152 

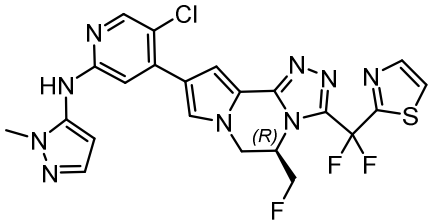
153 

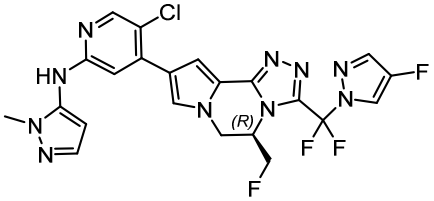
154 

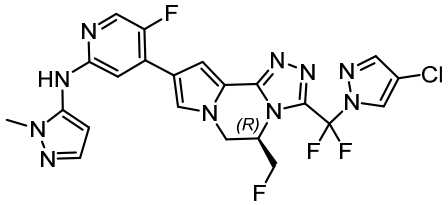
156 

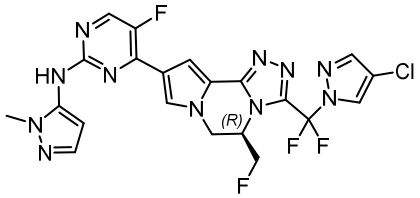
157 

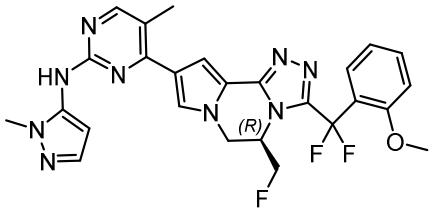
158 

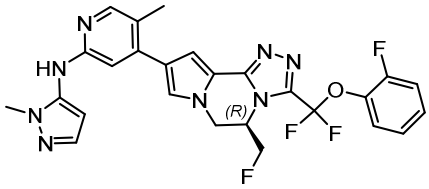
161 

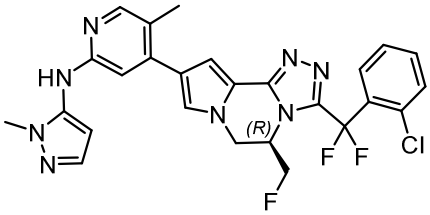
163 

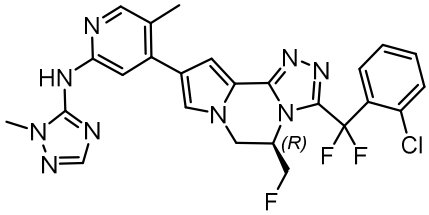
164 

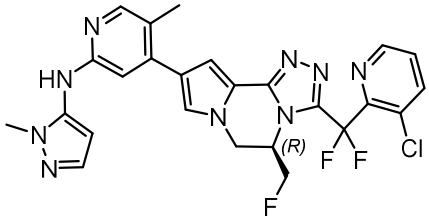
166 

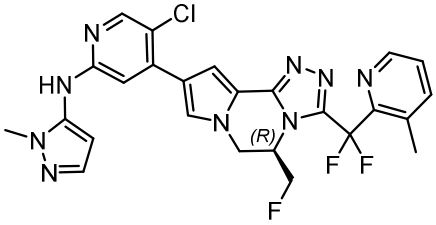
167 

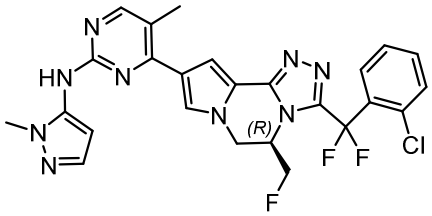
170 

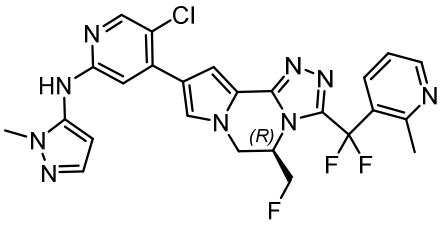
172 

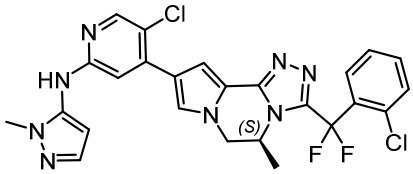
173 

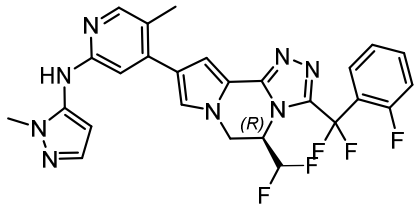
174 

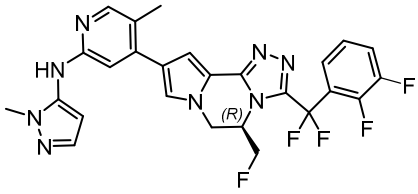
175 

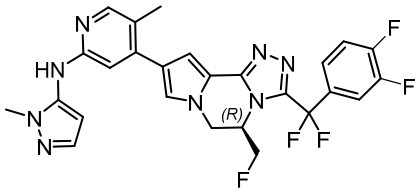
176 

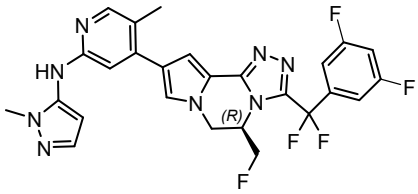
177 

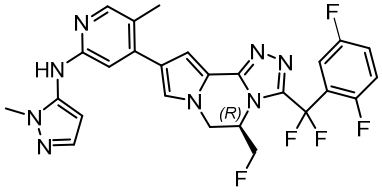
178 

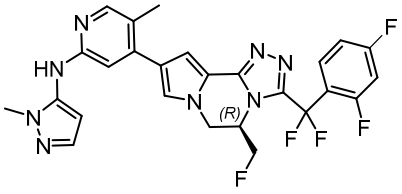
179 

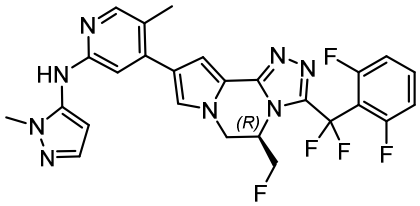
180 

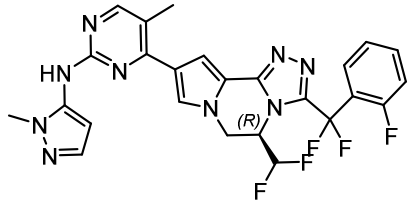
181 

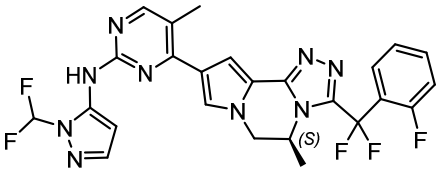
182 

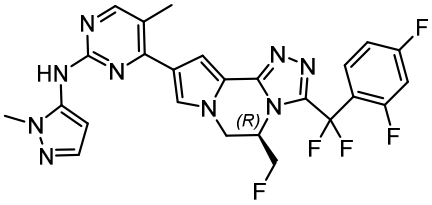
183 

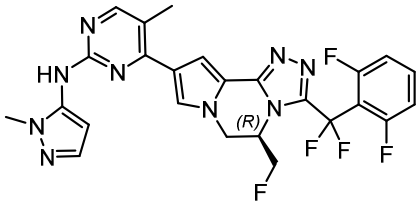
184 

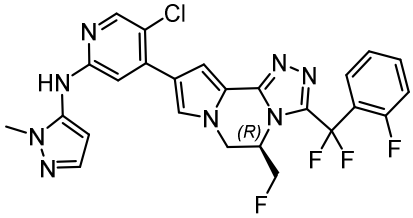
185 

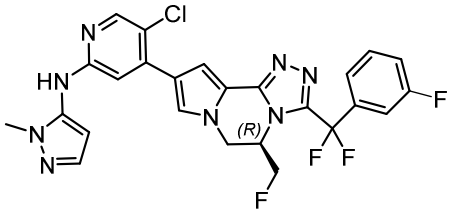
186 

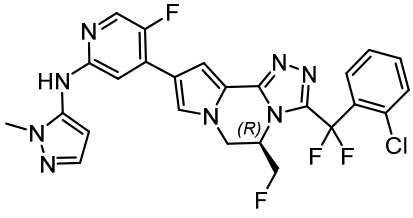
187 

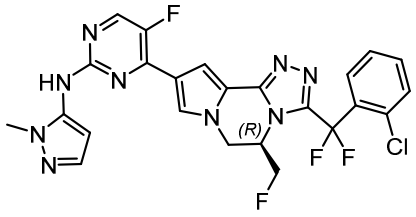
188 

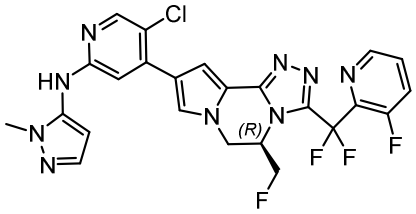
189 

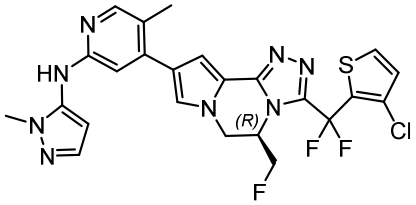
190 

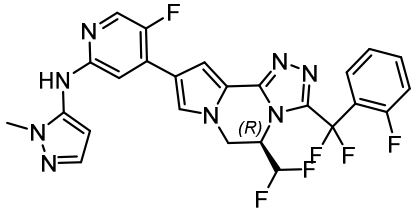
191 

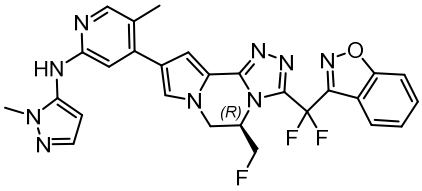
192 

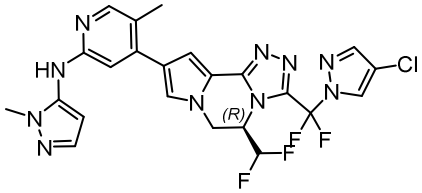
193 

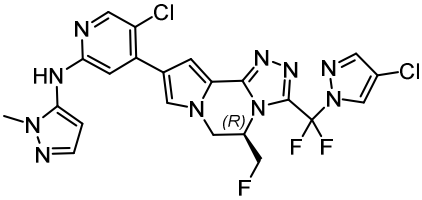
194 

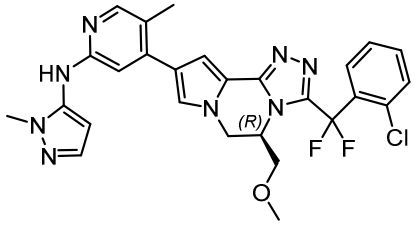
195 

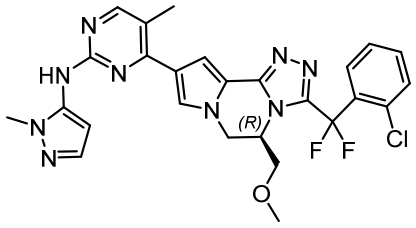
196 

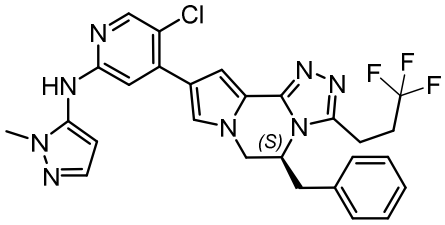
197 

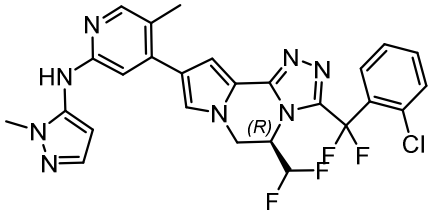
198 

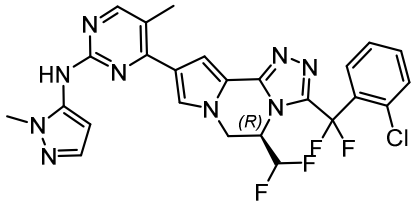
200 

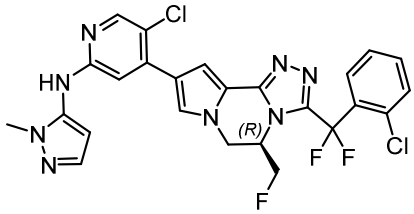
201 

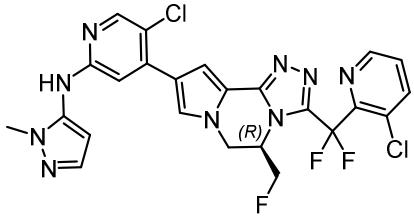
202 

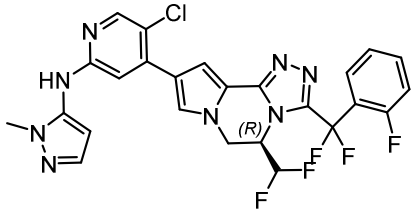
203 

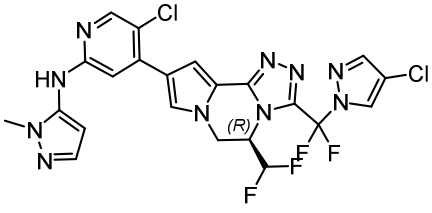
204 

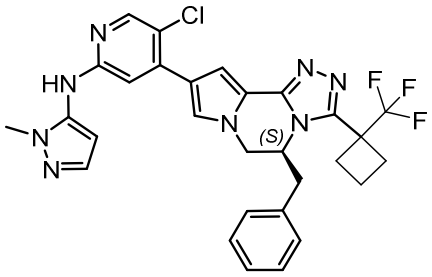
205 

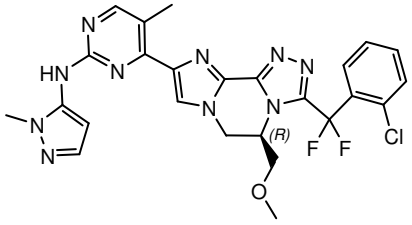
206 

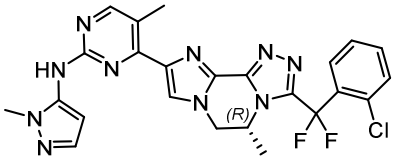
207 

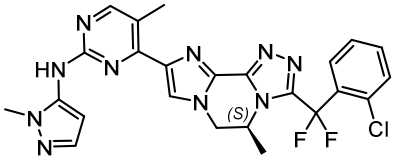
208 

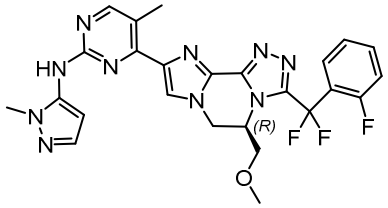
209 

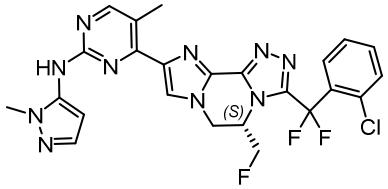
210 

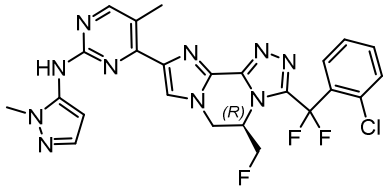
220 

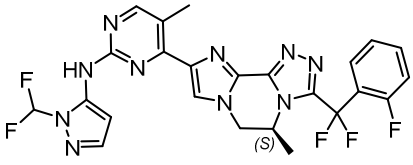
221 

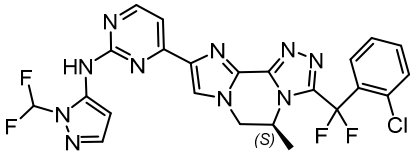
222 

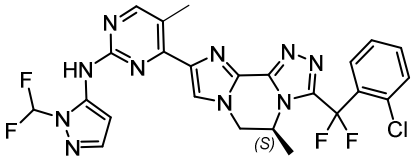
223 

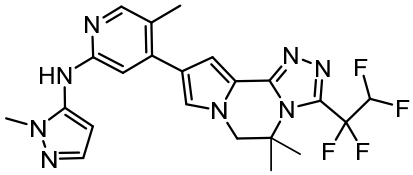
224 

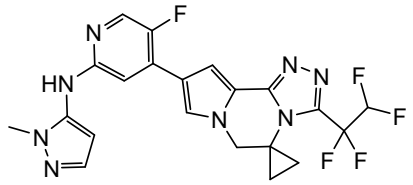
225 

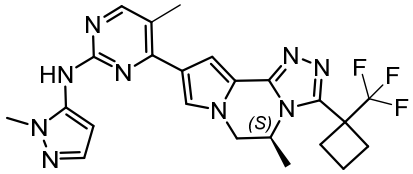
226 

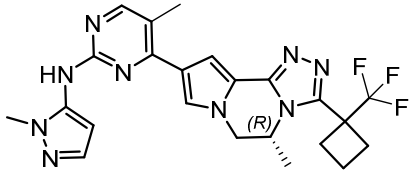
227 

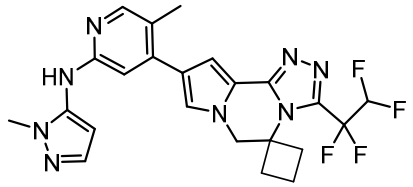
228 

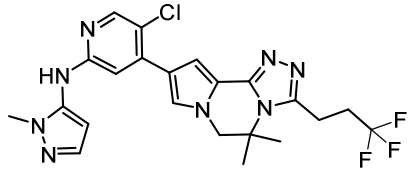
234 

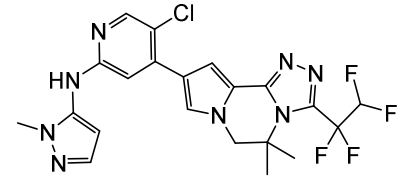
235 

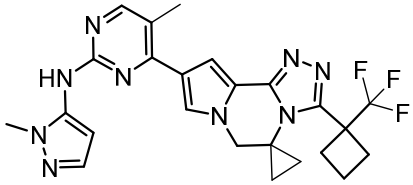
238 

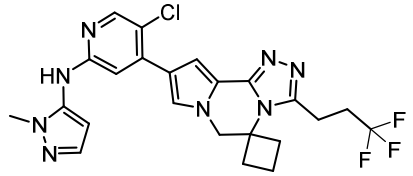
239 

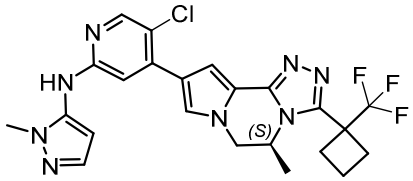
242 

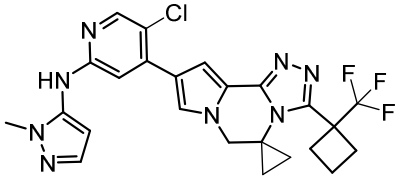
247 

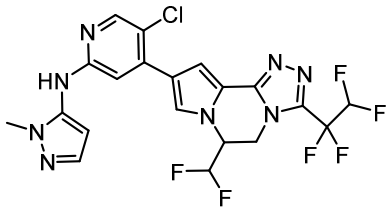
249 

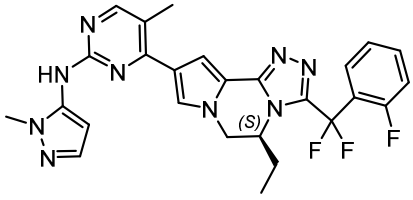
250 

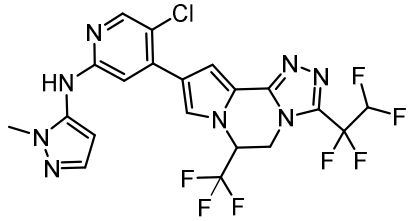
253 

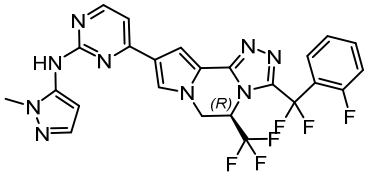
256 

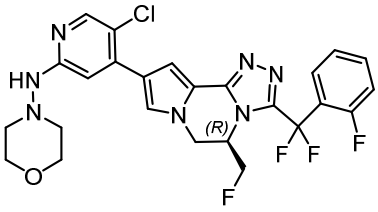
259 

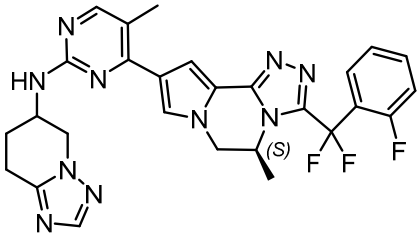
260 

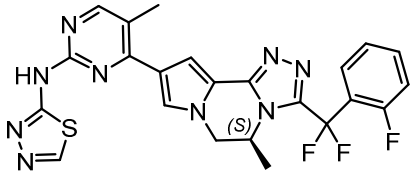
265 

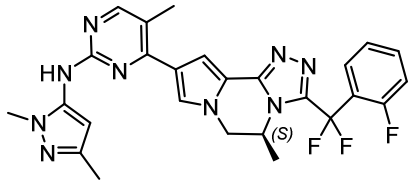
270 

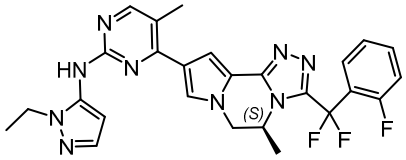
273 

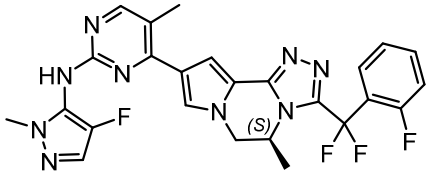
274 

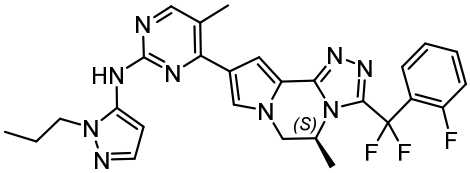
280 

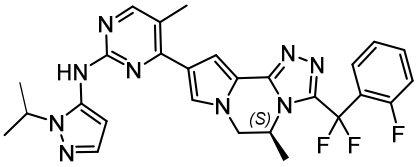
287 

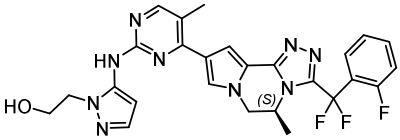
288 

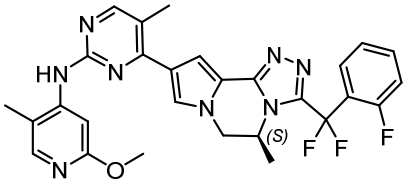
289 

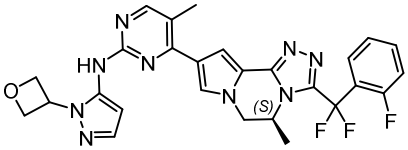
290 

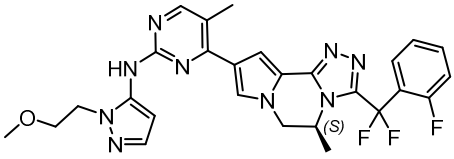
291 

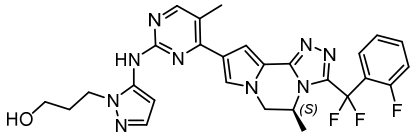
292 

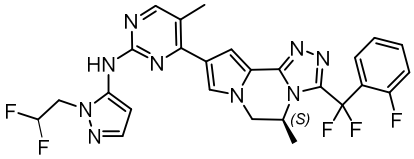
293 

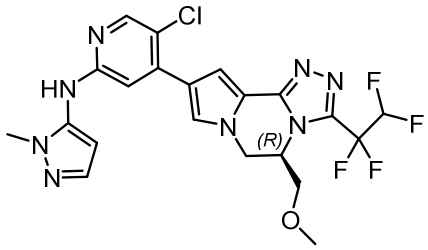
294 

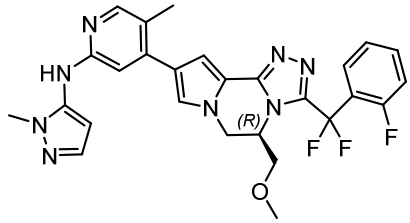
295 

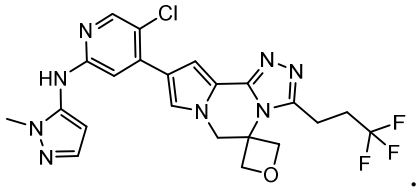
296 

297 

298 

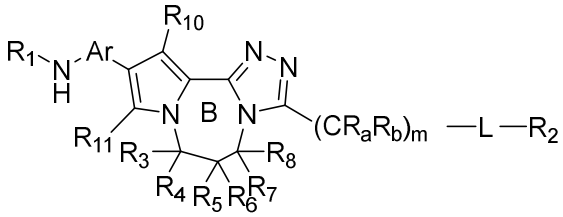
301 

303 

305 

31. The compound of formula (I) according to claim 1, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein, n is 1, ------ is single bond, R_3, R_4, R_5, R_6, R_7, and R_8 are independently selected from hydrogen, halo, hydroxy, C_{1-6} alkyl, and C_{1-6} alkoxyl; wherein said C_{1-6} alkyl is optionally substituted with one or more substituents independently selected from hydroxy and C_{1-6} alkoxyl; or any two of R_3, R_4, R_5, R_6, R_7, and R_8 together with the carbon atom they are attached to and the B ring form a 9-12 membered spirocyclic, fused, or bridged ring optionally containing 1-3 ring heteroatoms selected from N, O, or S; wherein said spirocyclic, fused, or bridged ring is optionally substituted with one or more substituents independently selected from halo, hydroxy, amino, C_{1-6} alkyl, and -CN.

32. The compound of formula (I) according to claim 31, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein the compound of formula (I) is the compound of formula (I-3),



(I-3)

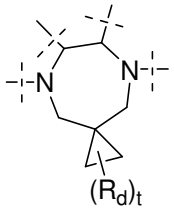
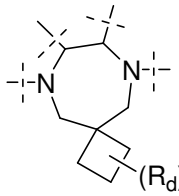
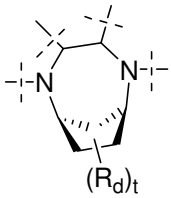
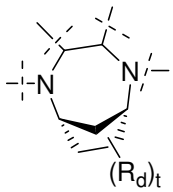
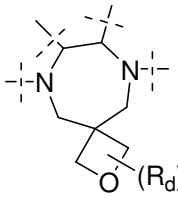
wherein,

R_1 is selected from C_{1-6} alkyl, -(C_{1-6} alkyl)-OH, saturated monocyclic C_{3-8} cycloalkyl, saturated monocyclic 3-8 membered heterocyclyl containing 1 or 2 ring heteroatoms independently selected from N, O and S, and heteroaryl; wherein each of said C_{3-8} cycloalkyl, 3-8 membered heterocyclyl,

and heteroaryl is optionally substituted with one or more substituents independently selected from halo, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} alkoxyl, and C_{1-6} haloalkyl;

Ar is heteroaryl optionally substituted with one or more substituents independently selected from halo, -CN, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} alkoxyl, and C_{1-6} haloalkyl;

R_2 is selected from halo, -CN, C_{1-6} alkyl, C_{1-6} haloalkyl, saturated monocyclic C_{3-8} cycloalkyl, phenyl, or heteroaryl, wherein each of said saturated monocyclic C_{3-8} cycloalkyl, phenyl, or heteroaryl is optionally substituted with one or more substituents independently selected from halo, -CN, C_{1-6} alkyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, and oxo;

R_3, R_4, R_5, R_6, R_7, and R_8 are independently selected from hydrogen, halo, hydroxy, C_{1-6} alkyl, and C_{1-6} alkoxyl; wherein said C_{1-6} alkyl is optionally substituted with one or more substituents independently selected from hydroxy and C_{1-6} alkoxyl; or any two of R_3, R_4, R_5, R_6, R_7, and R_8 together with the carbon atom they are attached to and the B ring form  ,  ,  ,  , or  , R_d is selected from hydrogen or halo, t is 0, 1, 2, or 3;

R_{10} and R_{11} are independently selected from hydrogen, halo, C_{1-6} alkyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, and -(C_{1-6} alkyl)-OH;

m is 0, 1, or 2;

R_a and R_b are independently selected from hydrogen, halo, hydroxy, or C_{1-6} alkyl; or R_a and R_b together with the carbon atom they are attached to form a saturated C_{3-6} cycloalkyl or a ~~4-6~~3-6 membered heterocyclyl, wherein said ~~4-6~~3-6 membered heterocyclyl is a saturated monocyclic ring having ~~4-6~~3-6 ring atoms with 1 or 2 of the ring atoms being ring heteroatoms independently selected from N, O and S, and the remaining ring atoms being carbon; wherein each of said saturated C_{3-6} cycloalkyl or ~~4-6~~3-6 membered heterocyclyl is optionally substituted with one or more substituents selected from halo;

L is absent, or L is NH, O or S;

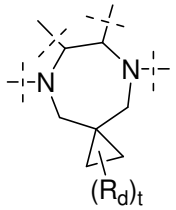
said heteroaryl is monocyclic aromatic hydrocarbon radical having 5 or 6 ring atoms with 1, 2 or 3 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, or bicyclic aromatic hydrocarbon radical having 8, 9 or 10 ring atoms with 1, 2, 3 or 4 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, wherein at least one of the rings is aromatic, and when the total number of S and O atoms in the heteroaryl group exceeds 1, said S and O heteroatoms are not adjacent to one another.

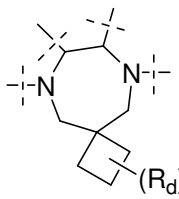
33. The compound of formula (I) according to claim 32, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein,

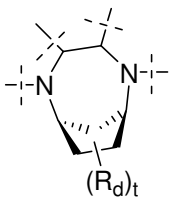
R_1 is selected from C_{1-6} alkyl, -(C_{1-6} alkyl)-OH, saturated monocyclic C_{3-8} cycloalkyl, saturated monocyclic 3-8 membered heterocyclyl containing 1 or 2 ring heteroatoms independently selected from N, O and S, and heteroaryl; wherein each of said C_{3-8} cycloalkyl, 3-8 membered heterocyclyl, and heteroaryl is optionally substituted with one or more substituents independently selected from halo, C_{1-6} alkoxyl, C_{1-6} haloalkyl, and C_{1-6} alkyl optionally substituted with one or more deuterium;

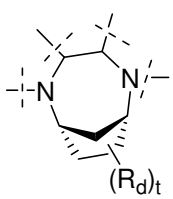
Ar is heteroaryl, wherein said heteroaryl is monocyclic aromatic hydrocarbon radical having 5 or 6 ring atoms with 1, 2 or 3 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, and when the total number of S and O atoms in the heteroaryl group exceeds 1, said S and O heteroatoms are not adjacent to one another; wherein said heteroaryl is optionally substituted with one or more substituents independently selected from halo, -CN, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} alkoxyl, and C_{1-6} haloalkyl;

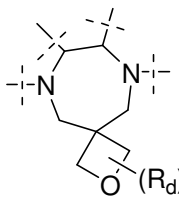
R_2 is selected from -CN, C_{1-6} haloalkyl, saturated monocyclic C_{3-8} cycloalkyl, phenyl, or heteroaryl, wherein said heteroaryl is monocyclic aromatic hydrocarbon radical having 5 or 6 ring atoms with 1, 2 or 3 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, or bicyclic aromatic hydrocarbon radical having 8, 9 or 10 ring atoms with 1, 2, 3 or 4 of the ring atoms being ring heteroatoms independently selected from N, O, and S, and the remaining ring atoms being carbon, wherein at least one of the rings is aromatic, and when the total number of S and O atoms in the heteroaryl group exceeds 1, said S and O heteroatoms are not adjacent to one another; wherein each of said saturated monocyclic C_{3-8} cycloalkyl, phenyl, or heteroaryl is optionally substituted with one or more substituents independently selected from halo, -CN, C_{1-6} alkyl, and C_{1-6} haloalkyl;

R_3, R_4, R_5, R_6, R_7, and R_8 are independently selected from hydrogen, halo, hydroxy, C_{1-6} alkyl, and C_{1-6} alkoxyl; wherein said C_{1-6} alkyl is optionally substituted with one or more substituents independently selected from hydroxy and C_{1-6} alkoxyl; or any two of R_3, R_4, R_5, R_6, R_7, and R_8 together with the carbon atom they are attached to and the B ring form 

, 

, 

, 

, or 

, R_d is selected from hydrogen and halo, t is 0, 1, 2, or 3;

R_{10} and R_{11} are independently selected from hydrogen, halo, and C_{1-6} alkyl;

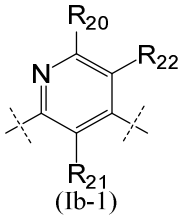
m is 0, 1, or 2;

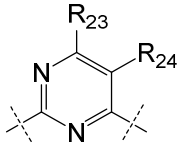
R_a and R_b are independently selected from hydrogen, halo, hydroxy, and C_{1-6} alkyl; or R_a and R_b together with the carbon atom they are attached to form a saturated monocyclic C_{3-6} cycloalkyl or a 3-6 membered heterocyclyl, wherein said 3-6 membered heterocyclyl is a saturated monocyclic ring having 3-6 ring atoms with 1 or 2 of the ring atoms being ring heteroatoms independently selected from N, O and S, and the remaining ring atoms being carbon; wherein each of said saturated monocyclic C_{3-6} cycloalkyl or 3-6 membered heterocyclyl is optionally substituted with one or more substituents selected from halo;

L is absent, or L is NH or O.

34. The compound of formula (I) according to claim 32, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein R_1 is selected from: (1) C_{1-6} alkyl, (2) -(C_{1-6} alkyl)-OH, (3) saturated monocyclic C_{3-8} cycloalkyl, which is optionally substituted with one or more substituents independently selected from halo and C_{1-6} alkoxyl, (4) saturated monocyclic 6 membered heterocyclyl containing 1 or 2 ring heteroatoms independently selected from N, O and S, and (5) heteroaryl selected from pyrazolyl, pyridyl, and isoxazolyl, wherein said heteroaryl is optionally substituted with one or more substituents independently selected from C_{1-6} alkoxyl, C_{1-6} haloalkyl, and C_{1-6} alkyl optionally substituted with one or more deuterium.

35. The compound of formula (I) according to claim 32, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein Ar is heteroaryl selected from pyridyl and pyrimidinyl, wherein said heteroaryl is each optionally substituted with one or more substituents independently selected from halo, -CN, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} alkoxyl, and C_{1-6} haloalkyl.

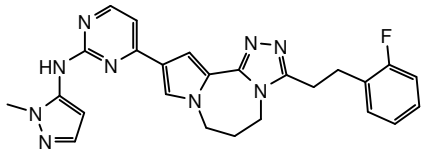
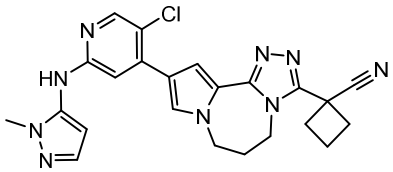
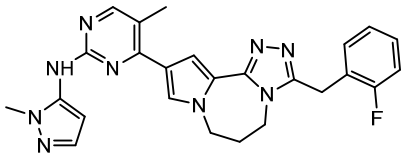
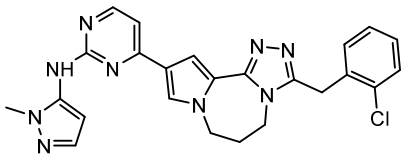
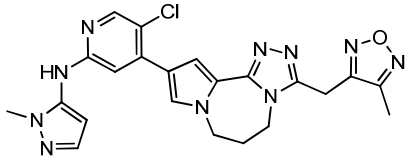
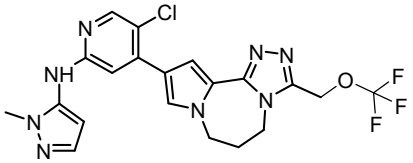
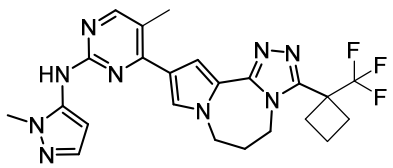
36. The compound of formula (I) according to claim 35, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein Ar is 

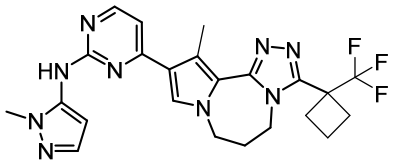
(Ib-1) or 

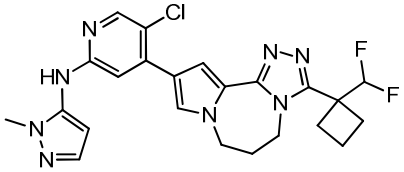
(Ib-2), wherein R_{20}, R_{21}, R_{22}, R_{23}, and R_{24} are independently selected from hydrogen, halo, -CN, C_{1-6} alkyl optionally substituted with one or more deuterium, C_{1-6} alkoxyl, and C_{1-6} haloalkyl.

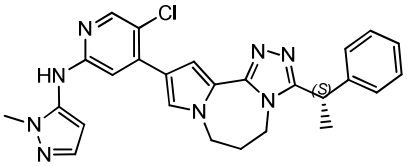
37. The compound of formula (I) according to claim 32, or a pharmaceutically acceptable salt thereof, or solvates, racemic mixtures, enantiomers, diasteromers, or tautomers of the compound of formula (I) or a pharmaceutically acceptable salt thereof, wherein R_2 is selected from: (1) -CN, (2) C_{1-6} haloalkyl, (3) saturated monocyclic C_{3-8} cycloalkyl, which is optionally substituted with one or more substituents selected from C_{1-6} haloalkyl, (4) phenyl, which is optionally substituted with one or more substituents independently selected from halo and -CN, and (5) heteroaryl selected from 1,2,5-oxadiazolyl, indolinyl, 1,2,3,4-tetrahydroquinolinyl, pyrazolyl, indazolyl, and pyrrolyl, wherein said heteroaryl is each optionally substituted with one or more substituents independently selected from halo, -CN, and C_{1-6} alkyl.

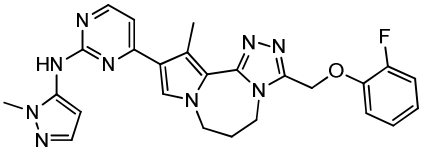
38. ~~The~~A compound ~~of formula (I) according to claim 32,~~ or a pharmaceutically acceptable salt thereof, wherein the compound ~~of formula (I)~~ is selected from:

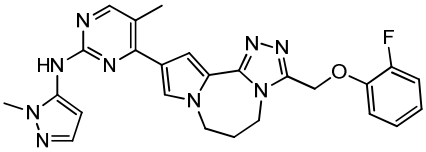
Compound	Structure
1	
4	
6	
8	
10	
11	
12	

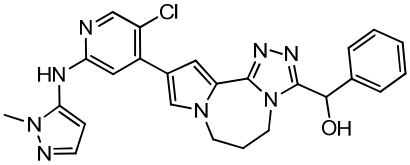
13 

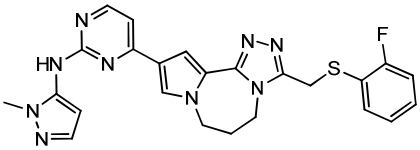
14 

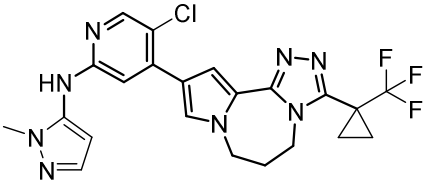
15 

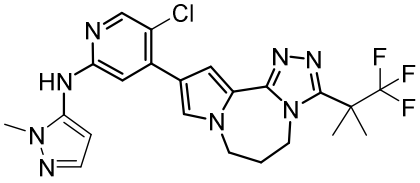
16 

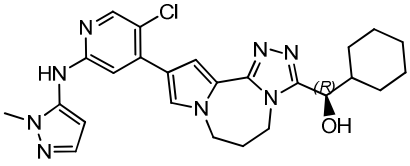
17 

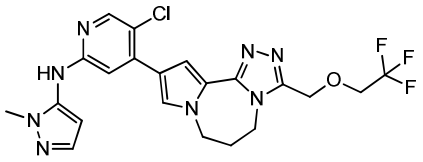
18 

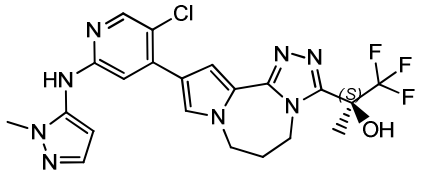
19 

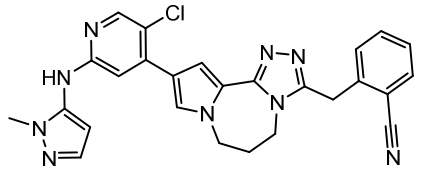
21 

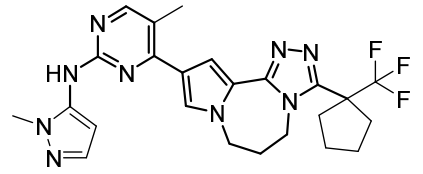
22 

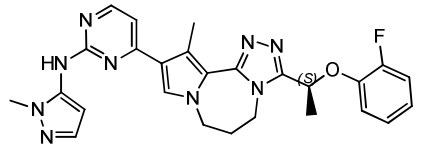
24 

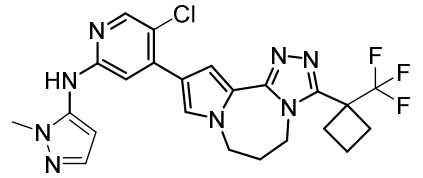
25 

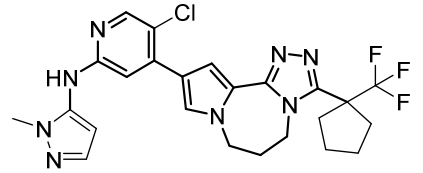
26 

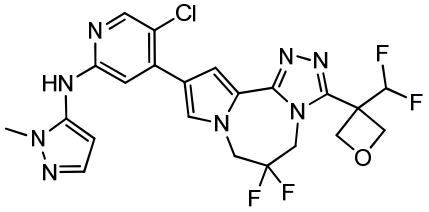
27 

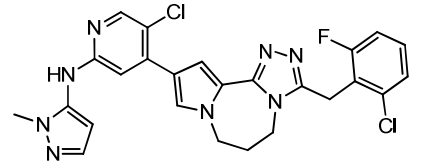
28 

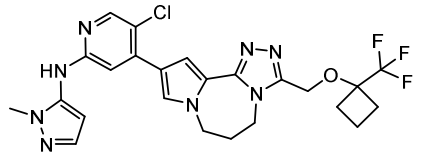
29 

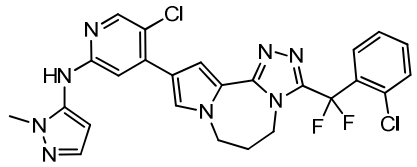
30 

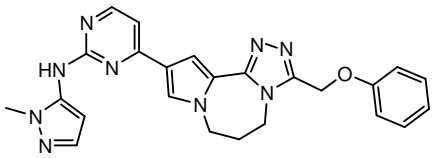
31 

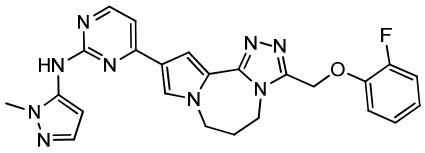
32 

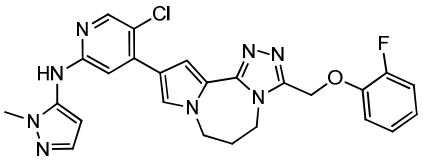
33 

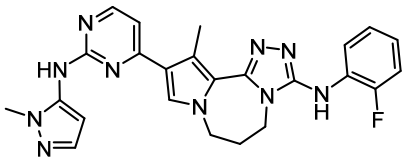
34 

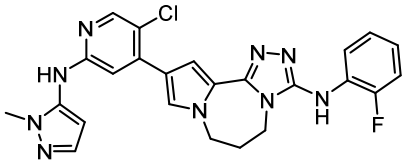
35 

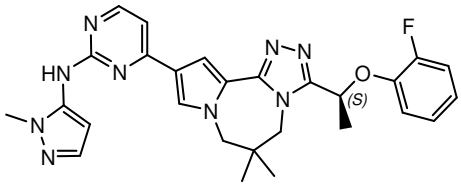
36 

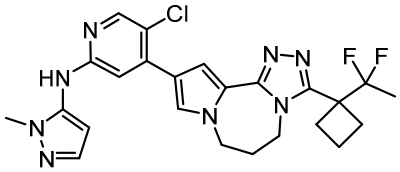
37 

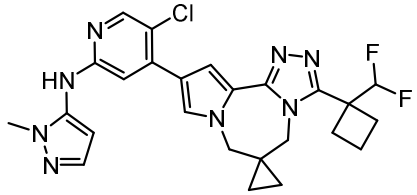
38 

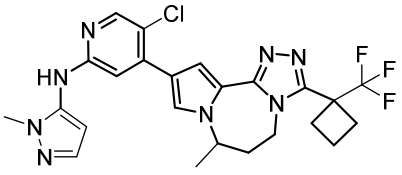
42 

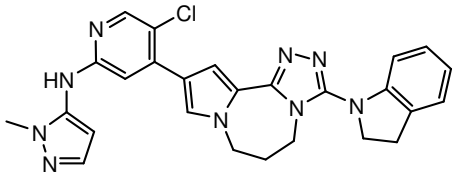
43 

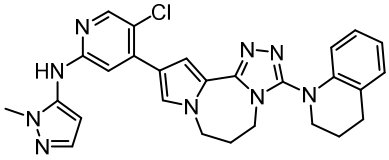
44 

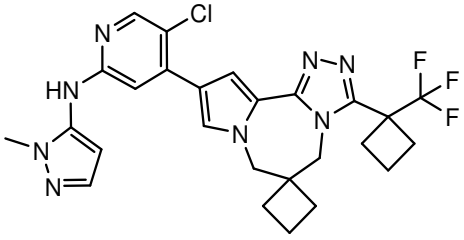
49 

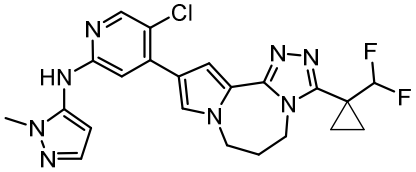
51 

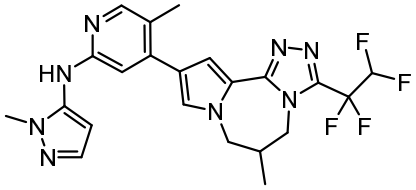
52 

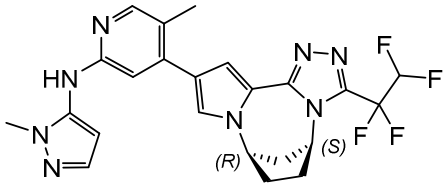
53 

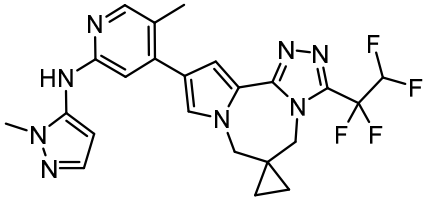
54 

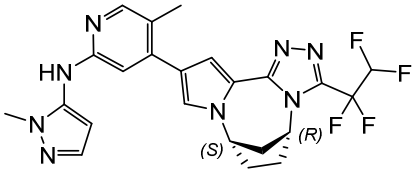
55 

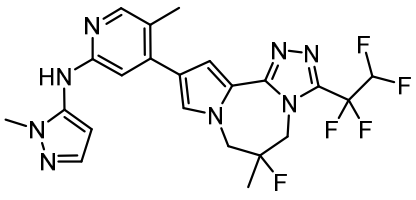
59 

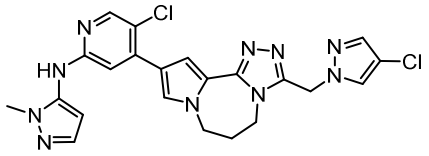
60 

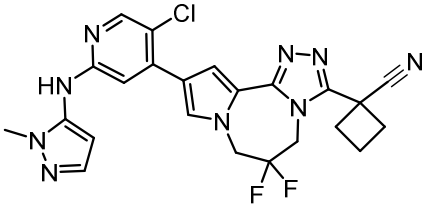
65 

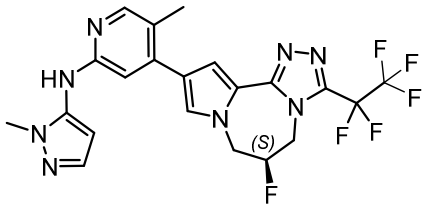
66 

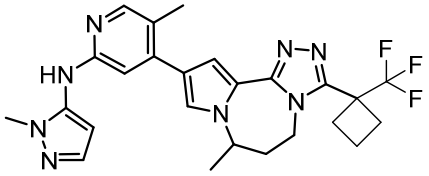
67 

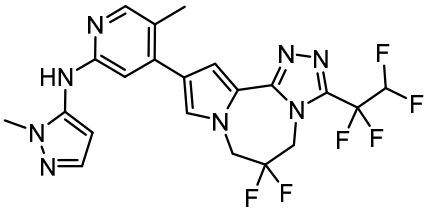
72 

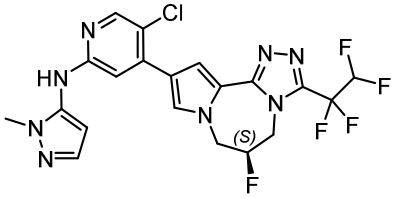
73 

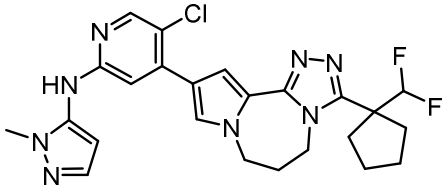
74 

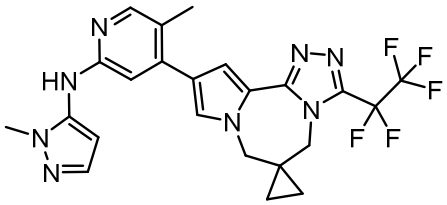
75 

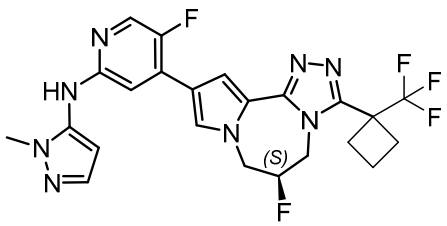
77 

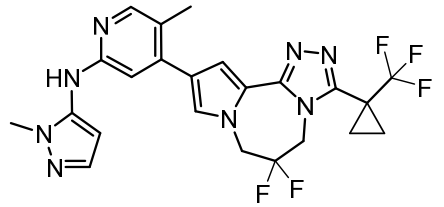
78 

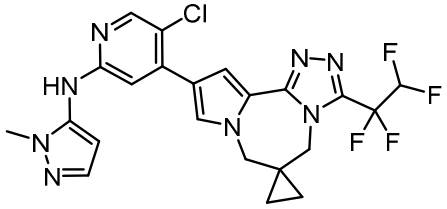
80 

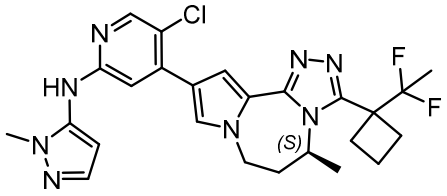
81 

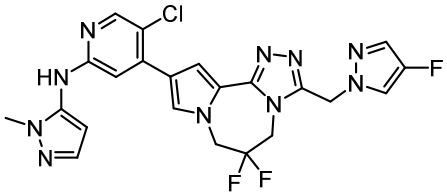
84 

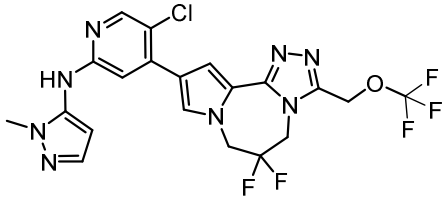
85 

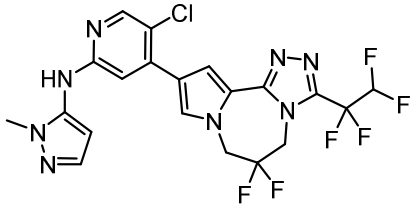
87 

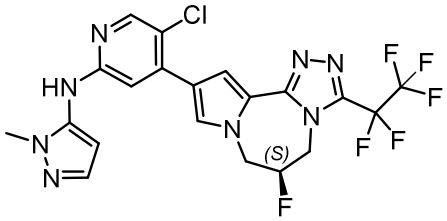
93 

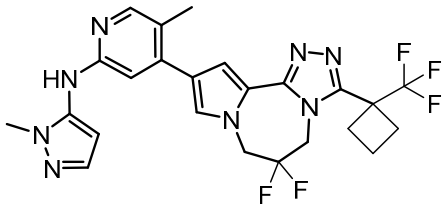
105 

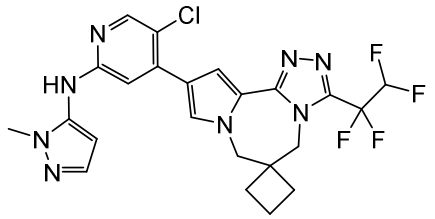
106 

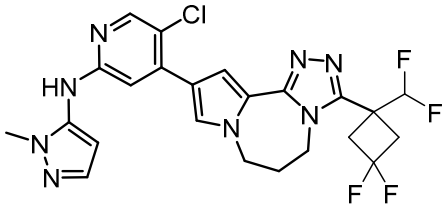
107 

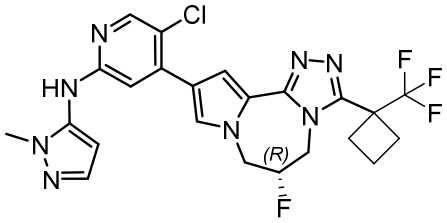
113 

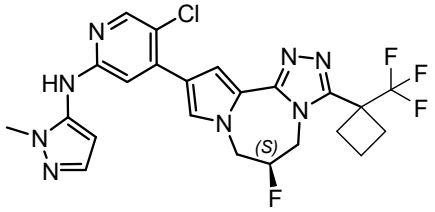
115 

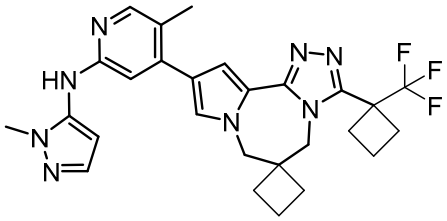
117 

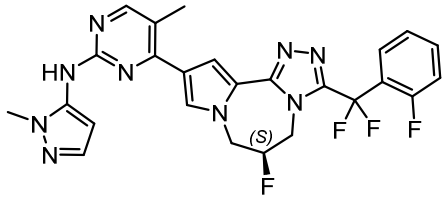
119 

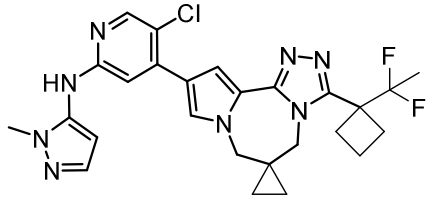
120 

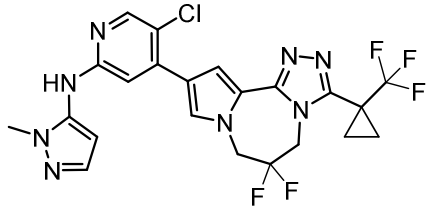
122 

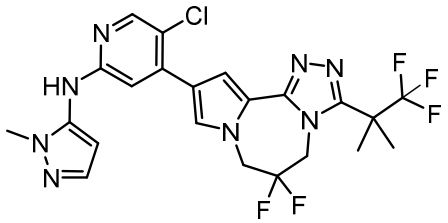
123 

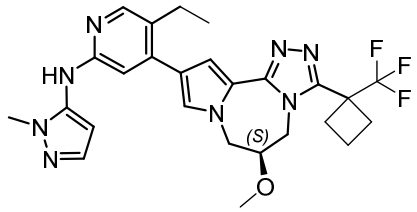
129 

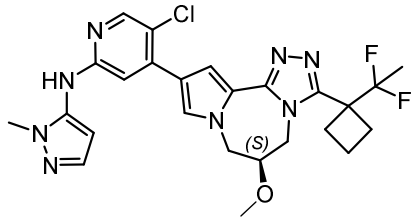
132 

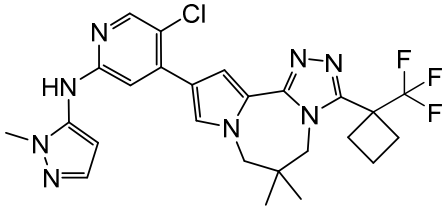
136 

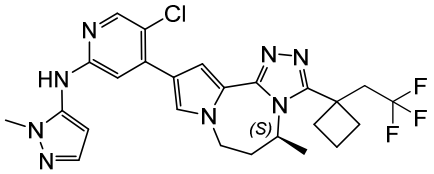
140 

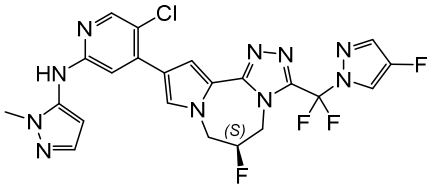
146 

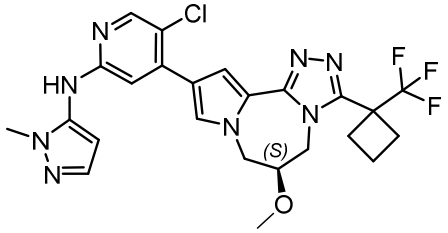
147 

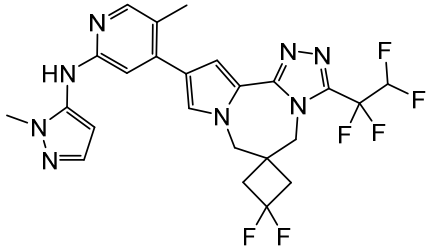
155 

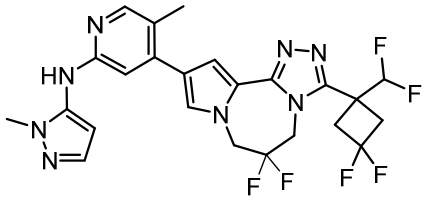
159 

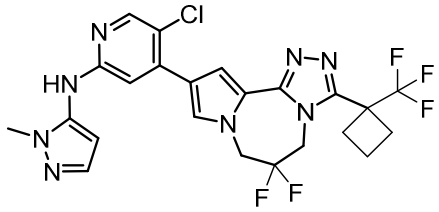
160 

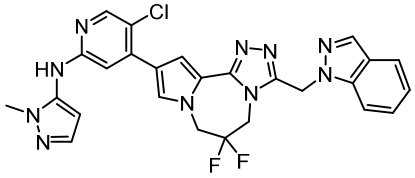
162 

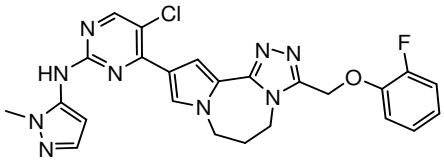
165 

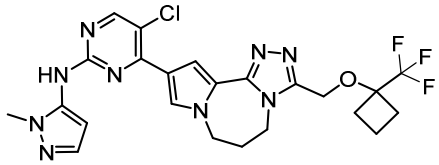
168 

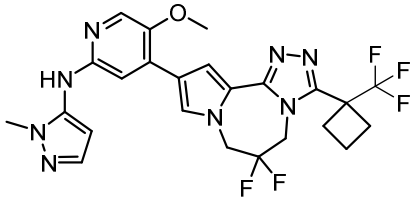
169 

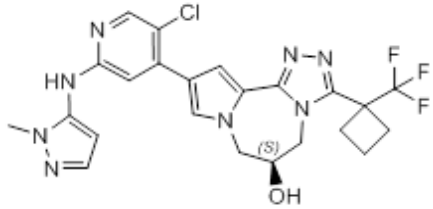
171 

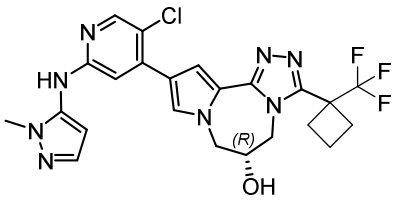
199 

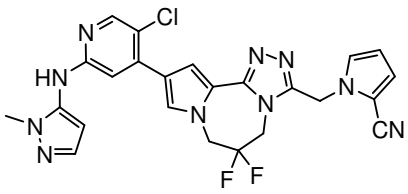
211 

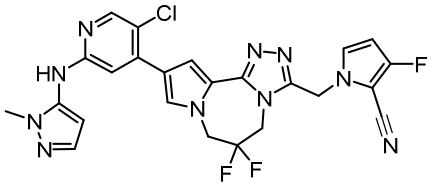
213 

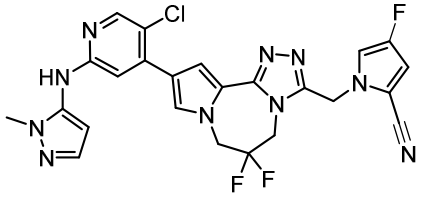
214 

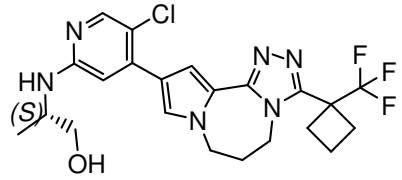
215 

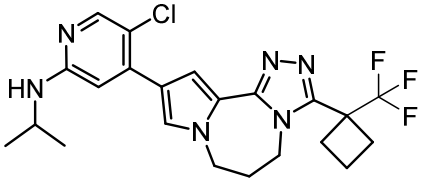
216 

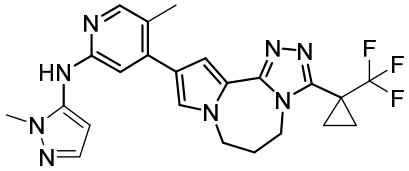
217 

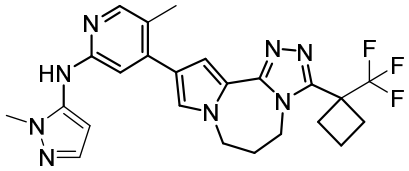
218 

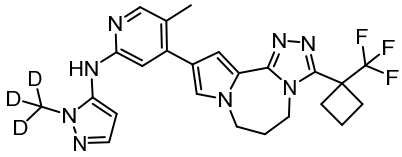
219 

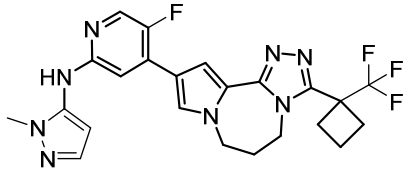
229 

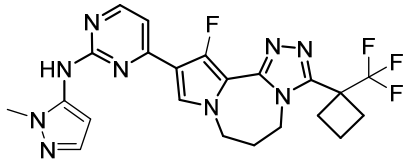
230 

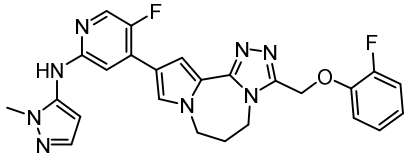
233 

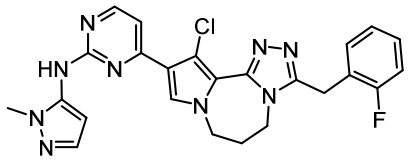
237 

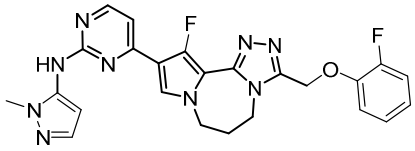
240 

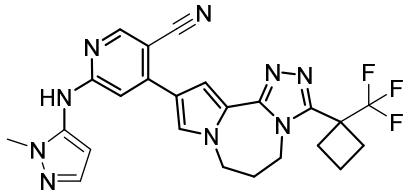
241 

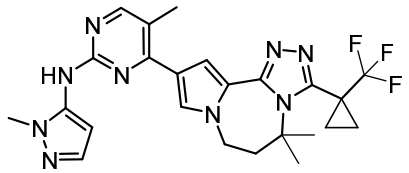
243 

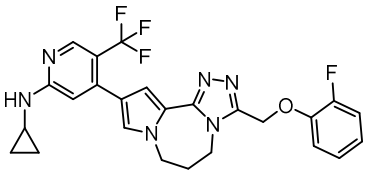
244 

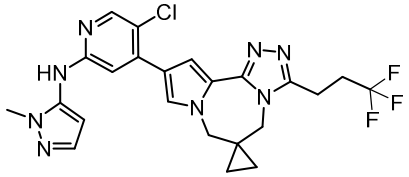
245 

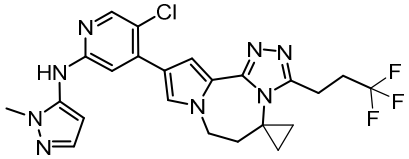
246 

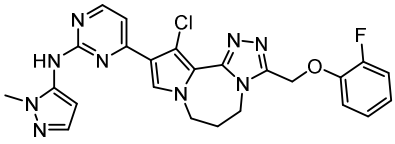
248 

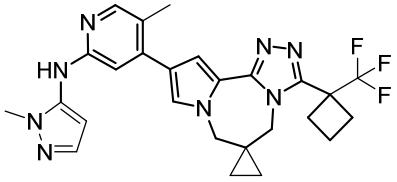
251 

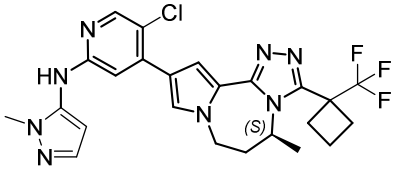
252 

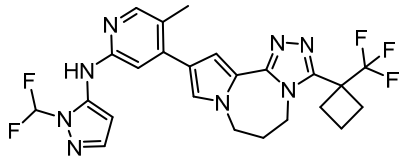
254 

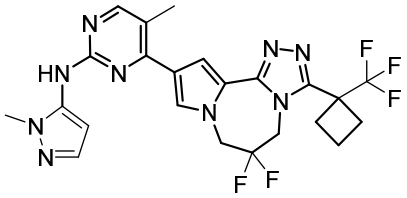
255 

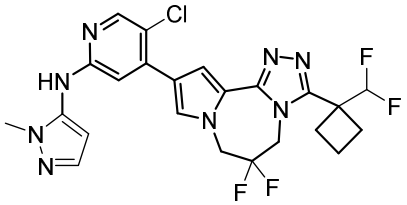
257 

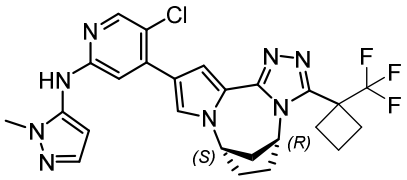
258 

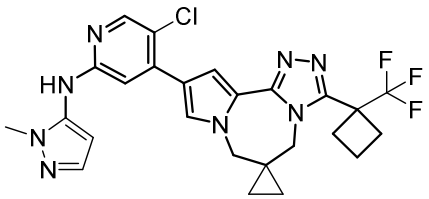
262 

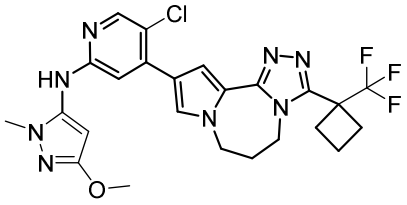
263 

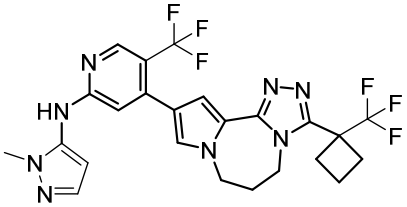
264 

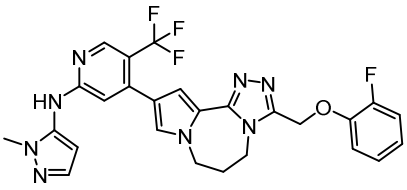
266 

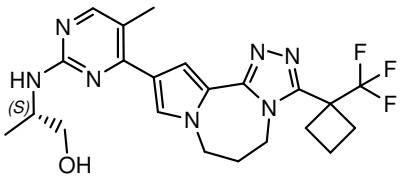
267 

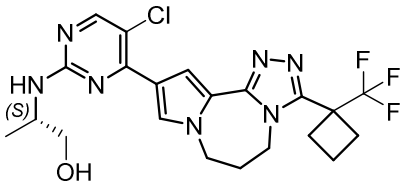
268 

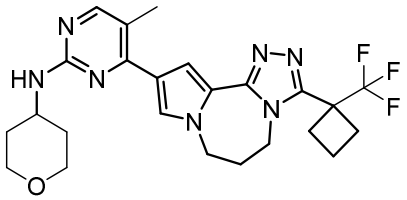
269 

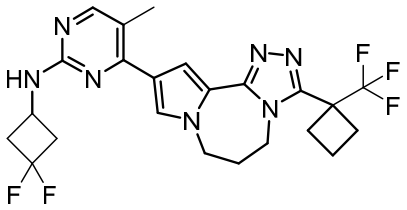
271 

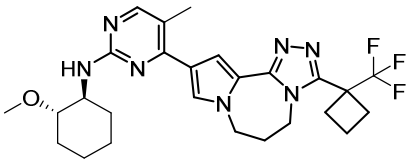
272 

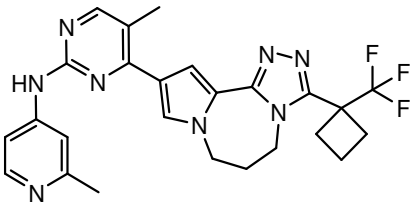
275 

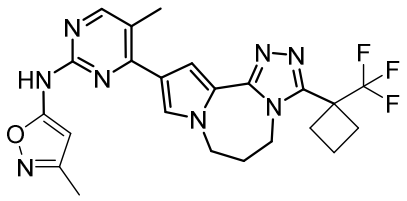
276 

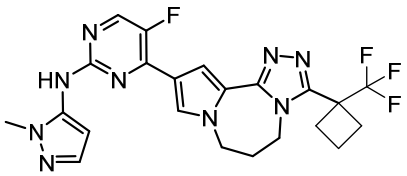
277 

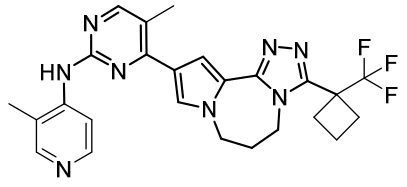
278 

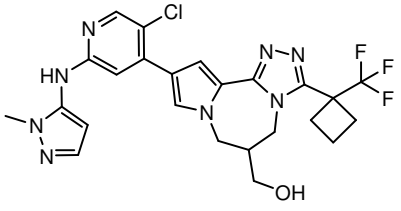
279 

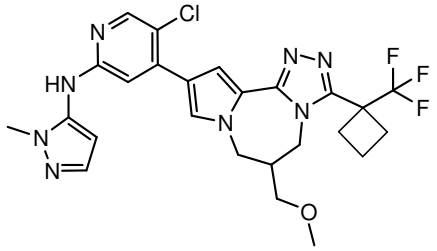
281 

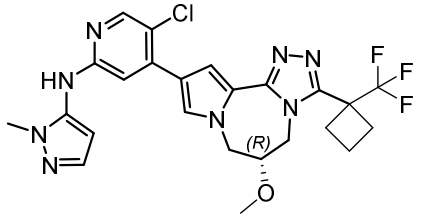
284 

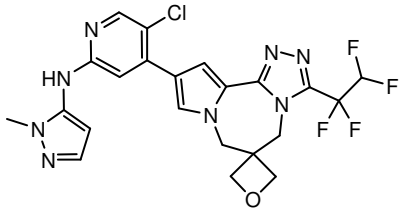
285 

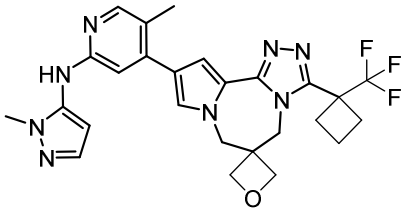
286 

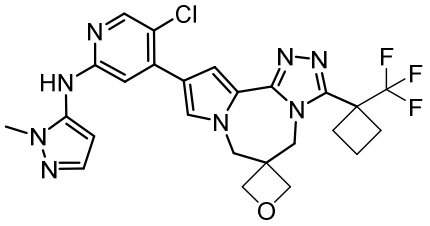
299 

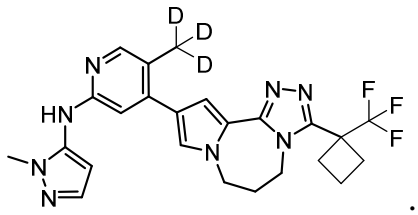
300 

302 

304 

306 

307 

322 

39. A pharmaceutical composition, comprising the compound of any one of claims 1-38, or a pharmaceutically acceptable salt thereof, and optionally a pharmaceutically acceptable carrier.

40. A method of ~~*in vivo* or~~ *in vitro* inhibiting the activity of ERK, comprising contacting an effective amount of the compound of any one of claims 1-38 or a pharmaceutically acceptable salt thereof with ERK.

41. Use of the compound of any one of claims 1-38 or a pharmaceutically acceptable salt thereof in the manufacture of a medicament for treating or preventing a disease responsive to

inhibition of ERK, wherein the disease responsive to inhibition of ERK is cancer or an autoimmune disease.

~~42. The use according to claim 41, wherein the medicament is used for treating cancer or an autoimmune disease.~~

~~43~~42. The use according to claim ~~42~~41, wherein the cancer is solid tumor or hematologic malignancy, such as leukemia, lymphoma, colorectal cancer, melanoma, glioma, pancreatic cancer, breast cancer, lung cancer (such as non-small cell lung cancer), thyroid cancer (such as papillary thyroid cancer), or ovarian cancer.

~~44. A method of treating or preventing a disease responsive to inhibition of ERK, comprising administering to the subject in need thereof an effective amount of the compound of any one of claims 1-38, or a pharmaceutically acceptable salt thereof.~~

~~45. The compound of any one of claims 1-38, or a pharmaceutically acceptable salt thereof for use in the treatment or prevention of a disease responsive to inhibition of ERK.~~

~~46~~43. The compound of any one of claims 1-38, or a pharmaceutically acceptable salt thereof for use as a medicament.

~~47~~44. The compound according to claim ~~46~~43, or a pharmaceutically acceptable salt thereof for use as a medicament for treating or preventing a disease responsive to inhibition of ERK, wherein the disease responsive to inhibition of ERK is cancer or an autoimmune disease.

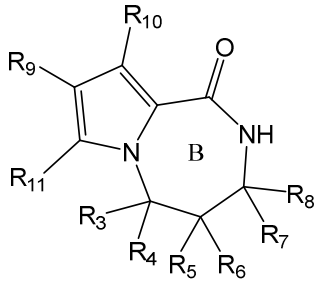
~~48. The compound according to claim 47, or a pharmaceutically acceptable salt thereof for use as a medicament for treating or preventing cancer or an autoimmune disease.~~

~~49~~45. The compound according to claim ~~48~~44, or a pharmaceutically acceptable salt thereof, wherein the cancer is solid tumor or hematologic malignancy, such as leukemia, lymphoma, colorectal cancer, melanoma, glioma, pancreatic cancer, breast cancer, lung cancer (such as non-small cell lung cancer), thyroid cancer (such as papillary thyroid cancer), or ovarian cancer.

~~50~~46. A combination, comprising the compound of any one of claims 1-38, or a pharmaceutically acceptable salt thereof, and at least one additional therapeutic agent.

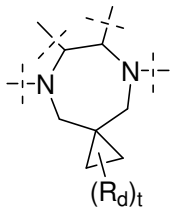
~~51~~47. The combination according to claim ~~50~~46, wherein said additional therapeutic agent is an anti-neoplastic agent, such as a radiotherapeutic agent, a chemotherapeutic agent, an immunotherapeutic agent, a targeted therapeutic agent.

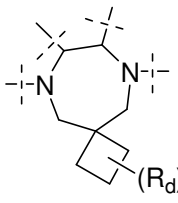
~~52~~48. A compound of formula (II):

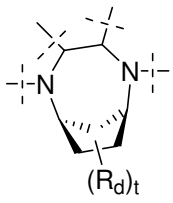


(II)

or racemic mixtures or enantiomers thereof, wherein, R_9 is a leaving group; R_{10} and R_{11} are independently selected from hydrogen, halo, and C_{1-6} alkyl; R_3, R_4, R_5, R_6, R_7, and R_8 are independently selected from hydrogen, halo, C_{1-6} alkyl, C_{1-6} alkoxyl, or C_{1-6} haloalkyl; or any two of R_3, R_4, R_5, R_6, R_7, and R_8 together with the carbon atom they are attached to and the B ring form



,


,


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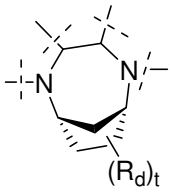
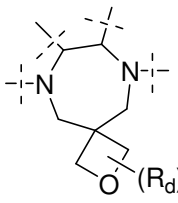
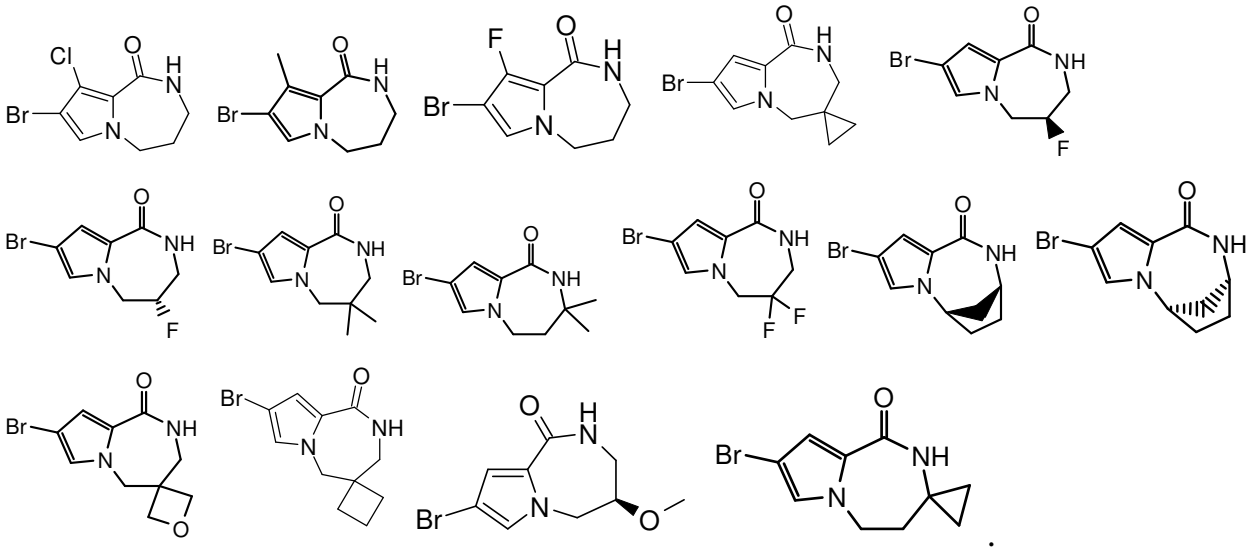


or


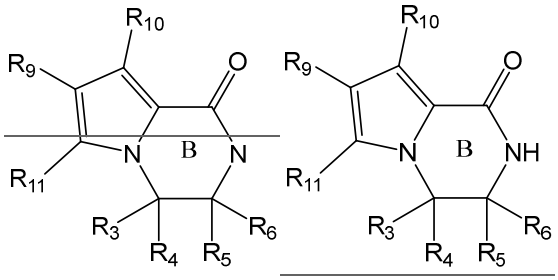
, R_d is selected from hydrogen and halo, t is 0, 1, 2, or 3; provided that, when both R_{10} and R_{11} are hydrogen, then R_3, R_4, R_5, R_6, R_7, and R_8 are not all hydrogen, and when one of R_3, R_4, R_5, R_6, R_7, and R_8 is methyl, then the other ones are not all hydrogen.

5349. A~~The~~ compound ~~of formula (II) according to claim 52, which is~~ selected from:



.

5450. A compound of formula (III):



(III)

or racemic mixtures or enantiomers thereof, wherein,

R_9 is a leaving group; R_{10} and R_{11} are independently selected from hydrogen, halo, and C_{1-6} alkyl;

R_3, R_4, R_5, and R_6 are independently selected from hydrogen, halo, C_{1-6} alkyl, C_{1-6} alkoxyl, C_{1-6} haloalkyl, or C_{1-6} alkyl optionally substituted with phenyl; or any pair of R_3 and R_4, or R_5 and R_6, together with the carbon atom they are attached to form a saturated C_{3-6} cycloalkyl or a saturated 3-4 membered heterocyclyl having 1 or 2 ring heteroatoms selected from N, O and S, thereby together with the B ring forming a spirocyclic ring; provided that, R_3, R_4, R_5, and R_6 are not all hydrogen, and when one or two of R_3, R_4, R_5, and R_6 is C_{1-6} alkyl, then the other ones are not all hydrogen.

~~55~~51. The compound of formula (III) according to claim ~~54~~50, which is selected from:

