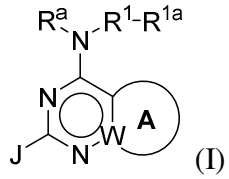
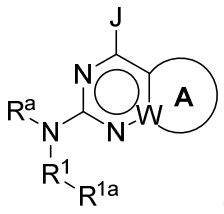
CLAIMS

1. A compound represented by formula (I) or formula (II):



(I)



(II);

or a pharmaceutically acceptable salt thereof;

wherein:

A is a fused optionally substituted aromatic ring, heteroaromatic ring, cycloalkyl ring, cycloalkenyl ring, heterocycloalkyl ring, or heterocycloalkenyl ring;

W is C or N;

R^a represents H or alkyl;

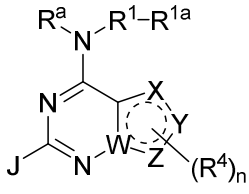
R^1 represents heteroarylene;

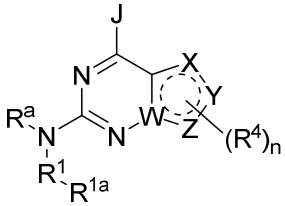
R^{1a} is optionally substituted phenyl; and

J represents optionally substituted alkyl, alkenyl, haloalkyl, hydroxyalkyl, alkoxyalkyl, aminoalkyl, cycloalkyl, (cycloalkyl)alkyl, heterocycloalkyl, (heterocycloalkyl)alkyl, or heterocycloalkenyl;

further wherein when J is heterocycloalkyl or heterocycloalkenyl, the point of attachment in J to the rest of the compound is a carbon atom.

2. The compound of claim 1, wherein the compound is represented by formula (Ia) or formula (IIa):


(Ia)


(IIa);

wherein:

W is C or N;

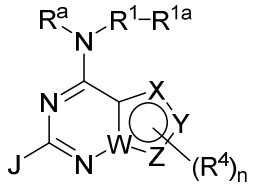
valence permitting, each of X, Y, and Z independently represent CH, CH_2, CO, N, NH, O, S, or SO_2, wherein any hydrogen of a CH, CH_2, or NH group is optionally replaced by an occurrence of R^4;

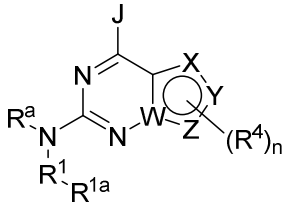
R^4, independently for each occurrence, represents halo, cyano, $-CH_2C(O)NH_2$, $-C(O)R^5$, $-C(O)OR^5$, $–S(O)_2R^5$, or optionally substituted alkyl, alkenyl, haloalkyl, hydroxyalkyl, aminoalkyl, alkoxy, aryl, aralkyl, heteroaryl, heteroaralkyl, heterocycloalkyl, heterocycloalkenyl, (heterocycloalkyl)alkyl, cycloalkyl, (cycloalkyl)alkyl, halocycloalkyl, hydroxycycloalkyl, aminocycloalkyl, aryloxy, heteroaryloxy, arylalkyloxy, or heteroarylalkyloxy;

R^5, independently for each occurrence, represents H or optionally substituted alkyl, aralkyl, aryl, heteroaralkyl, heteroaryl, cycloalkyl, heterocycloalkyl, (cycloalkyl)alkyl, or (heterocycloalkyl)alkyl; and

n is an integer from 0-4, as permitted by valence.

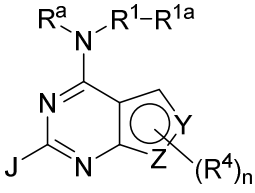
3. The compound of claim 2, wherein the compound is represented by formula (Ib) or (IIb):

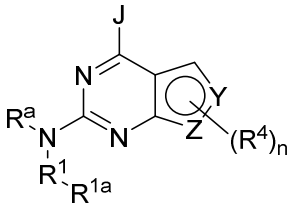

(Ib)


(IIb);

wherein each of X, Y, and Z independently represent CH, N, NH, O, S, or SO_2.

4. The compound of claim 3, wherein the compound is represented by formula (Ic) or (IIc):

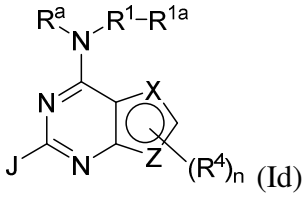

(Ic)

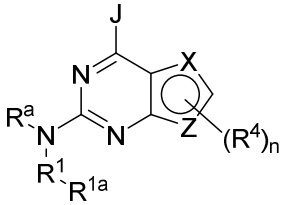

(IIc)

wherein each of Y and Z are independently selected from the group consisting of O, N, NH, and S.

5. The compound of claim 4, wherein Y is N; and Z is NH.

6. The compound of claim 3, wherein the compound is represented by formula (Id) or (IId):


(Id)


(IId);

wherein at least one of X and Z is selected from the group consisting of O, N, NH, and S.

7. The compound of claim 6, wherein one of X and Z is selected from the group consisting of O, NH, and S; and the other of X and Z is CH.

8. The compound of claim 6 or 7, wherein X is selected from the group consisting of O, NH, and S.

9. The compound of claim 6 or 7, wherein Z is selected from the group consisting of O, NH, and S.

10. The compound of claim 6, wherein one of X and Z is NH; and the other of X and Z is CH.

11. The compound of claim 6, wherein one of X and Z is O; and the other of X and Z is CH.

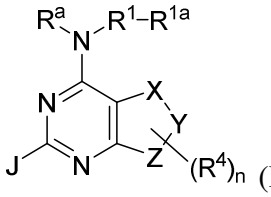
12. The compound of claim 6, wherein one of X and Z is S; and the other of X and Z is CH.

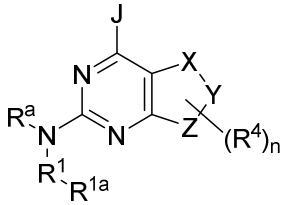
13. The compound of claim 6, wherein each of X and Z are selected from the group consisting of O, N, NH, and S.

14. The compound of claim 13, wherein one of X and Z is N; and the other of X and Z is NH.

15. The compound of claim 13, wherein one of X and Z is S; and the other of X and Z is N.

16. The compound of claim 2, wherein the compound is represented by formula (Ie) or (IIe):


(Ie)


(IIe);

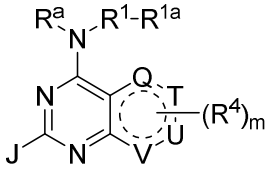
wherein X, Y, and Z independently represent CH_2, CO, NH, O, S, or SO_2.

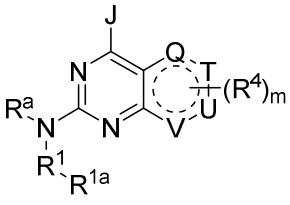
17. The compound of claim 16, wherein each of X, Y, and Z is CH_2.

18. The compound of claim 16, wherein one of X, Y, and Z is O.

19. The compound of any one of claims 2-18, wherein n is 0 or 1.

20. The compound of claim 1, wherein the compound is represented by formula (If) or formula (IIf):


(If)


(IIf);

wherein:

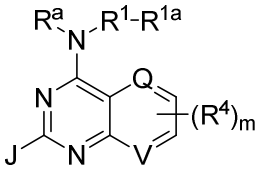
valence permitting, each of Q, T, U, and V independently represent CH, CH_2, N, NH, O, or SO_2, wherein any hydrogen of a CH, CH_2, or NH group is optionally replaced by an occurrence of R^4;

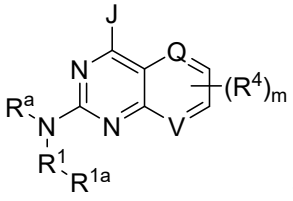
R^4, independently for each occurrence, represents halo, cyano, $-CH_2C(O)NH_2$, $-C(O)R^5$, $-C(O)OR^5$, $-S(O)_2R^5$, or optionally substituted alkyl, alkenyl, haloalkyl, hydroxyalkyl, aminoalkyl, alkoxy, aryl, aralkyl, heteroaryl, heteroaralkyl, heterocycloalkyl, heterocycloalkenyl, (heterocycloalkyl)alkyl, cycloalkyl, (cycloalkyl)alkyl, halocycloalkyl, hydroxycycloalkyl, aminocycloalkyl, aryloxy, heteroaryloxy, arylalkyloxy, or heteroarylalkyloxy;

R^5, independently for each occurrence, represents H or optionally substituted alkyl, aralkyl, aryl, heteroaralkyl, heteroaryl, cycloalkyl, heterocycloalkyl, (cycloalkyl)alkyl, or (heterocycloalkyl)alkyl; and

m is an integer from 0-4, as permitted by valence.

21. The compound of claim 20, wherein the compound is represented by formula (Ig) or (IIg):


(Ig)

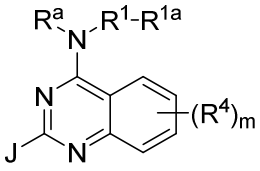

(IIg);

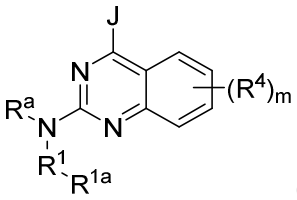
wherein Q represents CH or N; and V represents CH or N.

22. The compound of claim 21, wherein Q is N; and V is CH.

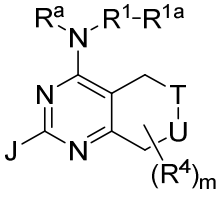
23. The compound of claim 21, wherein Q is CH; and V is N.

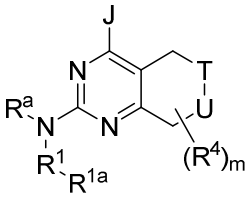
24. The compound of claim 21, wherein the compound is represented by formula (Ih) or (IIh):


(Ih)


(IIh).

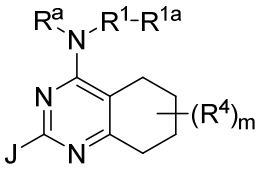
25. The compound of claim 20, wherein the compound is represented by formula (Ij) or (IIj):

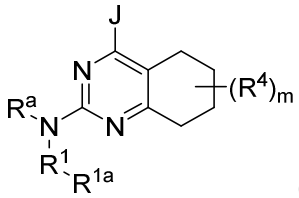

(Ij)


(IIj);

wherein T represents CH_2, NH, O, or SO_2; and U represents CH_2, NH, O, or SO_2.

26. The compound of claim 25, wherein the compound is represented by formula (Ik) or (IIk):


(Ik)



(IIk).

27. The compound of claim 25, wherein T is NH; and U is CH_2.

28. The compound of claim 25, wherein T is CH_2; and U is NH.

29. The compound of any one of claims 20-28, wherein m is 0 or 1.

30. The compound of any one of claims 1-29, wherein R^4, if present, is halo, -C(O)O(alkyl), or is selected from the group consisting of optionally substituted alkyl, alkoxy, aryl, heterocycloalkyl, cycloalkyl, and (cycloalkyl)alkyl.

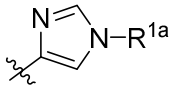
31. The compound of any one of claims 1-30, wherein R^4, if present, is optionally substituted alkyl, cycloalkyl, or alkoxy.

32. The compound of any one of claims 1-31, wherein R^a is H.

33. The compound of any one of claims 1-32, wherein R^1 is a nitrogen-containing heteroarylene.

34. The compound of any one of claims 1-33, wherein R^1 is a 5-membered nitrogen-containing heteroarylene.

35. The compound of any one of claims 1-34, wherein R^1 is imidazolene.

36. The compound of any one of claims 1-35, wherein $-R^1-R^{1a}$ represents  .

37. The compound of any one of claims 1-36, wherein R^{1a} is phenyl, substituted by one or more occurrences of alkoxy.

38. The compound of claim 37, wherein R^{1a} is 3,4,5-trimethoxyphenyl.

39. The compound of any one of claims 1-38, wherein J represents optionally substituted alkyl, alkenyl, cycloalkyl, or (cycloalkyl)alkyl.

40. The compound of any one of claims 1-39, wherein J represents optionally substituted branched alkyl or alkenyl.

41. The compound of any one of claims 1-40, wherein J represents isopropyl or isopropenyl.

42. The compound of any one of claims 1-39, wherein J represents optionally substituted cycloalkyl or (cycloalkyl)alkyl.

43. The compound of any one of claims 1-39, wherein J represents optionally substituted cycloalkyl.

44. The compound of any one of claims 1-38, wherein J represents optionally substituted heterocycloalkyl.

45. The compound of any one of claims 1-29, wherein:
R^{1a} is phenyl, substituted by two or more occurrences of alkoxy;
J is optionally substituted alkyl, alkenyl, cycloalkyl, or (cyclolkyl)alkyl, and
R^4, if present, is halo, -C(O)O(alkyl), or is selected from the group consisting of optionally substituted alkyl, alkoxy, aryl, heterocycloalkyl, cycloalkyl, and (cycloalkyl)alkyl.

46. The compound of any one of claims 1-29, wherein:
R^{1a} is phenyl, substituted by two or more occurrences of alkoxy (including 3,4,5-trimethoxyphenyl);
J is optionally substituted alkyl, alkenyl, cycloalkyl, or (cyclolkyl)alkyl; and
R^4, if present, is selected from the group consisting of optionally substituted alkyl, cycloalkyl, or alkoxy.

47. The compound of any one of claims 1-29, wherein:
R^{1a} is 3,4,5-trimethoxyphenyl;
J is optionally substituted alkyl, alkenyl, cycloalkyl, or (cyclolkyl)alkyl; and

R^4, if present, is halo, -C(O)O(alkyl), or is selected from the group consisting of optionally substituted alkyl, alkoxy, aryl, heterocycloalkyl, cycloalkyl, and (cycloalkyl)alkyl.

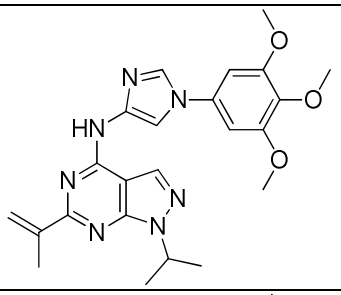
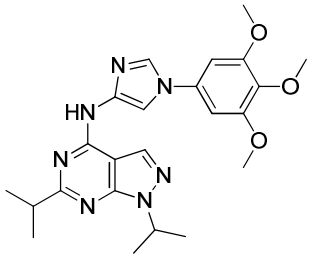
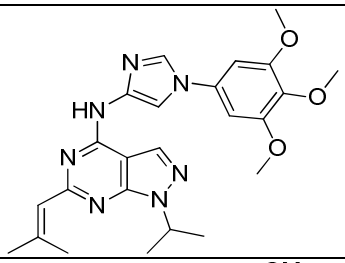
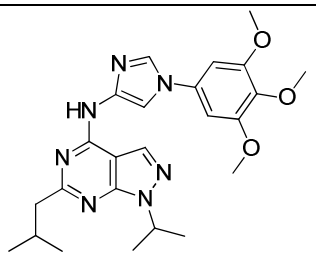
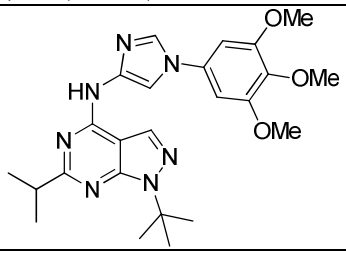
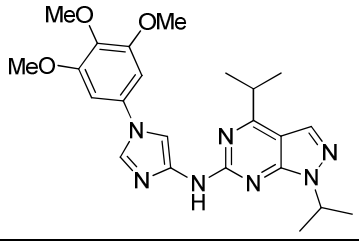
48. The compound of any one of claims 1-29, wherein:

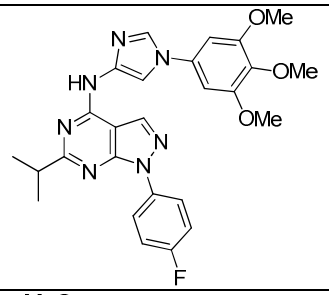
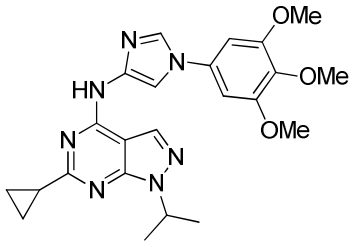
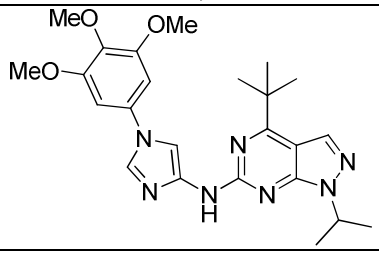
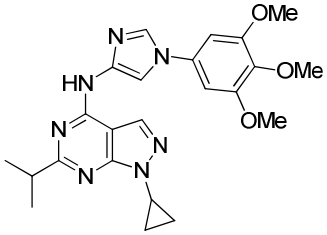
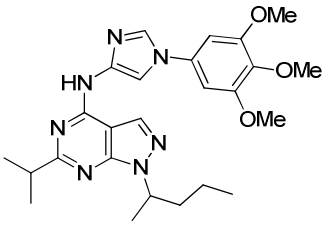
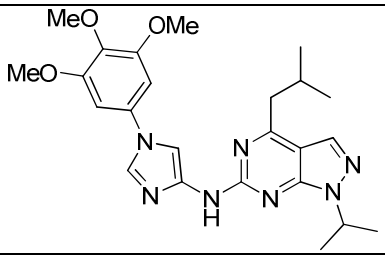
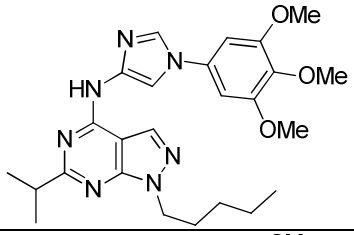
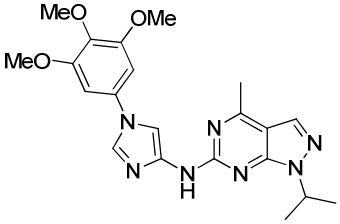
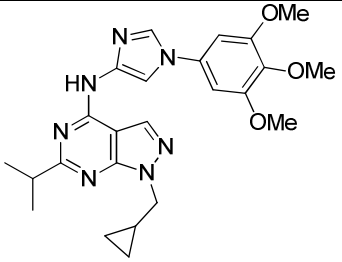
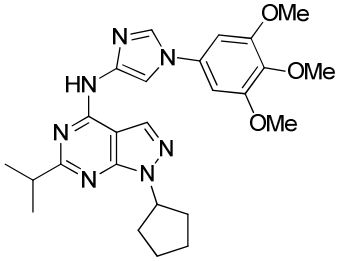
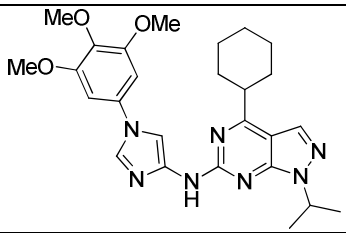
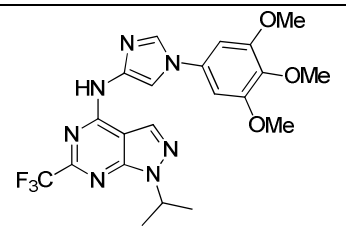
R^{1a} is 3,4,5-trimethoxyphenyl;

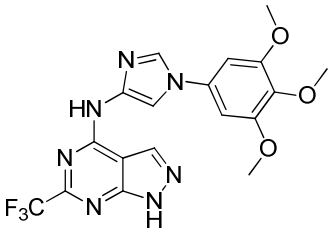
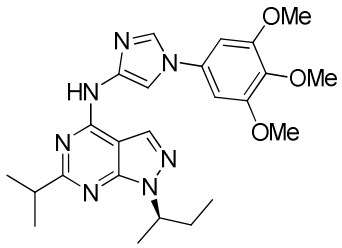
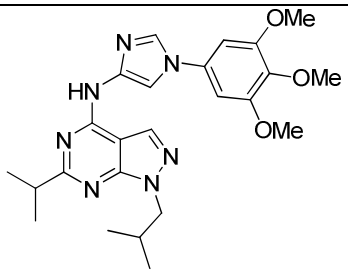
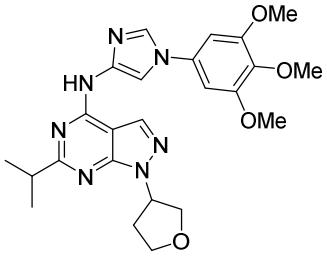
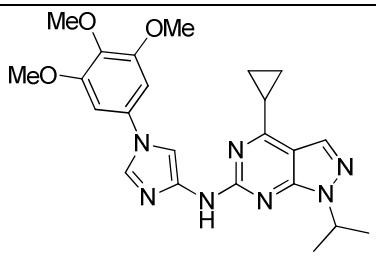
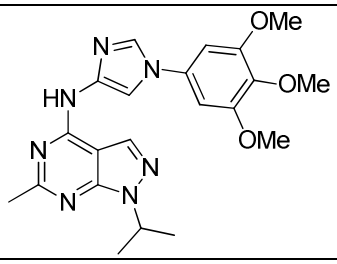
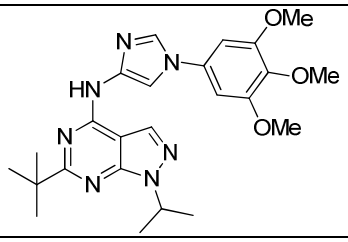
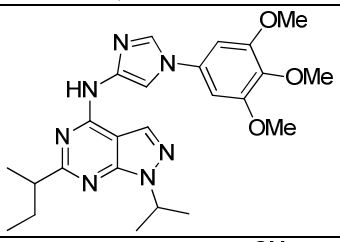
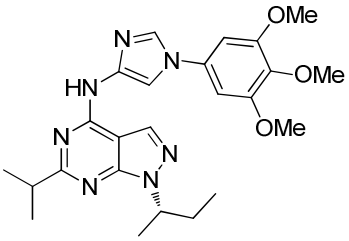
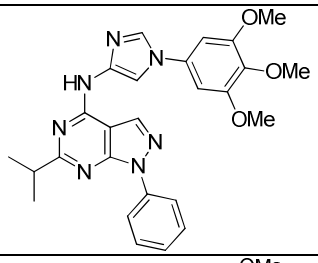
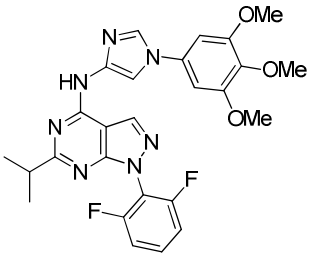
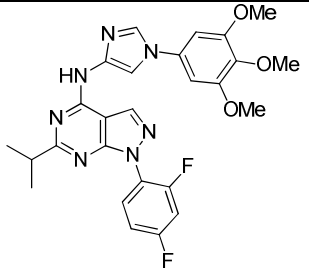
J is optionally substituted alkyl, alkenyl, cycloalkyl, or (cyclolkyl)alkyl; and

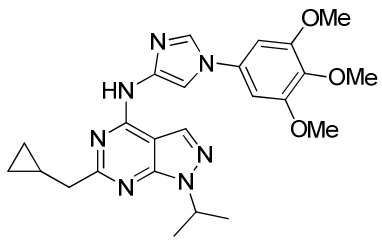
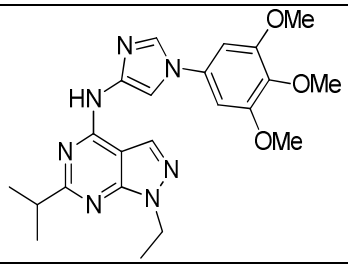
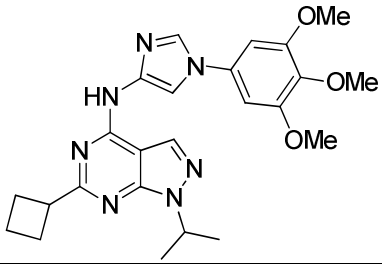
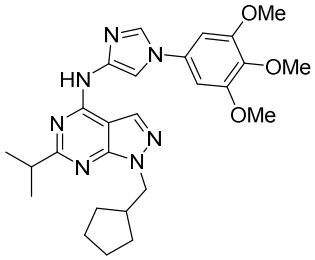
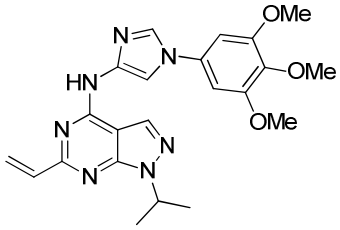
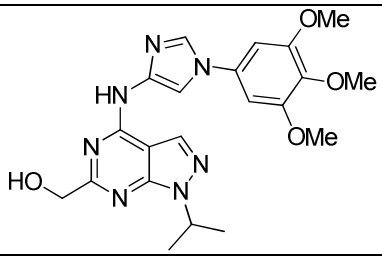
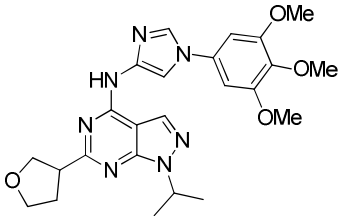
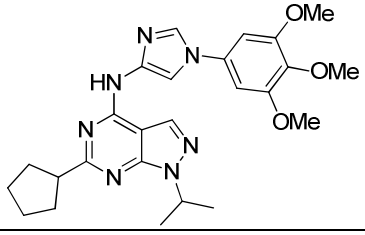
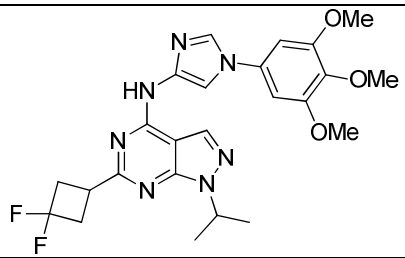
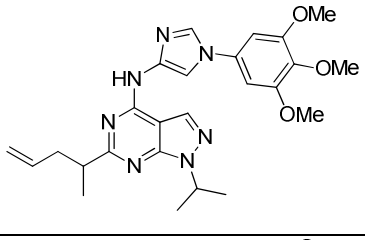
R^4, if present, is selected from the group consisting of optionally substituted alkyl, cycloalkyl, or alkoxy.

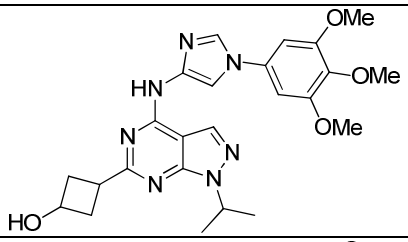
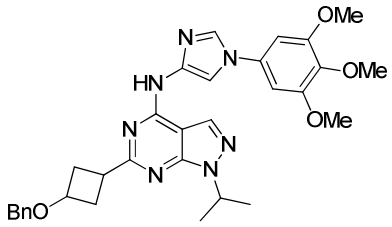
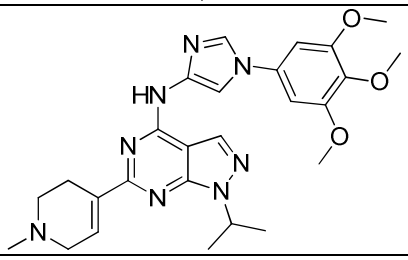
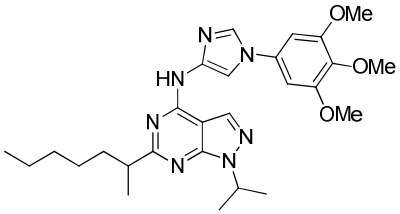
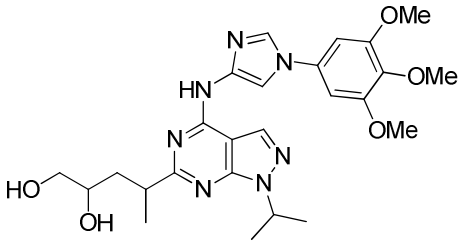
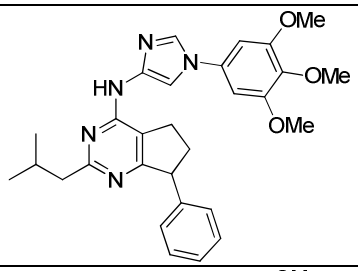
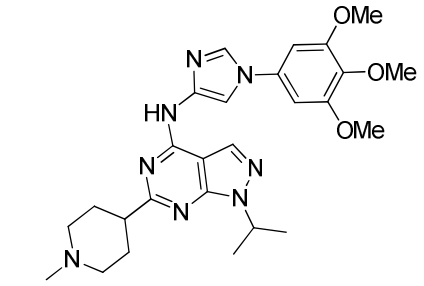
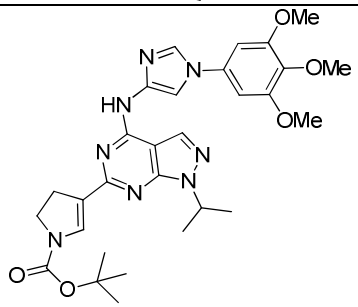
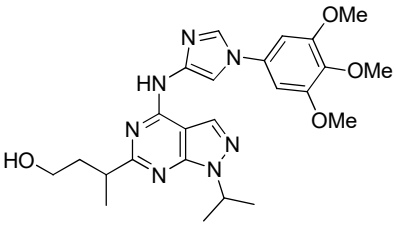
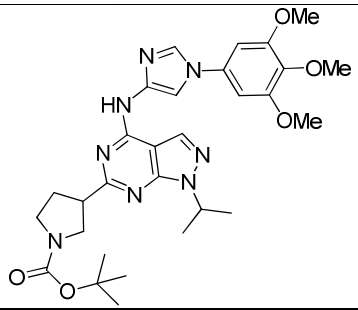
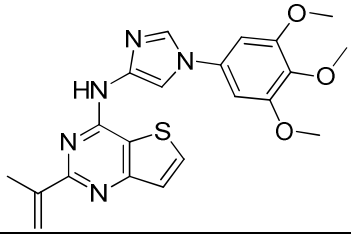
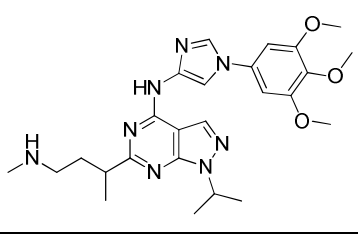
49. The compound of claim 1, or a pharmaceutically acceptable salt thereof, selected from the following table:

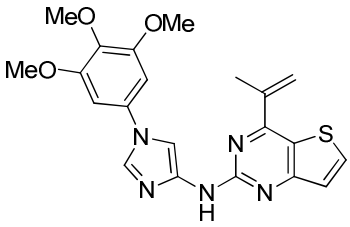
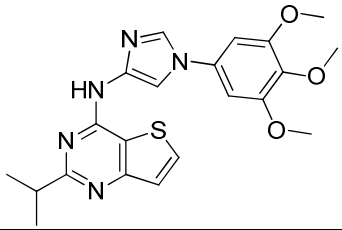
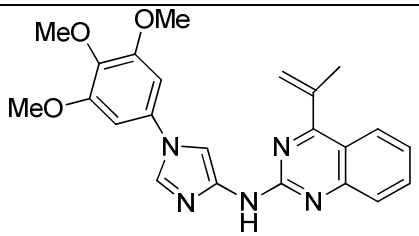
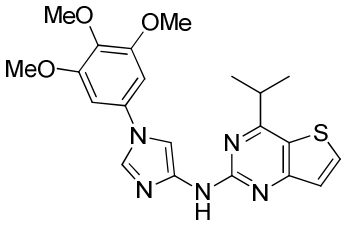
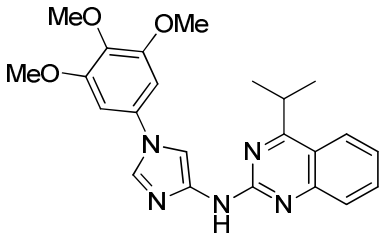
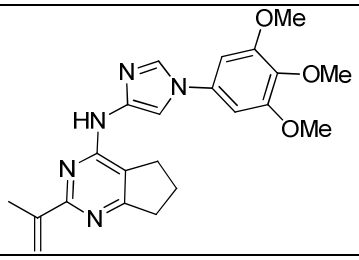
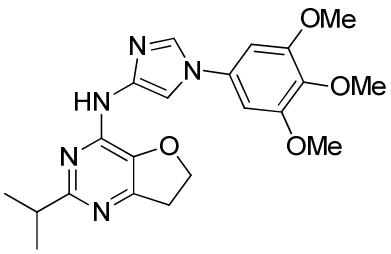
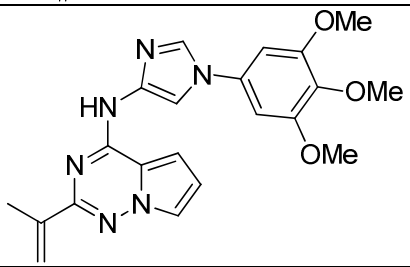
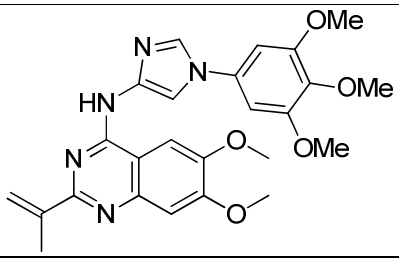
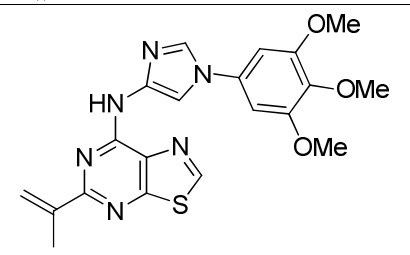
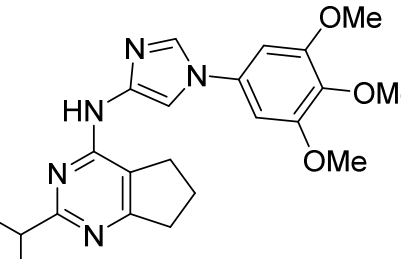
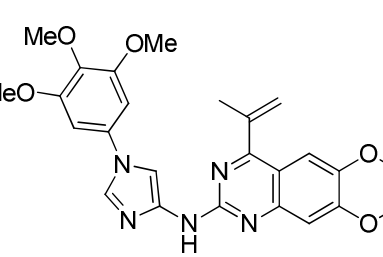
	
	
	

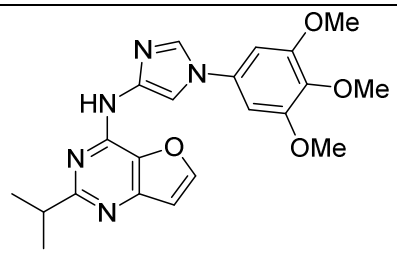
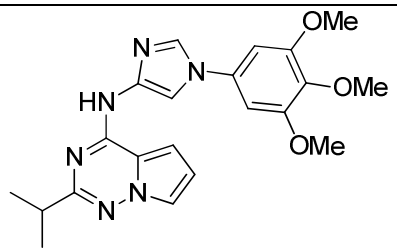
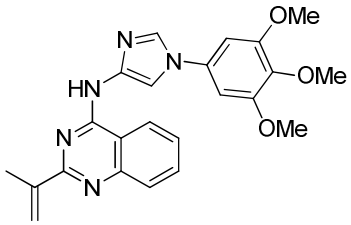
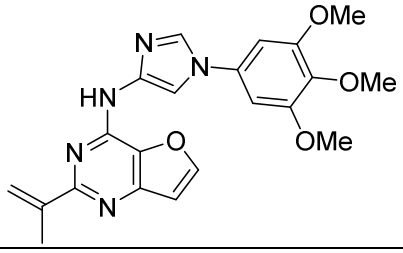
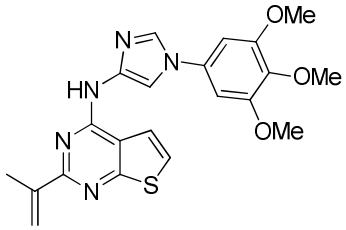
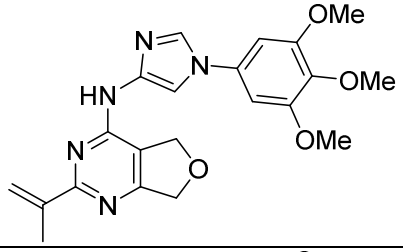
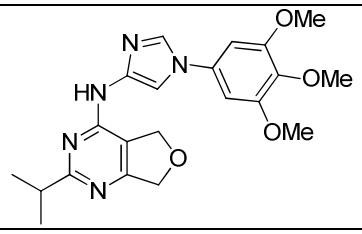
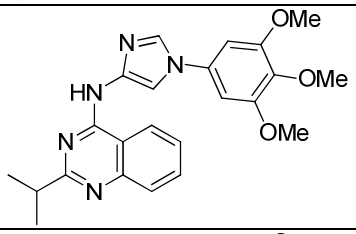
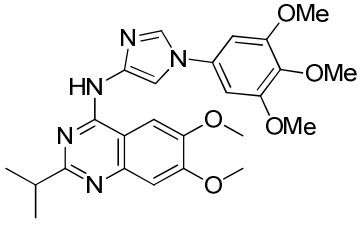
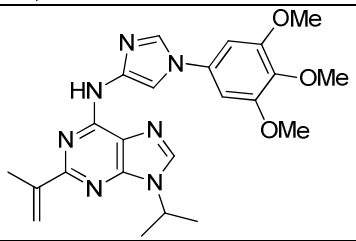
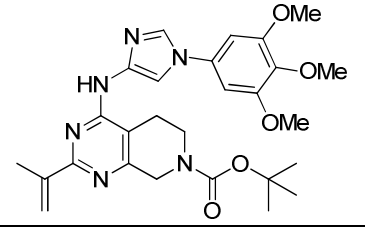
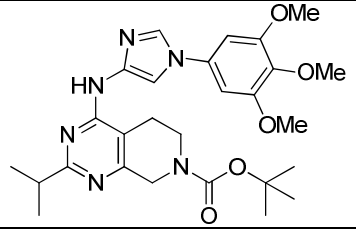
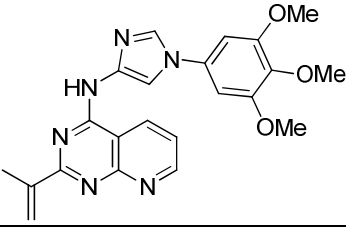
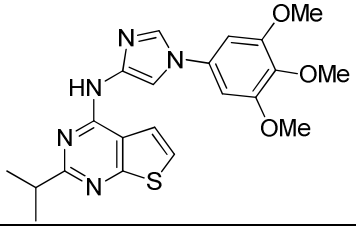
	
	
	
	
	
	

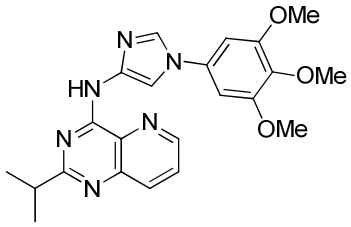
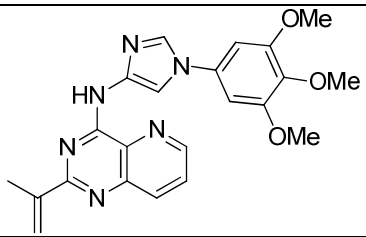
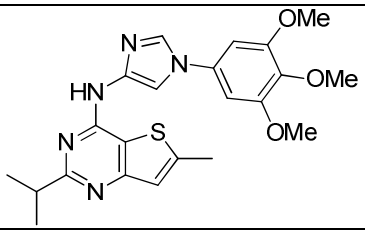
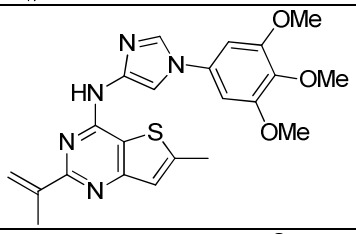
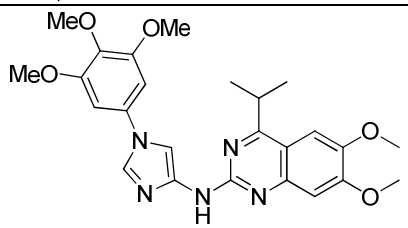
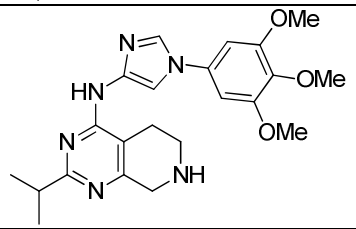
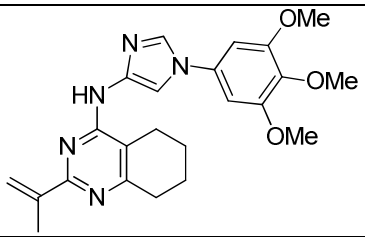
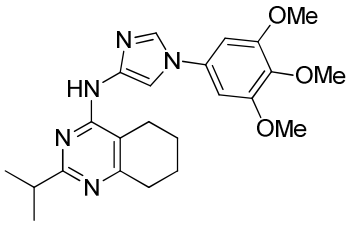
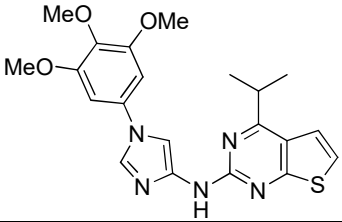
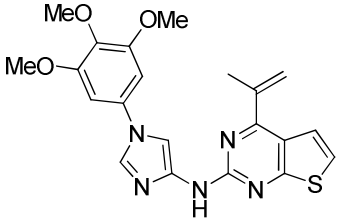
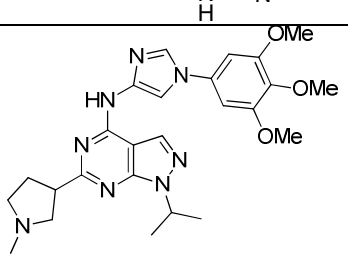
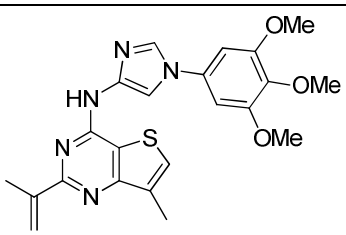
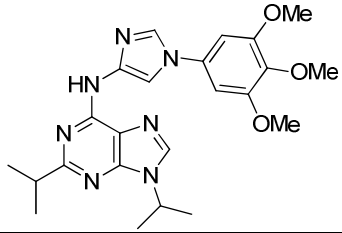
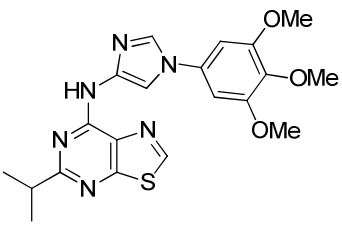
	
	
	
	
	
	

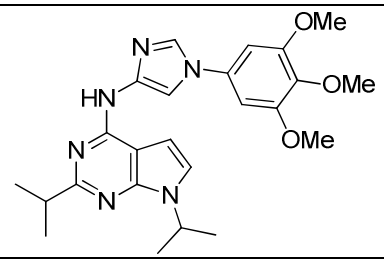
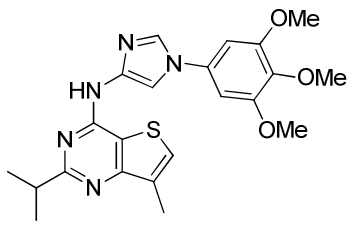
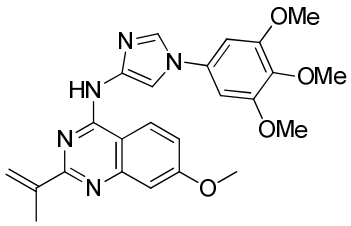
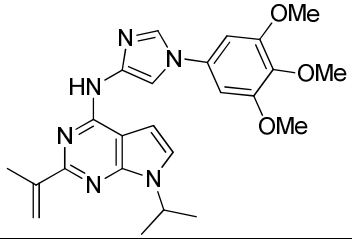
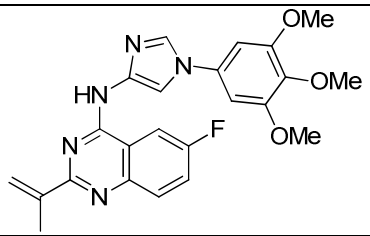
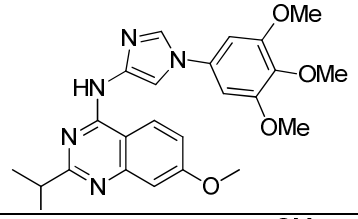
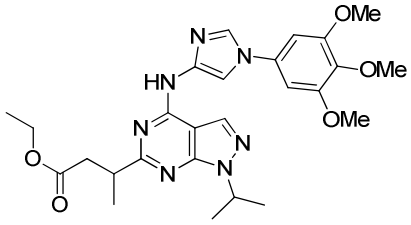
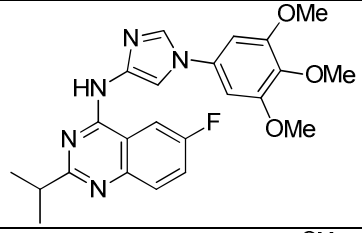
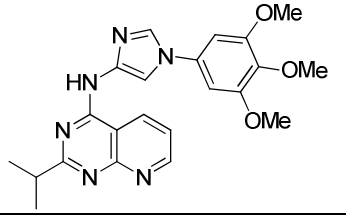
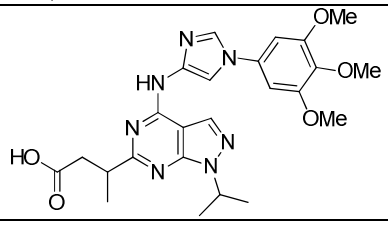
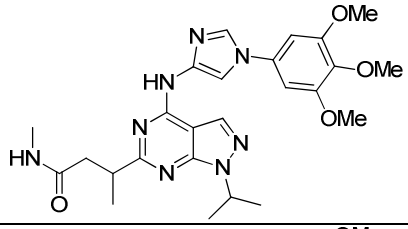
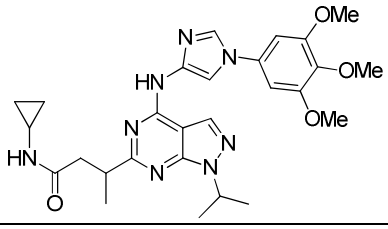
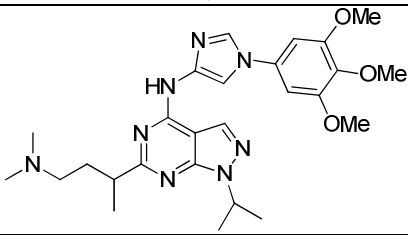
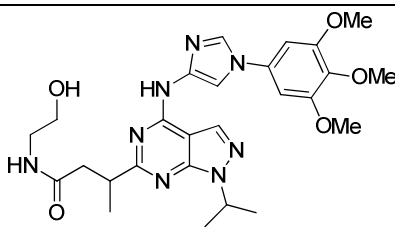
	
	
	
	
	

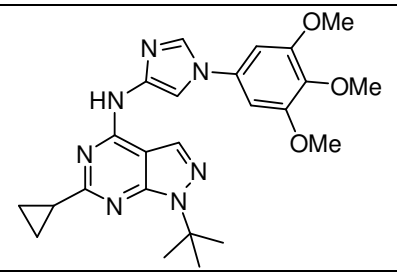
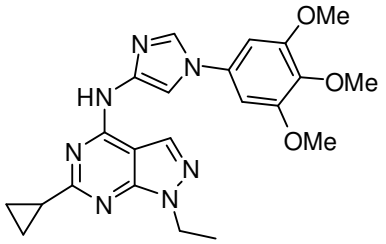
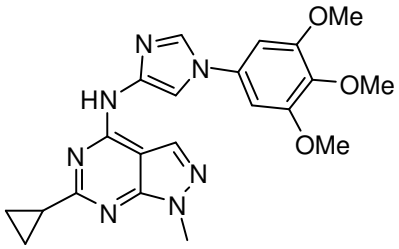
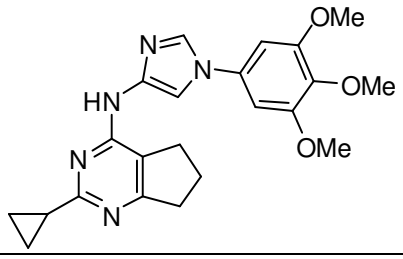
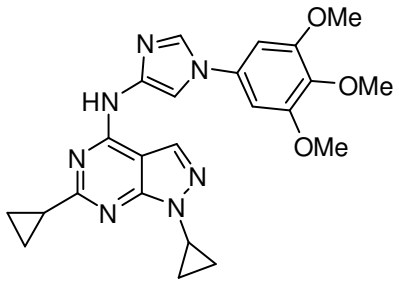
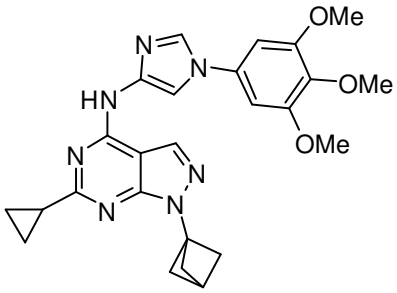
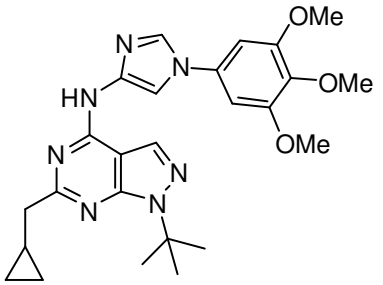
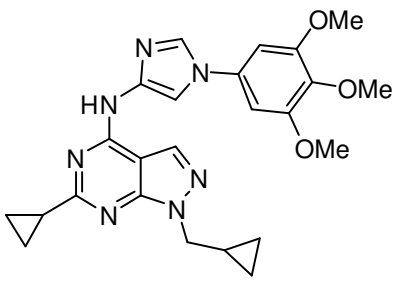
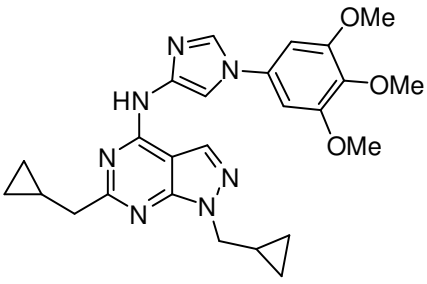
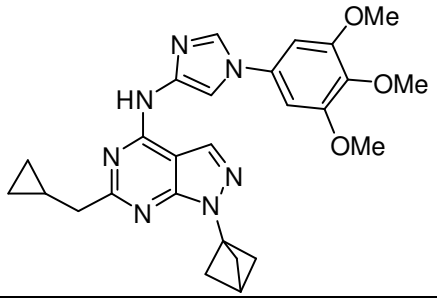
	
	
	
	
	
	

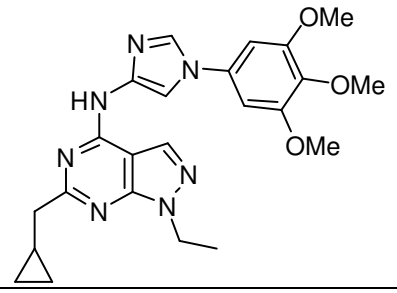
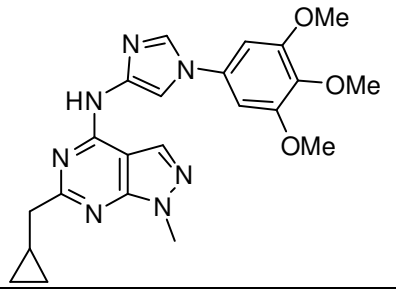
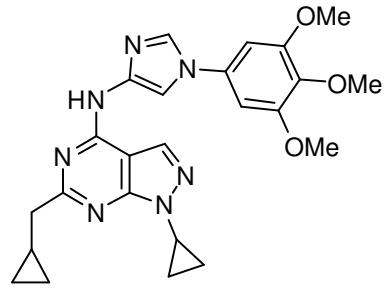
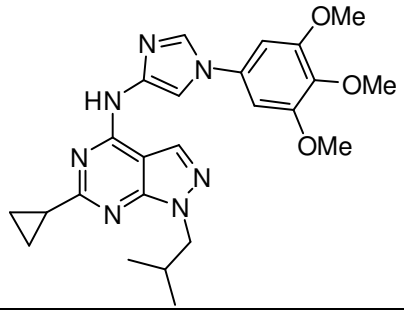
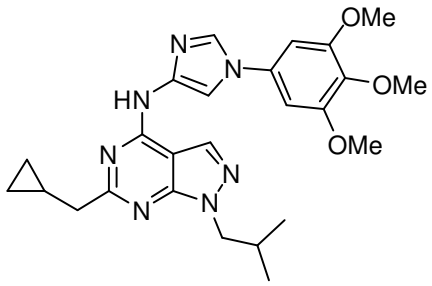
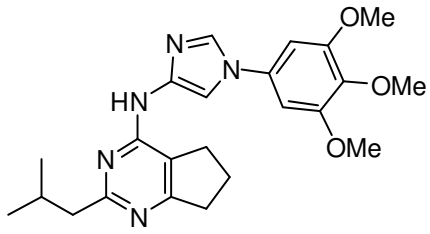
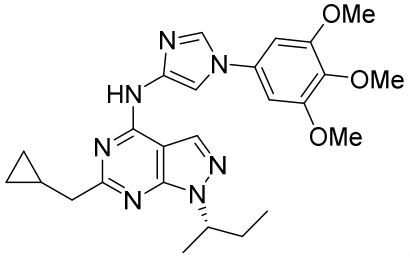
	
	
	
	
	
	

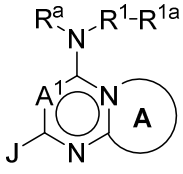
	
	
	
	
	
	
	

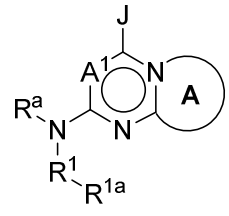
	
	
	
	
	
	
	

50. A compound represented by formula (III) or formula (IV):


(III)


(IV);

or a pharmaceutically acceptable salt thereof;

wherein:

A is a fused optionally substituted aromatic ring, heteroaromatic ring, cycloalkyl ring, cycloalkenyl ring, heterocycloalkyl ring, or heterocycloalkenyl ring;

A^1 is CH or N;

R^a represents H or alkyl;

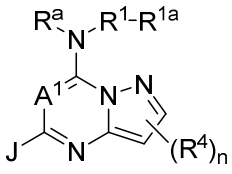
R^1 represents heteroarylene;

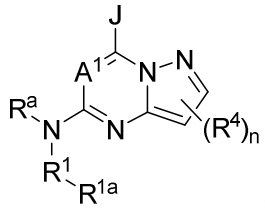
R^{1a} represents H or optionally substituted –C(O)alkyl, –C(O)aryl, –C(O)heteroaryl, –C(O)O(alkyl), –C(O)(heterocyclyl), $–C(O)NR^xR^y$, alkyl, cycloalkyl, cycloalkenyl, heterocycloalkyl, aryl, or heteroaryl;

J represents optionally substituted alkyl, alkenyl, haloalkyl, hydroxyalkyl, alkoxyalkyl, cycloalkyl, (cycloalkyl)alkyl, heterocycloalkyl, (heterocycloalkyl)alkyl, or heterocycloalkenyl; and

R^x and R^y each independently represent H, alkyl, aralkyl, heteroaralkyl, aryl, heteroaryl, cycloalkyl, heterocycloalkyl, (cycloalkyl)alkyl, (heterocycloalkyl)alkyl, or hydroxyalkyl.

51. The compound of claim 50, having the structure of formula (IIIa) or (IVa):


(IIIa)



(IVa);

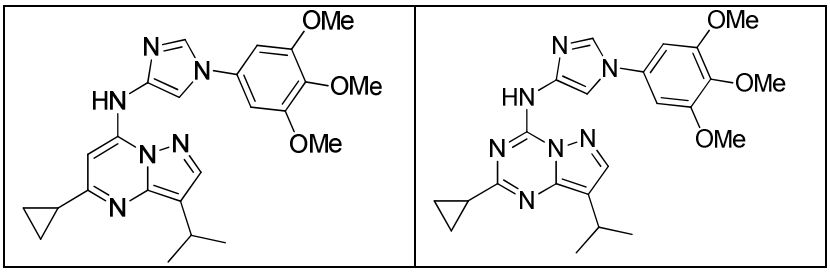
wherein:

R^4, independently for each occurrence, represents halo, cyano, $-CH_2C(O)NH_2$, $-C(O)R^5$, $-C(O)OR^5$, $-S(O)_2R^5$, or optionally substituted alkyl, alkenyl, haloalkyl, hydroxyalkyl, aminoalkyl, alkoxy, aryl, aralkyl, heteroaryl, heteroaralkyl, heterocycloalkyl, heterocycloalkenyl, (heterocycloalkyl)alkyl, cycloalkyl, (cycloalkyl)alkyl, halocycloalkyl, hydroxycycloalkyl, aminocycloalkyl, aryloxy, heteroaryloxy, arylalkyloxy, or heteroarylalkyloxy;

R^5, independently for each occurrence, represents optionally substituted alkyl, aralkyl, aryl, heteroaralkyl, heteroaryl, cycloalkyl, heterocycloalkyl, (cycloalkyl)alkyl, or (heterocycloalkyl)alkyl; and

n is an integer from 0-2.

52. The compound of claim 50, or a pharmaceutically acceptable salt thereof, selected from the following table:



.

53. A pharmaceutical composition, comprising a compound of any one of claims 1-52, or a pharmaceutically acceptable salt thereof; and a pharmaceutically acceptable carrier.

54. Use of a compound of any one of claims 1-52, or a pharmaceutically acceptable salt thereof, in the manufacture of a medicament for the inhibition of ALK2 kinase.

55. Use of a compound of any one of claims 1-52, or a pharmaceutically acceptable salt thereof, in the manufacture of a medicament for the treatment of fibrodysplasia ossificans progressiva.

56. Use of a compound of any one of claims 1-52, or a pharmaceutically acceptable salt thereof, in the manufacture of a medicament for the treatment of cancer.

57. The use of claim 56, wherein the cancer is a glioma.

58. The use of claim 57, wherein the glioma is diffuse intrinsic pontine glioma.

59. Use of a compound of any one of claims 1-52, or a pharmaceutically acceptable salt thereof, in the manufacture of a medicament for the treatment of anemia associated with high hepcidin, Iron Refractory Iron Deficiency Anemia (IRIDA), anemia of chronic diseases, cancer-related anemia, chemotherapy-associated anemia, anemia of inflammation, or hepcidin-producing adenoma.

60. Use of a compound of any one of claims 1-52, or a pharmaceutically acceptable salt thereof, in the manufacture of a medicament for the treatment of spondyloarthritis (SpA).

61. A compound of any one of claims 1-52, for use in therapy.