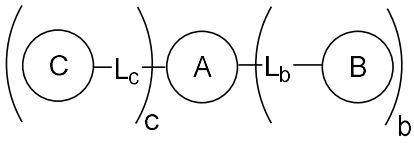
CLAIMS

1. An aryl hydrocarbon receptor (AHR) modulator compound of Formula (I) or a salt thereof



(I),

wherein:

A is an optionally substituted monocyclic, bicyclic, or tricyclic ring selected from 6- to 14-membered aryl and 5 to 14-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

b is 0 or 1;

B is an optionally substituted monocyclic, bicyclic, or tricyclic ring selected from 6- to 14-membered aryl and 5- to 14-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

L_b is a covalent bond, *–O–**, *–NR_{bb}–**, *–$NR_{bb}C(O)NR_{bb}$–**, *–C(O) –**, *–SO_2–**, *=N–**, *–N=**, *=N-C(O)–**, *–C(O)-N=**, *–O-R_{ba}–**, *–R_{ba}-O–**, *–C(O)NR_{bb}–**, *–$NR_{bb}C(O)$ –**,*–NR_{bb}-R_{ba}-(O)–**, *–O-R_{ba}-NR_{bb}–**, *–NR_{bb}-R_{ba}–**, *–R_{ba}-NR_{bb}–**, *–S-R_{ba}–**, *–R_{ba}-S–**, *–SO_2-R_{ba}–**, *–R_{ba}-SO_2–**, *–NR_{bb}-N=CR_{bb}–**, *–CR_{bb}=N-NR_{bb}–**, *–C(O)NR_{bb}-N=CR_{bb}–**, *–CR_{bb}=N-$NR_{bb}C(O)$–**, *–O-R_{ba}-C(O)NR_{bb}–**, *$NR_{bb}C(O)$-R_{ba}-O–**, *–NR_{bb}-R_{ba}-C(O)NR_{bb}–**, *–$NR_{bb}C(O)$-R_{ba}-NR_{bb}–**, *-$NR_{bb}C(O)O$-R_{ba}–**, *–R_{ba}-OC(O)NR_{bb}–**, *–R_{ba}-NR_{bb}-R_{ba}-C(O)NR_{bb}-C(O)NR_{bb}–**, *–$NR_{bb}C(O)$-$NR_{bb}C(O)$-R_{ba}-NR_{bb}-R_{ba}–**, in which * denotes the linkage between L_b and A and ** denotes the linkage between L_b and B;

each R_{ba} independently is H or C_1-C_3 alkyl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{baa}, –$NR_{baa}R_{baa}$ in which each R_{baa} is independently H or C_1-C_6 alkyl;

each R_{bb} independently is H, –C(O)R_{bba}, or a 6- to 10-membered aryl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{bba}, or –$NR_{bba}R_{bba}$, in which each R_{bba} is independently H or C_1-C_6 alkyl;

c is 0 or 1;

C is an optionally substituted monocyclic or bicyclic ring selected from 6- to 10-membered aryl and 5- to 10-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

L_c is a covalent bond, *–NR_{cb}–**, *–R_{ca}–**, *–C(O) –**, *–SO_2–**, *–N=CR_{cb}–**, *–CR_{cb}=N–**, *–C(O)NR_{cb}–**, *–NR_{cb}C(O)–**, *–S-R_{ca}–**, *–R_{ca}-S–**, *–O-R_{ca}–**, *–R_{ca}-O–**, *–C(O)$NR_{cb}NR_{cb}$C(O)–**, in which * denotes the linkage between L_c and A and ** denotes the linkage between L_c and C;

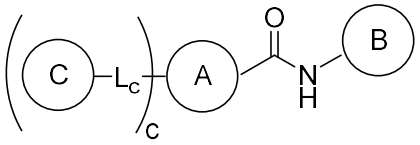
each R_{ca} independently is H or C_1-C_3 alkyl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{caa}, or –$NR_{caa}R_{caa}$, in which each R_{caa} is independently H or C_1-C_6 alkyl;

each R_{cb} independently is H, –C(O)R_{cba}, or a 6- to 10-membered aryl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{cba}, or –$NR_{cba}R_{cba}$, in which each R_{cba} is independently H or C_1-C_6 alkyl;

when c is 1, b is 1; and

when b is 0 and c is 0, A is an optionally substituted tricyclic ring selected from 14-membered aryl and 12- to 14-membered saturated or unsaturated heterocycle comprising 1-3 heteroatoms selected from N, O and S.

2. The compound of claim 1, wherein the compound is represented by Formula (Ia)



(Ia)

wherein

A is an optionally substituted monocyclic, bicyclic, or tricyclic ring selected from 6- to 14-membered aryl and 5- to 14-membered saturated or unsaturated heterocycle comprising 1-5 heteroatoms selected from N, O and S;

B is an optionally substituted monocyclic, bicyclic, or tricyclic ring selected from 6- to 14-membered aryl and 5- to 14-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

c is 0 or 1;

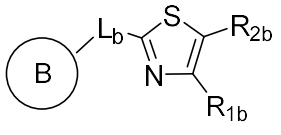
C is an optionally substituted monocyclic or bicyclic ring selected from 6- to 10-membered aryl and 5- to 10-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

L_c is a covalent bond, *–NR_{cb}–**, *–R_{ca}–**, *–C(O) –**, *–SO_2–**, *–N=CR_{cb}–**, *–CR_{cb}=N–**, *–C(O)NR_{cb}–**, *–NR_{cb}C(O)–**, *–S-R_{ca}–**, *–R_{ca}-S–**, *–O-R_{ca}–**, *–R_{ca}-O–**, *–C(O)$NR_{cb}NR_{cb}$C(O)–**, in which * denotes the linkage between L_c and A and ** denotes the linkage between L_c and C;

each R_{ca} independently is H or C_1-C_3 alkyl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{caa}, or –$NR_{caa}R_{caa}$, in which each R_{caa} is independently H or C_1-C_6 alkyl; and

each R_{cb} independently is H, –C(O)R_{cba}, or a 6- to 10-membered aryl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{cba}, or –$NR_{cba}R_{cba}$, in which each R_{cba} is independently H or C_1-C_6 alkyl.

3. The compound of claim 1, wherein the compound is represented by Formula (Ib)



(Ib)

wherein

B is an optionally substituted monocyclic, bicyclic, or tricyclic ring selected from 6- to 14-membered aryl and 5- to 14-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

L_b is a covalent bond, *–O–**, *–NR_{bb}–**, *–NR_{bb}C(O)NR_{bb}–**, *–C(O) –**, *–SO_2–**, *=N–**, *–N=**, *=N-C(O)–**, *–C(O)-N=**, *–O-R_{ba}–**, *–R_{ba}-O–**, *–C(O)NR_{bb}–**, *–NR_{bb}C(O)–**,*–NR_{bb}-R_{ba}-(O)–**, *–O-R_{ba}-NR_{bb}–**, *–NR_{bb}-R_{ba}–**, *–R_{ba}-NR_{bb}–**, *–S-R_{ba}–**, *–R_{ba}-S–**, *–SO_2-R_{ba}–**, *–R_{ba}-SO_2–**, *–NR_{bb}-N=CR_{bb}–**, *–CR_{bb}=N-NR_{bb}–**, *–C(O)NR_{bb}-N=CR_{bb}–**, *–CR_{bb}=N-NR_{bb}C(O)–**, *–O-R_{ba}-C(O)NR_{bb}–**, *NR_{bb}C(O)-R_{ba}-O–**, *–NR_{bb}-R_{ba}-C(O)NR_{bb}–**, *–NR_{bb}C(O)-R_{ba}-NR_{bb}–**, *-NR_{bb}C(O)O-R_{ba}–**, *–R_{ba}-OC(O)NR_{bb}–**, *–R_{ba}-NR_{bb}-R_{ba}-C(O)NR_{bb}-C(O)NR_{bb}–**, *–NR_{bb}C(O)-NR_{bb}C(O)-R_{ba}-NR_{bb}-R_{ba}–**, in which * denotes the linkage between L_b and a thiazole carbon and ** denotes the linkage between L_b and B;

each R_{ba} independently is H or C_1-C_3 alkyl optionally substituted with one or more halogen, $–CF_3$, –CN, $–OR_{baa}$, $–NR_{baa}R_{baa}$ in which each R_{baa} is independently H or C_1-C_6 alkyl;

each R_{bb} independently is H, $–C(O)R_{bba}$, or a 6- to 10-membered aryl optionally substituted with one or more halogen, $–CF_3$, –CN, $–OR_{bba}$, or $–NR_{bba}R_{bba}$, in which each R_{bba} is independently H or C_1-C_6 alkyl;

R_{1b} is hydrogen or $–L_c$-C;

R_{2b} is hydrogen, an optionally substituted pyrazole ring, or $CONR_{3b}R_{4b}$, wherein each R_{3b} and R_{4b} is independently hydrogen or C_1-C_6 alkyl;

C is an optionally substituted monocyclic or bicyclic ring selected from 6- to 10-membered aryl and 5- to 10-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

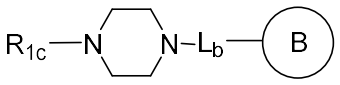
L_c is a covalent bond, $*–NR_{cb}–**$, $*–R_{ca}–**$, *–C(O) –**, $*–SO_2–**$, $*–N=CR_{cb}–**$, $*–CR_{cb}=N–**$, $*–C(O)NR_{cb}–**$, $*–NR_{cb}C(O)–**$, $*–S\text{-}R_{ca}–**$, $*–R_{ca}\text{-}S–**$, $*–O\text{-}R_{ca}–**$, $*–R_{ca}\text{-}O–**$, $*–C(O)NR_{cb}NR_{cb}C(O)–**$, in which * denotes the linkage between L_c and a thiazole carbon and ** denotes the linkage between L_c and C;

each R_{ca} independently is H or C_1-C_3 alkyl optionally substituted with one or more halogen, $–CF_3$, –CN, $–OR_{caa}$, or $–NR_{caa}R_{caa}$, in which each R_{caa} is independently H or C_1-C_6 alkyl;

each R_{cb} independently is H, –C(O)Rcba, or a 6- to 10-membered aryl optionally substituted with one or more halogen, $–CF_3$, –CN, $–OR_{cba}$, or $–NR_{cba}R_{cba}$, in which each R_{cba} is independently H or C_1-C_6 alkyl; and

R_{1b} and R_{2b} are not both hydrogen.

4. The compound of claim 1, wherein the compound is represented by Formula (Ic)



(Ic)

wherein

B is an optionally substituted monocyclic, bicyclic, or tricyclic ring selected from 6- to 14-membered aryl and 5- to 14-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

L_b is a covalent bond, $*–O–**$, $*–NR_{bb}–**$, $*–NR_{bb}C(O)NR_{bb}–**$, *–C(O) –**, $*–SO_2–**$, *=N–**, *–N=**, *=N-C(O)–**, *–C(O)-N=**, $*–O\text{-}R_{ba}–**$, $*–R_{ba}\text{-}O–**$, *–

$C(O)NR_{bb}$–**, *–$NR_{bb}C(O)$ –**,*–NR_{bb}-R_{ba}-(O)–**, *–O-R_{ba}-NR_{bb}–**, *–NR_{bb}-R_{ba}–**, *–R_{ba}-NR_{bb}–**, *–S-R_{ba}–**, *–R_{ba}-S–**, *–SO_2-R_{ba}–**, *–R_{ba}-SO_2–**, *–NR_{bb}-N=CR_{bb}–**, *–CR_{bb}=N-NR_{bb}–**, *–C(O)NR_{bb}-N=CR_{bb}–**, *–CR_{bb}=N-$NR_{bb}C(O)$–**, *–O-R_{ba}-$C(O)NR_{bb}$–**, *$NR_{bb}C(O)$-R_{ba}-O–**, *–NR_{bb}-R_{ba}-$C(O)NR_{bb}$–**, *–$NR_{bb}C(O)$-R_{ba}-NR_{bb}–**, *-$NR_{bb}C(O)O$-R_{ba}–**, *–R_{ba}-$OC(O)NR_{bb}$–**, *–R_{ba}-NR_{bb}-R_{ba}-$C(O)NR_{bb}$-$C(O)NR_{bb}$–**, *–$NR_{bb}C(O)$-$NR_{bb}C(O)$-R_{ba}-NR_{bb}-R_{ba}–**, in which * denotes the linkage between L_b and a piperazine nitrogen and ** denotes the linkage between L_b and B;

each R_{ba} independently is H or C_1-C_3 alkyl optionally substituted with one or more halogen, $–CF_3$, –CN, $–OR_{baa}$, $–NR_{baa}R_{baa}$ in which each R_{baa} is independently H or C_1-C_6 alkyl;

each R_{bb} independently is H, $–C(O)R_{bba}$, or a 6- to 10-membered aryl optionally substituted with one or more halogen, $–CF_3$, –CN, $–OR_{bba}$, or $–NR_{bba}R_{bba}$, in which each R_{bba} is independently H or C_1-C_6 alkyl;

R_{1c} is $–L_c$-C, $C(O)R_{2a}$, or $C(O)OR_{2a}$, wherein each R_{2a} is C_1-C_6 alkyl;

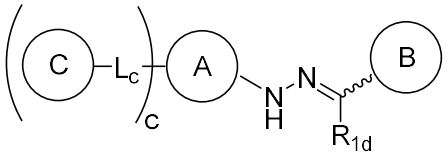
C is an optionally substituted monocyclic or bicyclic ring selected from 6- to 10-membered aryl and 5- to 10-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

L_c is a covalent bond, *–NR_{cb}–**, *–R_{ca}–**, *–C(O) –**, *–SO_2–**, *–N=CR_{cb}–**, *–CR_{cb}=N–**, *–$C(O)NR_{cb}$–**, *–$NR_{cb}C(O)$–**, *–S-R_{ca}–**, *–R_{ca}-S–**, *–O-R_{ca}–**, *–R_{ca}-O–**, *–$C(O)NR_{cb}NR_{cb}C(O)$–**, in which * denotes the linkage between L_c and a piperazine nitrogen and ** denotes the linkage between L_c and C;

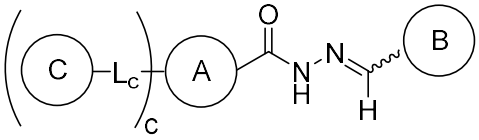
each R_{ca} independently is H or C_1-C_3 alkyl optionally substituted with one or more halogen, $–CF_3$, –CN, $–OR_{caa}$, or $–NR_{caa}R_{caa}$, in which each R_{caa} is independently H or C_1-C_6 alkyl; and

each R_{cb} independently is H, –C(O)Rcba, or a 6- to 10-membered aryl optionally substituted with one or more halogen, $–CF_3$, –CN, $–OR_{cba}$, or $–NR_{cba}R_{cba}$, in which each R_{cba} is independently H or C_1-C_6 alkyl.

5. The compound of claim 1, wherein the compound is represented by Formula (Id1) or Formula (Id2)



(Id1)



(Id2)

wherein

A is an optionally substituted monocyclic, bicyclic, or tricyclic ring selected from 6- to 14-membered aryl and 5- to 14-membered saturated or unsaturated heterocycle comprising 1-5 heteroatoms selected from N, O and S;

B is an optionally substituted monocyclic, bicyclic, or tricyclic ring selected from 6- to 14-membered aryl and 5- to 14-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

c is 0 or 1;

C is an optionally substituted monocyclic or bicyclic ring selected from 6- to 10-membered aryl and 5- to 10-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

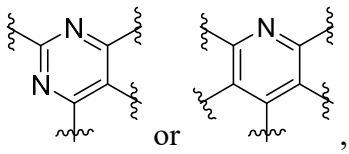
L_c is a covalent bond, *–NR_{cb}–**, *–R_{ca}–**, *–C(O) –**, *–SO_2–**, *–N=CR_{cb}–**, *–CR_{cb}=N–**, *–C(O)NR_{cb}–**, *–NR_{cb}C(O)–**, *–S-R_{ca}–**, *–R_{ca}-S–**, *–O-R_{ca}–**, *–R_{ca}-O–**, *–C(O)$NR_{cb}NR_{cb}$C(O)–**, in which * denotes the linkage between L_c and A and ** denotes the linkage between L_c and C;

each R_{ca} independently is H or C_1-C_3 alkyl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{caa}, or –$NR_{caa}R_{caa}$, in which each R_{caa} is independently H or C_1-C_6 alkyl;

each R_{cb} independently is H, –C(O)Rcba, or a 6- to 10-membered aryl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{cba}, or –$NR_{cba}R_{cba}$, in which each R_{cba} is independently H or C_1-C_6 alkyl; and

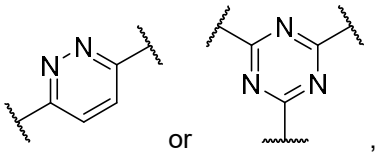
R_{1d} is hydrogen or C_1-C_3 alkyl.

6. The compound of claim 1, wherein A is



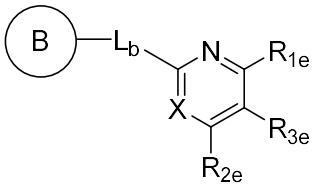
in which each $-\!\!\!\sim\!\!\!-$ independently denotes the linkage between A and hydrogen, –Lb-B, –Lc-C, or a substituent.

7. The compound of claim 1, wherein A is

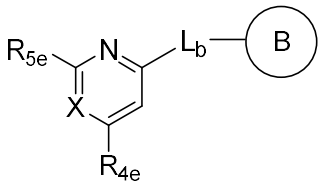


in which each $-\!\!\!\sim\!\!\!-$ independently denotes the linkage between A and hydrogen, –Lb-B, –Lc-C, or a substituent.

8. The compound of claim 1, wherein the compound is represented by Formula (Ie1) or Formula (Ie2)



(Ie1)



(Ie2)

wherein

X is N or CR_{6e} in which R_{6e} is hydrogen, halogen, or –CN;

B is an optionally substituted monocyclic, bicyclic, or tricyclic ring selected from 6- to 14-membered aryl and 5- to 14-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

L_b is a covalent bond, *–O–**, *–NR_{bb}–**, *–$NR_{bb}C(O)NR_{bb}$–**, *–C(O) –**, *–SO_2–**, *=N–**, *–N=**, *=N-C(O)–**, *–C(O)-N=**, *–O-R_{ba}–**, *–R_{ba}-O–**, *–$C(O)NR_{bb}$–**, *–$NR_{bb}C(O)$–**,*–NR_{bb}-R_{ba}-(O)–**, *–O-R_{ba}-NR_{bb}–**, *–NR_{bb}-R_{ba}–**, *–R_{ba}-NR_{bb}–**, *–S-R_{ba}–**, *–R_{ba}-S–**, *–SO_2-R_{ba}–**, *–R_{ba}-SO_2–**, *–NR_{bb}-N=CR_{bb}–**, *–CR_{bb}=N-NR_{bb}–**, *–$C(O)NR_{bb}$-N=CR_{bb}–**, *–CR_{bb}=N-$NR_{bb}C(O)$–**, *–O-R_{ba}-

$C(O)NR_{bb}$–**, *$NR_{bb}C(O)$-R_{ba}-O–**, *–NR_{bb}-R_{ba}-$C(O)NR_{bb}$–**, *–$NR_{bb}C(O)$-R_{ba}-NR_{bb}–**, *-$NR_{bb}C(O)O$-R_{ba}–**, *–R_{ba}-$OC(O)NR_{bb}$–**, *–R_{ba}-NR_{bb}-R_{ba}-$C(O)NR_{bb}$-$C(O)NR_{bb}$–**, *–$NR_{bb}C(O)$-$NR_{bb}C(O)$-R_{ba}-NR_{bb}-R_{ba}–**, in which * denotes the linkage between L_b and a pyridine or pyrimidine carbon and ** denotes the linkage between L_b and B;

each R_{ba} independently is H or C_1-C_3 alkyl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{baa}, –$NR_{baa}R_{baa}$ in which each R_{baa} is independently H or C_1-C_6 alkyl;

each R_{bb} independently is H, –$C(O)R_{bba}$, or a 6- to 10-membered aryl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{bba}, or –$NR_{bba}R_{bba}$, in which each R_{bba} is independently H or C_1-C_6 alkyl;

R_{1e} is hydrogen, –CF_3, or –L_c-C;

R_{2e} is hydrogen, –CF_3, L_c-C, or 6-membered aryl optionally substituted with one or more halogen, –CF_3, or –CN;

R_{3e} is hydrogen or when R_{1e} is hydrogen and R_{2e} is hydrogen R_{3e} is L_c-C;

R_{4e} is hydrogen or L_c-C;

R_{5e} is hydrogen or L_c-C;

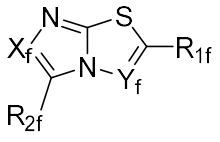
C is an optionally substituted monocyclic or bicyclic ring selected from 6- to 10-membered aryl and 5- to 10-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

L_c is a covalent bond, *–NR_{cb}–**, *–R_{ca}–**, *–C(O) –**, *–SO_2–**, *–N=CR_{cb}–**, *–CR_{cb}=N–**, *–$C(O)NR_{cb}$–**, *–$NR_{cb}C(O)$–**, *–S-R_{ca}–**, *–R_{ca}-S–**, *–O-R_{ca}–**, *–R_{ca}-O–**, *–$C(O)NR_{cb}NR_{cb}C(O)$–**, in which * denotes the linkage between L_c and a pyridine or pyrimidine carbon and ** denotes the linkage between L_c and C;

each R_{ca} independently is H or C_1-C_3 alkyl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{caa}, or –$NR_{caa}R_{caa}$, in which each R_{caa} is independently H or C_1-C_6 alkyl; and

each R_{cb} independently is H, –$C(O)R_{cba}$, or a 6- to 10-membered aryl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{cba}, or –$NR_{cba}R_{cba}$, in which each R_{cba} is independently H or C_1-C_6 alkyl.

9. The compound of claim 1, wherein the compound is represented by Formula (If)



(If)

wherein

X_f is N or CR_{3f} in which R_{3f} is hydrogen, C_1-C_6 alkyl, or $–L_b–B$;

Y_f is N or CR_{4f} in which R_{4f} is hydrogen or C_1-C_6 alkyl;

B is an optionally substituted monocyclic, bicyclic, or tricyclic ring selected from 6- to 14-membered aryl and 5- to 14-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

L_b is a covalent bond, *–O–**, *–NR_{bb}–**, *–$NR_{bb}C(O)NR_{bb}$–**, *–C(O) –**, *–SO_2–**, *=N–**, *–N=**, *=N-C(O)–**, *–C(O)-N=**, *–O-R_{ba}–**, *–R_{ba}-O–**, *–$C(O)NR_{bb}$–**, *–$NR_{bb}C(O)$–**,*–NR_{bb}-R_{ba}-(O)–**, *–O-R_{ba}-NR_{bb}–**, *–NR_{bb}-R_{ba}–**, *–R_{ba}-NR_{bb}–**, *–S-R_{ba}–**, *–R_{ba}-S–**, *–SO_2-R_{ba}–**, *–R_{ba}-SO_2–**, *–NR_{bb}-N=CR_{bb}–**, *–CR_{bb}=N-NR_{bb}–**, *–$C(O)NR_{bb}$-N=CR_{bb}–**, *–CR_{bb}=N-$NR_{bb}C(O)$–**, *–O-R_{ba}-$C(O)NR_{bb}$–**, *$NR_{bb}C(O)$-R_{ba}-O–**, *–NR_{bb}-R_{ba}-$C(O)NR_{bb}$–**, *–$NR_{bb}C(O)$-R_{ba}-NR_{bb}–**, *-$NR_{bb}C(O)O$-R_{ba}–**, *–R_{ba}-$OC(O)NR_{bb}$–**, *–R_{ba}-NR_{bb}-R_{ba}-$C(O)NR_{bb}$-$C(O)NR_{bb}$–**, *–$NR_{bb}C(O)$-$NR_{bb}C(O)$-R_{ba}-NR_{bb}-R_{ba}–**, in which * denotes the linkage between L_b and a imidazo[2,1-*b*]thiazole or imidazo[2,1-*b*][1,3,4]thiadiazole carbon and ** denotes the linkage between L_b and B;

each R_{ba} independently is H or C_1-C_3 alkyl optionally substituted with one or more halogen, $–CF_3$, –CN, $–OR_{baa}$, $–NR_{baa}R_{baa}$ in which each R_{baa} is independently H or C_1-C_6 alkyl;

each R_{bb} is independently H, $–C(O)R_{bba}$, or a 6- to 10-membered aryl optionally substituted with one or more halogen, $–CF_3$, –CN, $–OR_{bba}$, or $–NR_{bba}R_{bba}$, in which each R_{bba} is independently H or C_1-C_6 alkyl;

R_{1f} is CF_3, C_1-C_6 alkyl, $–L_b–B$, or $C(O)NHR_{5f}$ in which R_{5f} is C_1-C_3 alkyl;

R_{2f} is hydrogen or $–L_b–B$ when X_f is CR_{3f};

R_{2f} is hydrogen or $–L_c–C$ when X_f is N;

C is an optionally substituted monocyclic or bicyclic ring selected from 6- to 10-membered aryl and 5- to 10-membered saturated or unsaturated heterocyclyl comprising 1-5 heteroatoms selected from N, O and S;

L_c is a covalent bond, *–NR_{cb}–**, *–R_{ca}–**, *–C(O) –**, *–SO_2–**, *–N=CR_{cb}–**, *–CR_{cb}=N–**, *–$C(O)NR_{cb}$–**, *–$NR_{cb}C(O)$–**, *–S-R_{ca}–**, *–R_{ca}-S–**, *–O-R_{ca}–**, *–

R_{ca}-O–**, *–C(O)$NR_{cb}NR_{cb}$C(O)–**, in which * denotes the linkage between L_c and a [1,2,4]triazolo[3,4-b][1,3,4]thiadiazole carbon and ** denotes the linkage between L_c and C;

each R_{ca} independently is H or C_1-C_3 alkyl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{caa}, or –$NR_{caa}R_{caa}$, in which each R_{caa} is independently H or C_1-C_6 alkyl; and

each R_{cb} independently is H, –C(O)R_{cba}, or a 6- to 10-membered aryl optionally substituted with one or more halogen, –CF_3, –CN, –OR_{cba}, or –$NR_{cba}R_{cba}$, in which each R_{cba} is independently H or C_1-C_6 alkyl.

10. A compound selected from the group consisting of

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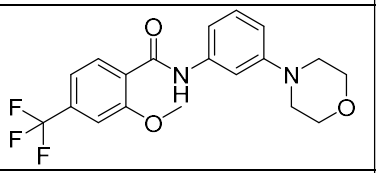
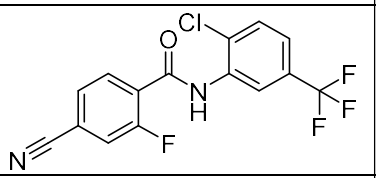
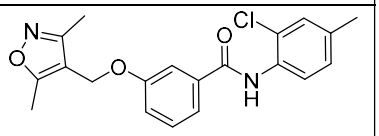
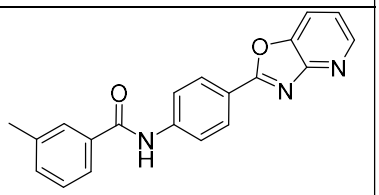
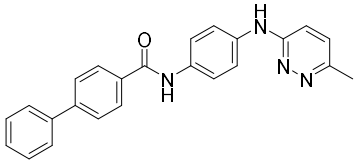
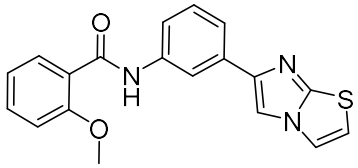
1	
2	
3	
4	
5	
6	

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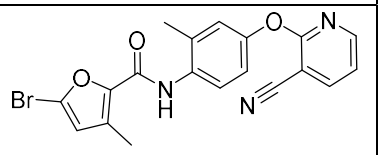
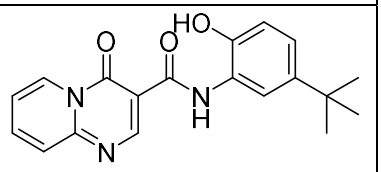
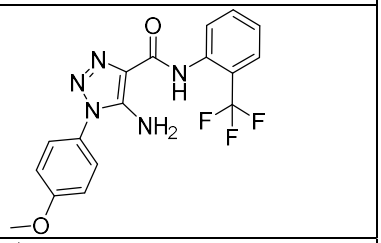
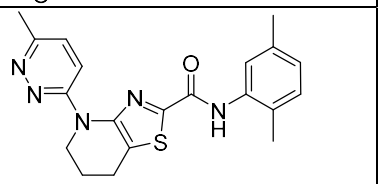
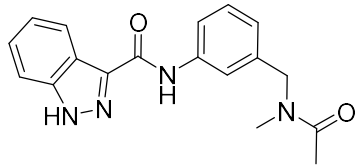
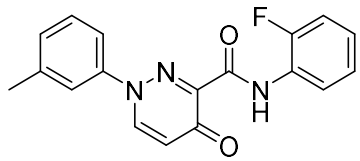
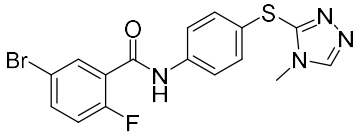
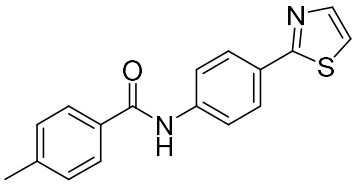
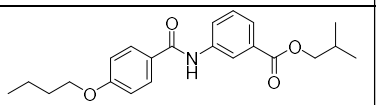
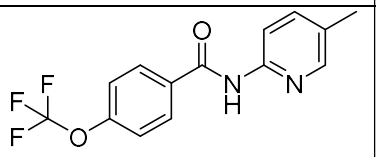
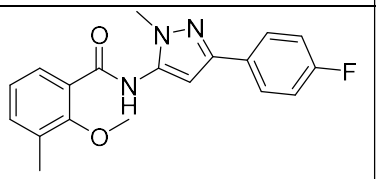
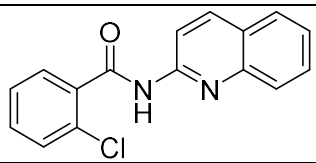
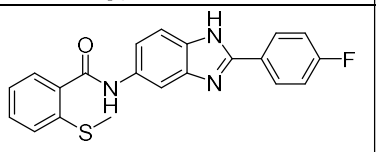
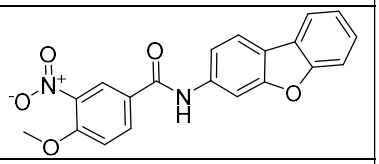
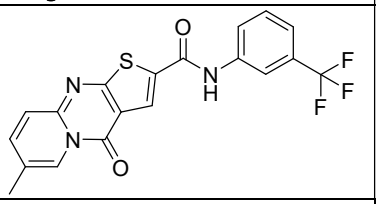
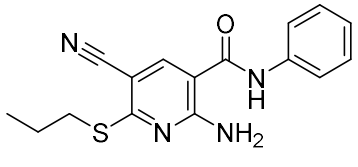
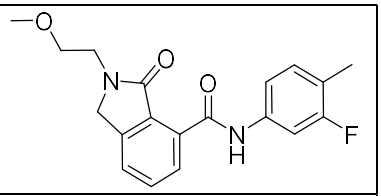
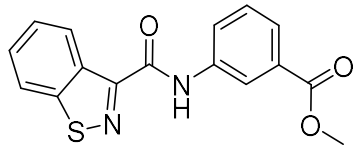
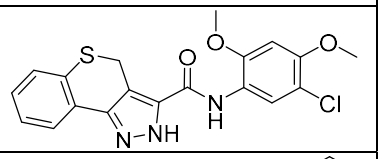
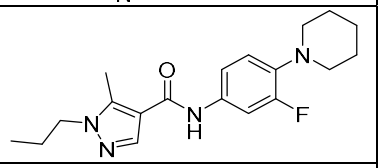
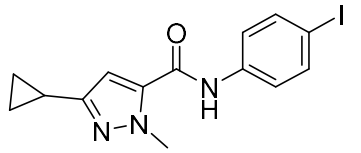
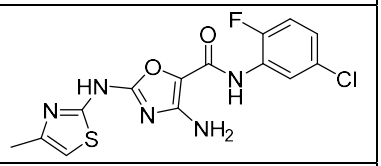
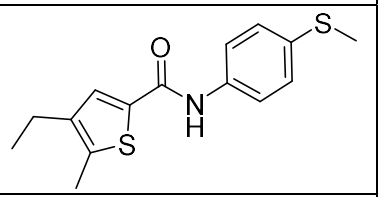
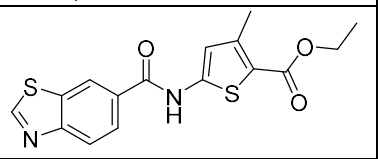
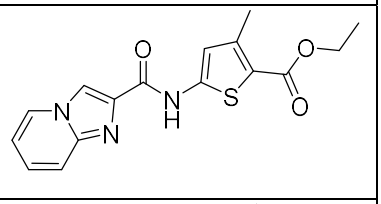
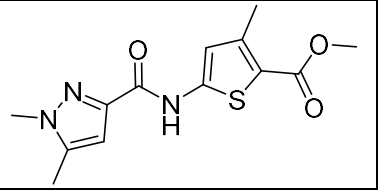
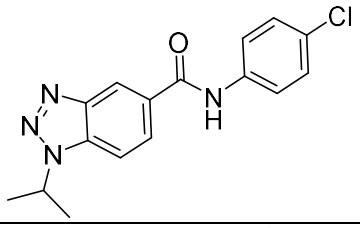
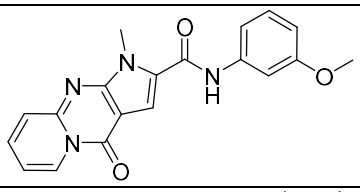
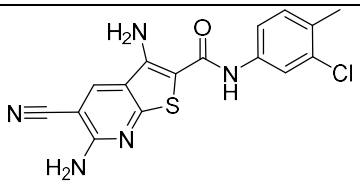
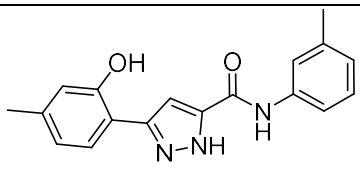
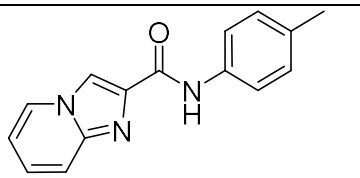
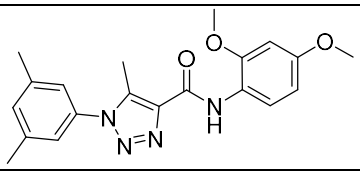
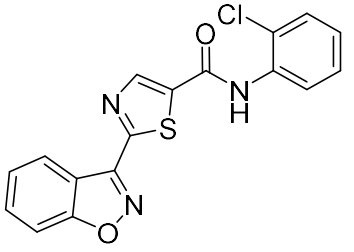
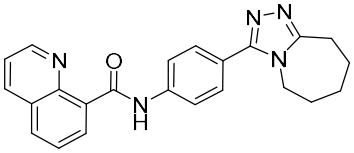
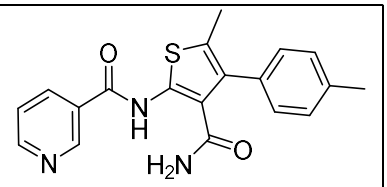
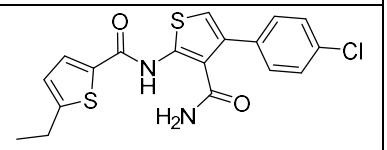
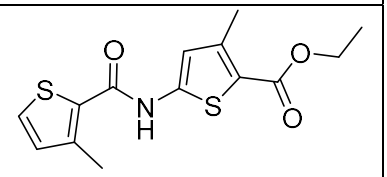
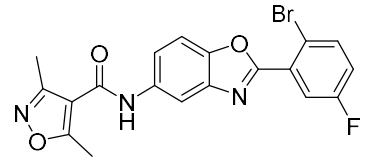
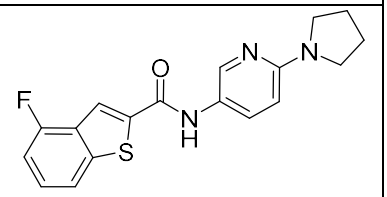
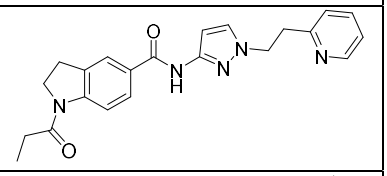
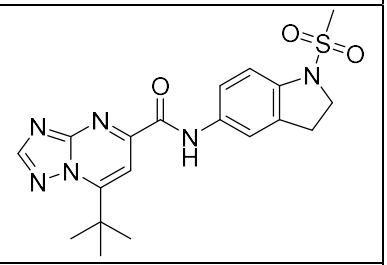
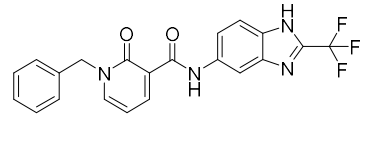
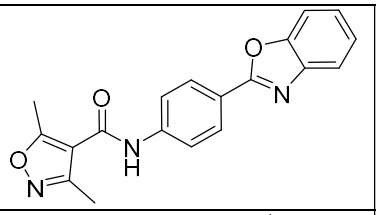
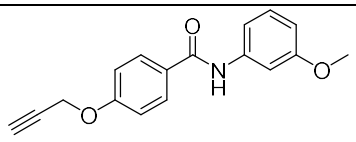
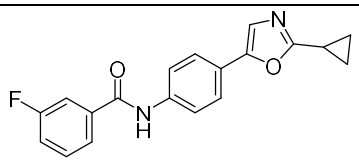
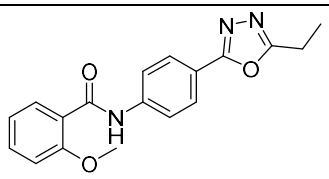
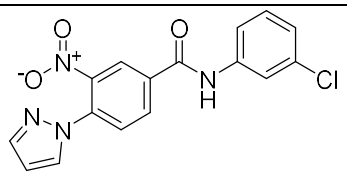
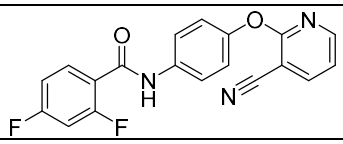
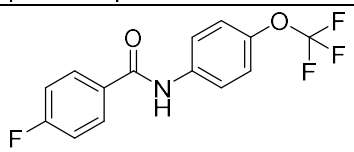
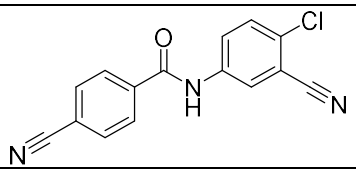
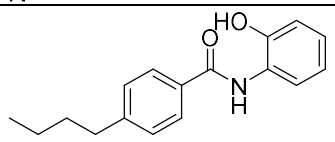
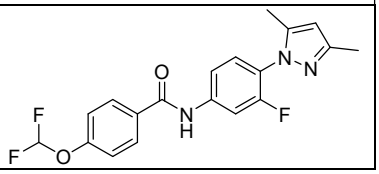
26	
27	
28	
29	
30	
31	

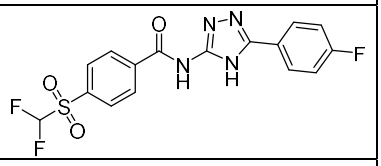
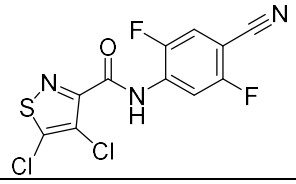
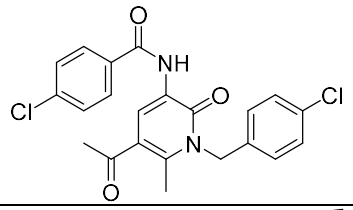
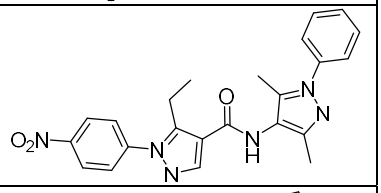
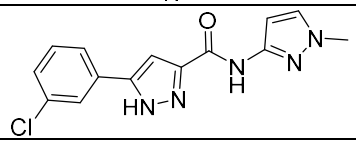
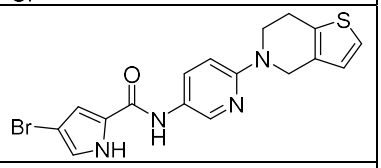
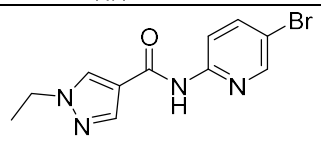
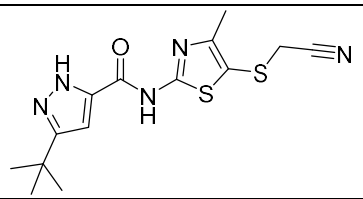
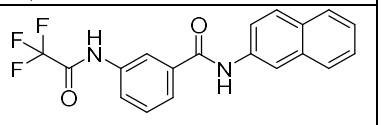
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	

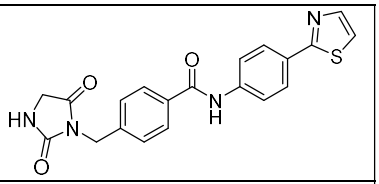
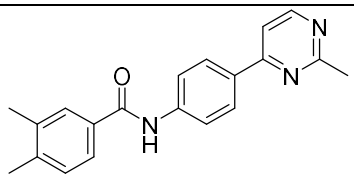
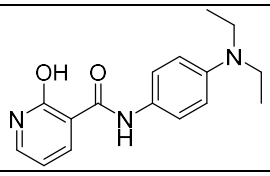
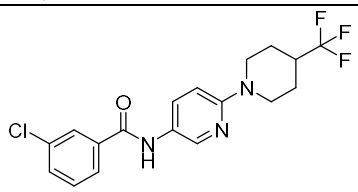
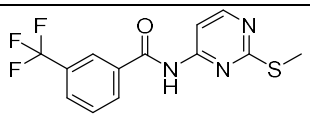
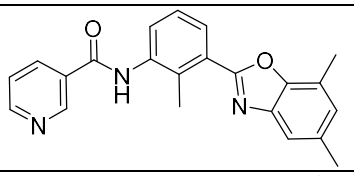
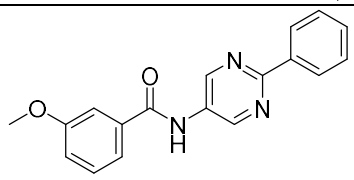
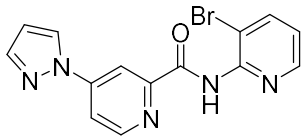
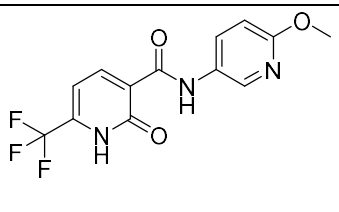
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	

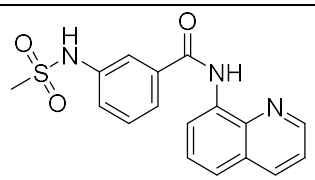
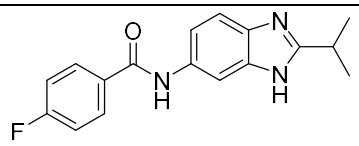
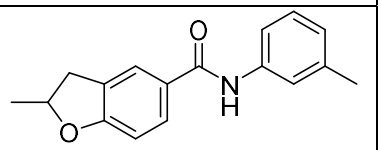
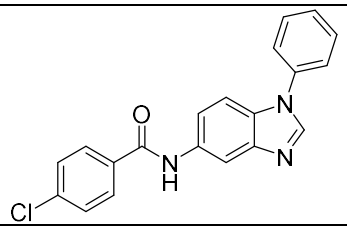
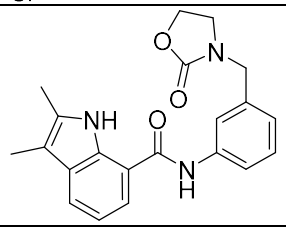
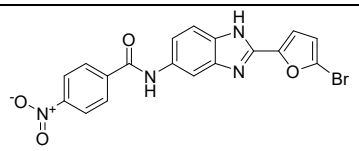
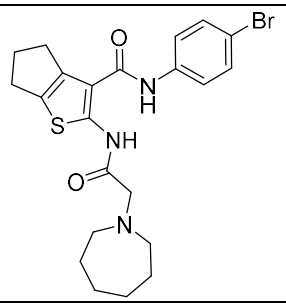
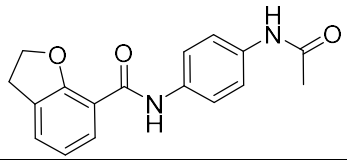
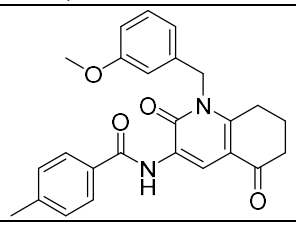
17	
18	
19	
20	
21	
22	
23	
24	

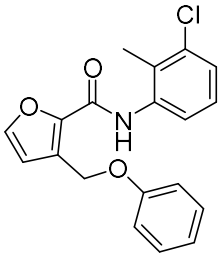
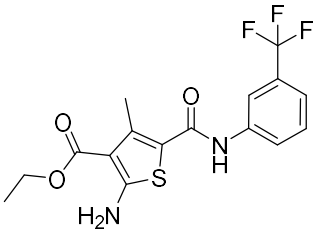
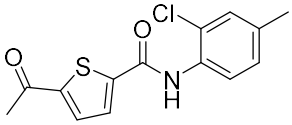
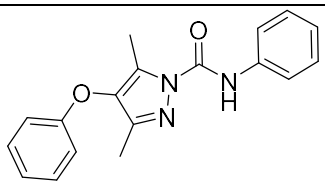
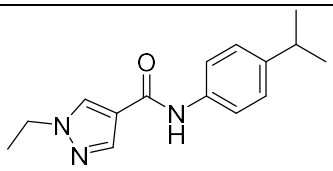
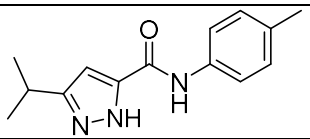
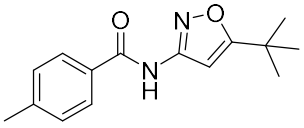
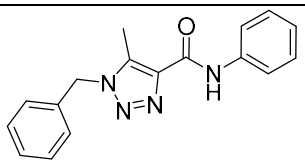
42	
43	
44	
45	
46	
47	
48	
49	

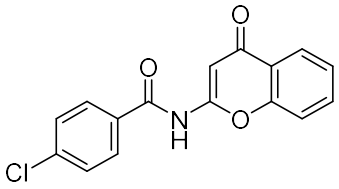
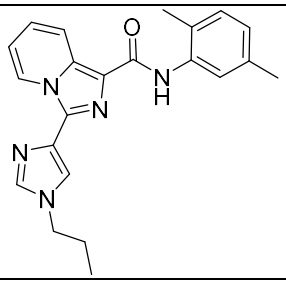
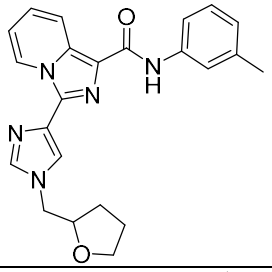
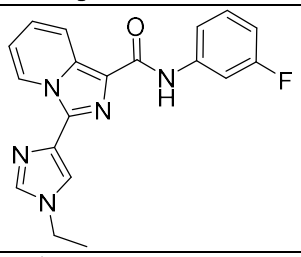
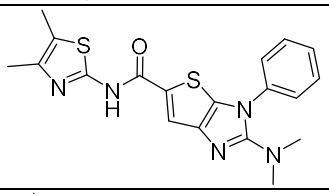
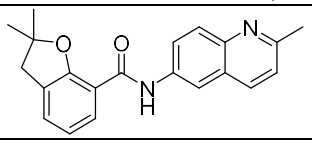
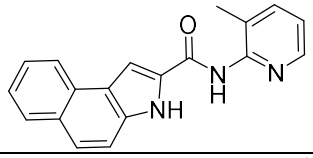
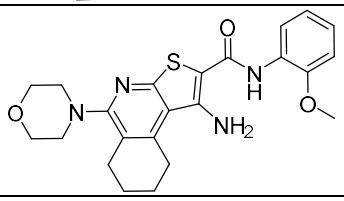
25	
1A	
2A	
3A	
4A	
5A	
6A	
7A	
8A	
9A	

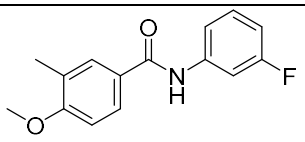
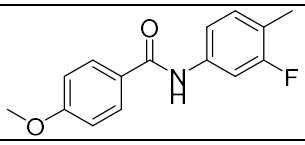
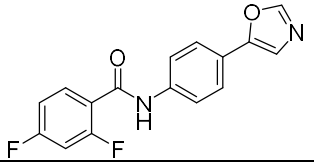
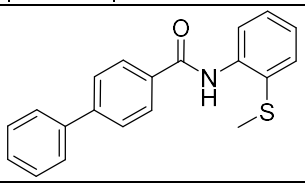
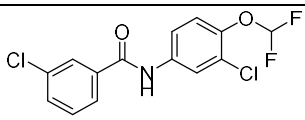
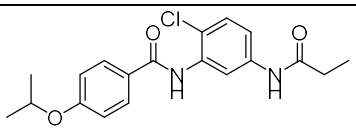
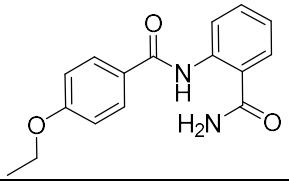
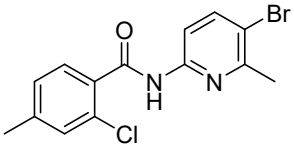
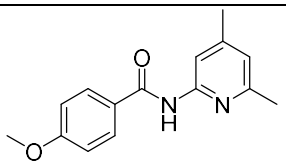
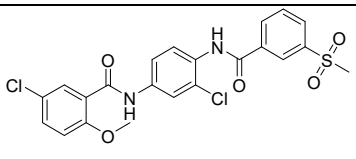
27A	
28A	
29A	
30A	
31A	
32A	
33A	
34A	
35A	

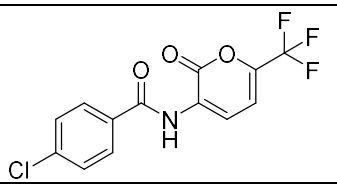
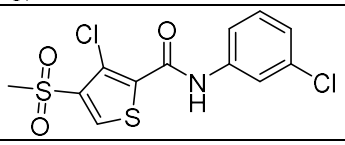
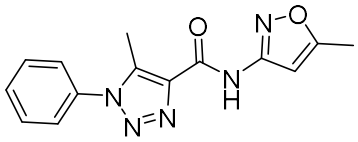
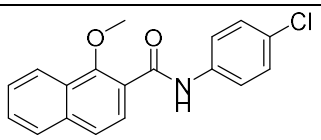
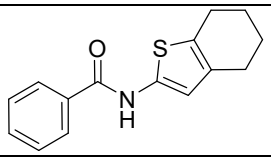
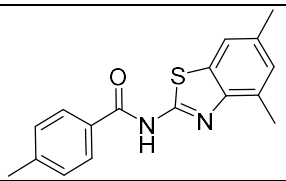
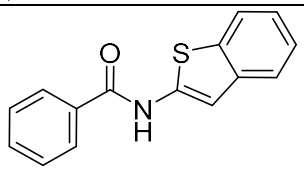
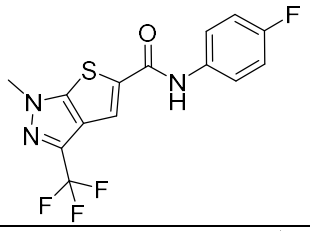
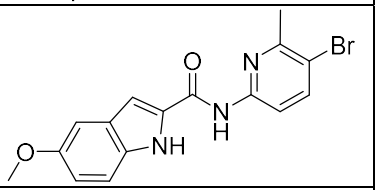
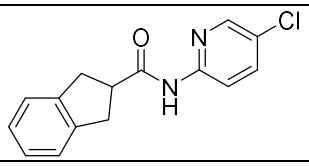
10A	
11A	
12A	
13A	
14A	
15A	
16A	
17A	
18A	

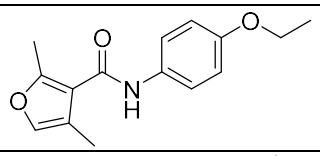
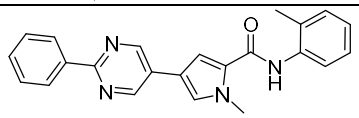
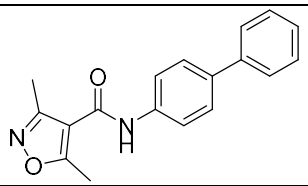
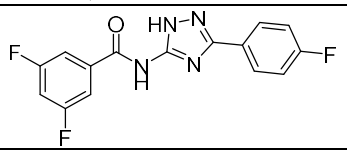
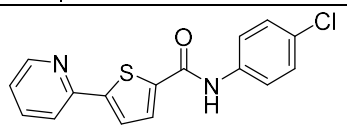
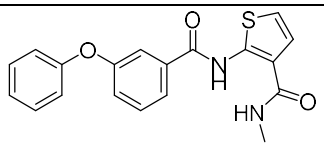
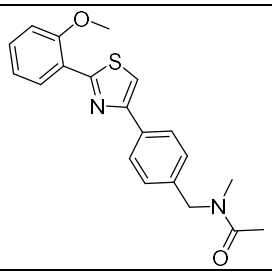
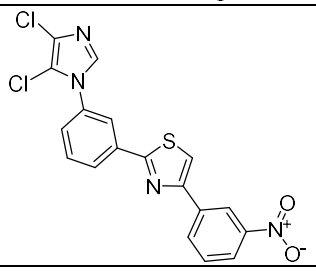
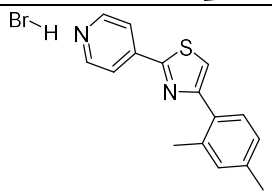
36A	
37A	
38A	
39A	
40A	
41A	
42A	
43A	
44A	

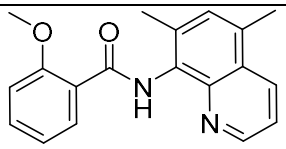
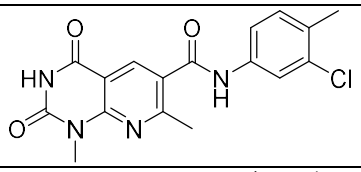
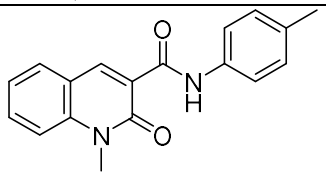
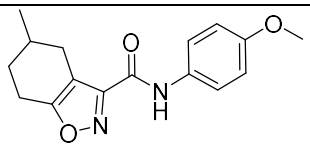
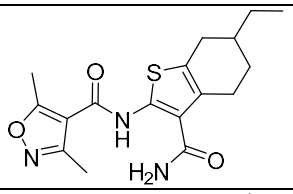
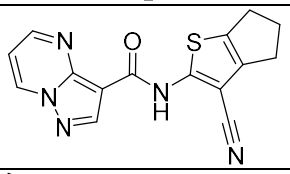
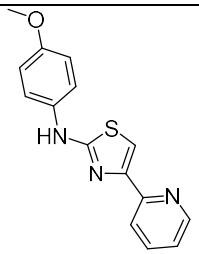
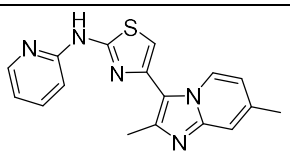
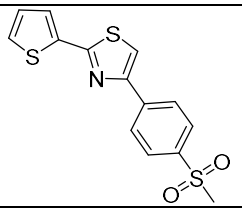
19A	
20A	
21A	
22A	
23A	
24A	
25A	
26A	

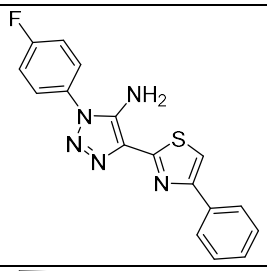
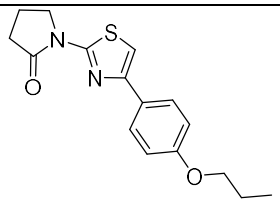
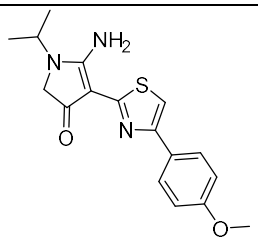
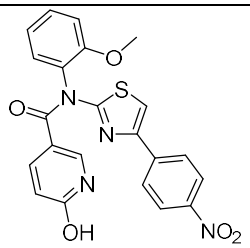
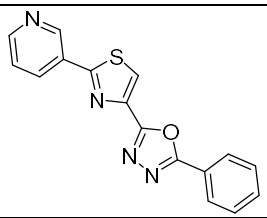
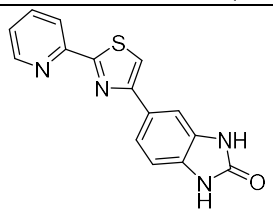
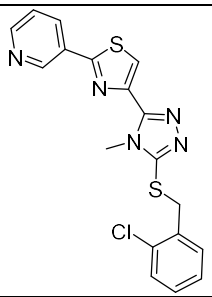
45A	
46A	
47A	
48A	
49A	
50A	
51A	
52A	

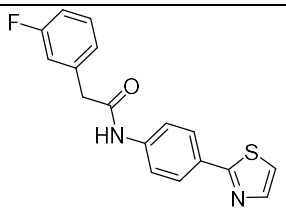
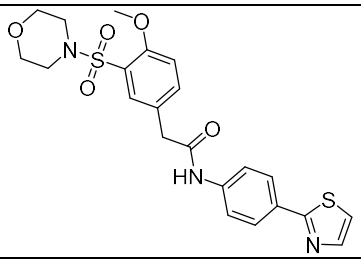
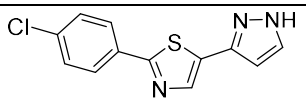
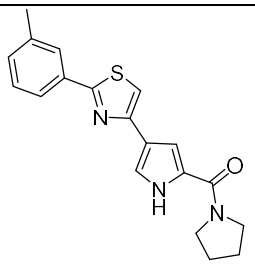
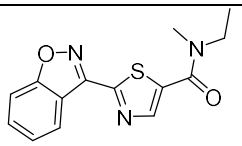
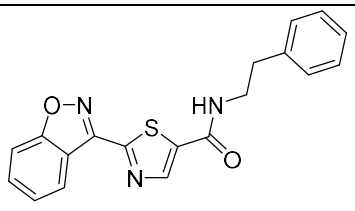
1B	
2B	
3B	
4B	
5B	
6B	
7B	
8B	
9B	
10B	

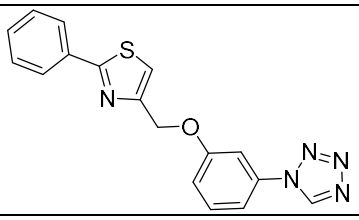
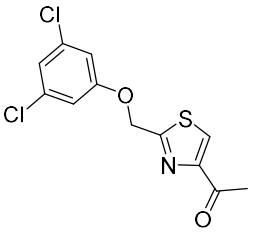
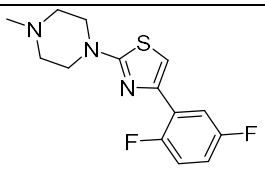
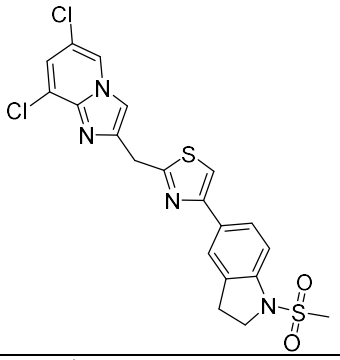
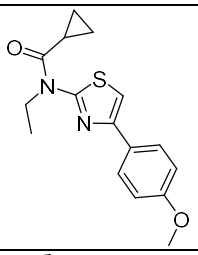
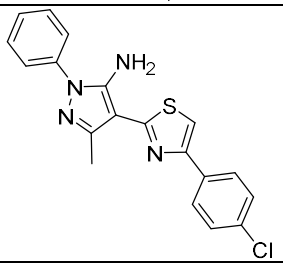
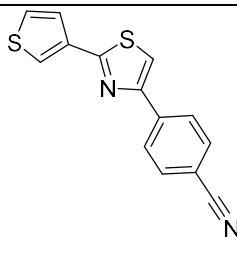
17B	
18B	
19B	
20B	
21B	
22B	
23B	
24B	
25B	
26B	

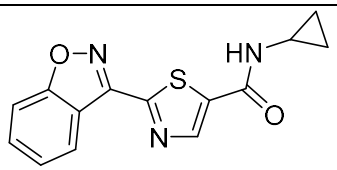
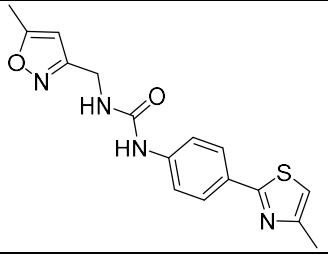
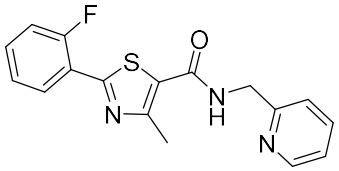
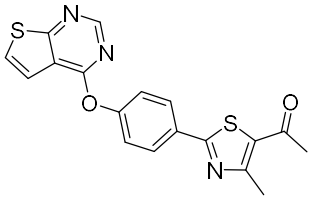
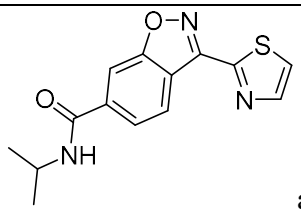
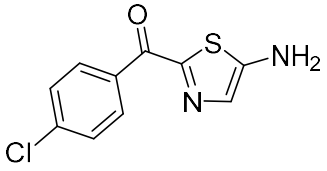
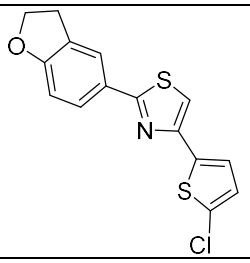
11B	
12B	
13B	
14B	
15B	
16B	
50	
51	
52	

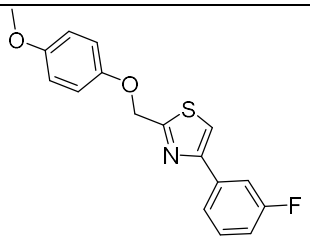
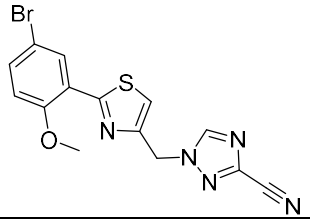
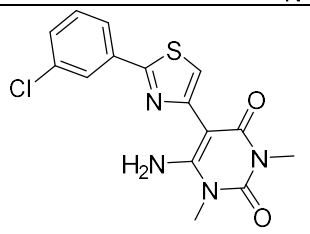
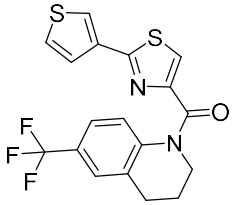
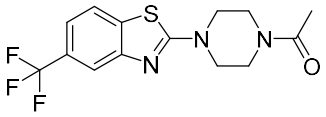
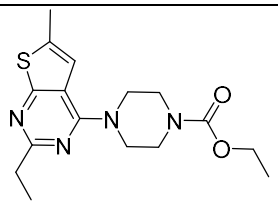
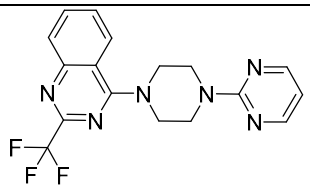
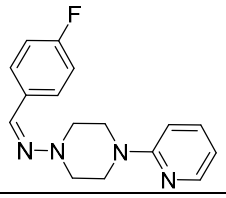
27B	
28B	
29B	
30B	
31B	
32B	
59	
60	
61	

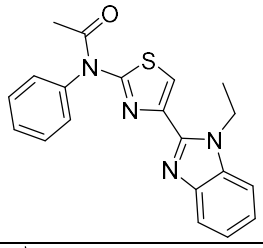
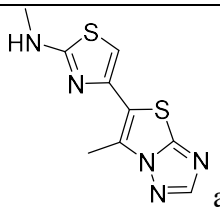
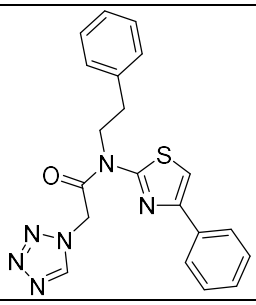
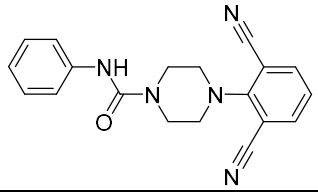
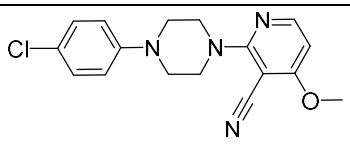
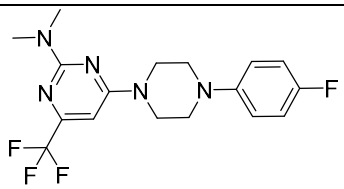
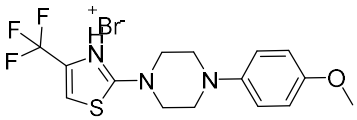
53	
54	
55	
56	
57	
58	
53A	

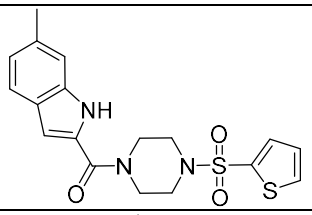
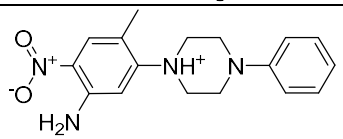
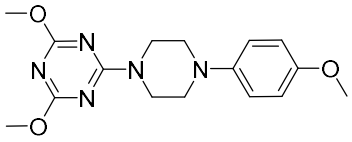
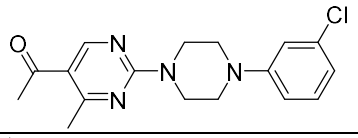
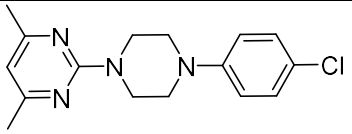
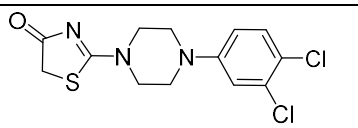
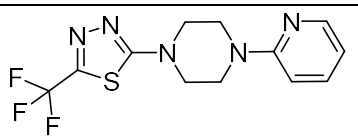
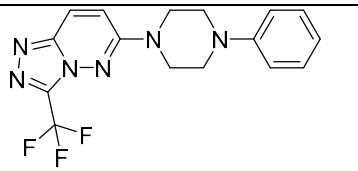
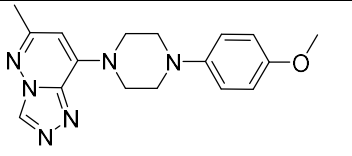
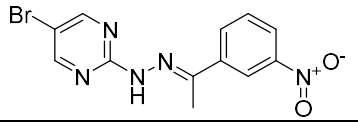
62	
63	
64	
126	
65	
60A	

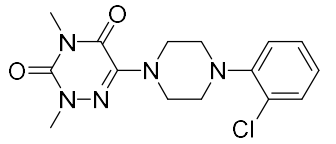
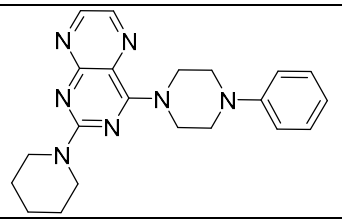
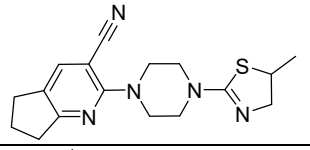
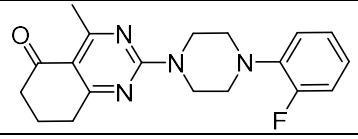
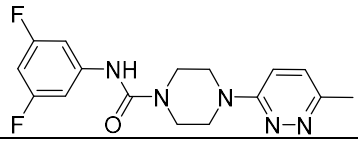
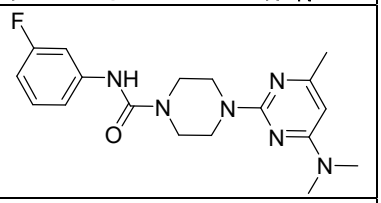
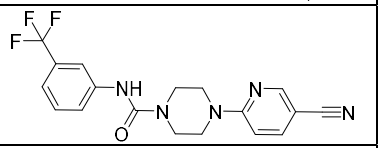
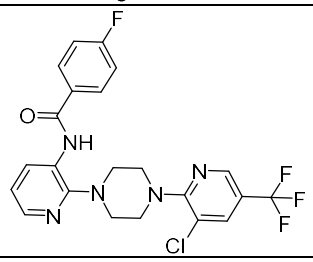
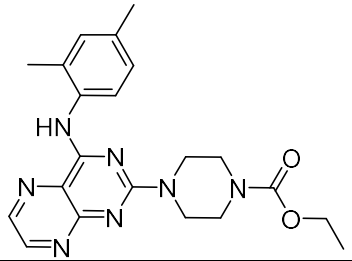
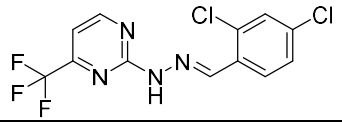
54A	
55A	
56A	
57A	
58A	
59A	
33B	

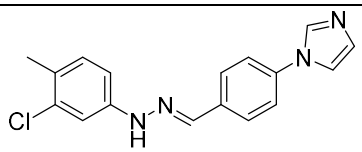
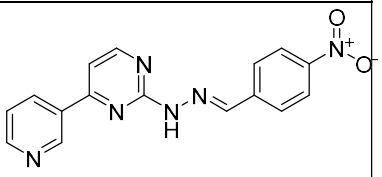
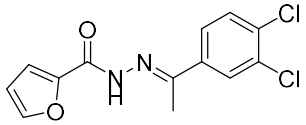
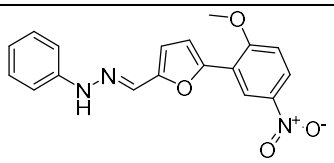
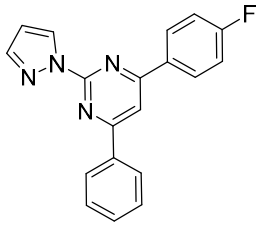
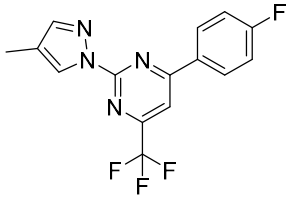
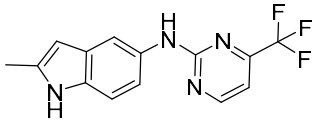
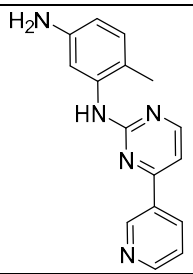
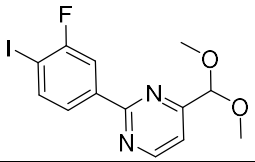
61A	
62A	
63A	
64A	
65A	 and
66A	
38B	

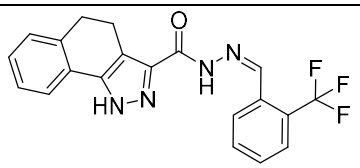
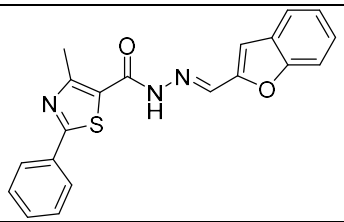
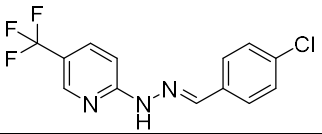
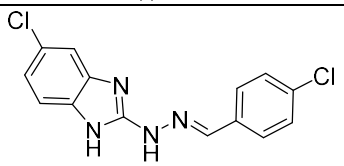
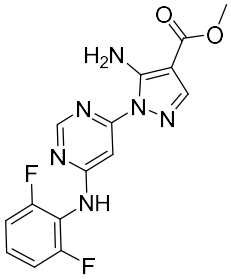
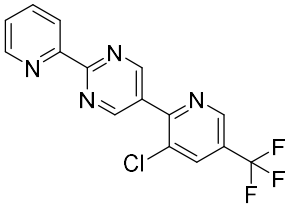
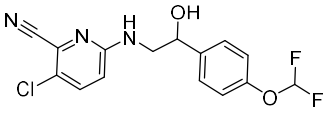
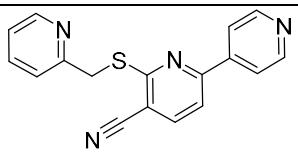
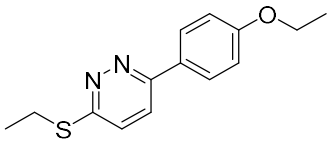
34B	
35B	
36B	
37B	
74	
75	
76	
77	

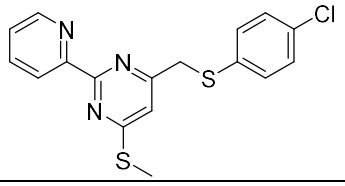
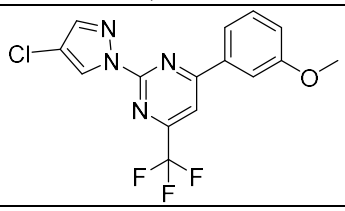
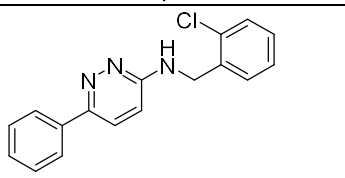
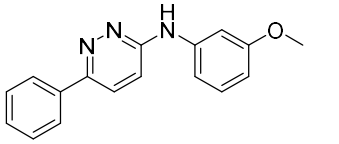
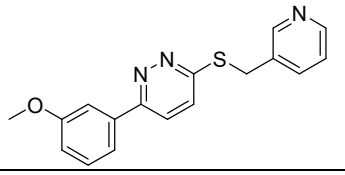
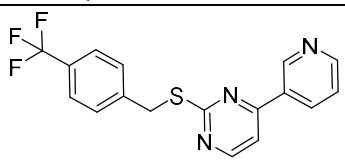
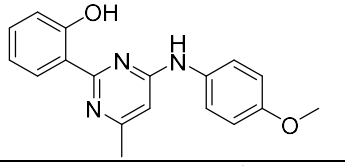
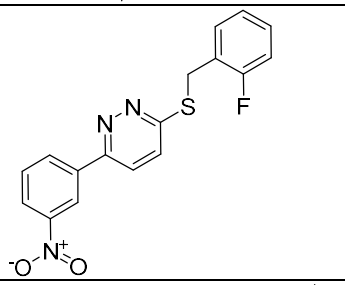
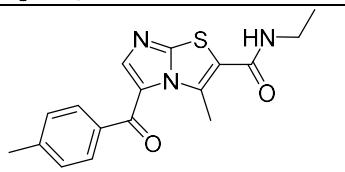
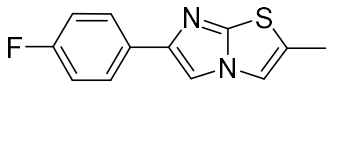
39B	
40B	 and
41B	
79	
80	
81	
111	

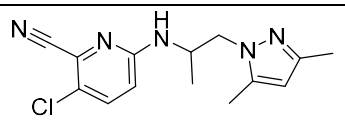
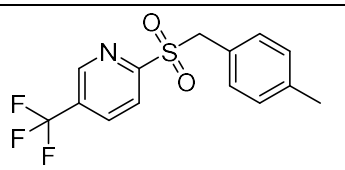
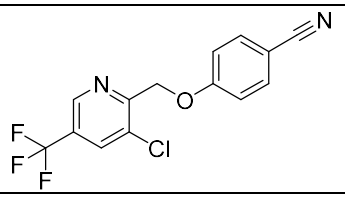
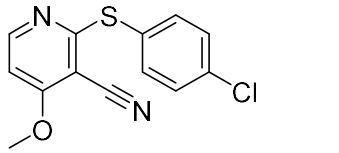
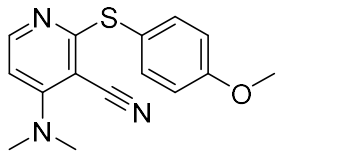
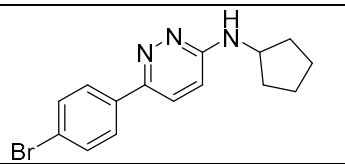
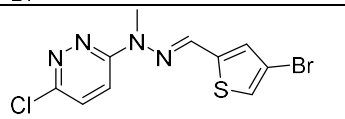
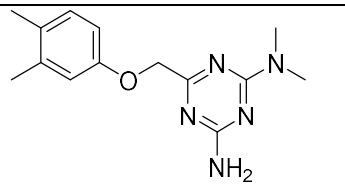
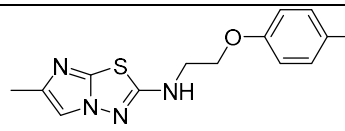
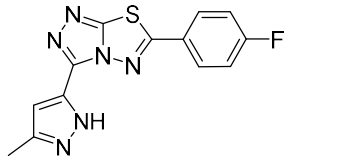
78	
67A	
68A	
69A	
70A	
71A	
72A	
73A	
74A	
112	

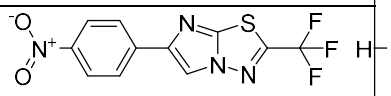
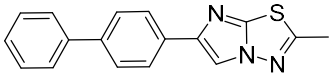
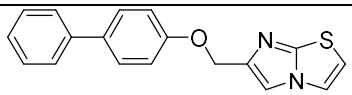
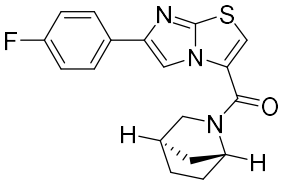
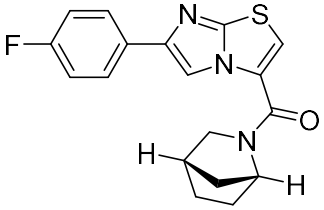
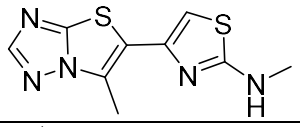
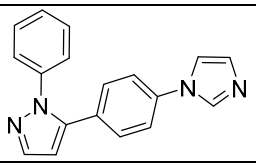
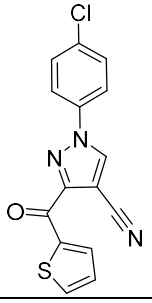
42B	
75A	
76A	
77A	
78A	
79A	
80A	
81A	
82A	
114	

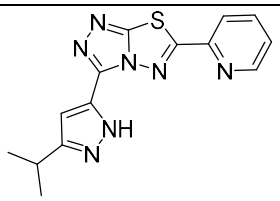
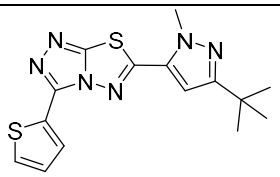
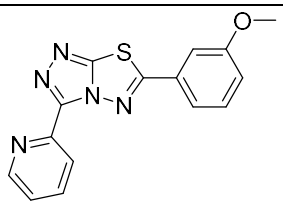
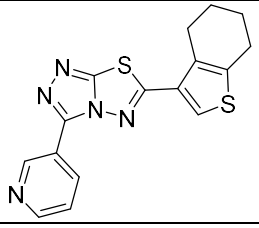
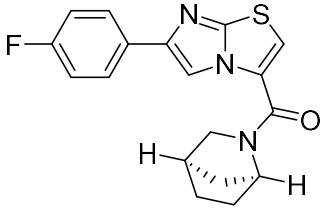
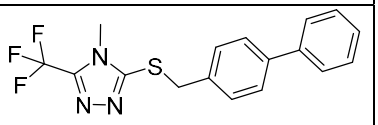
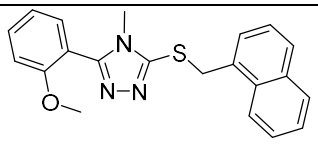
98	
113	
43B	
44B	 and
82	
83	
84	
85	
84A	

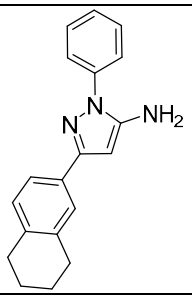
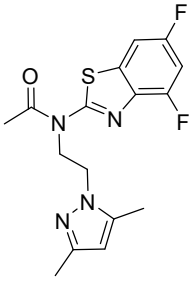
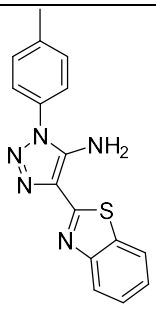
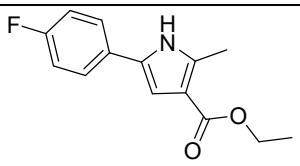
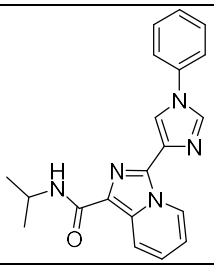
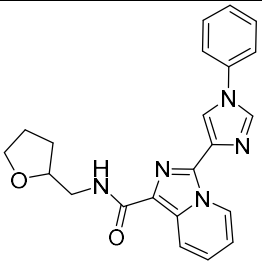
99	 and
115	
45B	
83A	
86	
87	
88	 and
89	
90A	

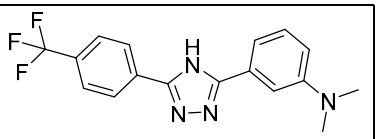
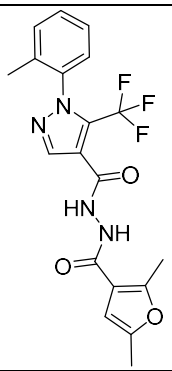
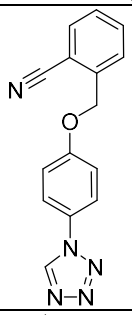
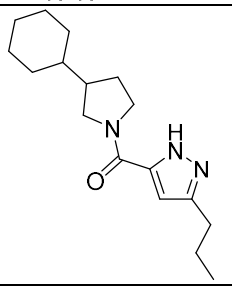
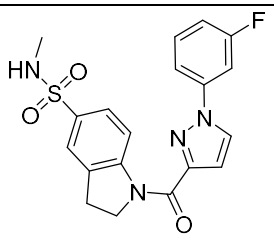
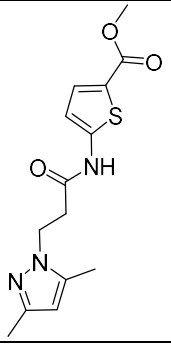
85A	
86A	
87A	
88A	
89A	
46B	
47B	
48B	
66	
67	

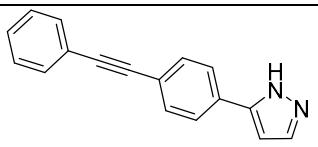
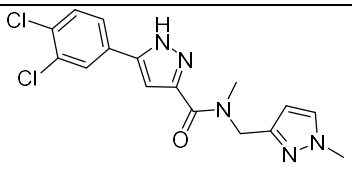
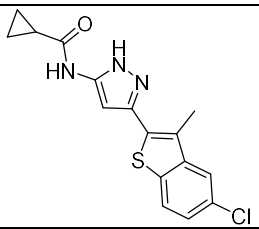
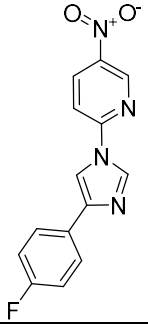
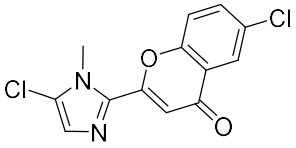
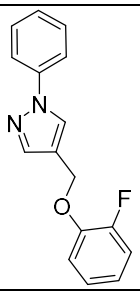
91A	
92A	
93A	
94A	
95A	
49B	
50B	
51B	
70	
71	

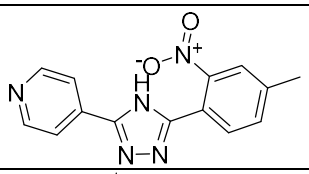
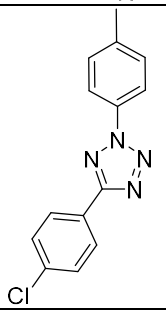
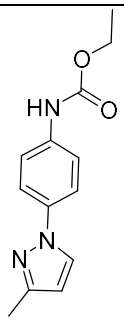
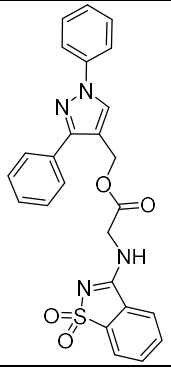
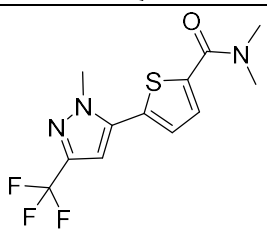
68	
69	
96A	
97A	
97A1	
40B	
90	
91	

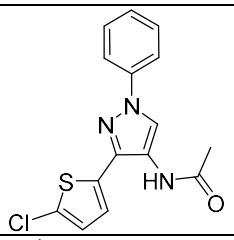
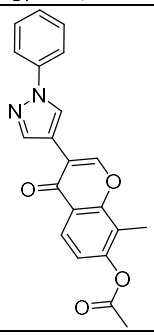
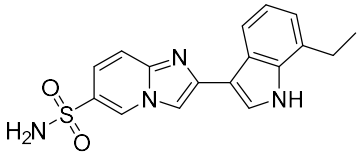
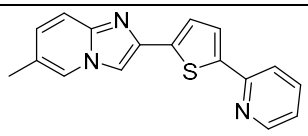
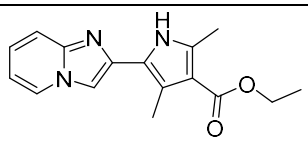
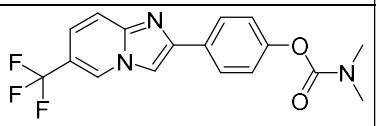
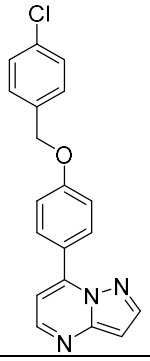
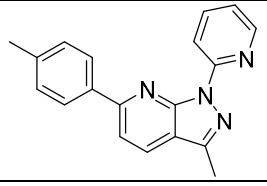
72	
73	
98A	
99A	
97A2	
95	
96	

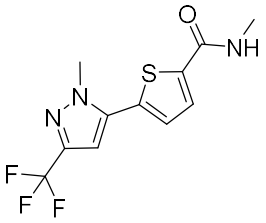
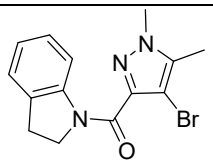
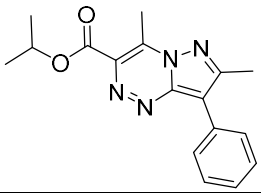
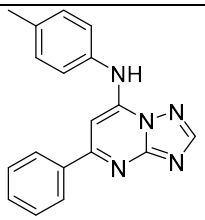
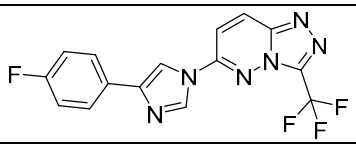
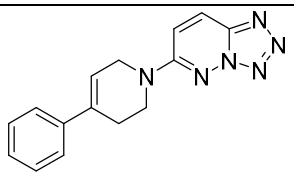
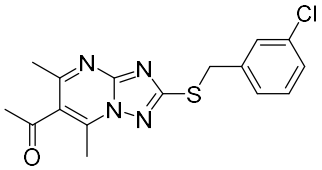
92	
93	
94	
100A	
101A	
102A	

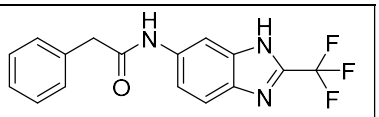
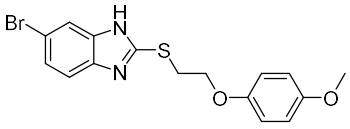
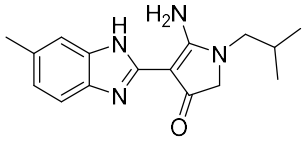
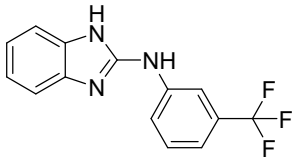
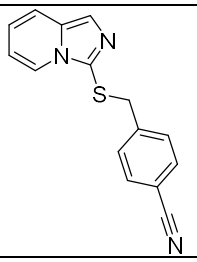
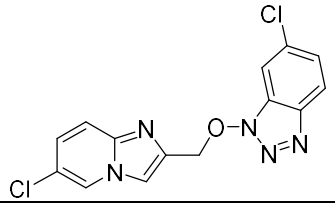
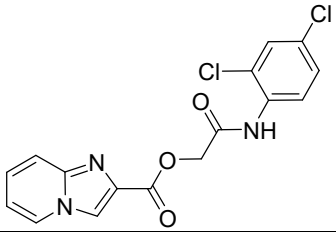
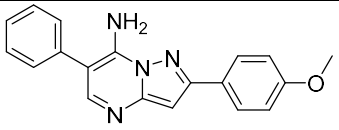
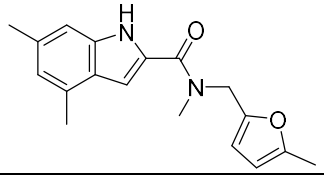
97	
139	
154	
106A	
107A	
108A	

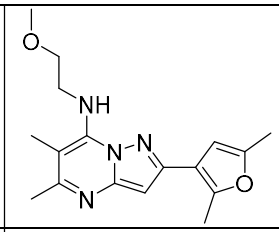
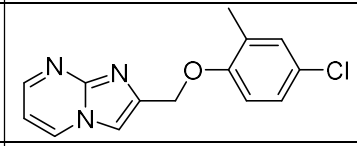
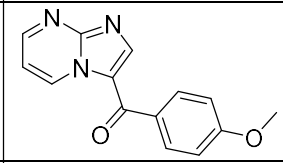
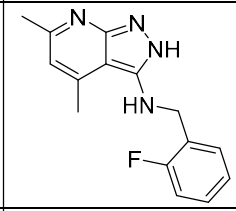
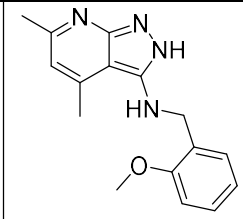
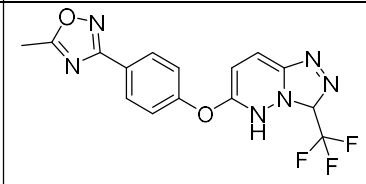
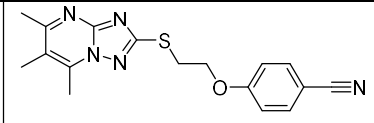
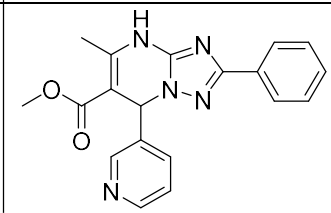
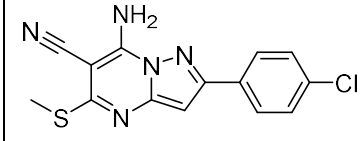
103A	
104A	
105A	
52B	
53B	
54B	

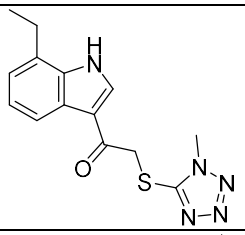
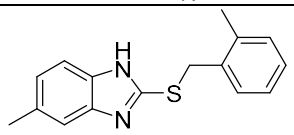
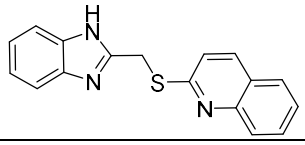
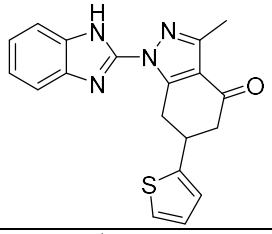
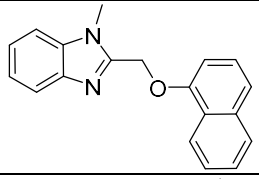
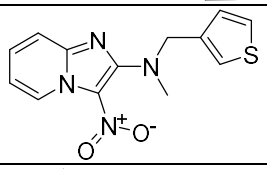
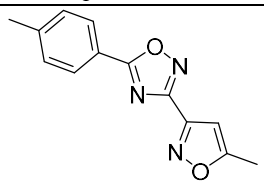
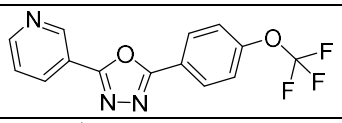
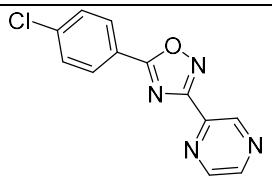
109A	
110A	
57B	
58B	
59B	

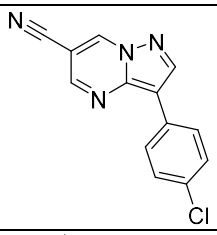
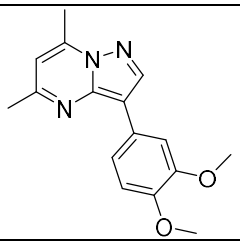
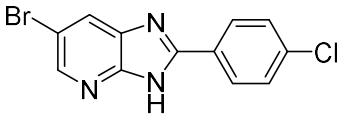
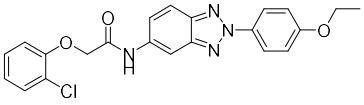
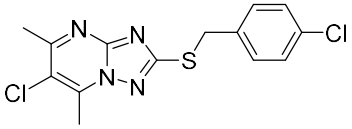
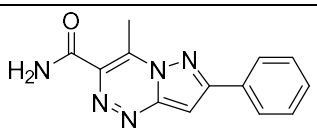
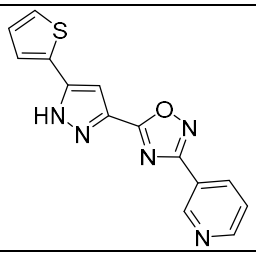
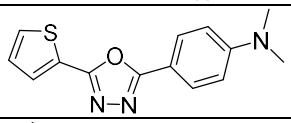
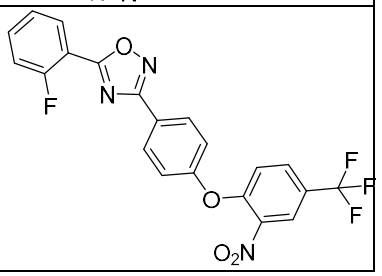
55B	
56B	
100	
101	
102	
103	
104	
105	

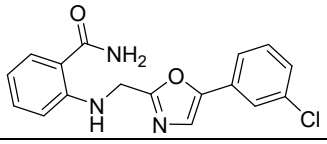
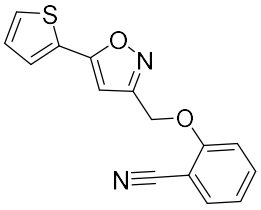
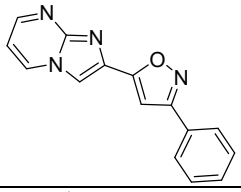
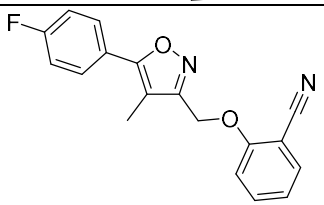
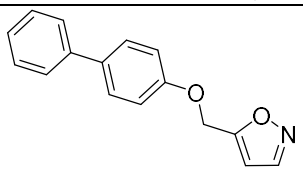
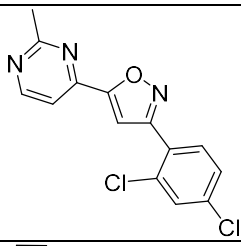
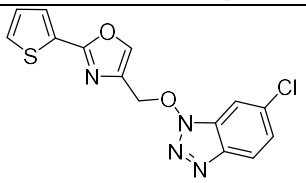
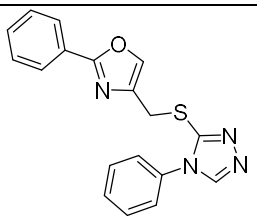
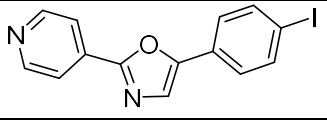
60B	
61B	
106	
107	
108	
110	
125	

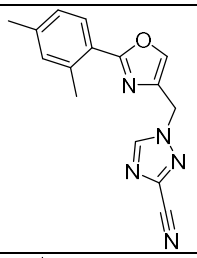
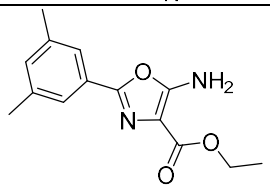
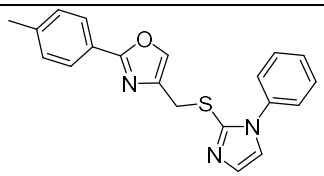
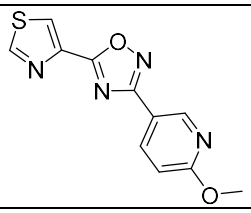
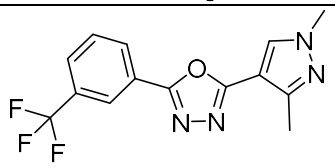
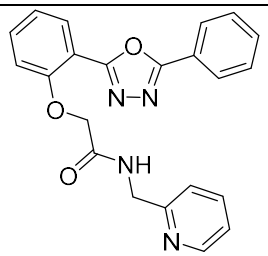
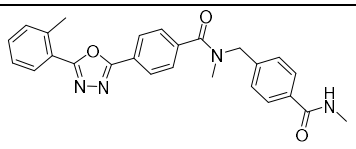
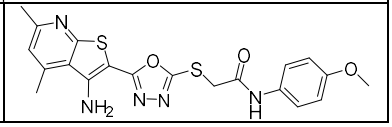
111A	
112A	
113A	
114A	
115A	
116A	
117A	
118A	
62B	

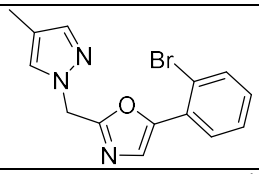
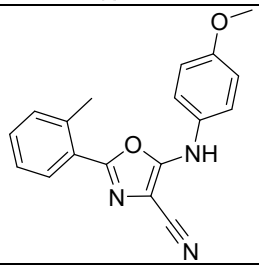
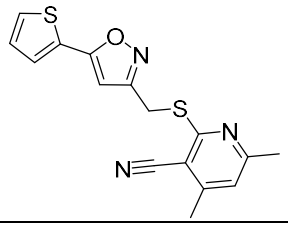
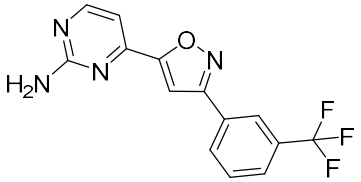
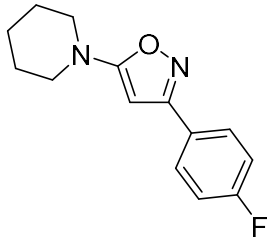
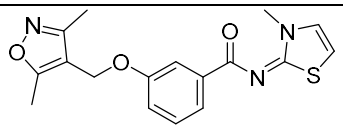
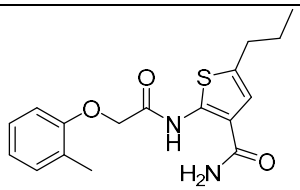
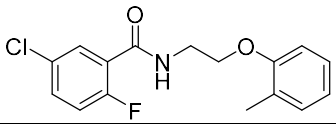
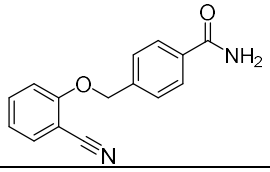
119A	
120A	
121A	
122A	
123A	
124A	
125A	
126A	
69B	

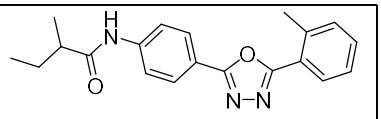
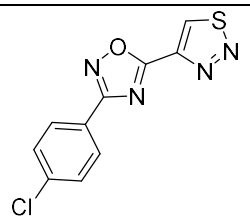
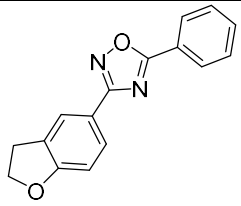
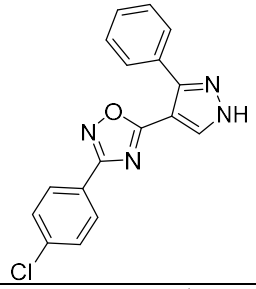
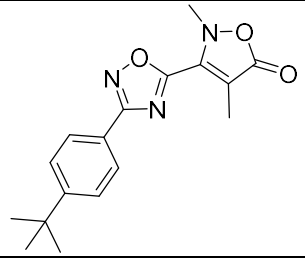
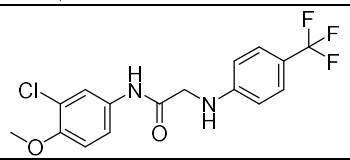
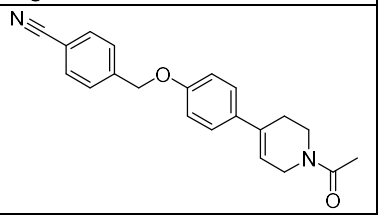
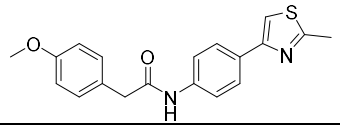
63B	
64B	
65B	
66B	
67B	
68B	
122	
123	
140	

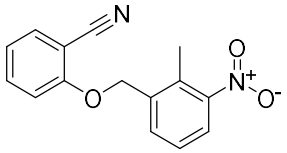
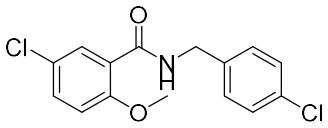
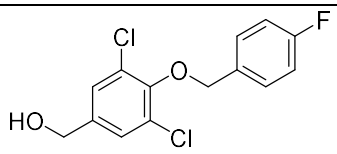
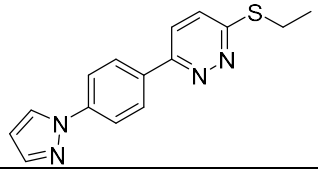
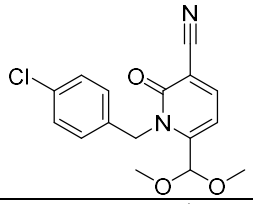
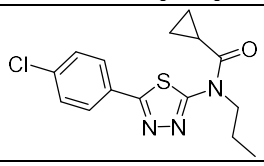
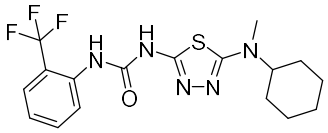
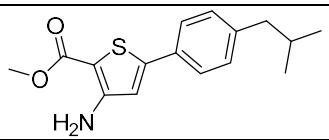
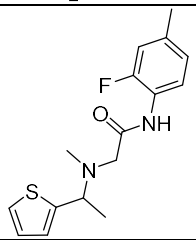
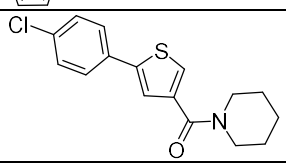
70B	
71B	
72B	
73B	
74B	
75B	
144	
149	
157	

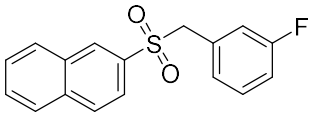
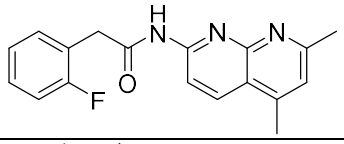
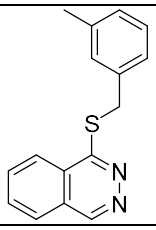
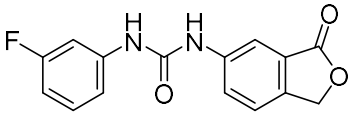
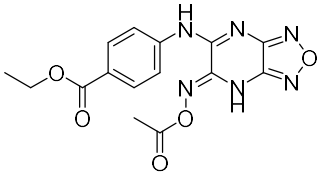
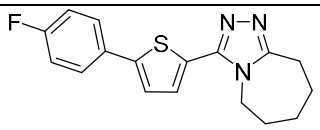
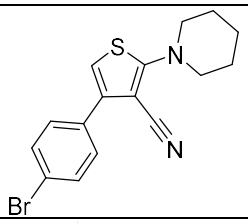
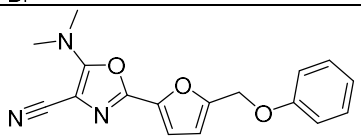
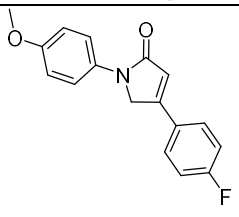
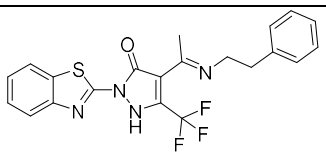
141	
127A	
128A	
129A	
130A	
131A	
132A	
133A	
76B	

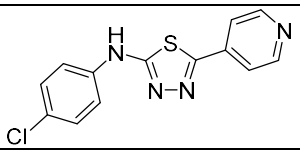
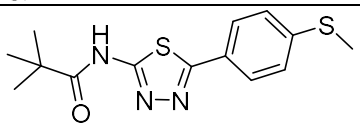
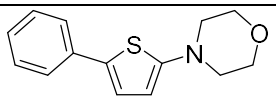
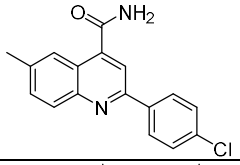
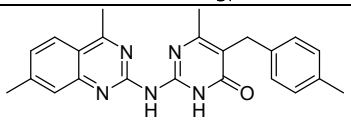
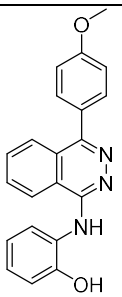
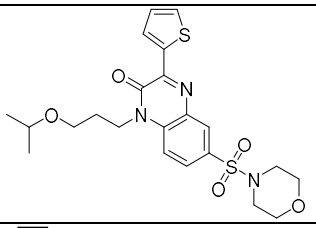
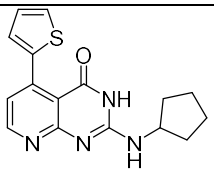
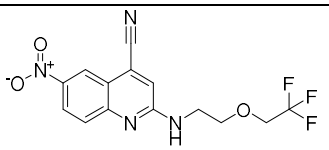
134A	
135A	
136A	
137A	
138A	
139A	
140A	
82B	

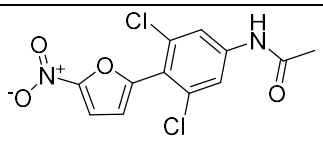
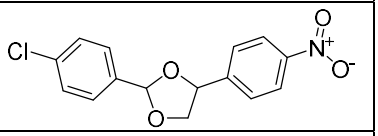
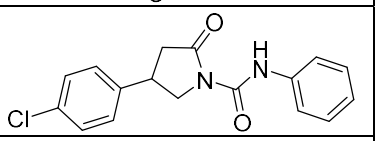
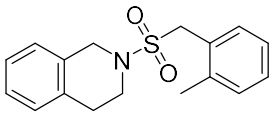
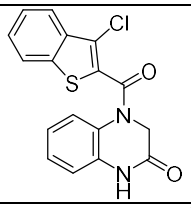
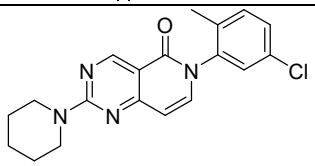
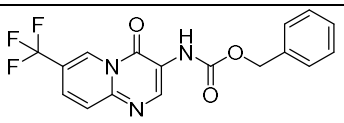
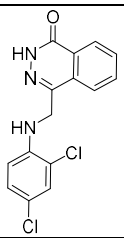
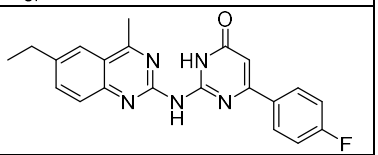
77B	
78B	
79B	
80B	
81B	
118	
119	
141A	
142A	

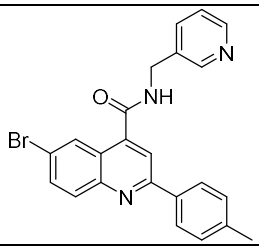
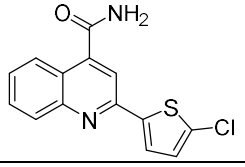
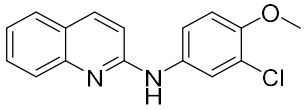
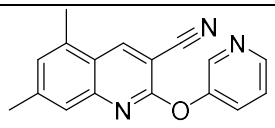
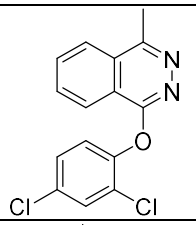
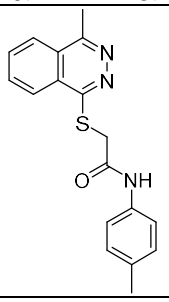
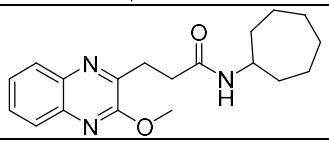
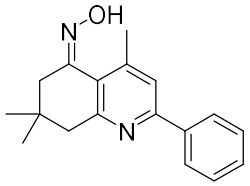
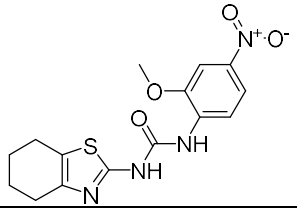
83B	
84B	
85B	
86B	
87B	
127	
143	
143A	

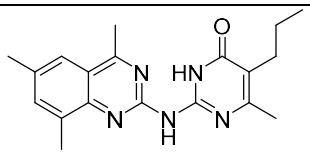
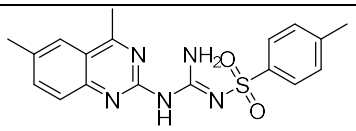
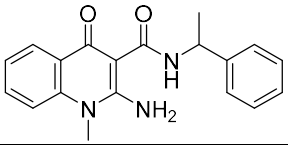
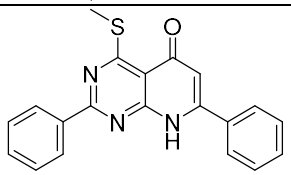
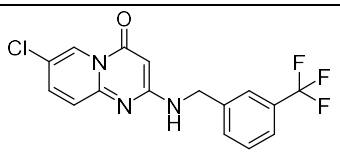
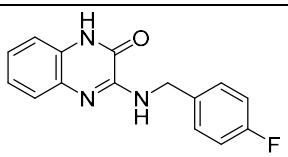
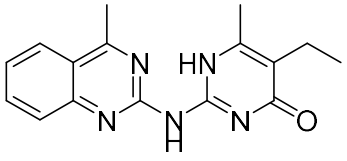
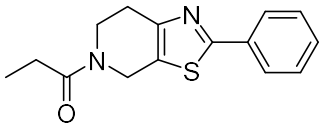
88B	
89B	
90B	
91B	
92B	
144A	
145A	
146A	
147A	
148A	

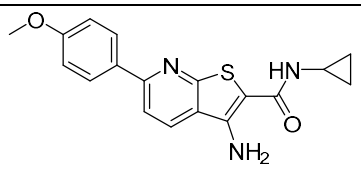
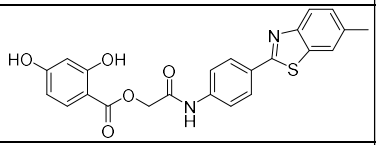
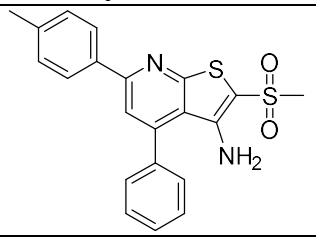
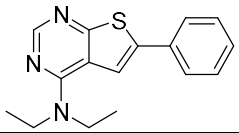
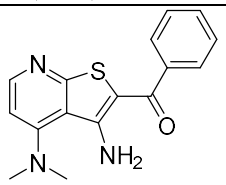
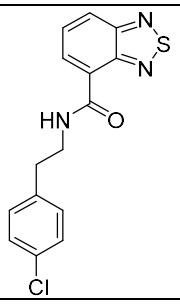
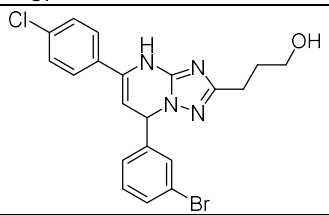
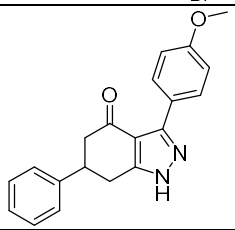
93B	
94B	
95B	
96B	
97B	
149A	
150A	
151A	
152A	
153A	

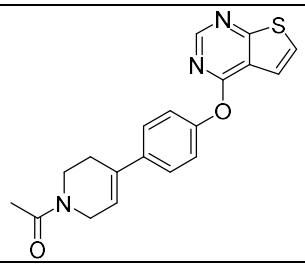
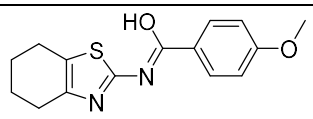
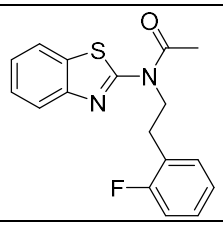
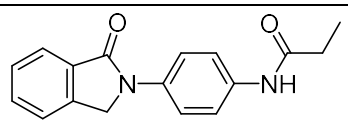
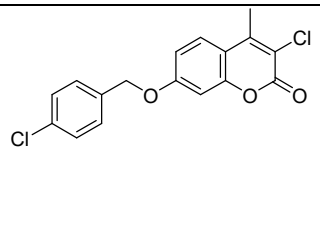
98B	
99B	
100B	
116	
124	
130	
128	
129	
154A	

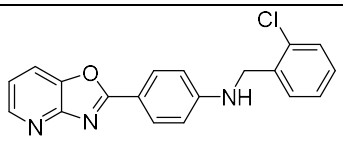
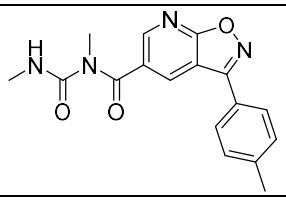
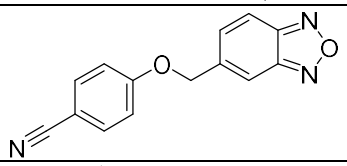
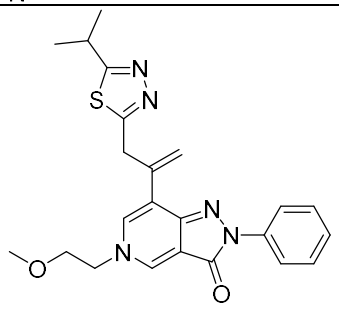
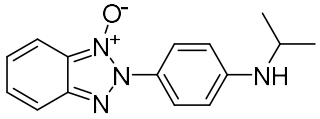
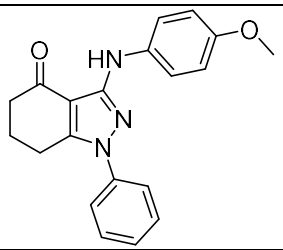
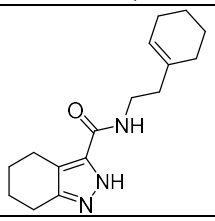
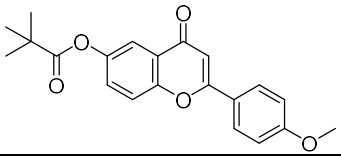
101B	
102B	
103B	
131	
132	
134	
151	
156	
162A	

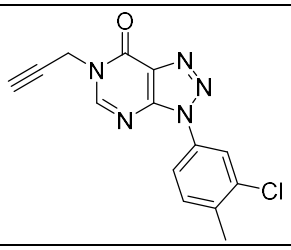
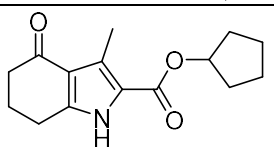
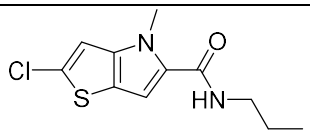
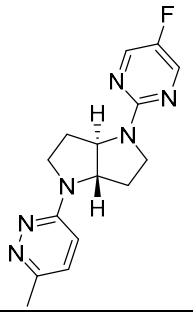
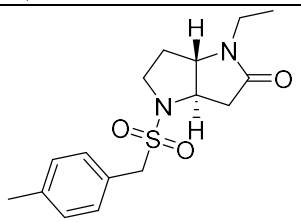
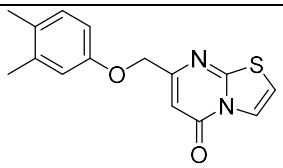
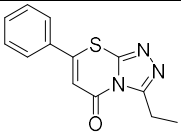
155A	
156A	
157A	
158A	
159A	
160A	
161A	
104B	
121	

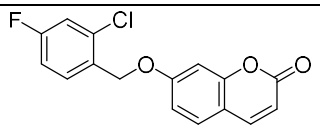
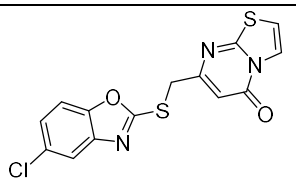
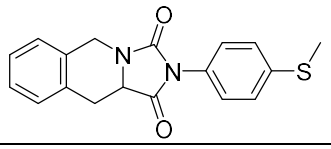
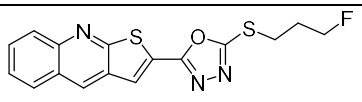
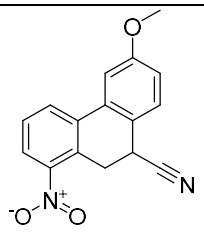
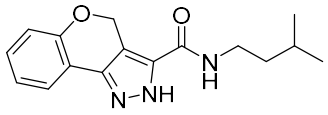
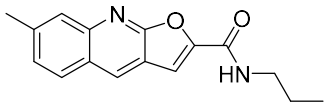
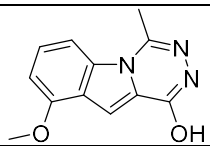
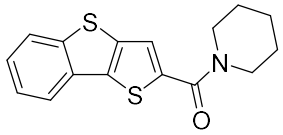
163A	
164A	
165A	
166A	
167A	
168A	
105B	
147	

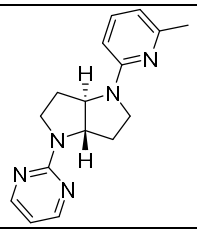
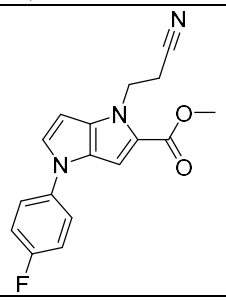
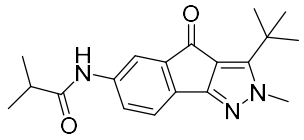
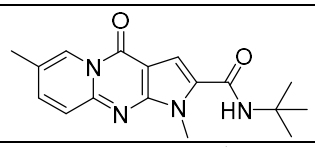
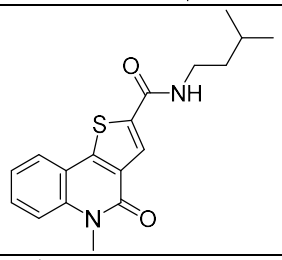
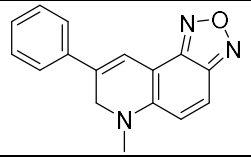
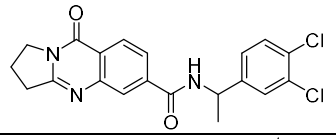
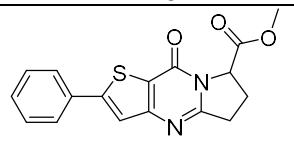
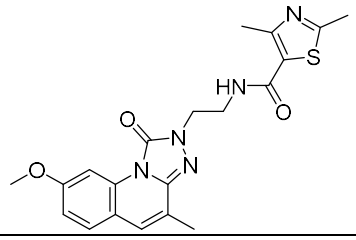
136	
138	
169A	
170A	
106B	
107B	
109	
117	

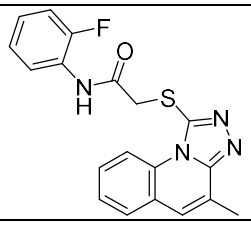
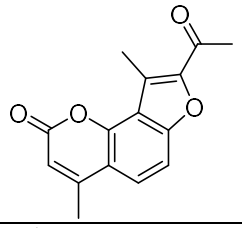
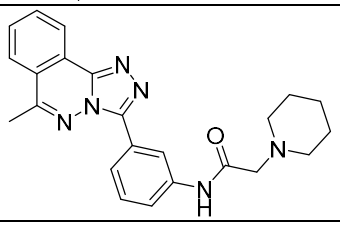
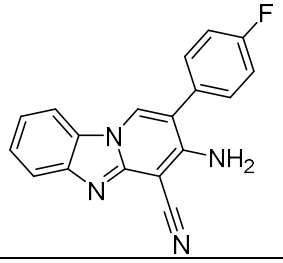
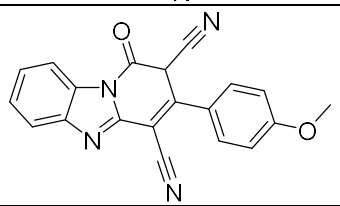
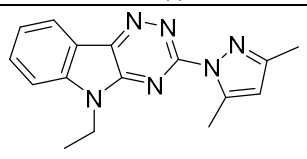
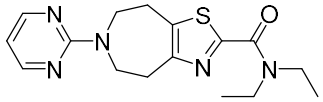
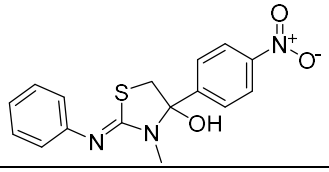
150	
171A	
108B	
135	
137	

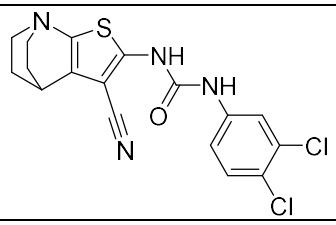
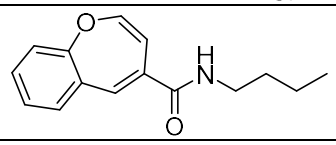
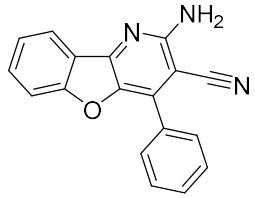
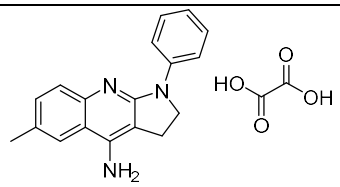
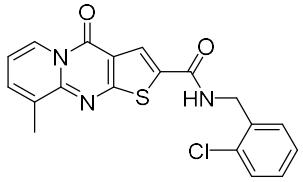
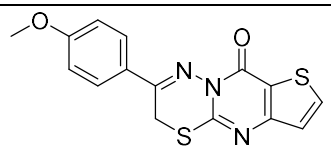
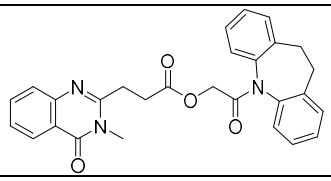
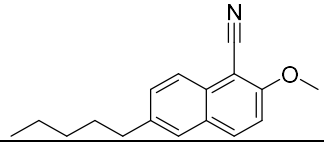
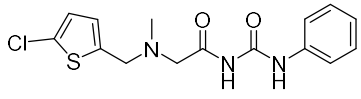
172A	
173A	
174A	
175A	
176A	
177A	
109B	
110B	

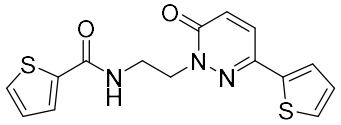
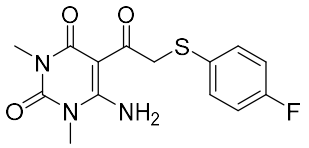
178A	
179A	
180A	
181A	
182A	
113B	
114B	

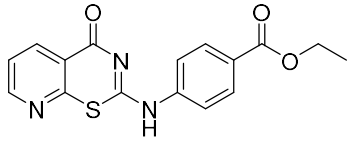
111B	
112B	
120	
155	
152	
183A	
184A	
185A	
186A	

115B	
116B	
148	
146	
145	
188A	
189A	
190A	
191A	

187A	
118B	
119B	
120B	
121B	
122B	
133	
142	

192A	
193A	
123B	
124B	
125B	
126B	
127B	
117B	
153	

194A	
195A	

196A	
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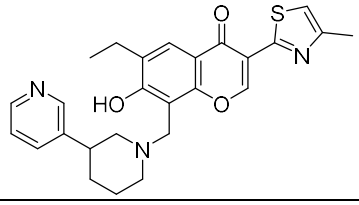
197A	

, or a salt thereof.

11. A method of producing an expanded population of hematopoietic stem cells ex vivo, the method comprising contacting a population of hematopoietic stem cells with the compound of any one of claims 1-10 in an amount sufficient to produce an expanded population of hematopoietic stem cells.

12. A method of enriching a population of cells with hematopoietic stem cells ex vivo, said method comprising contacting a population of hematopoietic stem cells with the compound of any one of claims 1-10.

13. A method of maintaining the hematopoietic stem cell functional potential of a population of hematopoietic stem cells ex vivo for two or more days, said method comprising contacting a first population of hematopoietic stem cells with the compound of any one of claims 1-10, wherein the first population of hematopoietic stem cells exhibits a hematopoietic stem cell functional potential after two or more days that is greater than that of a control population of hematopoietic stem cells cultured under the same conditions and for the same time as said first population of hematopoietic stem cells but not contacted with said compound.

14. A population of hematopoietic stem cells produced by contacting said hematopoietic stem cells or progenitors thereof with the compound of any one of claims 1-10 for use in treating a human patient suffering from a stem cell disorder.

15. A method of preparing an expanded population of hematopoietic stem cells for transplantation into a human patient suffering from a stem cell disorder, said method comprising contacting a first population of hematopoietic stem cells with the compound of

any one of claims 1-10 for a time sufficient to produce said expanded population of hematopoietic stem cells.

16. An expanded population of hematopoietic stem cells for use in treating a human patient suffering from a stem cell disorder, comprising the steps of:

a. preparing an expanded population of hematopoietic stem cells by contacting a first population of hematopoietic stem cells with the compound of any one of claims 1-10 for a time sufficient to produce said expanded population of hematopoietic stem cells; and

b. administering said expanded population of hematopoietic stem cells to said patient.

17. A method of producing microglia in the central nervous system of a patient (e.g., a human patient) in need thereof, comprising administering an expanded population of hematopoietic stem cells to the patient, wherein the expanded population of hematopoietic stem cells is prepared by contacting a first population of hematopoietic stem cells with the compound of any one of claims 1-10 for a time sufficient to produce the expanded population of hematopoietic stem cells, and wherein administration of the expanded population of hematopoietic stem cells results in formation of microglia in the central nervous system of the patient.

18. A composition comprising a population of hematopoietic stem cells, wherein said hematopoietic stem cells or progenitors thereof have been contacted with the compound of any one of claims 1-10, thereby expanding said hematopoietic stem cells or progenitors thereof.

19. A composition comprising:
the compound of any one of claims 1-10; and
a cell culture medium.

20. A pharmaceutical composition comprising the compound of any one of claims 1-10, or a pharmaceutically acceptable salt, hydrate, or solvate thereof, and a pharmaceutically acceptable carrier.

21. A method of modulating the activity of an aryl hydrocarbon receptor, comprising administering to a subject in need thereof an effective amount of the compound of any one of claims 1-10, or a pharmaceutically acceptable salt, hydrate, or solvate thereof.

22. The compound of any one of claims 1-10, or a pharmaceutically acceptable salt, hydrate, or solvate thereof, for use in treating or preventing a disease or disorder.