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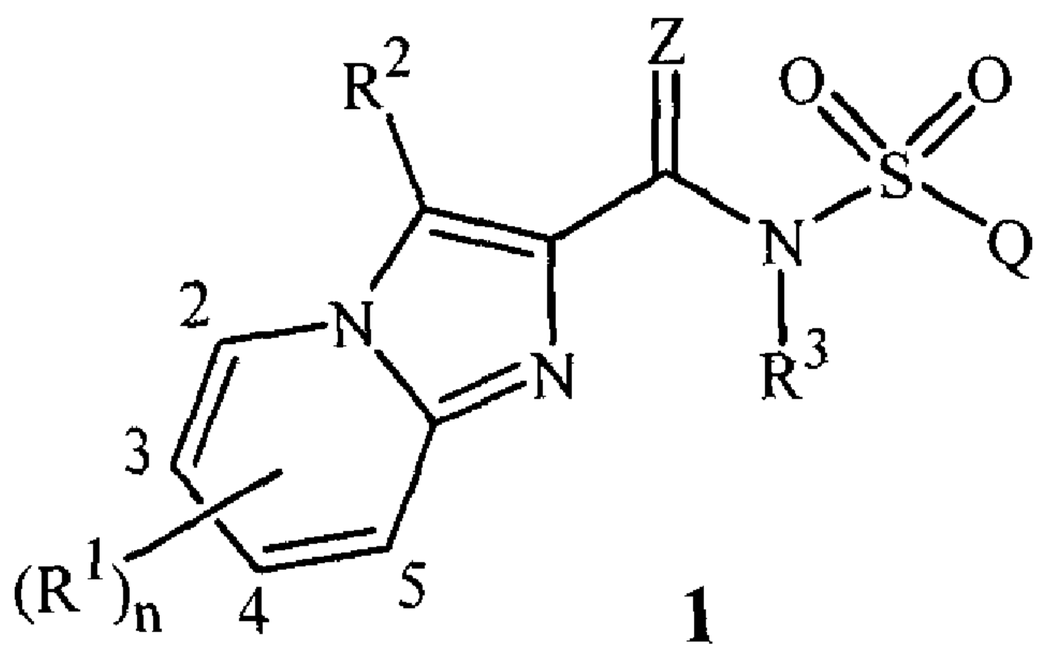
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(54) Title: NEMATOCIDAL SULFONAMIDES



1

(57) Abrégé/Abstract:
Disclosed are compounds of Formula 1 (see "Formula 1"), N-oxides, and salts thereof, wherein Z is O or S; and R^1, R^2, R^3, Q and n are as defined in the disclosure. Also disclosed are compositions containing the compounds of Formula 1 and methods for controlling a parasitic nematode comprising contacting the parasitic nematode or its environment with a biologically effective amount of a compound or a composition of the invention.

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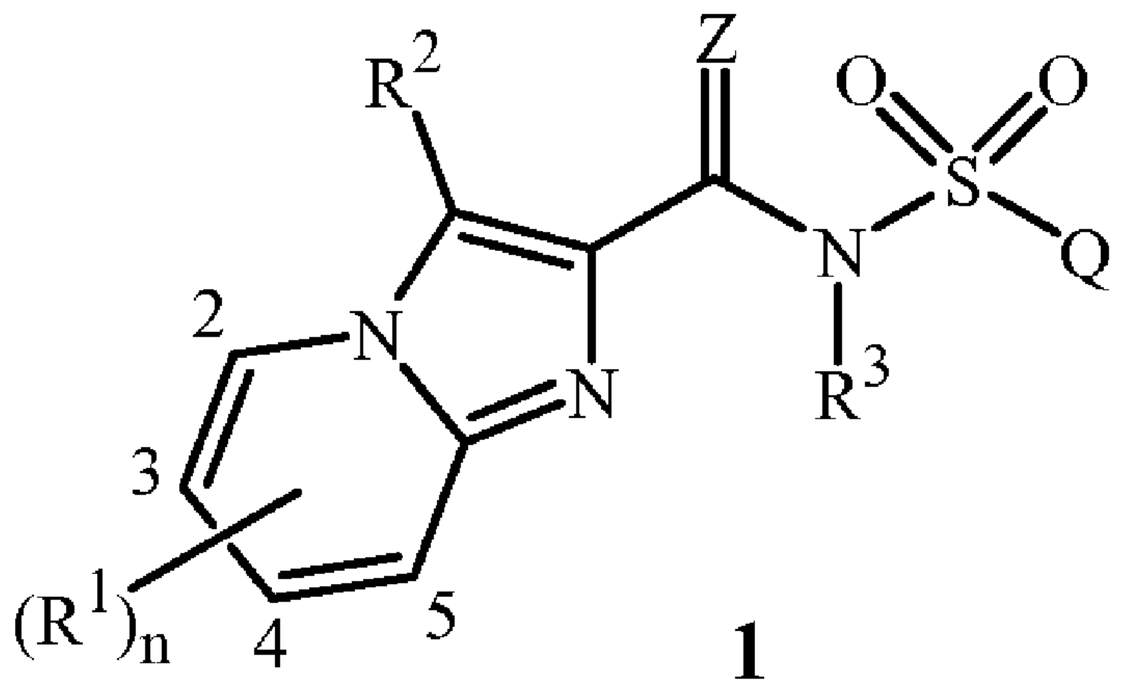
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1

(57) Abstract: Disclosed are compounds of Formula 1 (see "Formula 1"), *N*-oxides, and salts thereof, wherein Z is O or S; and R^1, R^2, R^3, Q and n are as defined in the disclosure. Also disclosed are compositions containing the compounds of Formula 1 and methods for controlling a parasitic nematode comprising contacting the parasitic nematode or its environment with a biologically effective amount of a compound or a composition of the invention.

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TITLE

NEMATOCIDAL SULFONAMIDES

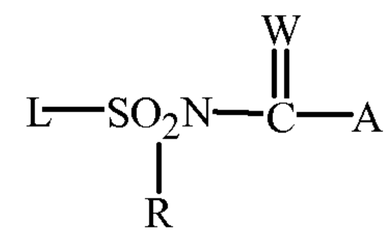
FIELD OF THE INVENTION

This invention relates to certain sulfonamides, their *N*-oxides, salts and compositions suitable for agronomic and nonagronomic uses, and methods of their use for controlling parasitic nematodes in both agronomic and nonagronomic environments.

BACKGROUND OF THE INVENTION

The control of plant-parasitic nematodes is extremely important in achieving high crop efficiency. Nematode-induced root damage can cause significant reduction in crop yields and quality and thereby result in increased costs to the consumer. Due to widespread development of resistance to anthelmintic agents in nematode parasites, nematodes continue to cause problems in livestock despite the available chemical therapeutic agents. The need continues for new compounds which are more effective, less costly, less toxic, environmentally safer or have different modes of action.

European Patent Application Publication No. 0 244 166 A2 discloses compounds of Formula **i** as herbicides



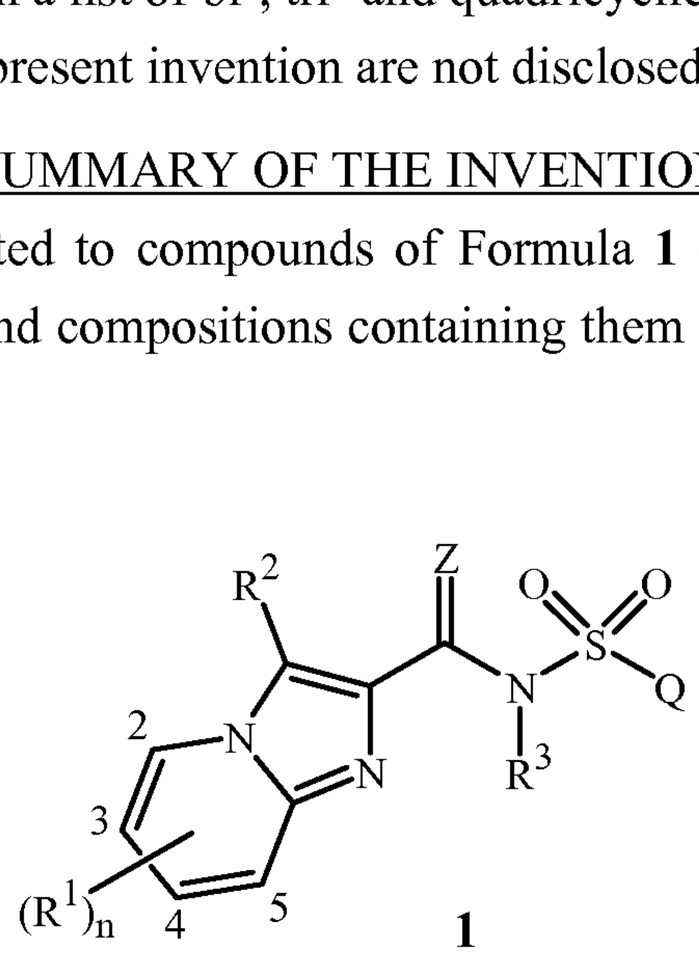
i

wherein, *inter alia*, R is H or an organic substituent, W is O or S, L is an aryl or heteroaryl moiety, and A is selected from a list of bi-, tri- and quadricyclic heterocyclic groups.

The compounds of the present invention are not disclosed in this publication.

SUMMARY OF THE INVENTION

This invention is directed to compounds of Formula **1** (including all stereoisomers), *N*-oxides, and salts thereof, and compositions containing them and their use for controlling a parasitic nematode:



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wherein

Z is O or S;

each R^1 is independently halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$ or $N(R^{10})S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

R^2 is H, halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$ or $N(R^{10})S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

R^3 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently

selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or C_1–C_6 alkyl substituted with 1 or 2 substituents independently selected from the group consisting of phenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$; or phenyl optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

Q is phenyl, naphthalenyl, a 5- or 6-membered heteroaromatic ring or an 8- to 10-membered heteroaromatic bicyclic ring system, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(X)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$, $N(R^{10})S(O)_2NR^{11}R^{12}$ and R^{14};

each X is independently O or S;

each R^4 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{4a} is independently H, C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^5 is independently H, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$,

$C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{5a} is independently H or C_1–C_6 alkyl;

each R^6 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$;

each R^{6a} is independently H, C_1–C_6 alkyl, $C(O)R^{13}$ or $C(O)OR^{13}$;

each R^7 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{7a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^8 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano,

nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{8a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^9 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{9a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^{10} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$;

each R^{10a} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl;

each R^{11} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11a}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11a}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11a}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11a}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10a})C(O)R^{7a}$;

each R^{11a} is independently H, C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl;

each R^{12} is independently H, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{13} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$;

each R^{14} is independently C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{15} is independently C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl,

$C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each m is independently 0, 1 or 2; and

n is 0, 1, 2, 3 or 4.

This invention is also directed to such compounds of Formula **1** (including all stereoisomers), *N*-oxides, and salts thereof, and compositions containing them and their use for controlling a parasitic nematode as described above, and further herein, provided that when n is 2 and one R^1 is CF_3 in the 3-position of Formula **1** and the other R^1 is Cl in the 5-position of Formula **1**, and R^2 and R^3 are H, then Q is other than 2-chlorophenyl, 2-chloro-6-methylphenyl, 2,6-dichlorophenyl, 2-chloro-4-fluorophenyl, 2,5-bis(2,2,2-trifluoroethoxy)phenyl, 2,4,6-trichlorophenyl, 2-chloro-5-(trifluoromethyl)phenyl or 3,5-dimethyl-4-isoxazolyl.

This invention also provides a composition comprising a compound of Formula **1**, an *N*-oxide, or a salt thereof, and at least one additional component selected from the group consisting of surfactants, solid diluents and liquid diluents. In one embodiment, this invention also provides a composition for controlling a parasitic nematode comprising a compound of Formula **1**, an *N*-oxide, or a salt thereof, and at least one additional component selected from the group consisting of surfactants, solid diluents and liquid diluents, said composition optionally further comprising at least one additional biologically active compound or agent.

This invention provides a method for controlling a parasitic nematode comprising contacting the parasitic nematode or its environment with a biologically effective amount of a compound of Formula **1**, an *N*-oxide, or a salt thereof, (e.g., as a composition described herein). This invention also relates to such method wherein the parasitic nematode or its environment is contacted with a composition comprising a biologically effective amount of a compound of Formula **1**, an *N*-oxide, or a salt thereof, and at least one additional component selected from the group consisting of surfactants, solid diluents and liquid diluents, said composition optionally further comprising a biologically effective amount of at least one additional biologically active compound or agent.

This invention also provides a method for protecting a seed from a parasitic nematode comprising contacting the seed with a biologically effective amount of a compound of Formula **1**, an *N*-oxide, or a salt thereof, (e.g., as a composition described herein). This invention also relates to the treated seed.

DETAILS OF THE INVENTION

As used herein, the terms “comprises”, “comprising”, “includes”, “including”, “has”, “having”, “contains”, “containing”, “characterized by” or any other variation thereof, are intended to cover a non-exclusive inclusion, subject to any limitation explicitly indicated. For example, a composition, mixture, process or method that comprises a list of elements is

not necessarily limited to only those elements but may include other elements not expressly listed or inherent to such composition, mixture, process or method.

The transitional phrase "consisting of" excludes any element, step or ingredient not specified. If in the claim, such would close the claim to the inclusion of materials other than those recited except for impurities ordinarily associated therewith. When the phrase "consisting of" appears in a clause of the body of a claim, rather than immediately following the preamble, it limits only the element set forth in that clause; other elements are not excluded from the claim as a whole.

The transitional phrase "consisting essentially of" is used to define a composition or method that includes materials, steps, features, components or elements, in addition to those literally disclosed, provided that these additional materials, steps, features, components or elements do not materially affect the basic and novel characteristic(s) of the claimed invention. The term "consisting essentially of" occupies a middle ground between "comprising" and "consisting of".

Where applicants have defined an invention or a portion thereof with an open-ended term such as "comprising", it should be readily understood that (unless otherwise stated) the description should be interpreted to also describe such an invention using the terms "consisting essentially of" or "consisting of".

Further, unless expressly stated to the contrary, "or" refers to an inclusive or and not to an exclusive or. For example, a condition A or B is satisfied by any one of the following: A is true (or present) and B is false (or not present), A is false (or not present) and B is true (or present), and both A and B are true (or present).

Also, the indefinite articles "a" and "an" preceding an element or component of the invention are intended to be nonrestrictive regarding the number of instances (i.e. occurrences) of the element or component. Therefore "a" or "an" should be read to include one or at least one, and the singular word form of the element or component also includes the plural unless the number is obviously meant to be singular.

As used to in the present disclosure and claims, the term "nematode" refers to a living organism of the Phylum Nematoda. As generally defined, a "parasite" lives or grows inside or feeds on another living organism (such as a plant, animal or human) described as the "host". As referred to in the present disclosure and claims a "parasitic nematode" is particularly a nematode that injures or damages tissue or causes other forms of disease in plants, animals (particularly vertebrates) or humans.

A parasite "infestation" refers to the presence of parasites in numbers that pose a risk to plants, humans or animals. The presence can be in the environment, e.g., in a human or animal house, or surrounding property or structures, on an agricultural crop or other type of plant, in animal bedding, on the skin or fur of an animal, etc. When the infestation that is referred to is within an animal, e.g., in the blood or other internal tissues, the term infestation

is also intended to be synonymous with the term, "infection," as that term is generally understood in the art, unless otherwise stated.

As referred to in the present disclosure and claims, the terms "parasiticidal" and "parasiticidally" refers to observable effects on a parasitic nematode to provide protection of a plant, animal or human from the nematode. Parasiticidal effects typically relate to diminishing the occurrence or activity of the target parasitic nematode. Such effects on the nematode include necrosis, death, retarded growth, diminished mobility or lessened ability to remain on or in the host plant, animal or human, reduced feeding and inhibition of reproduction. These effects on parasitic nematodes provide control (including prevention, reduction or elimination) of parasitic infestation or infection of the plant, animal or human. Therefore "control" of a parasitic nematode means achieving a parasiticidal effect on the nematode. The expressions "parasiticidally effective amount" and "biologically effective amount" in the context of applying a chemical compound to control a parasitic nematode refer an amount of the compound that is sufficient to control the parasitic nematode.

The term "agronomic" refers to the production of field crops such as for food and fiber and includes the growth of soybeans and other legumes, cereal (e.g., wheat, oats, barley, rye, rice, maize/corn), leafy vegetables (e.g., lettuce, cabbage, and other cole crops), fruiting vegetables (e.g., tomatoes, pepper, eggplant, crucifers and cucurbits), potatoes, sweet potatoes, grapes, cotton, tree fruits (e.g., pome, stone and citrus), small fruit (berries, cherries) and other specialty crops (e.g., canola, sunflower, olives).

The term "nonagronomic" refers to other than field crops, such as horticultural crops (e.g., greenhouse, nursery or ornamental plants not grown in a field), residential, agricultural, commercial and industrial structures, turf (e.g., sod farm, pasture, golf course, lawn, sports field, etc.), wood products, stored product, agro-forestry and vegetation management, public health (i.e. human) and animal health (e.g., domesticated animals such as pets, livestock and poultry, undomesticated animals such as wildlife) applications.

Nonagronomic applications include protecting an animal from a parasitic nematode by administering a parasiticidally effective (i.e. biologically effective) amount of a compound of the invention, typically in the form of a composition formulated for veterinary use, to the animal to be protected.

In the above recitations, the term "alkyl", used either alone or in compound words such as "haloalkyl" includes straight-chain or branched alkyl, such as, methyl, ethyl, *n*-propyl, *i*-propyl, or the different butyl, pentyl or hexyl isomers. "Alkenyl" includes straight-chain or branched alkenes such as ethenyl, 1-propenyl, 2-propenyl, and the different butenyl, pentenyl and hexenyl isomers. "Alkenyl" also includes polyenes such as 1,2-propadienyl and 2,4-hexadienyl. "Alkynyl" includes straight-chain or branched alkynes such as ethynyl, 1-propynyl, 2-propynyl and the different butynyl, pentynyl and hexynyl isomers. "Alkynyl" can also include moieties comprised of multiple triple bonds such as 2,5-hexadiynyl.

"Alkoxy" includes, for example, methoxy, ethoxy, *n*-propyloxy, isopropyloxy and the different butoxy, pentoxy and hexyloxy isomers. "Alkoxyalkyl" denotes alkoxy substitution on alkyl. Examples of "alkoxyalkyl" include CH_3OCH_2, $CH_3OCH_2CH_2$, $CH_3CH_2OCH_2$, $CH_3CH_2CH_2CH_2OCH_2$ and $CH_3CH_2OCH_2CH_2$.

"Cycloalkyl" includes, for example, cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl. The term "cycloalkylalkyl" denotes cycloalkyl substitution on an alkyl moiety. Examples of "cycloalkylalkyl" include cyclopropylmethyl, cyclopentylethyl, and other cycloalkyl moieties bonded to straight-chain or branched alkyl groups. "Cycloalkenyl" includes groups such as cyclopentenyl and cyclohexenyl as well as groups with more than one double bond such as 1,3- and 1,4-cyclohexadienyl. The term "cycloalkylcycloalkyl" denotes cycloalkyl substitution on another cycloalkyl ring, wherein each cycloalkyl ring independently has from 3 to 7 carbon atom ring members. Examples of cycloalkylcycloalkyl include cyclopropylcyclopropyl (such as 1,1'-bicyclopropyl-1-yl, 1,1'-bicyclopropyl-2-yl), cyclohexylcyclopentyl (such as 4-cyclopentylcyclohexyl) and cyclohexylcyclohexyl (such as 1,1'-bicyclohexyl-1-yl), and the different *cis*- and *trans*-cycloalkylcycloalkyl isomers, (such as (1*R*,2*S*)-1,1'-bicyclopropyl-2-yl and (1*R*,2*R*)-1,1'-bicyclopropyl-2-yl).

The term "halogen", either alone or in compound words such as "haloalkyl", or when used in descriptions such as "alkyl substituted with halogen" includes fluorine, chlorine, bromine or iodine. Further, when used in compound words such as "haloalkyl", or when used in descriptions such as "alkyl substituted with halogen" said alkyl may be partially or fully substituted with halogen atoms which may be the same or different. Examples of "haloalkyl" or "alkyl substituted with halogen" include F_3C, $ClCH_2$, CF_3CH_2 and CF_3CCl_2. The terms "haloalkoxy", "haloalkenyl", "haloalkynyl", and the like, are defined analogously to the term "haloalkyl". Examples of "haloalkoxy" include CF_3O, CCl_3CH_2O, $HCF_2CH_2CH_2O$ and CF_3CH_2O. Examples of "haloalkenyl" include $(Cl)_2C{=}CHCH_2$ and $CF_3CH_2CH{=}CHCH_2$. Examples of "haloalkynyl" include $HC{\equiv}CCHCl$, $CF_3C{\equiv}C$, $CCl_3C{\equiv}C$ and $FCH_2C{\equiv}CCH_2$.

The chemical abbreviation C(O) as used herein represents a carbonyl moiety. For example, $C(O)CH_3$ represents an acetyl group. The chemical abbreviations CO_2 and C(O)O as used herein represent an ester moiety. For example, CO_2Me and C(O)OMe represent a methyl ester.

"OCN" means -O-C≡N, and "SCN" means -S-C≡N.

The total number of carbon atoms in a substituent group is indicated by the "C_i–C_j" prefix where i and j are numbers from 1 to 14. C_2 alkoxyalkyl designates CH_3OCH_2; C_3 alkoxyalkyl designates, for example, $CH_3CH(OCH_3)$, $CH_3OCH_2CH_2$ or $CH_3CH_2OCH_2$; and C_4 alkoxyalkyl designates the various isomers of an alkyl group substituted with an alkoxy group containing a total of four carbon atoms, examples including $CH_3CH_2CH_2OCH_2$ and $CH_3CH_2OCH_2CH_2$.

When a compound is substituted with a substituent bearing a subscript that indicates the number of said substituents can exceed 1, said substituents (when they exceed 1) are independently selected from the group of defined substituents, e.g., R^1, n is 0, 1, 2, 3 or 4. When a group contains a substituent which can be hydrogen, for example R^2 or R^3, then when this substituent is taken as hydrogen, it is recognized that this is equivalent to said group being unsubstituted. When a variable group is shown to be optionally attached to a position, for example $(R^v)_r$ in U-29 of Exhibit 1 wherein r may be 0, then hydrogen may be at the position even if not recited in the variable group definition. When one or more positions on a group are said to be "not substituted" or "unsubstituted", then hydrogen atoms are attached to take up any free valency.

Unless otherwise indicated, a "ring" or "ring system" as a component of Formula **1** (e.g., substituent Q) is carbocyclic or heterocyclic. The term "ring system" denotes two or more fused rings. The term "heterocyclic ring" denotes a ring in which at least one atom forming the ring backbone is not carbon, e.g., nitrogen, oxygen or sulfur. Typically a heterocyclic ring contains no more than 4 nitrogens, no more than 2 oxygens and no more than 2 sulfurs. Unless otherwise indicated, a heterocyclic ring can be a saturated, partially unsaturated, or fully unsaturated ring. The term "heterocyclic ring system" denotes a ring system in which at least one ring of the ring system is a heterocyclic ring. Unless otherwise indicated, heterocyclic rings and ring systems can be attached through any available carbon or nitrogen by replacement of a hydrogen on said carbon or nitrogen.

"Aromatic" indicates that each of the ring atoms is essentially in the same plane and has a *p*-orbital perpendicular to the ring plane, and in which $(4n + 2)$ π electrons, where n is a positive integer, are associated with the ring to comply with Hückel's rule. When a fully unsaturated heterocyclic ring satisfies Hückel's rule, then said ring is also called a "heteroaromatic ring". The term "heteroaromatic ring system" denotes a heterocyclic ring system in which at least one ring of the ring system is aromatic.

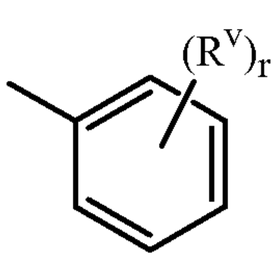
As used herein, the following definitions shall apply unless otherwise indicated. The term "optionally substituted" is used interchangeably with the phrase "substituted or unsubstituted" or with the term "(un)substituted". The expression "optionally substituted with 1 to 4 substituents" means that no substituent is present (i.e. unsubstituted) or that 1, 2, 3 or 4 substituents are present (limited by the number of available bonding positions). Unless otherwise indicated, an optionally substituted group may have a substituent at each substitutable position of the group, and each substitution is independent of the other.

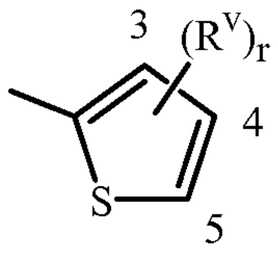
When a substituent is a 5- or 6-membered nitrogen-containing heteroaromatic ring, it may be attached to the remainder of Formula **1** though any available carbon or nitrogen ring atom, unless otherwise described.

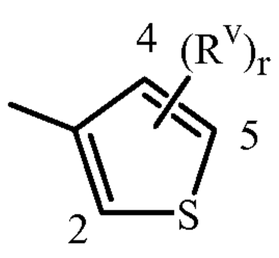
An example of phenyl optionally substituted with one to five substituents is the ring illustrated as U-1 in Exhibit 1, wherein R^v is as defined in the Summary of the Invention for R^1, R^2, R^3 or Q and r is an integer from 0 to 5.

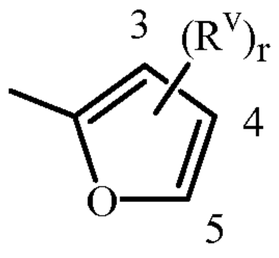
Examples of an optionally substituted 5- or 6-membered heteroaromatic ring include the rings U-2 through U-61 illustrated in Exhibit 1 wherein R^v is any substituent as defined in the Summary of the Invention for R^1, R^2, R^3 or Q and r is an integer from 0 to 4, limited by the number of available positions on each U group. As U-29, U-30, U-36, U-37, U-38, U-39, U-40, U-41, U-42 and U-43 have only one available position, for these U groups r is limited to the integers 0 or 1, and r being 0 means that the U group is unsubstituted and a hydrogen is present at the position indicated by $(R^v)_r$.

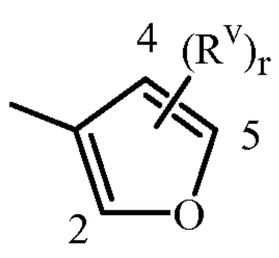
Exhibit 1

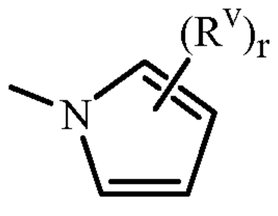

U-1

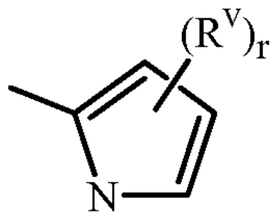

U-2

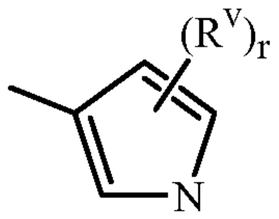

U-3

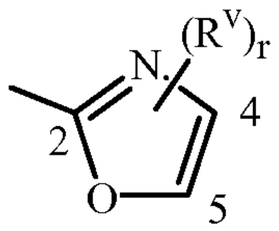

U-4

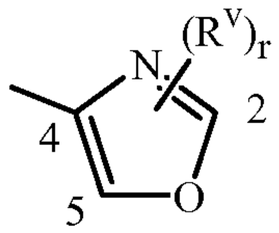

U-5

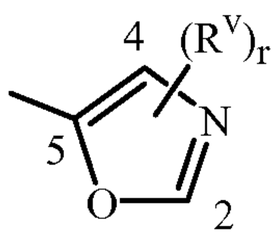

U-6

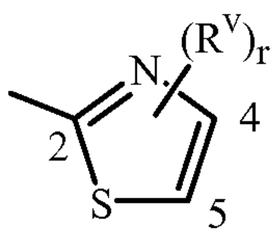

U-7

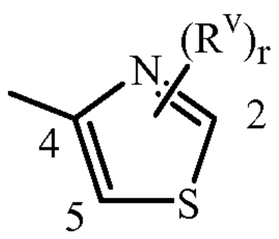

U-8

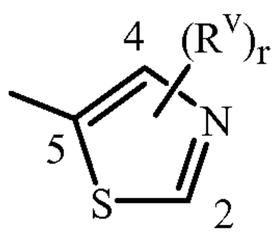

U-9

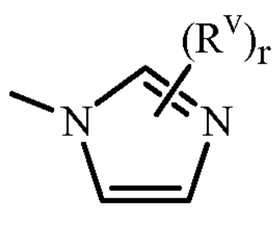

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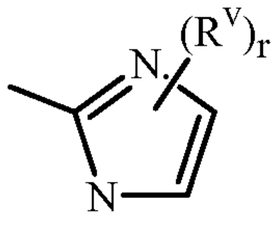

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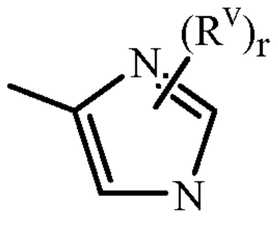

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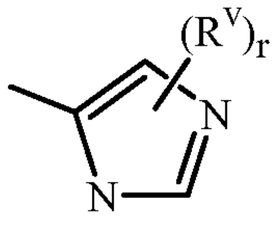

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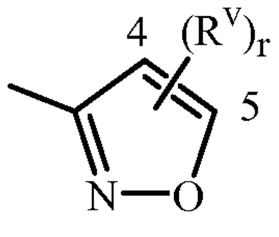

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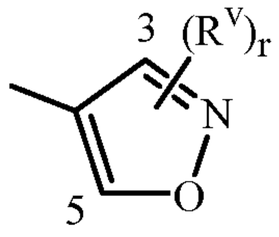

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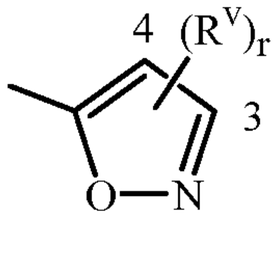

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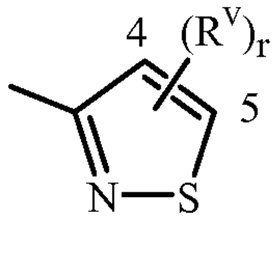

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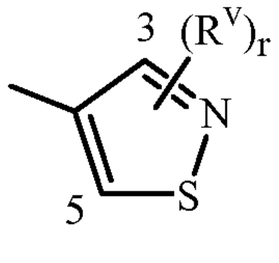

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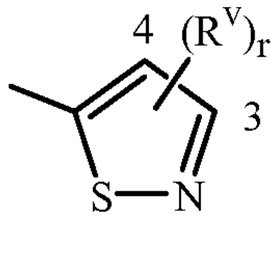

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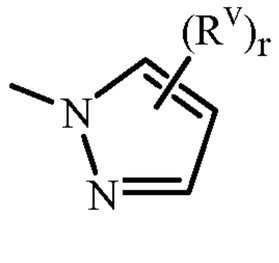

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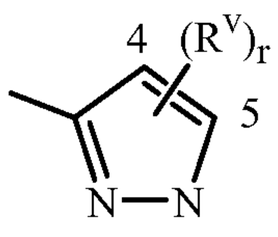

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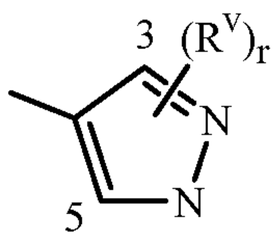

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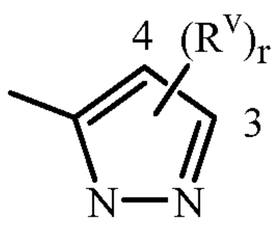

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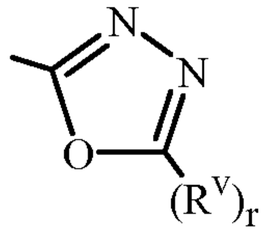
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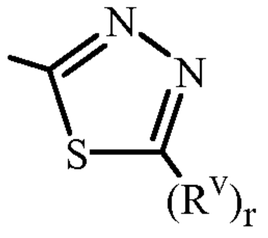
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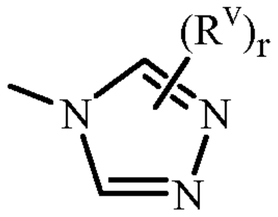
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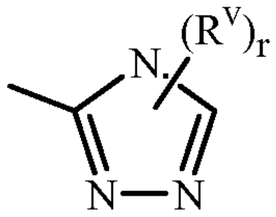
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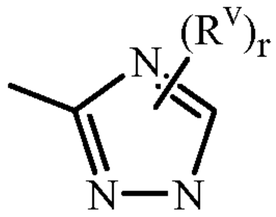
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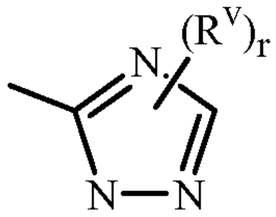
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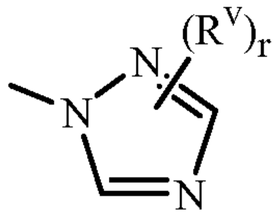
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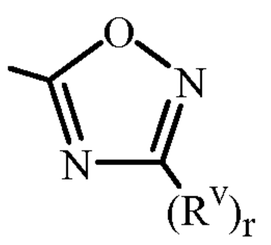
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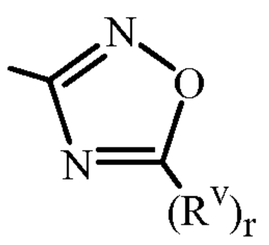
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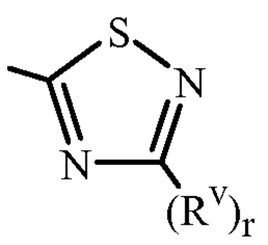
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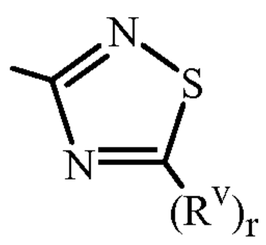
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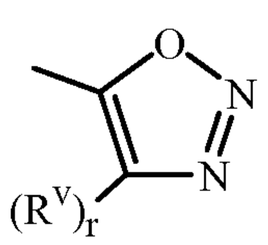
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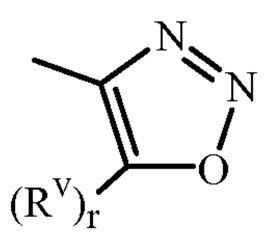
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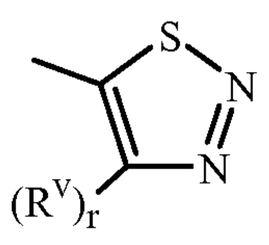
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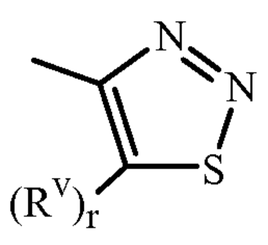
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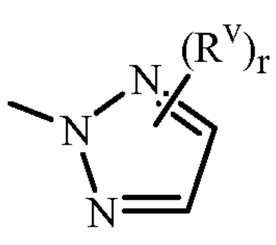
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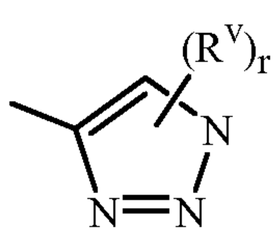
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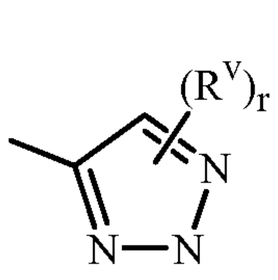
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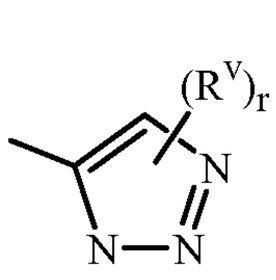
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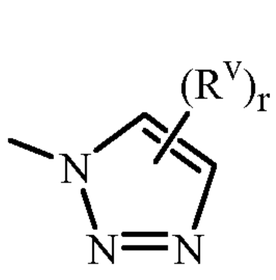
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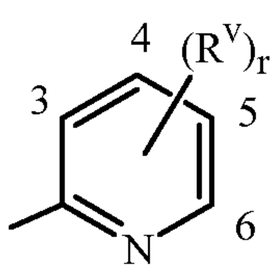
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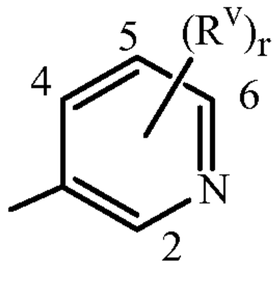
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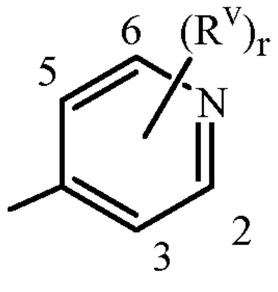
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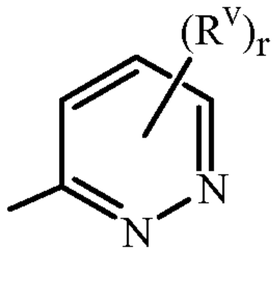
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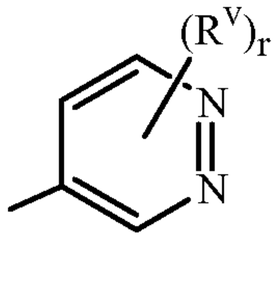
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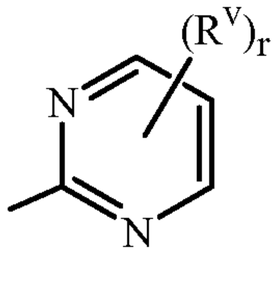
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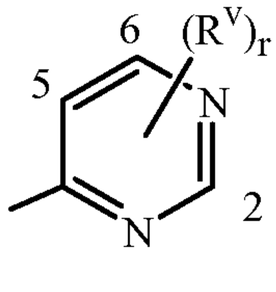
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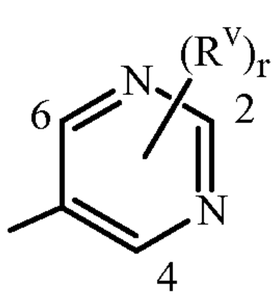
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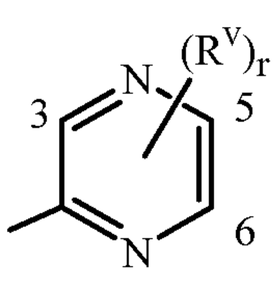
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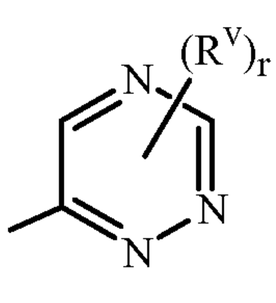
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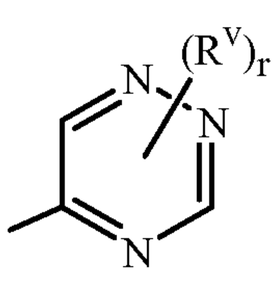
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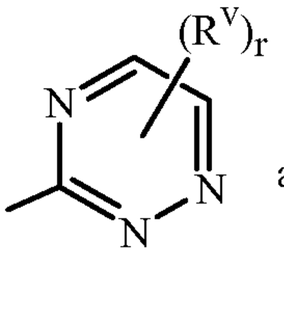
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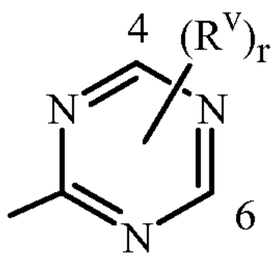
U-58 ,



U-59 ,



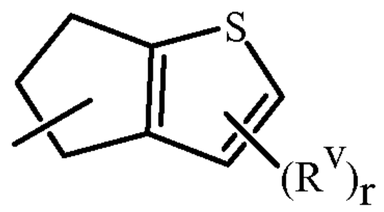
U-60 and

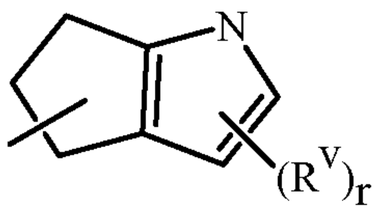


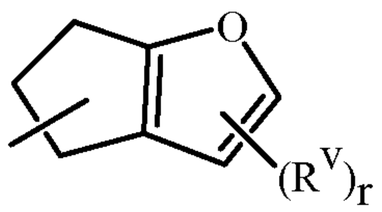
U-61 .

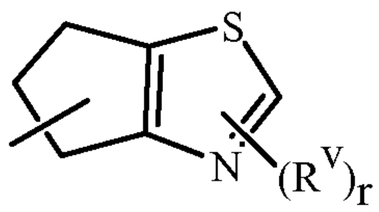
As noted above, Q can be (among others) an 8- to 10-membered heteroaromatic bicyclic ring system optionally substituted with substituents selected from a group of substituents as defined in the Summary of Invention. Examples of optionally substituted 8-, 9- or 10-membered heteroaromatic bicyclic ring systems include the rings U-81 through U-123 illustrated in Exhibit 3 wherein R^V is any substituent as defined in the Summary of the Invention for Q, and r is typically an integer from 0 to 4.

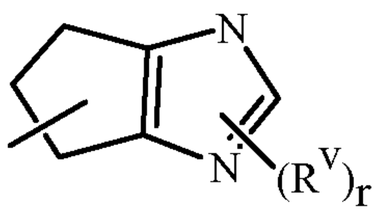
Exhibit 3

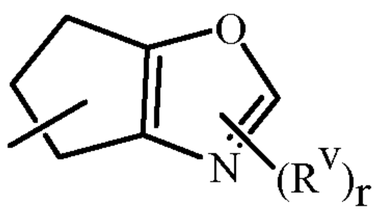

U-81

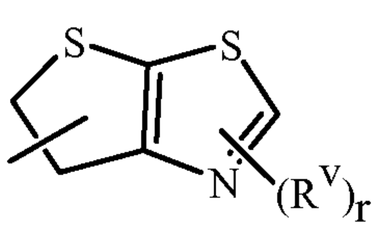

U-82

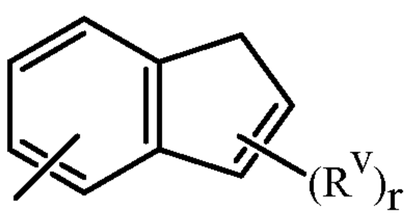

U-83

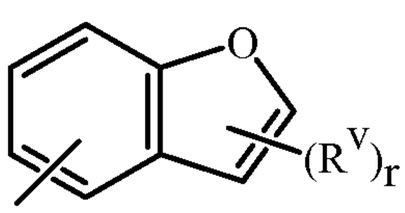

U-84

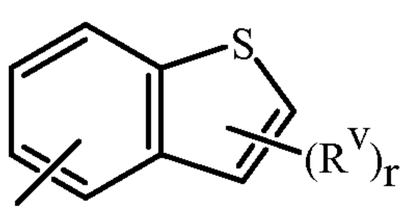

U-85

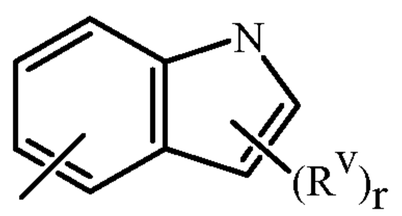

U-86

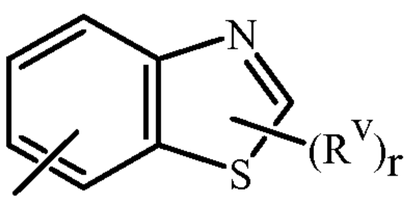

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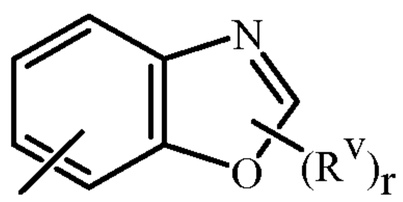

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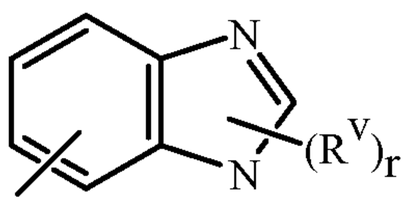

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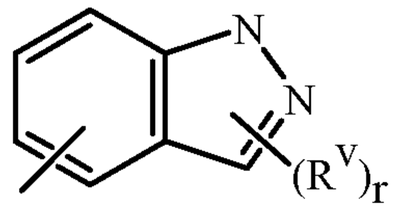

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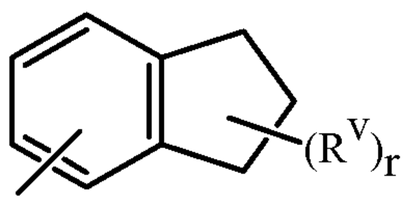

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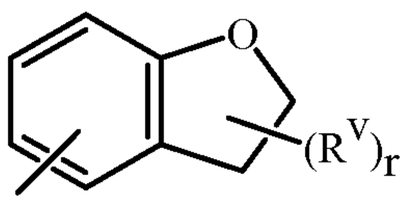

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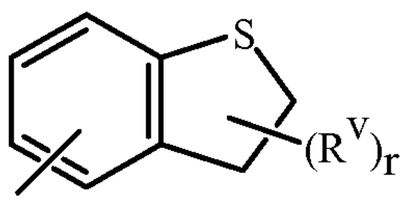

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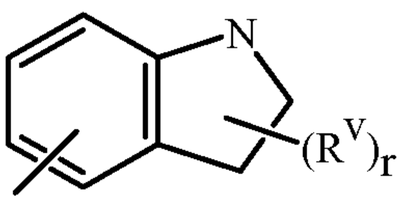

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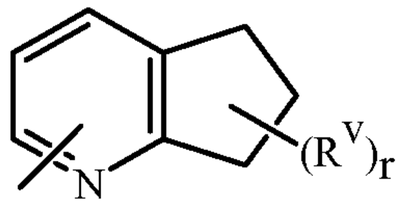

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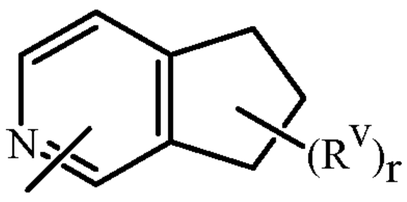

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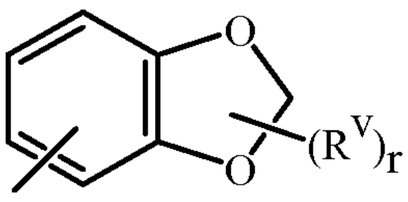

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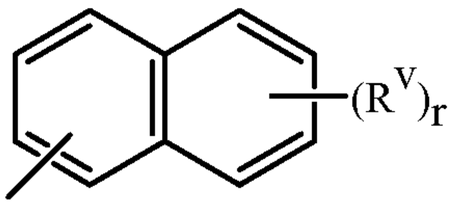

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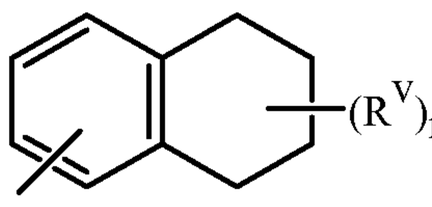

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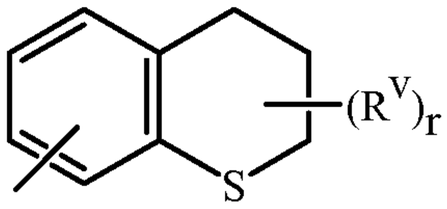

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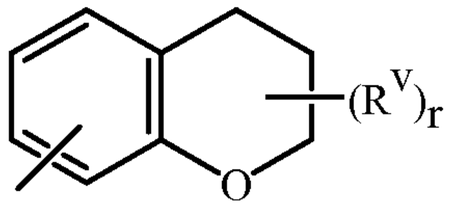

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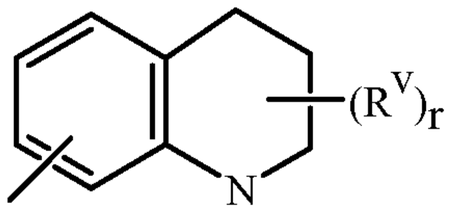

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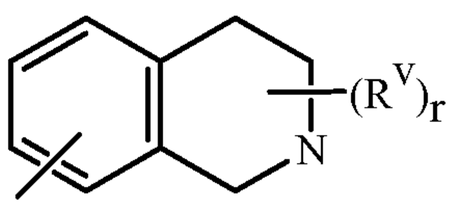

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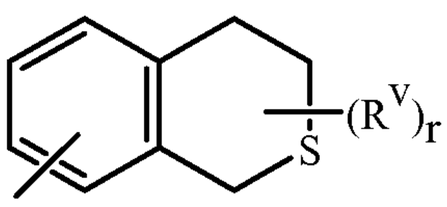

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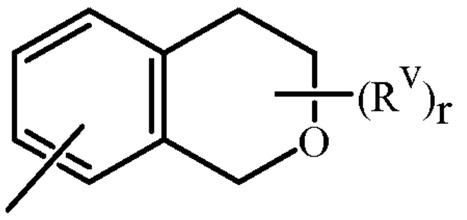

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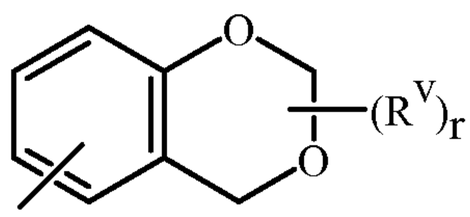

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U-109

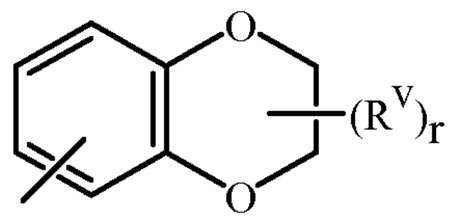

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U-111

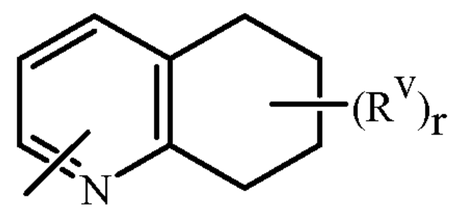

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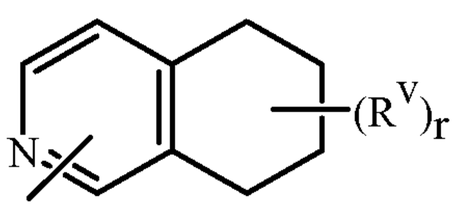
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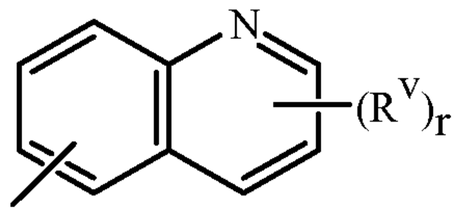
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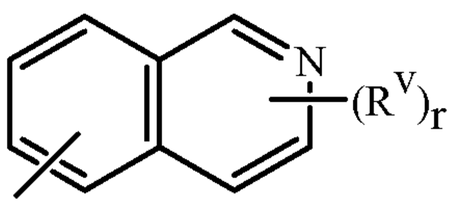
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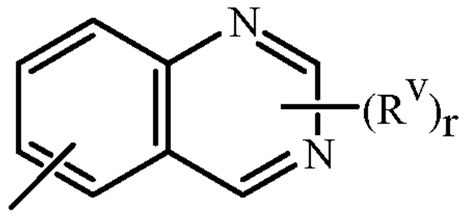
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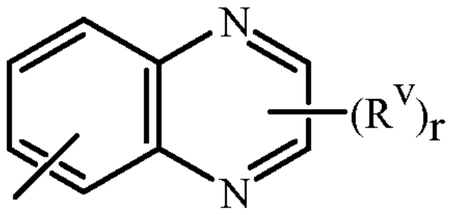
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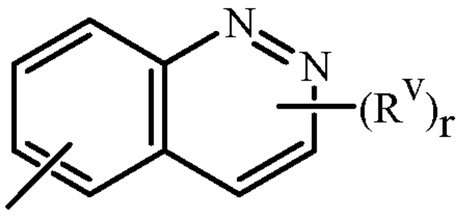
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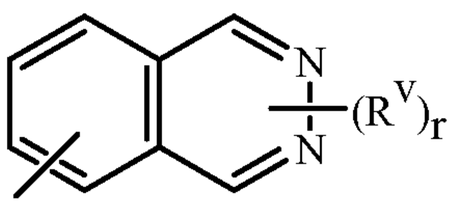
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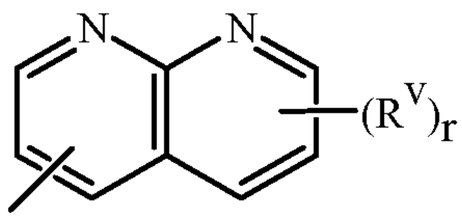
U-120



U-121



U-122 and



U-123.

Although R^V groups are shown in the structures U-1 through U-123, it is noted that they do not need to be present since they are optional substituents. The nitrogen atoms that require substitution to fill their valence are substituted with H or R^V. Note that when the attachment point between $(R^V)_r$ and the U group is illustrated as floating, $(R^V)_r$ can be attached to any available carbon atom or nitrogen atom of the U group. Note that when the attachment point on the U group is illustrated as floating, the U group can be attached to the remainder of Formula **1** through any available carbon or nitrogen of the U group by replacement of a hydrogen atom. Note that some U groups can only be substituted with less than 4 R^V groups (e.g., U-2 through U-5, U-7 through U-48, and U-52 through U-61).

A wide variety of synthetic methods are known in the art to enable preparation of aromatic and nonaromatic heterocyclic rings and ring systems; for extensive reviews see the eight volume set of *Comprehensive Heterocyclic Chemistry*, A. R. Katritzky and C. W. Rees editors-in-chief, Pergamon Press, Oxford, 1984 and the twelve volume set of *Comprehensive Heterocyclic Chemistry II*, A. R. Katritzky, C. W. Rees and E. F. V. Scriven editors-in-chief, Pergamon Press, Oxford, 1996.

Compounds of this invention can exist as one or more stereoisomers. The various stereoisomers include enantiomers, diastereomers, atropisomers and geometric isomers. One skilled in the art will appreciate that one stereoisomer may be more active and/or may exhibit beneficial effects when enriched relative to the other stereoisomer(s) or when separated from the other stereoisomer(s). Additionally, the skilled artisan knows how to separate, enrich, and/or to selectively prepare said stereoisomers. The compounds of the invention may be present as a mixture of stereoisomers, individual stereoisomers or as an optically active form.

Compounds selected from Formula **1**, (including all stereoisomers, *N*-oxides, and salts thereof), typically exist in more than one form, and Formula **1** thus includes all crystalline and non-crystalline forms of the compounds that Formula **1** represents. Non-crystalline forms include embodiments which are solids such as waxes and gums as well as

embodiments which are liquids such as solutions and melts. Crystalline forms include embodiments which represent essentially a single crystal type and embodiments which represent a mixture of polymorphs (i.e. different crystalline types). The term "polymorph" refers to a particular crystalline form of a chemical compound that can crystallize in different crystalline forms, these forms having different arrangements and/or conformations of the molecules in the crystal lattice. Although polymorphs can have the same chemical composition, they can also differ in composition due the presence or absence of co-crystallized water or other molecules, which can be weakly or strongly bound in the lattice. Polymorphs can differ in such chemical, physical and biological properties as crystal shape, density, hardness, color, chemical stability, melting point, hygroscopicity, suspensibility, dissolution rate and biological availability. One skilled in the art will appreciate that a polymorph of a compound represented by Formula **1** can exhibit beneficial effects (e.g., suitability for preparation of useful formulations, improved biological performance) relative to another polymorph or a mixture of polymorphs of the same compound represented by Formula **1**. Preparation and isolation of a particular polymorph of a compound represented by Formula **1** can be achieved by methods known to those skilled in the art including, for example, crystallization using selected solvents and temperatures.

One skilled in the art will appreciate that not all nitrogen-containing heterocycles can form *N*-oxides since the nitrogen requires an available lone pair for oxidation to the oxide; one skilled in the art will recognize those nitrogen-containing heterocycles which can form *N*-oxides. One skilled in the art will also recognize that tertiary amines can form *N*-oxides. Synthetic methods for the preparation of *N*-oxides of heterocycles and tertiary amines are very well known by one skilled in the art including the oxidation of heterocycles and tertiary amines with peroxy acids such as peracetic and 3-chloroperbenzoic acid (MCPBA), hydrogen peroxide, alkyl hydroperoxides such as *t*-butyl hydroperoxide, sodium perborate, and dioxiranes such as dimethyldioxirane. These methods for the preparation of *N*-oxides have been extensively described and reviewed in the literature, see for example: T. L. Gilchrist in *Comprehensive Organic Synthesis*, vol. 7, pp 748–750, S. V. Ley, Ed., Pergamon Press; M. Tisler and B. Stanovnik in *Comprehensive Heterocyclic Chemistry*, vol. 3, pp 18–20, A. J. Boulton and A. McKillop, Eds., Pergamon Press; M. R. Grimmett and B. R. T. Keene in *Advances in Heterocyclic Chemistry*, vol. 43, pp 149–161, A. R. Katritzky, Ed., Academic Press; M. Tisler and B. Stanovnik in *Advances in Heterocyclic Chemistry*, vol. 9, pp 285–291, A. R. Katritzky and A. J. Boulton, Eds., Academic Press; and G. W. H. Cheeseman and E. S. G. Werstiuk in *Advances in Heterocyclic Chemistry*, vol. 22, pp 390–392, A. R. Katritzky and A. J. Boulton, Eds., Academic Press.

One skilled in the art recognizes that because in the environment and under physiological conditions salts of chemical compounds are in equilibrium with their corresponding nonsalt forms, salts share the biological utility of the nonsalt forms. Thus a

wide variety of salts of the compounds of Formula **1** are useful for control of parasitic nematodes. The salts of the compounds of Formula **1** include acid-addition salts with inorganic or organic acids such as hydrobromic, hydrochloric, nitric, phosphoric, sulfuric, acetic, butyric, fumaric, lactic, maleic, malonic, oxalic, propionic, salicylic, tartaric, 4-toluenesulfonic or valeric acids. When a compound of Formula **1** contains an acidic moiety such as a carboxylic acid, phenol or sulfonylamide (i.e. when R^3 is H), salts also include those formed with organic or inorganic bases such as pyridine, triethylamine or ammonia, or amides, hydrides, hydroxides or carbonates of sodium, potassium, lithium, calcium, magnesium or barium. Accordingly, the present invention comprises compounds selected from Formula **1**, *N*-oxides and salts thereof.

Embodiments of the present invention as described in the Summary of the Invention include those described below. In the following Embodiments, Formula **1** includes stereoisomers, *N*-oxides, and salts thereof, and reference to "a compound of Formula **1**" includes the definitions of substituents specified in the Summary of the Invention unless further defined in the Embodiments.

Embodiment 1. A compound of Formula **1** wherein Z is O.

Embodiment 2. A compound of Formula **1** wherein Z is S.

Embodiment 3. A compound of Formula **1** or Embodiment 1 or 2 wherein each R^1 is independently halogen, cyano, nitro, OR^4, C_1–C_6 alkyl or C_1–C_6 haloalkyl.

Embodiment 3a. A compound of Embodiment 3 wherein each R^1 is independently halogen, C_1–C_6 haloalkyl or C_1–C_6 haloalkoxy (i.e. OR^4 and R^4 is C_1–C_6 haloalkyl).

Embodiment 3b. A compound of Embodiment 3a wherein n is 2, and one R^1 is in the 3-position of Formula **1**, and a second R^1 is in the 5-position of Formula **1**.

Embodiment 3c. A compound of Embodiment 3a or 3b wherein each R^1 is independently halogen or C_1–C_2 haloalkyl.

Embodiment 3d. A compound of Embodiment 3c wherein each R^1 is independently F, Cl, Br or CF_3.

Embodiment 3e. A compound of Embodiment 3c wherein n is 2, and each R^1 is independently F, Cl, Br or CF_3.

Embodiment 3f. A compound of Formula **1** wherein n is 1, and R^1 is CF_3 and is in the 3-position of Formula **1**.

Embodiment 3g. A compound of Formula **1** wherein n is 2, and one R^1 is CF_3 and is in the 3-position of Formula **1**, and a second R^1 is Cl and is in the 5-position of Formula **1**.

Embodiment 3h. A compound of Formula **1** wherein n is 2, and one R^1 is CF_3 and is in the 3-position of Formula **1**, and a second R^1 is Br and is in the 5-position of Formula **1**.

Embodiment 3i. A compound of Formula **1** wherein n is 2, and one R^1 is CF_3 and is in the 3-position of Formula **1**, and a second R^1 is F and is in the 5-position of Formula **1**.

Embodiment 4. A compound of Formula **1** or any of Embodiments 1–3i wherein Q is phenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(X)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 4a. A compound of Embodiment 4 wherein Q is phenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, OR^{4a}, C_1–C_3 alkyl, C_1–C_3 haloalkyl and $C(O)R^{7b}$;
each R^{4a} is independently C_1–C_3 alkyl or C_1–C_3 haloalkyl; and
each R^{7b} is independently C_1–C_3 alkyl.

Embodiment 4b. A compound of Embodiment 4 wherein Q is phenyl, pyridinyl, pyrazolyl, oxazolyl, thiazolyl, isoxazolyl, isothiazolyl, furanyl or thienyl, each optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(X)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 4c. A compound of Embodiment 4b wherein Q is phenyl, pyridinyl, pyrazolyl, oxazolyl, thiazolyl, isoxazolyl, isothiazolyl, furanyl or thienyl, each optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, OR^{4a}, C_1–C_3 alkyl and C_1–C_3 haloalkyl; and
each R^{4a} is independently C_1–C_3 alkyl or C_1–C_3 haloalkyl.

Embodiment 4d. A compound of Embodiment 4b wherein Q is phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 4e. A compound of Embodiment 4d wherein Q is phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, OR^{4a}, C_1–C_3 alkyl, C_1–C_3 haloalkyl and $C(O)R^{7b}$; each R^{4a} is independently C_1–C_3 alkyl or C_1–C_3 haloalkyl; and

each R^{7b} is independently C_1–C_3 alkyl.

Embodiment 4f. A compound of Embodiment 4b wherein Q is pyridinyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 4g. A compound of Embodiment 4f wherein Q is pyridinyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, OR^{4a}, C_1–C_3 alkyl and C_1–C_3 haloalkyl; and each R^{4a} is independently C_1–C_3 alkyl or C_1–C_3 haloalkyl.

Embodiment 4h. A compound of Embodiment 4b wherein Q is pyrazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 4i. A compound of Embodiment 4h wherein Q is pyrazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, OR^{4a}, C_1–C_3 alkyl and C_1–C_3 haloalkyl; and each R^{4a} is independently C_1–C_3 alkyl or C_1–C_3 haloalkyl.

Embodiment 4j. A compound of Embodiment 4b wherein Q is oxazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 4k. A compound of Embodiment 4j wherein Q is oxazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, OR^{4a}, C_1–C_3 alkyl and C_1–C_3 haloalkyl; and each R^{4a} is independently C_1–C_3 alkyl or C_1–C_3 haloalkyl.

Embodiment 4l. A compound of Embodiment 4b wherein Q is thiazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 4m. A compound of Embodiment 4l wherein Q is thiazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, OR^{4a}, C_1–C_3 alkyl and C_1–C_3 haloalkyl; and each R^{4a} is independently C_1–C_3 alkyl or C_1–C_3 haloalkyl.

Embodiment 4n. A compound of Embodiment 4b wherein Q is isoxazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 4o. A compound of Embodiment 4n wherein Q is isoxazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, OR^{4a}, C_1–C_3 alkyl and C_1–C_3 haloalkyl; and each R^{4a} is independently C_1–C_3 alkyl or C_1–C_3 haloalkyl.

Embodiment 4p. A compound of Embodiment 4b wherein Q is isothiazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 4q. A compound of Embodiment 4p wherein Q is isothiazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, OR^{4a}, C_1–C_3 alkyl and C_1–C_3 haloalkyl; and each R^{4a} is independently C_1–C_3 alkyl or C_1–C_3 haloalkyl.

Embodiment 4r. A compound of Embodiment 4b wherein Q is furanyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 4s. A compound of Embodiment 4r wherein Q is furanyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, OR^{4a}, C_1–C_3 alkyl and C_1–C_3 haloalkyl; and each R^{4a} is independently C_1–C_3 alkyl or C_1–C_3 haloalkyl.

Embodiment 4t. A compound of Embodiment 4b wherein Q is thienyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl,

$C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 4u. A compound of Embodiment 4t wherein Q is thienyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, OR^{4a}, C_1–C_3 alkyl and C_1–C_3 haloalkyl; and each R^{4a} is independently C_1–C_3 alkyl or C_1–C_3 haloalkyl.

Embodiment 4v. A compound of Embodiment 4b wherein Q is phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, OR^4, NR^5R^6, C_1–C_4 alkyl, C_1–C_4 haloalkyl, $C(X)R^7$ and $C(O)OR^8$.

Embodiment 4w. A compound of Embodiment 4b wherein Q is pyridinyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, OR^4, NR^5R^6, C_1–C_4 alkyl, C_1–C_4 haloalkyl, $C(X)R^7$ and $C(O)OR^8$.

Embodiment 4x. A compound of Embodiment 4b wherein Q is furanyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, OR^4, NR^5R^6, C_1–C_4 alkyl, C_1–C_4 haloalkyl, $C(X)R^7$ and $C(O)OR^8$.

Embodiment 5. A compound of Formula **1** or any of Embodiments 1–4x wherein R^2 is H, halogen or C_1–C_6 alkyl.

Embodiment 5a. A compound of Embodiment 5 wherein R^2 is H, F, Cl, Br or C_1–C_2 alkyl.

Embodiment 5b. A compound of Embodiment 5a wherein R^2 is H, Cl, Br or CH_3.

Embodiment 5c. A compound of Embodiment 5a wherein R^2 is H.

Embodiment 6. A compound of Formula **1** or any of Embodiments 1–5c wherein R^3 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, $C(X)R^7$, $C(O)OR^8$ or $S(O)_mR^9$; or C_1–C_6 alkyl substituted with 1 or 2 OR^4.

Embodiment 6a. A compound of Embodiment 6 wherein R^3 is H or C_1–C_6 alkyl.

Embodiment 6b. A compound of Embodiment 6a wherein R^3 is H.

Embodiment 7. A compound of Formula **1** or any of Embodiments 1–6b wherein R^4 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$.

Embodiment 8. A compound of Formula **1** or any of Embodiments 1–7 wherein R^5 is H, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl,

C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$.

Embodiment 9. A compound of Formula **1** or any of Embodiments 1–8 wherein R^6 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl; or C_3–C_7 cycloalkyl or C_4–C_8 cycloalkylalkyl, each optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, C_1–C_4 alkyl, C_1–C_4 haloalkyl and OR^{4a};

Embodiment 10. A compound of Formula **1** or any of Embodiments 1–9 wherein R^7 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$.

Embodiment 11. A compound of Formula **1** or any of Embodiments 1–10 wherein R^8 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$.

Embodiment 12. A compound of Formula **1** or any of Embodiments 1–11 wherein R^9 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$.

Embodiment 13. A compound of Formula **1** or any of Embodiments 1–12 wherein R^{10} is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl.

Embodiment 14. A compound of Formula **1** or any of Embodiments 1–13 wherein R^{14} is C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the

group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$.

Embodiments of this invention, including Embodiments 1–14 above as well as any other embodiments described herein, can be combined in any manner, and the descriptions of variables in the embodiments pertain not only to the compounds of Formula **1** but also to the starting compounds and intermediate compounds useful for preparing the compounds of Formula **1**. In addition, embodiments of this invention, including Embodiments 1–14 above as well as any other embodiments described herein, and any combination thereof, pertain to the compositions and methods of the present invention.

Combinations of Embodiments 1–14 are illustrated by:

Embodiment A. A compound of Formula **1** wherein

Z is O; and

Q is phenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(X)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment B. A compound of Embodiment A wherein

Q is phenyl, pyridinyl, pyrazolyl, oxazolyl, thiazolyl, isoxazolyl, isothiazolyl, furanyl or thienyl, each optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(X)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment C. A compound of Embodiment B wherein

each R^1 is independently halogen, cyano, nitro, OR^4, C_1–C_6 alkyl or C_1–C_6 haloalkyl;

R^2 is H, halogen or C_1–C_6 alkyl;

R^3 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, $C(X)R^7$, $C(O)OR^8$ or $S(O)_mR^9$; or C_1–C_6 alkyl substituted with 1 or 2 OR^4; and

n is 1 or 2.

Specific embodiments include compounds of Formula **1** selected from the group consisting of:

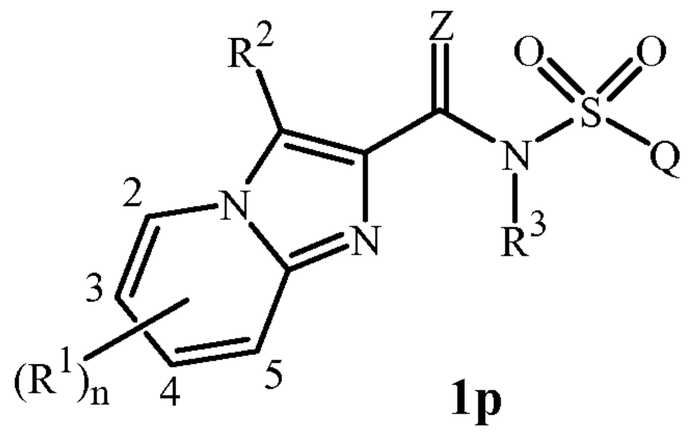
8-chloro-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,

8-chloro-*N*-[(4-cyano-2,5-dimethylphenyl)sulfonyl]-6-(trifluoromethyl)-

imidazo[1,2-*a*]pyridine-2-carboxamide,
N-[(5-acetyl-2-chlorophenyl)sulfonyl]-8-chloro-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide,
8-chloro-*N*-[(3-methyl-2-thienyl)sulfonyl]-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide,
8-chloro-*N*-[(4-methyl-2-thienyl)sulfonyl]-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide,
8-chloro-*N*-[(3-chloro-1-methyl-1*H*-pyrazol-4-yl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,
8-chloro-*N*-[(5-methoxy-2-nitrophenyl)sulfonyl]-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide,
8-chloro-*N*-[(2-chloro-5-ethylphenyl)sulfonyl]-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide,
8-chloro-*N*-[(1-ethyl-3-methyl-1*H*-pyrazol-4-yl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,
8-bromo-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,
N-[(2-bromo-5-methylphenyl)sulfonyl]-8-chloro-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide,
8-chloro-*N*-[(2-chloro-5-methylphenyl)sulfonyl]-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide,
8-chloro-*N*-[(3-chloro-1-ethyl-1*H*-pyrazol-4-yl)sulfonyl]-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide, and
N-[(5-acetyl-2-methylphenyl)sulfonyl]-8-chloro-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide.

Further embodiments of the present invention as described in the Summary of the Invention include those described below. In the following Embodiments, Formula **1p** includes stereoisomers, *N*-oxides, and salts thereof, and reference to "a compound of Formula **1p**" includes the definitions of substituents specified in the Summary of the Invention unless further defined in the Embodiments.

Embodiment 15. A compound of Formula **1p**



1p

wherein

Z is O or S;

each R^1 is independently halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ or $N(R^{10})C(O)R^{7a}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

R^2 is H, halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$;

R^3 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 5 substituents independently selected from the group consisting of

halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

Q is phenyl, naphthalenyl, a 5- or 6-membered heteroaromatic ring or an 8- to 10-membered heteroaromatic bicyclic ring system, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$, $N(R^{10})C(O)R^{7a}$ and R^{14};

each X is independently O or S;

each R^4 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{4a} is independently H, C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^5 is independently H, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{5a} is independently H or C_1–C_6 alkyl;

each R^6 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4

substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$;

each R^{6a} is independently H, C_1–C_6 alkyl, $C(O)R^{13}$ or $C(O)OR^{13}$;

each R^7 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{7a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^8 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{8a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^9 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$,

OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{9a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^{10} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$;

each R^{10a} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl;

each R^{11} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with halogen, cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11a}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11a}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11a}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11a}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10a})C(O)R^{7a}$;

each R^{11a} is independently H, C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl;

each R^{12} is independently H, C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl;

each R^{13} is independently H or C_1–C_4 alkyl;

each R^{14} is independently C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each m is independently 0, 1 or 2; and

n is 0, 1, 2, 3 or 4.

Embodiment 16. A compound of Formula **1p** wherein Z is O.

Embodiment 17. A compound of Formula **1p** wherein Z is S.

Embodiment 18. A compound of Formula **1p** or Embodiment 1 or 2 wherein each R^1 is independently halogen, cyano, nitro, OR^4, C_1–C_6 alkyl or C_1–C_6 haloalkyl.

Embodiment 18a. A compound of Embodiment 18 wherein each R^1 is independently halogen, C_1–C_6 haloalkyl or C_1–C_6 haloalkoxy (i.e. OR^4 and R^4 is C_1–C_6 haloalkyl).

Embodiment 18b. A compound of Embodiment 18a wherein n is 2, and one R^1 is in the 3-position, and a second R^1 is in the 5-position.

Embodiment 18c. A compound of Embodiment 18a or 18b wherein each R^1 is independently halogen or C_1–C_2 haloalkyl.

Embodiment 18d. A compound of Embodiment 18c wherein each R^1 is independently Cl, Br or CF_3.

Embodiment 18e. A compound of Embodiment 18c wherein n is 2, and each R^1 is independently Cl, Br or CF_3.

Embodiment 18f. A compound of Formula **1p** wherein n is 1, and R^1 is CF_3 and is in the 3-position.

Embodiment 18g. A compound of Formula **1p** wherein n is 2, and one R^1 is CF_3 and is in the 3-position, and a second R^1 is Cl and is in the 5-position.

Embodiment 18h. A compound of Formula **1p** wherein n is 2, and one R^1 is CF_3 and is in the 3-position, and a second R^1 is Br and is in the 5-position.

Embodiment 19. A compound of Formula **1p** or any of Embodiments 15–18h wherein Q is phenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 19a. A compound of Embodiment 19 wherein Q is phenyl, pyridinyl, pyrazolyl, oxazolyl, thiazolyl, isoxazolyl, isothiazolyl or thienyl, each optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 19b. A compound of Embodiment 19a wherein Q is phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl,

C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 19c. A compound of Embodiment 19a wherein Q is pyridinyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 19d. A compound of Embodiment 19a wherein Q is pyrazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 19e. A compound of Embodiment 19a wherein Q is oxazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 19f. A compound of Embodiment 19a wherein Q is thiazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 19g. A compound of Embodiment 19a wherein Q is isoxazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 19h. A compound of Embodiment 19a wherein Q is isothiazolyl optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl,

$C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 19i. A compound of Embodiment 19a wherein Q is thienyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment 19j. A compound of Embodiment 19b wherein Q is phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, OR^4, C_1–C_4 alkyl, C_1–C_4 haloalkyl, $C(X)R^7$ and $C(O)OR^8$.

Embodiment 19k. A compound of Embodiment 19c wherein Q is pyridinyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, OR^4, C_1–C_4 alkyl, C_1–C_4 haloalkyl, $C(X)R^7$ and $C(O)OR^8$.

Embodiment 20. A compound of Formula **1p** or any of Embodiments 15–19k wherein R^2 is H, halogen or C_1–C_6 alkyl.

Embodiment 20a. A compound of Embodiment 20 wherein R^2 is H, F, Cl, Br or C_1–C_2 alkyl.

Embodiment 20b. A compound of Embodiment 20a wherein R^2 is H, Cl, Br or CH_3.

Embodiment 21. A compound of Formula **1p** or any of Embodiments 15–20b wherein R^3 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, $C(X)R^7$, $C(O)OR^8$ or $S(O)_mR^9$; or C_1–C_6 alkyl substituted with 1 or 2 OR^4.

Embodiment 21a. A compound of Embodiment 21 wherein R^3 is H or C_1–C_6 alkyl.

Embodiment 21b. A compound of Embodiment 21a wherein R^3 is H.

Embodiment 22. A compound of Formula **1p** or any of Embodiments 15–21b wherein R^4 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$.

Embodiment 23. A compound of Formula **1p** or any of Embodiments 15–22 wherein R^5 is H, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4

substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$.

Embodiment 24. A compound of Formula **1p** or any of Embodiments 15–23 wherein R^6 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl; or C_3–C_7 cycloalkyl or C_4–C_8 cycloalkylalkyl, each optionally substituted with 1 or 2 substituents independently selected from the group consisting of halogen, cyano, C_1–C_4 alkyl, C_1–C_4 haloalkyl and OR^{4a};

Embodiment 25. A compound of Formula **1p** or any of Embodiments 15–24 wherein R^7 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$.

Embodiment 26. A compound of Formula **1p** or any of Embodiments 15–25 wherein R^8 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$.

Embodiment 27. A compound of Formula **1p** or any of Embodiments 15–26 wherein R^9 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$.

Embodiment 28. A compound of Formula **1p** or any of Embodiments 15–27 wherein R^{10} is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl.

Embodiment 29. A compound of Formula **1p** or any of Embodiments 15–28 wherein R^{14} is C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_6

alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$.

Embodiments of this invention, including Embodiments 15–29 above as well as any other embodiments described herein, can be combined in any manner, and the descriptions of variables in the embodiments pertain not only to the compounds of Formula **1p** but also to the starting compounds and intermediate compounds useful for preparing the compounds of Formula **1p**. In addition, embodiments of this invention, including Embodiments 15–29 above as well as any other embodiments described herein, and any combination thereof, pertain to the compositions and methods of the present invention.

Combinations of Embodiments 15–29 are illustrated by:

Embodiment A1. A compound of Formula **1p** wherein

Z is O; and

Q is phenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment B1. A compound of Embodiment A1 wherein

Q is phenyl, pyridinyl, pyrazolyl, oxazolyl, thiazolyl, isoxazolyl, isothiazolyl or thienyl, each optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

Embodiment C1. A compound of Embodiment B1 wherein

each R^1 is independently H, halogen, cyano, nitro, OR^4, C_1–C_6 alkyl or C_1–C_6 haloalkyl;

R^2 is H, halogen or C_1–C_6 alkyl;

R^3 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, $C(X)R^7$, $C(O)OR^8$ or $S(O)_mR^9$; or C_1–C_6 alkyl substituted with 1 or 2 OR^4; and

n is 1 or 2.

Of note is that compounds of this invention are characterized by favorable metabolic and/or soil residual patterns and exhibit activity controlling a spectrum of agronomic and nonagronomic parasitic nematodes.

Of particular note, for reasons of parasitic nematode control spectrum and economic importance, protection of agronomic crops from damage or injury caused by parasitic nematodes by controlling parasitic nematodes are embodiments of the invention. Compounds of this invention because of their favorable translocation properties or

systemicity in plants also protect foliar or other plant parts which are not directly contacted with a compound of Formula **1** or a composition comprising the compound.

Also noteworthy as embodiments of the present invention are compositions comprising a compound of any of the preceding Embodiments, as well as any other embodiments described herein, and any combinations thereof, and at least one additional component selected from the group consisting of a surfactant, a solid diluent and a liquid diluent, said compositions optionally further comprising at least one additional biologically active compound or agent.

Further noteworthy as embodiments of the present invention are compositions for controlling a parasitic nematode comprising a compound of any of the preceding Embodiments, as well as any other embodiments described herein, and any combinations thereof, and at least one additional component selected from the group consisting of a surfactant, a solid diluent and a liquid diluent, said compositions optionally further comprising at least one additional biologically active compound or agent. Embodiments of the invention further include methods for controlling a parasitic nematode comprising contacting the parasitic nematode or its environment with a biologically effective amount of a compound of any of the preceding Embodiments (e.g., as a composition described herein).

Embodiments of the invention also include a composition comprising a compound of any of the preceding Embodiments, in the form of a soil drench liquid formulation. Embodiments of the invention further include methods for controlling a parasitic nematode comprising contacting the soil with a liquid composition as a soil drench comprising a biologically effective amount of a compound of any of the preceding Embodiments.

Embodiments of the invention also include a spray composition for controlling a parasitic nematode comprising a biologically effective amount of a compound of any of the preceding Embodiments and a propellant. Embodiments of the invention further include a bait composition for controlling a parasitic nematode comprising a biologically effective amount of a compound of any of the preceding Embodiments, one or more food materials, optionally an attractant, and optionally a humectant.

Embodiments of the invention also include methods for protecting a seed from a parasitic nematode comprising contacting the seed with a biologically effective amount of a compound of any of the preceding Embodiments.

Embodiments of the invention also include methods for controlling a parasitic nematode comprising contacting the parasitic nematode or its environment with a biologically effective amount of a compound of Formula **1**, an *N*-oxide, or a salt thereof, (e.g., as a composition described herein), provided that the methods are not methods of medical treatment of a human or animal body by therapy.

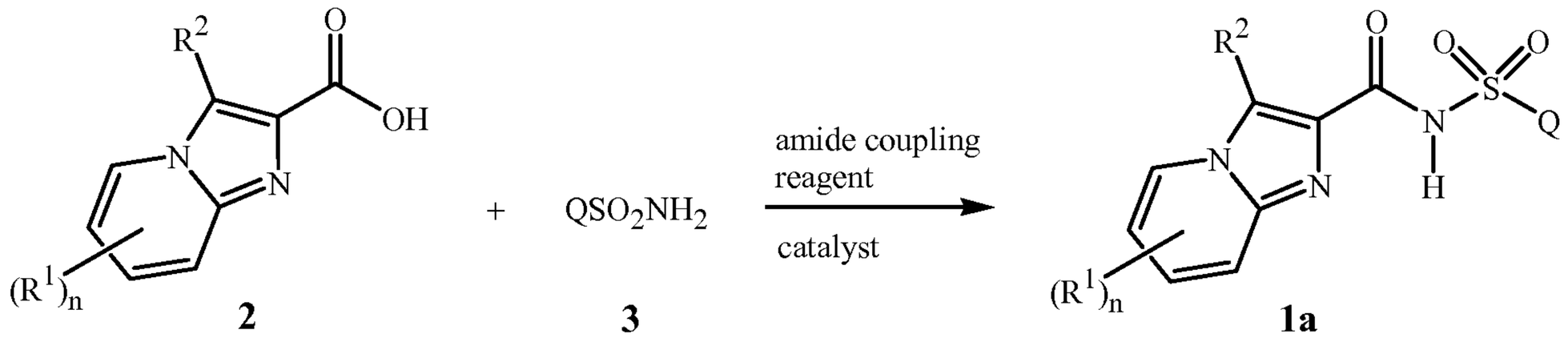
This invention also relates to such methods wherein the parasitic nematode or its environment is contacted with a composition comprising a biologically effective amount of a

compound of Formula **1**, an *N*-oxide, or a salt thereof, and at least one additional component selected from the group consisting of surfactants, solid diluents and liquid diluents, said composition optionally further comprising a biologically effective amount of at least one additional biologically active compound or agent, provided that the methods are not methods of medical treatment of a human or animal body by therapy.

One or more of the following methods and variations as described in Schemes 1–8 can be used to prepare the compounds of Formula **1**. The definitions of X, Q, R^1, R^2 and R^3 in the compounds of Formulae **1a**–**1c** and **2**–**10** below are as defined above in the Summary of the Invention unless otherwise noted. Formulae **1a**–**1c** are various subsets of Formula **1**, and all substituents for Formulae **1a**–**1c** are as defined above for Formula **1** unless otherwise noted. Room temperature is between about 20 and 25 °C.

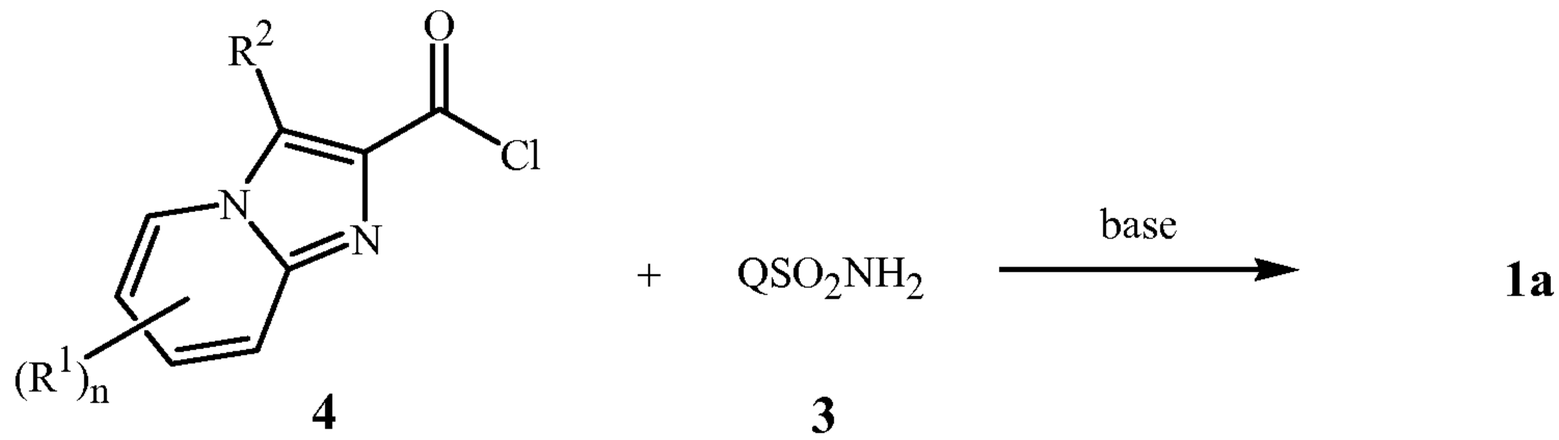
Compounds of Formula **1a** (i.e. Formula **1** wherein Z is oxygen and R^3 is H) can be prepared by the reaction of carboxylic acids of Formula **2** with aryl or heteroaryl sulfonamides of Formula **3** as shown in Scheme 1. Typically, an amide coupling reagent and a catalyst such as *N*,*N*-dimethylaminopyridine (DMAP) are used in the method of Scheme 1. Amide coupling reagents include 1-ethyl-3-(3-dimethylaminopropyl)-carbodiimide hydrochloride (EDC), *N*,*N*'-dicyclohexylcarbodiimide (DCC) and 1,1'-carbonyldiimidazole (CDI). The reaction can be carried out at temperatures ranging from room temperature to the reflux temperature of the solvent. Typical solvents include alcohols, ethers, esters, amides and halogenated hydrocarbons. Step D of Synthesis Example 1 describes a particularly useful set of conditions utilizing EDC/DMAP in a 1:1 solvent mixture of *t*-butanol and dichloromethane.

Scheme 1



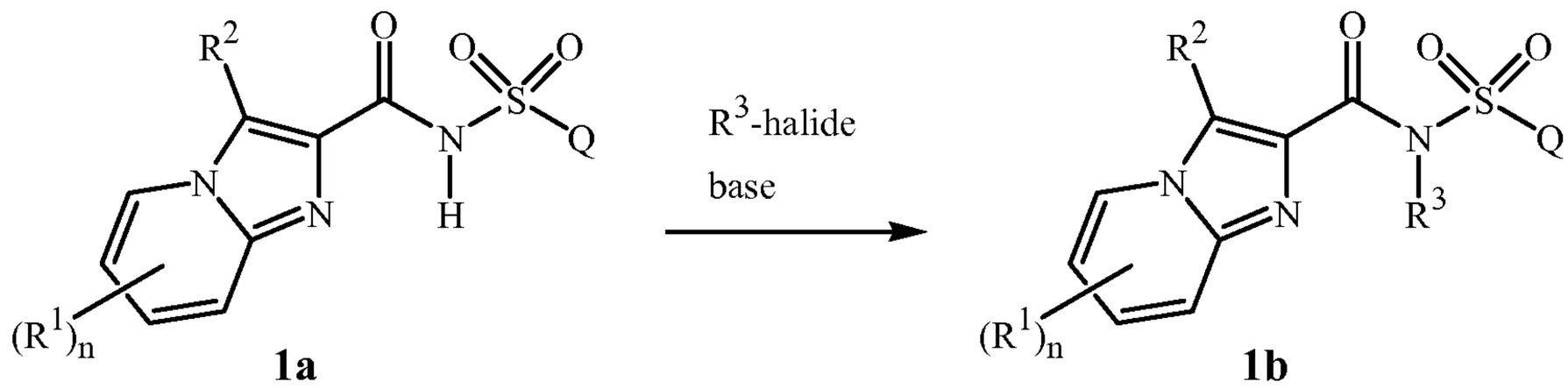
Compounds of Formula **1a** can also be prepared by the reaction of carboxylic acid chlorides of Formula **4** with aryl or heteroaryl sulfonamides of Formula **3** as shown in Scheme 2. The reaction typically involves use of a base such as triethylamine or pyridine and optionally a catalyst such as DMAP in the presence of a solvent. The reaction can be carried out at temperatures ranging from room temperature to the reflux temperature of the solvent. Typical solvents include ethers, esters and halogenated hydrocarbons.

Scheme 2



Compounds of Formula **1b** wherein R^3 is optionally substituted alkyl, alkenyl, alkynyl or cycloalkyl can be prepared by the reaction of compounds of Formula **1a** with appropriately substituted alkyl, alkenyl, alkynyl or cycloalkyl halides and base as shown in Scheme 3. Typical reaction conditions comprise potassium carbonate as the base and DMF as the solvent.

Scheme 3

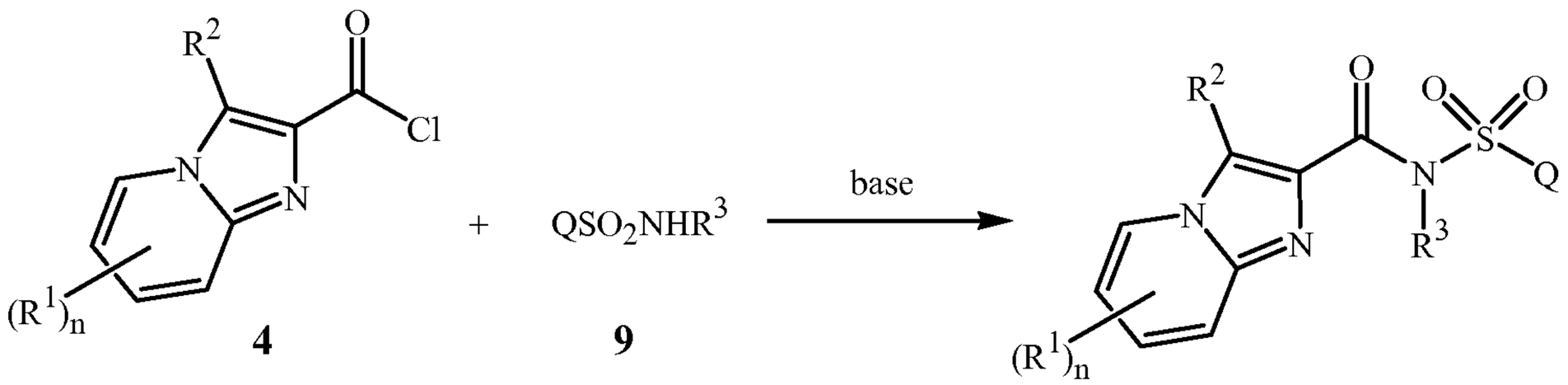


halide is Cl, Br or I

Compounds of Formula **1b** wherein R^3 is $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_2R^9$ or $S(O)_2NR^{11}R^{12}$ can be prepared by the reaction of compounds of Formula **1a** with acyl or sulfonyl halides (e.g., $ClC(X)R^7$, $ClC(O)OR^8$, $ClC(O)NR^{11}R^{12}$, $ClS(O)_2R^9$ or $ClS(O)_2NR^{11}R^{12}$) by acylation or sulfonylation methods well known in the art.

Compounds of Formula **1b** wherein R^3 is optionally substituted alkyl, alkenyl, alkynyl, cycloalkyl or phenyl can be prepared by the reaction of acid chlorides of Formula **4** with sulfonamides of Formula **9** as shown in Scheme 4. Alternatively, compounds of Formula **1b** wherein R^3 is optionally substituted alkyl, alkenyl, alkynyl, cycloalkyl or phenyl can be prepared by the reaction of carboxylic acids of Formula **2** with sulfonamides of Formula **9** by the method of Scheme 1.

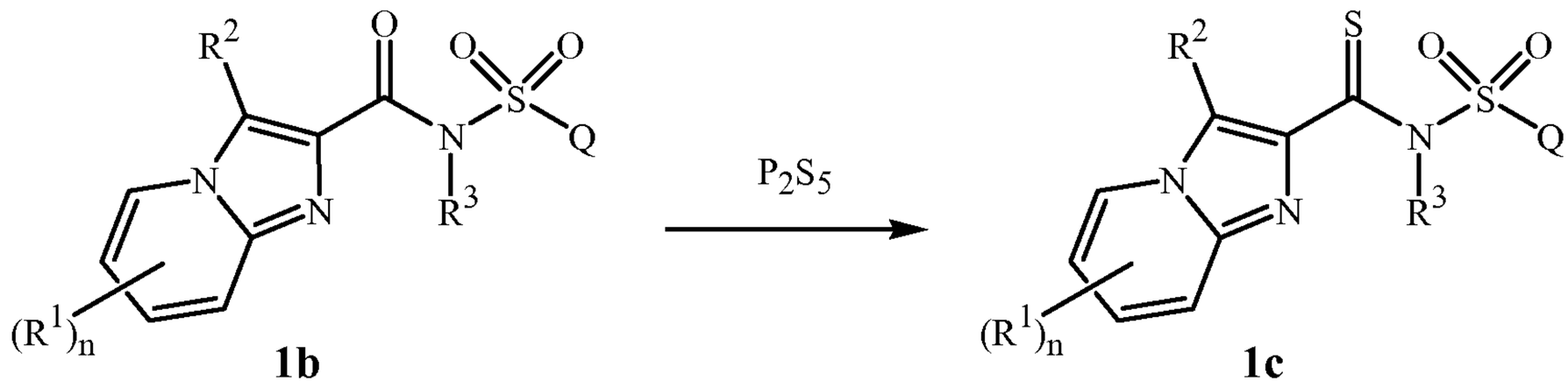
Scheme 4



R^3 is optionally substituted alkyl,
alkenyl, alkynyl, cycloalkyl or phenyl

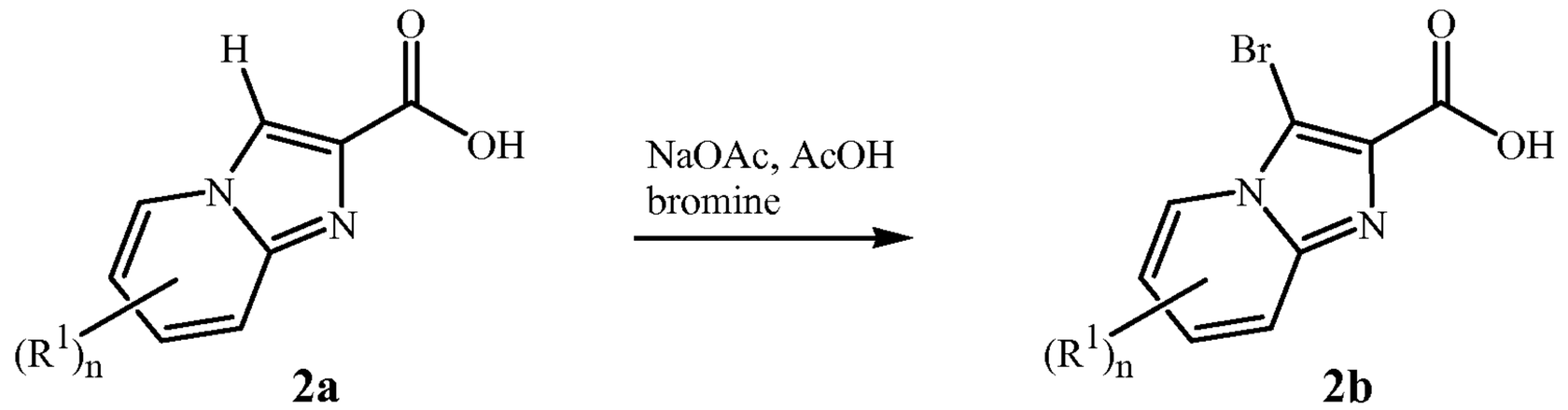
Thioamides of Formula **1c** (i.e. Formula **1** wherein X is sulfur) can be prepared by the reaction of compounds of Formula **1b** (i.e. Formula **1** wherein X is O) with thiation reagents such as phosphorus pentasulfide or Lawesson's reagent as depicted in Scheme 5.

Scheme 5



Compounds of Formula **2b** (i.e. Formula **2** wherein R^2 is bromine) can be prepared by the reaction of compounds of Formula **2a** (i.e. Formula **2** wherein R^2 is H) with bromine in acetic acid in the presence of sodium acetate as described in *Heterocycles* **2002**, *57*(1), 21–38.

Scheme 6

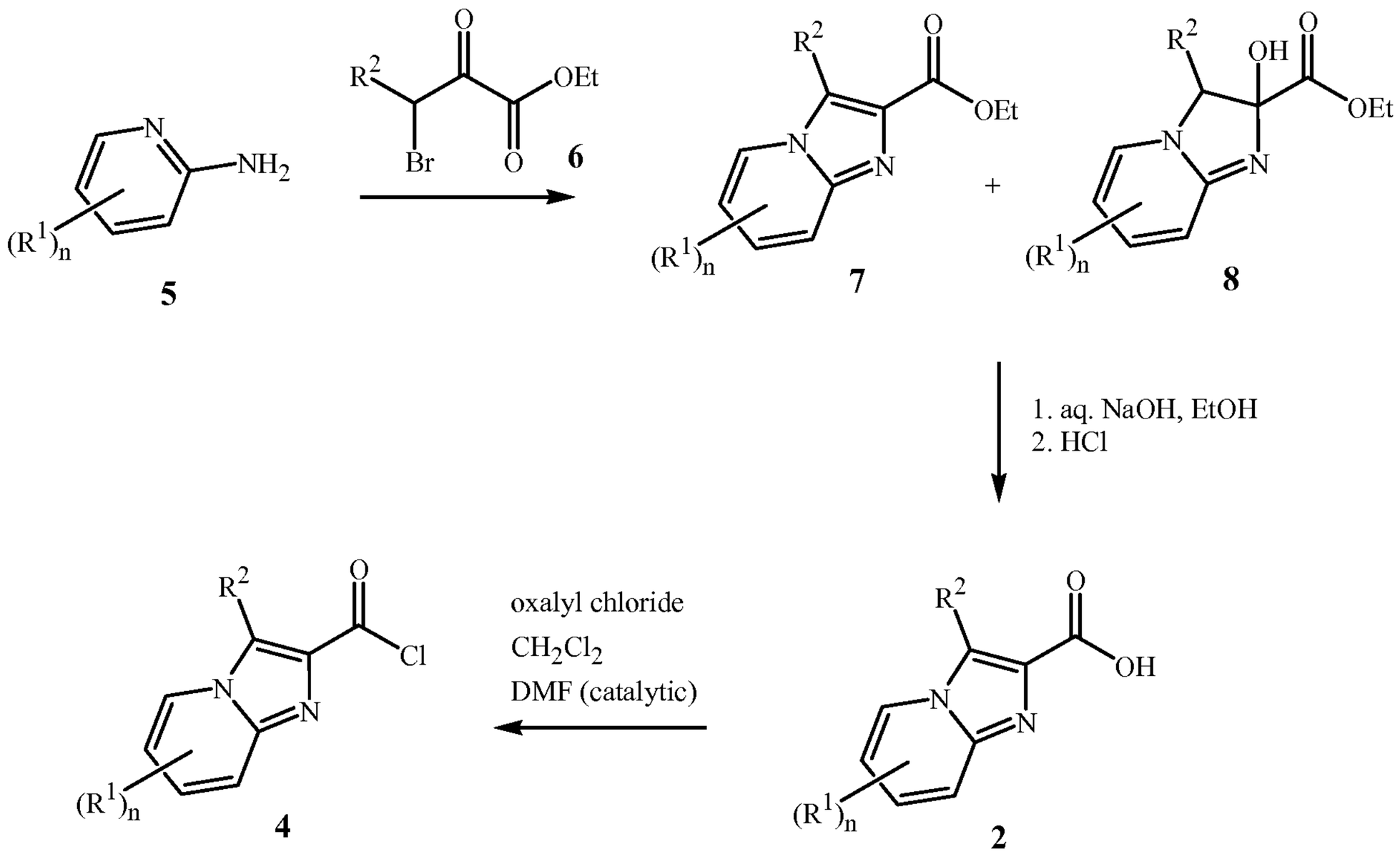


Compounds of Formula **2** wherein R^2 is cyano can be prepared by reaction of compounds of Formula **2b** with CuCN by methods known in the art. Compounds of Formula **2** wherein R^2 is nitro can be prepared by reaction of compounds of Formula **2a** with nitric acid/sulfuric acid as described in *Bioorganic Med. Chem. Lett.* **2005**, *15*(11), 2790–

2794. Compounds of Formula **2** wherein R^2 is OR^4, NR^5R^6 or SR^9 can be prepared from compounds of Formula **2** wherein R^2 is F by standard displacement reactions well known in the art. Compounds of Formula **2** wherein R^2 is F can be prepared as described in *Russian Chem. Bull.* **2005**, *54*(2), 470–471.

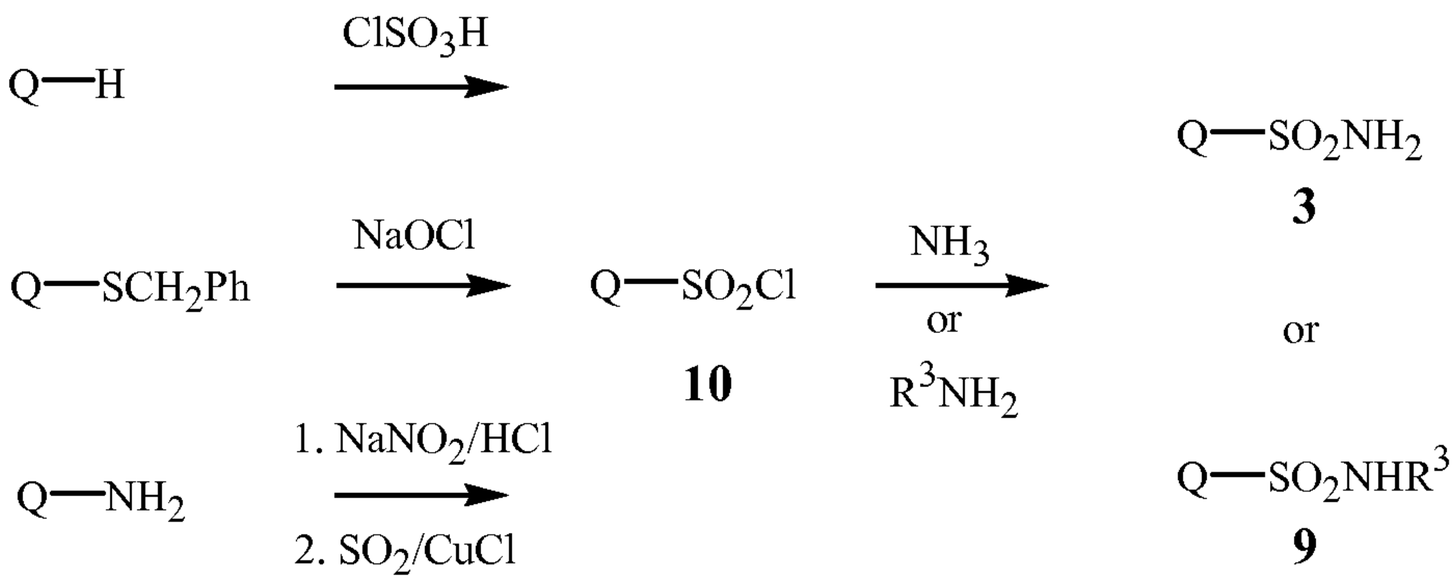
Carboxylic acids of Formula **2** and acid chlorides of Formula **4** can be prepared by the reactions shown in Scheme 7. Reaction of a suitably substituted 2-aminopyridine of Formula **5** with a 2-bromopyruvate of Formula **6** wherein R^2 is H, optionally substituted alkyl, alkenyl, alkynyl, $C(O)R^7$, $C(O)OR^8$ or $C(O)NR^{11}R^{12}$, or an optionally substituted phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring at temperatures ranging from room temperature to the boiling temperature of the solvent affords the carboxylic ester of Formula **7** along with variable amounts of the alcohol of Formula **8**. Heating the reaction mixture to boiling in a solvent such as 1,2-dimethoxyethane results in complete conversion of alcohol **8** to ester **7**. Treatment of a mixture of esters **7** and **8** with an aqueous hydroxide base such as sodium hydroxide in a water-miscible solvent such as ethanol results in ester hydrolysis to form the carboxylic acid of Formula **2** after acidification with a strong acid such as hydrochloric acid. This method is detailed in Step C of Synthesis Example 1. The carboxylic acid of Formula **2** can be converted to the acid chloride of Formula **4** by well known conventional means such as treatment with thionyl chloride or oxalyl chloride with a catalytic amount of *N*,*N*-dimethylformamide (DMF) in moderately polar, aprotic solvents including dichloromethane, dichloroethane, toluene and ethyl acetate. Intermediates of Formula **6** can be prepared by a variety of well-known synthetic methods, including the bromination of optionally substituted pyruvates or lactates (alpha-hydroxy esters). Typical reaction conditions include direct bromination with bromine (see, for example, *JACS* **1944**, *66*, 1656–1659) or $CuBr_2$ in ethyl acetate/chloroform (see, for example, *JOC* **2002**, *67*(4), 1102–1108), or reaction of a lactate with *N*-bromosuccinimide in CCl_4 (see, for example, *JACS* **1954**, *76*, 5796–5797).

Scheme 7



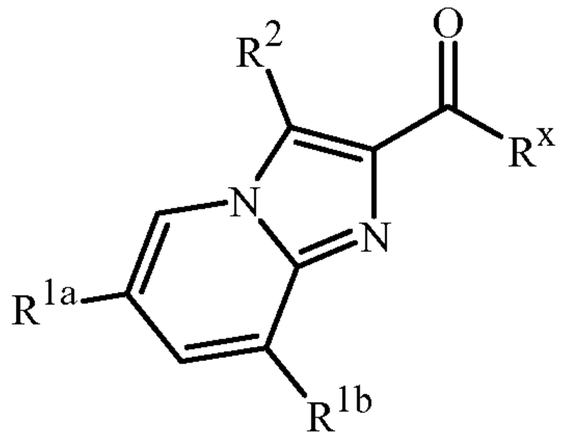
Sulfonamides of Formulae **3** and **9** are known in the chemical literature or are available commercially. As shown in Scheme 8, sulfonamides of Formula **3** are readily prepared from the corresponding sulfonyl chlorides of Formula **10** by reaction with ammonia, while sulfonamides of Formula **9** are readily prepared from the corresponding sulfonyl chlorides of Formula **10** by reaction with R^3NH_2. The sulfonyl chloride intermediates are available commercially or can be prepared by a large variety of methods known in the literature. Three of the most common methods of sulfonyl chloride preparation are shown in Scheme 8, including (a) direct chlorosulfonylation of aromatic and heteroaromatic systems with chlorosulfonic acid, (b) oxidation of sulfides (for example with sodium hypochlorite) in the prescence of hydrochloric acid, and (c) diazotization and chlorosulfonylation of aromatic and heteroaromatic amines. These three methods are meant only to be illustrative; a large variety of other synthetic methods are available for the preparation of sulfonyl chlorides and sulfonamides.

Scheme 8



Examples of intermediates useful in the preparation of compounds of this invention are shown in Tables I-1 through I-12. The following abbreviations are used in the Tables which follow: Me means methyl, Et means ethyl, *i*-Pr means isopropyl, *n*-Pr means normal propyl, OMe means methoxy and SMe means thiomethoxy.

TABLE I-1

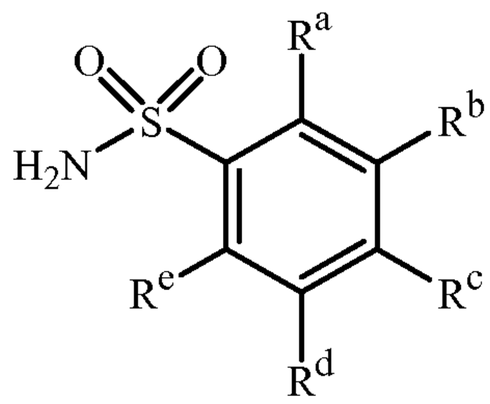


R^{1a}	R^{1b}	R^2	R^x	R^{1a}	R^{1b}	R^2	R^x
H	H	H	Cl	H	H	Cl	Cl
H	H	H	OH	H	H	Cl	OH
H	H	H	OCH_3	H	H	Cl	OCH_3
H	H	H	OCH_2CH_3	H	H	Cl	OCH_2CH_3
CF_3	H	H	Cl	CF_3	H	Cl	Cl
CF_3	H	H	OH	CF_3	H	Cl	OH
CF_3	H	H	OCH_3	CF_3	H	Cl	OCH_3
CF_3	H	H	OCH_2CH_3	CF_3	H	Cl	OCH_2CH_3
CF_3	Cl	H	Cl	CF_3	Cl	Cl	Cl
CF_3	Cl	H	OH	CF_3	Cl	Cl	OH
CF_3	Cl	H	OCH_3	CF_3	Cl	Cl	OCH_3
CF_3	Cl	H	OCH_2CH_3	CF_3	Cl	Cl	OCH_2CH_3

R^{1a}	R^{1b}	R^2	R^x	R^{1a}	R^{1b}	R^2	R^x
CF_3	Br	H	Cl	CF_3	Br	Cl	Cl
CF_3	Br	H	OH	CF_3	Br	Cl	OH
CF_3	Br	H	OCH_3	CF_3	Br	Cl	OCH_3
CF_3	Br	H	OCH_2CH_3	CF_3	Br	Cl	OCH_2CH_3
Cl	H	H	Cl	Cl	H	Cl	Cl
Cl	H	H	OH	Cl	H	Cl	OH
Cl	H	H	OCH_3	Cl	H	Cl	OCH_3
Cl	H	H	OCH_2CH_3	Cl	H	Cl	OCH_2CH_3
Cl	Cl	H	Cl	Cl	Cl	Cl	Cl
Cl	Cl	H	OH	Cl	Cl	Cl	OH
Cl	Cl	H	OCH_3	Cl	Cl	Cl	OCH_3
Cl	Cl	H	OCH_2CH_3	Cl	Cl	Cl	OCH_2CH_3
Br	H	H	Cl	Br	H	Cl	Cl
Br	H	H	OH	Br	H	Cl	OH
Br	H	H	OCH_3	Br	H	Cl	OCH_3
Br	H	H	OCH_2CH_3	Br	H	Cl	OCH_2CH_3
Br	Br	H	Cl	Br	Br	Cl	Cl
Br	Br	H	OH	Br	Br	Cl	OH
Br	Br	H	OCH_3	Br	Br	Cl	OCH_3
Br	Br	H	OCH_2CH_3	Br	Br	Cl	OCH_2CH_3
H	H	Br	Cl	H	H	CH_3	Cl
H	H	Br	OH	H	H	CH_3	OH
H	H	Br	OCH_3	H	H	CH_3	OCH_3
H	H	Br	OCH_2CH_3	H	H	CH_3	OCH_2CH_3
CF_3	H	Br	Cl	CF_3	H	CH_3	Cl
CF_3	H	Br	OH	CF_3	H	CH_3	OH
CF_3	H	Br	OCH_3	CF_3	H	CH_3	OCH_3
CF_3	H	Br	OCH_2CH_3	CF_3	H	CH_3	OCH_2CH_3
CF_3	Cl	Br	Cl	CF_3	Cl	CH_3	Cl
CF_3	Cl	Br	OH	CF_3	Cl	CH_3	OH
CF_3	Cl	Br	OCH_3	CF_3	Cl	CH_3	OCH_3
CF_3	Cl	Br	OCH_2CH_3	CF_3	Cl	CH_3	OCH_2CH_3
CF_3	Br	Br	Cl	CF_3	Br	CH_3	Cl
CF_3	Br	Br	OH	CF_3	Br	CH_3	OH
CF_3	Br	Br	OCH_3	CF_3	Br	CH_3	OCH_3
CF_3	Br	Br	OCH_2CH_3	CF_3	Br	CH_3	OCH_2CH_3
Cl	H	Br	Cl	Cl	H	CH_3	Cl

R^{1a}	R^{1b}	R^2	R^x	R^{1a}	R^{1b}	R^2	R^x
Cl	H	Br	OH	Cl	H	CH_3	OH
Cl	H	Br	OCH_3	Cl	H	CH_3	OCH_3
Cl	H	Br	OCH_2CH_3	Cl	H	CH_3	OCH_2CH_3
Cl	Cl	Br	Cl	Cl	Cl	CH_3	Cl
Cl	Cl	Br	OH	Cl	Cl	CH_3	OH
Cl	Cl	Br	OCH_3	Cl	Cl	CH_3	OCH_3
Cl	Cl	Br	OCH_2CH_3	Cl	Cl	CH_3	OCH_2CH_3
Br	H	Br	Cl	Br	H	CH_3	Cl
Br	H	Br	OH	Br	H	CH_3	OH
Br	H	Br	OCH_3	Br	H	CH_3	OCH_3
Br	H	Br	OCH_2CH_3	Br	H	CH_3	OCH_2CH_3
Br	Br	Br	Cl	Br	Br	CH_3	Cl
Br	Br	Br	OH	Br	Br	CH_3	OH
Br	Br	Br	OCH_3	Br	Br	CH_3	OCH_3
Br	Br	Br	OCH_2CH_3	Br	Br	CH_3	OCH_2CH_3

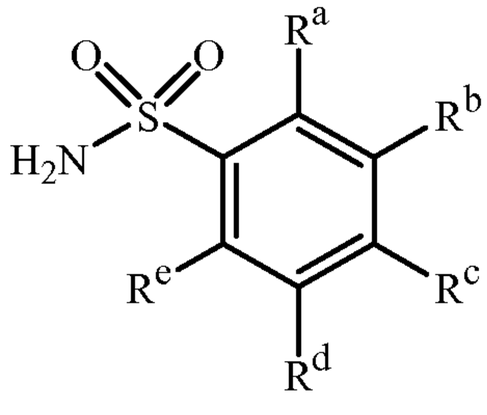
TABLE I-2



R^a	R^b	R^c	R^d	R^e	R^a	R^b	R^c	R^d	R^e
H	H	H	H	H	Me	H	H	H	H
H	Me	H	H	H	Me	Me	H	H	H
H	F	H	H	H	Me	F	H	H	H
H	Cl	H	H	H	Me	Cl	H	H	H
H	Br	H	H	H	Me	Br	H	H	H
H	CF_3	H	H	H	Me	CF_3	H	H	H
H	cyano	H	H	H	Me	cyano	H	H	H
H	OMe	H	H	H	Me	OMe	H	H	H
H	SMe	H	H	H	Me	SMe	H	H	H
F	H	H	H	H	Cl	H	H	H	H
F	Me	H	H	H	Cl	Me	H	H	H
F	F	H	H	H	Cl	F	H	H	H

F	Cl	H	H	H	Cl	Cl	H	H	H
F	Br	H	H	H	Cl	Br	H	H	H
F	CF_3	H	H	H	Cl	CF_3	H	H	H
F	cyano	H	H	H	Cl	cyano	H	H	H
F	OMe	H	H	H	Cl	OMe	H	H	H
F	SMe	H	H	H	Cl	SMe	H	H	H
Br	H	H	H	H	CF_3	H	H	H	H
Br	Me	H	H	H	CF_3	Me	H	H	H
Br	F	H	H	H	CF_3	F	H	H	H
Br	Cl	H	H	H	CF_3	Cl	H	H	H
Br	Br	H	H	H	CF_3	Br	H	H	H
Br	CF_3	H	H	H	CF_3	CF_3	H	H	H
Br	cyano	H	H	H	CF_3	cyano	H	H	H
Br	OMe	H	H	H	CF_3	OMe	H	H	H
Br	SMe	H	H	H	CF_3	SMe	H	H	H
cyano	H	H	H	H	cyano	Br	H	H	H
cyano	Me	H	H	H	cyano	CF_3	H	H	H
cyano	F	H	H	H	cyano	cyano	H	H	H
cyano	Cl	H	H	H	cyano	OMe	H	H	H
					cyano	SMe	H	H	H

TABLE I-2a

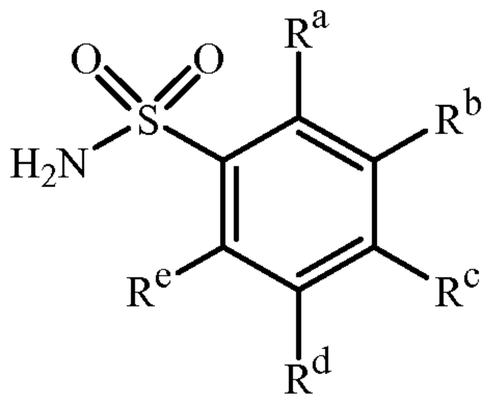


R^a	R^b	R^c	R^d	R^e	R^a	R^b	R^c	R^d	R^e
H	H	H	H	H	Me	H	H	H	H
H	H	H	Me	H	Me	H	H	Me	H
H	H	H	Et	H	Me	H	H	Et	H
H	H	H	*i*-Pr	H	Me	H	H	*i*-Pr	H
H	H	H	F	H	Me	H	H	F	H
H	H	H	Cl	H	Me	H	H	Cl	H
H	H	H	Br	H	Me	H	H	Br	H
H	H	H	CF_3	H	Me	H	H	CF_3	H

H	H	H	cyano	H	Me	H	H	cyano	H
H	H	H	OMe	H	Me	H	H	OMe	H
H	H	H	OEt	H	Me	H	H	OEt	H
H	H	H	$OCH(CH_3)_2$	H	Me	H	H	$OCH(CH_3)_2$	H
H	H	H	OCH_2CF_3	H	Me	H	H	OCH_2CF_3	H
H	H	H	SMe	H	Me	H	H	SMe	H
H	H	H	$C(O)CH_3$	H	Me	H	H	$C(O)CH_3$	H
F	H	H	H	H	Cl	H	H	H	H
F	H	H	Me	H	Cl	H	H	Me	H
F	H	H	Et	H	Cl	H	H	Et	H
F	H	H	*i*-Pr	H	Cl	H	H	*i*-Pr	H
F	H	H	F	H	Cl	H	H	F	H
F	H	H	Cl	H	Cl	H	H	Cl	H
F	H	H	Br	H	Cl	H	H	Br	H
F	H	H	CF_3	H	Cl	H	H	CF_3	H
F	H	H	cyano	H	Cl	H	H	cyano	H
F	H	H	OMe	H	Cl	H	H	OMe	H
F	H	H	OEt	H	Cl	H	H	OEt	H
F	H	H	$OCH(CH_3)_2$	H	Cl	H	H	$OCH(CH_3)_2$	H
F	H	H	OCH_2CF_3	H	Cl	H	H	OCH_2CF_3	H
F	H	H	SMe	H	Cl	H	H	SMe	H
F	H	H	$C(O)CH_3$	H	Cl	H	H	$C(O)CH_3$	H
Br	H	H	H	H	CF_3	H	H	H	H
Br	H	H	Me	H	CF_3	H	H	Me	H
Br	H	H	Et	H	CF_3	H	H	Et	H
Br	H	H	*i*-Pr	H	CF_3	H	H	*i*-Pr	H
Br	H	H	F	H	CF_3	H	H	F	H
Br	H	H	Cl	H	CF_3	H	H	Cl	H
Br	H	H	Br	H	CF_3	H	H	Br	H
Br	H	H	CF_3	H	CF_3	H	H	CF_3	H
Br	H	H	cyano	H	CF_3	H	H	cyano	H
Br	H	H	OMe	H	CF_3	H	H	OMe	H
Br	H	H	OEt	H	CF_3	H	H	OEt	H
Br	H	H	$OCH(CH_3)_2$	H	CF_3	H	H	$OCH(CH_3)_2$	H
Br	H	H	OCH_2CF_3	H	CF_3	H	H	OCH_2CF_3	H
Br	H	H	SMe	H	CF_3	H	H	SMe	H
Br	H	H	$C(O)CH_3$	H	CF_3	H	H	$C(O)CH_3$	H
cyano	H	H	H	H	cyano	H	H	CF_3	H

cyano	H	H	Me	H	cyano	H	H	cyano	H
cyano	H	H	Et	H	cyano	H	H	OMe	H
cyano	H	H	*i*-Pr	H	cyano	H	H	OEt	H
cyano	H	H	F	H	cyano	H	H	$OCH(CH_3)_2$	H
cyano	H	H	Cl	H	cyano	H	H	OCH_2CF_3	H
cyano	H	H	Br	H	cyano	H	H	SMe	H
					cyano	H	H	$C(O)CH_3$	H

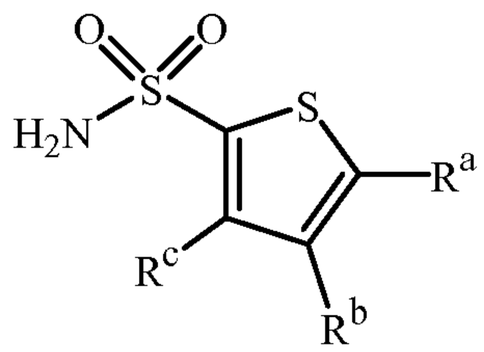
TABLE I-2b



R^a	R^b	R^c	R^d	R^e	R^a	R^b	R^c	R^d	R^e
H	H	F	H	H	Cl	H	F	H	H
H	H	F	Cl	H	Cl	H	F	Cl	H
H	H	F	Br	H	Cl	H	F	Br	H
H	H	F	Me	H	Cl	H	F	Me	H
H	H	F	Et	H	Cl	H	F	Et	H
H	H	F	OMe	H	Cl	H	F	OMe	H
H	H	F	acetyl	H	Cl	H	F	acetyl	H
H	H	Cl	H	H	Cl	H	Cl	H	H
H	H	Cl	Cl	H	Cl	H	Cl	Cl	H
H	H	Cl	Br	H	Cl	H	Cl	Br	H
H	H	Cl	Me	H	Cl	H	Cl	Me	H
H	H	Cl	Et	H	Cl	H	Cl	Et	H
H	H	Cl	OMe	H	Cl	H	Cl	OMe	H
H	H	Cl	acetyl	H	Cl	H	Cl	acetyl	H
H	H	Br	H	H	Cl	H	Br	H	H
H	H	Br	Cl	H	Cl	H	Br	Cl	H
H	H	Br	Br	H	Cl	H	Br	Br	H
H	H	Br	Me	H	Cl	H	Br	Me	H
H	H	Br	Et	H	Cl	H	Br	Et	H
H	H	Br	OMe	H	Cl	H	Br	OMe	H
H	H	Br	acetyl	H	Cl	H	Br	acetyl	H

H	H	Me	H	H	Cl	H	Me	H	H
H	H	Me	Cl	H	Cl	H	Me	Cl	H
H	H	Me	Br	H	Cl	H	Me	Br	H
H	H	Me	Me	H	Cl	H	Me	Me	H
H	H	Me	Et	H	Cl	H	Me	Et	H
H	H	Me	OMe	H	Cl	H	Me	OMe	H
H	H	Me	acetyl	H	Cl	H	Me	acetyl	H
Br	H	F	H	H	Me	H	F	H	H
Br	H	F	Cl	H	Me	H	F	Cl	H
Br	H	F	Br	H	Me	H	F	Br	H
Br	H	F	Me	H	Me	H	F	Me	H
Br	H	F	Et	H	Me	H	F	Et	H
Br	H	F	OMe	H	Me	H	F	OMe	H
Br	H	F	acetyl	H	Me	H	F	acetyl	H
Br	H	Cl	H	H	Me	H	Cl	H	H
Br	H	Cl	Cl	H	Me	H	Cl	Cl	H
Br	H	Cl	Br	H	Me	H	Cl	Br	H
Br	H	Cl	Me	H	Me	H	Cl	Me	H
Br	H	Cl	Et	H	Me	H	Cl	Et	H
Br	H	Cl	OMe	H	Me	H	Cl	OMe	H
Br	H	Cl	acetyl	H	Me	H	Cl	acetyl	H
Br	H	Br	H	H	Me	H	Br	H	H
Br	H	Br	Cl	H	Me	H	Br	Cl	H
Br	H	Br	Br	H	Me	H	Br	Br	H
Br	H	Br	Me	H	Me	H	Br	Me	H
Br	H	Br	Et	H	Me	H	Br	Et	H
Br	H	Br	OMe	H	Me	H	Br	OMe	H
Br	H	Br	acetyl	H	Me	H	Br	acetyl	H
Br	H	Me	H	H	Me	H	Me	H	H
Br	H	Me	Cl	H	Me	H	Me	Cl	H
Br	H	Me	Br	H	Me	H	Me	Br	H
Br	H	Me	Me	H	Me	H	Me	Me	H
Br	H	Me	Et	H	Me	H	Me	Et	H
Br	H	Me	OMe	H	Me	H	Me	OMe	H
Br	H	Me	acetyl	H	Me	H	Me	acetyl	H

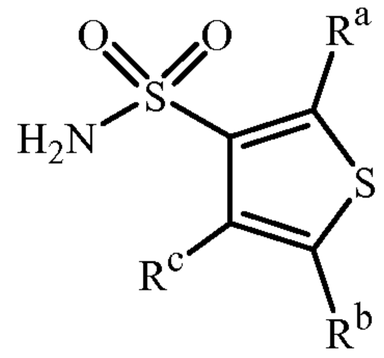
TABLE I-3



R^a	R^b	R^c	R^a	R^b	R^c	R^a	R^b	R^c
H	H	H	Me	H	H	Cl	H	H
H	H	Me	Me	H	Me	Cl	H	Me
H	H	Cl	Me	H	Cl	Cl	H	Cl
H	H	Br	Me	H	Br	Cl	H	Br
H	Me	H	Me	Me	H	Cl	Me	H
H	Me	Me	Me	Me	Me	Cl	Me	Me
H	Me	Cl	Me	Me	Cl	Cl	Me	Cl
H	Me	Br	Me	Me	Br	Cl	Me	Br
H	Et	H	Me	Et	H	Cl	Et	H
H	Et	Me	Me	Et	Me	Cl	Et	Me
H	Et	Cl	Me	Et	Cl	Cl	Et	Cl
H	Et	Br	Me	Et	Br	Cl	Et	Br
H	Cl	H	Me	Cl	H	Cl	Cl	H
H	Cl	Me	Me	Cl	Me	Cl	Cl	Me
H	Cl	Cl	Me	Cl	Cl	Cl	Cl	Cl
H	Cl	Br	Me	Cl	Br	Cl	Cl	Br
Br	H	H	Et	H	H			
Br	H	Me	Et	H	Me			
Br	H	Cl	Et	H	Cl			
Br	H	Br	Et	H	Br			
Br	Me	H	Et	Me	H			
Br	Me	Me	Et	Me	Me			
Br	Me	Cl	Et	Me	Cl			
Br	Me	Br	Et	Me	Br			
Br	Et	H	Et	Et	H			
Br	Et	Me	Et	Et	Me			
Br	Et	Cl	Et	Et	Cl			
Br	Et	Br	Et	Et	Br			
Br	Cl	H	Et	Cl	H			

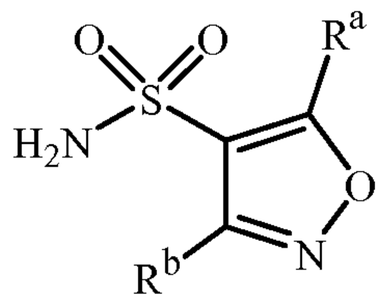
Br	Cl	Me	Et	Cl	Me
Br	Cl	Cl	Et	Cl	Cl
Br	Cl	Br	Et	Cl	Br

TABLE I-4



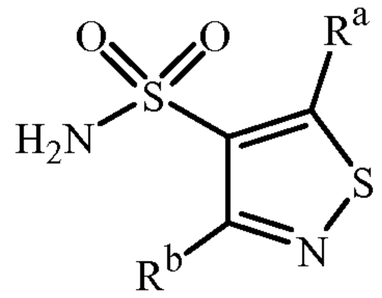
R^a	R^b	R^c	R^a	R^b	R^c	R^a	R^b	R^c
H	H	H	Me	H	H	Cl	H	H
H	H	Me	Me	H	Me	Cl	H	Me
H	H	Cl	Me	H	Cl	Cl	H	Cl
H	Me	H	Me	Me	H	Cl	Me	H
H	Me	Me	Me	Me	Me	Cl	Me	Me
H	Me	Cl	Me	Me	Cl	Cl	Me	Cl
H	Et	H	Me	Et	H	Cl	Et	H
H	Et	Me	Me	Et	Me	Cl	Et	Me
H	Et	Cl	Me	Et	Cl	Cl	Et	Cl
Et	H	H	Br	H	H			
Et	H	Me	Br	H	Me			
Et	H	Cl	Br	H	Cl			
Et	Me	H	Br	Me	H			
Et	Me	Me	Br	Me	Me			
Et	Me	Cl	Br	Me	Cl			
Et	Et	H	Br	Et	H			
Et	Et	Me	Br	Et	Me			
Et	Et	Cl	Br	Et	Cl			

TABLE I-5



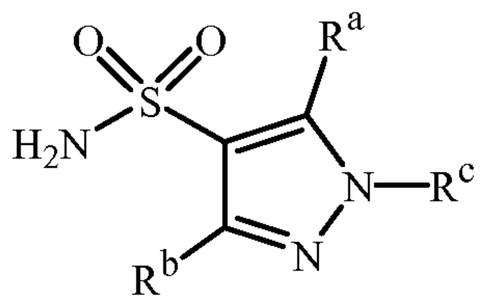
R^a	R^b	R^a	R^b	R^a	R^b
H	H	Me	H	Cl	H
H	Me	Me	Me	Cl	Me
H	Cl	Me	Cl	Cl	Cl

TABLE I-6



R^a	R^b	R^a	R^b	R^a	R^b
H	H	Me	H	Cl	H
H	Me	Me	Me	Cl	Me
H	Cl	Me	Cl	Cl	Cl

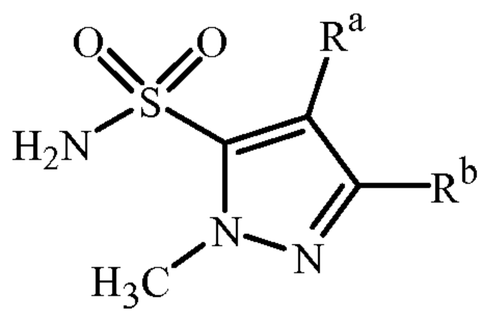
TABLE I-7



R^a	R^b	R^c	R^a	R^b	R^c	R^a	R^b	R^c
H	H	Me	Me	H	Me	Cl	H	Me
H	H	Et	Me	H	Et	Cl	H	Et
H	H	*i*-Pr	Me	H	*i*-Pr	Cl	H	*i*-Pr
H	H	*n*-Pr	Me	H	*n*-Pr	Cl	H	*n*-Pr
Br	H	Me	H	Me	Me	Me	Me	Me
Br	H	Et	H	Me	Et	Me	Me	Et
Br	H	*i*-Pr	H	Me	*i*-Pr	Me	Me	*i*-Pr
Br	H	*n*-Pr	H	Me	*n*-Pr	Me	Me	*n*-Pr
Cl	Me	Me	Br	Me	Me	H	Cl	Me

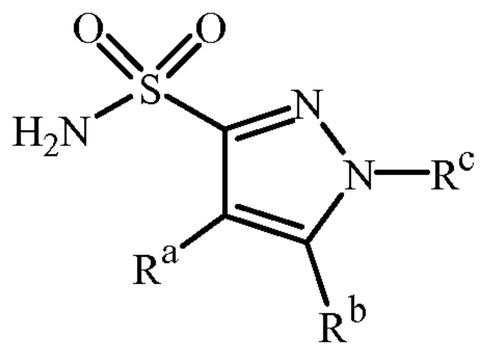
Cl	Me	Et	Br	Me	Et	H	Cl	Et
Cl	Me	*i*-Pr	Br	Me	*i*-Pr	H	Cl	*i*-Pr
Cl	Me	*n*-Pr	Br	Me	*n*-Pr	H	Cl	*n*-Pr
Me	Cl	Me	Cl	Cl	Me	Br	Cl	Me
Me	Cl	Et	Cl	Cl	Et	Br	Cl	Et
Me	Cl	*i*-Pr	Cl	Cl	*i*-Pr	Br	Cl	*i*-Pr
Me	Cl	*n*-Pr	Cl	Cl	*n*-Pr	Br	Cl	*n*-Pr
Me	Cl	*n*-Pr	Cl	Cl	*n*-Pr	Br	Cl	*n*-Pr
H	Br	Me	Me	Br	Me	Cl	Br	Me
H	Br	Et	Me	Br	Et	Cl	Br	Et
H	Br	*i*-Pr	Me	Br	*i*-Pr	Cl	Br	*i*-Pr
H	Br	*n*-Pr	Me	Br	*n*-Pr	Cl	Br	*n*-Pr
Br	Br	Me						
Br	Br	Et						
Br	Br	*i*-Pr						
Br	Br	*n*-Pr						

TABLE I-8



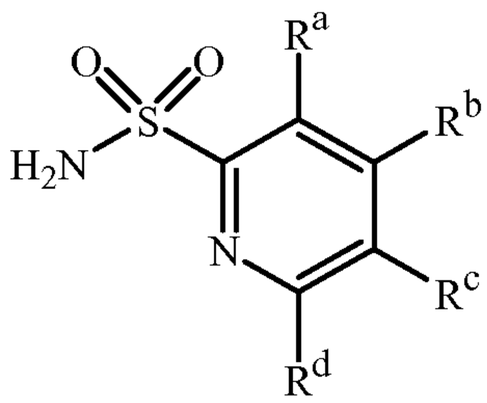
R^a	R^b	R^a	R^b	R^a	R^b	R^a	R^b
H	H	Me	H	Cl	H	Br	H
H	Cl	Me	Cl	Cl	Cl	Br	Cl
H	Me	Me	Me	Cl	Me	Br	Me
H	Et	Me	Et	Cl	Et	Br	Et
H	*i*-Pr	Me	*i*-Pr	Cl	*i*-Pr	Br	*i*-Pr
H	*n*-Pr	Me	*n*-Pr	Cl	*n*-Pr	Br	*n*-Pr

TABLE I-9



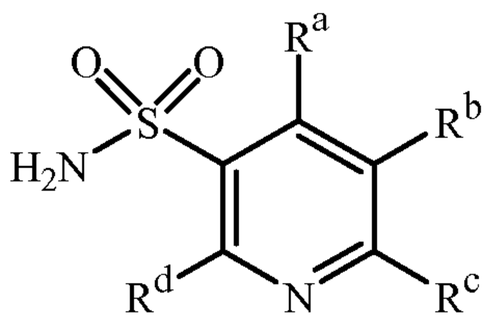
R^a	R^b	R^c	R^a	R^b	R^c	R^a	R^b	R^c
H	H	Me	Me	H	Me	Cl	H	Me
H	H	Et	Me	H	Et	Cl	H	Et
H	H	*i*-Pr	Me	H	*i*-Pr	Cl	H	*i*-Pr
H	H	*n*-Pr	Me	H	*n*-Pr	Cl	H	*n*-Pr
Br	H	Me	H	Me	Me	Me	Me	Me
Br	H	Et	H	Me	Et	Me	Me	Et
Br	H	*i*-Pr	H	Me	*i*-Pr	Me	Me	*i*-Pr
Br	H	*n*-Pr	H	Me	*n*-Pr	Me	Me	*n*-Pr
Cl	Me	Me	Br	Me	Me	H	Cl	Me
Cl	Me	Et	Br	Me	Et	H	Cl	Et
Cl	Me	*i*-Pr	Br	Me	*i*-Pr	H	Cl	*i*-Pr
Cl	Me	*n*-Pr	Br	Me	*n*-Pr	H	Cl	*n*-Pr
Me	Cl	Me	Cl	Cl	Me	Br	Cl	Me
Me	Cl	Et	Cl	Cl	Et	Br	Cl	Et
Me	Cl	*i*-Pr	Cl	Cl	*i*-Pr	Br	Cl	*i*-Pr
Me	Cl	*n*-Pr	Cl	Cl	*n*-Pr	Br	Cl	*n*-Pr
H	Br	Me	Me	Br	Me	Cl	Br	Me
H	Br	Et	Me	Br	Et	Cl	Br	Et
H	Br	*i*-Pr	Me	Br	*i*-Pr	Cl	Br	*i*-Pr
H	Br	*n*-Pr	Me	Br	*n*-Pr	Cl	Br	*n*-Pr
Br	Br	Me						
Br	Br	Et						
Br	Br	*i*-Pr						
Br	Br	*n*-Pr						

TABLE I-10



R^a	R^b	R^c	R^d	R^a	R^b	R^c	R^d
Me	H	H	H	Cl	H	H	H
Me	H	H	Me	Cl	H	H	Me
Me	H	H	OMe	Cl	H	H	OMe
Me	OMe	H	H	Cl	OMe	H	H
Me	OMe	H	Me	Cl	OMe	H	Me
Me	OMe	H	OMe	Cl	OMe	H	OMe
Me	H	Me	H	Cl	H	Me	H
Me	H	Me	Me	Cl	H	Me	Me
Me	H	Me	OMe	Cl	H	Me	OMe
Me	OMe	Me	H	Cl	OMe	Me	H
Me	OMe	Me	Me	Cl	OMe	Me	Me
Me	OMe	Me	OMe	Cl	OMe	Me	OMe
Me	Me	H	H	Cl	Me	H	H
Me	Me	H	Me	Cl	Me	H	Me
Me	Me	H	OMe	Cl	Me	H	OMe
Me	Me	Me	H	Cl	Me	Me	H
Me	Me	Me	Me	Cl	Me	Me	Me
Me	Me	Me	OMe	Cl	Me	Me	OMe
Br	H	H	H	Br	OMe	Me	H
Br	H	H	Me	Br	OMe	Me	Me
Br	H	H	OMe	Br	OMe	Me	OMe
Br	OMe	H	H	Br	Me	H	H
Br	OMe	H	Me	Br	Me	H	Me
Br	OMe	H	OMe	Br	Me	H	OMe
Br	H	Me	H	Br	Me	Me	H
Br	H	Me	Me	Br	Me	Me	Me
Br	H	Me	OMe	Br	Me	Me	OMe

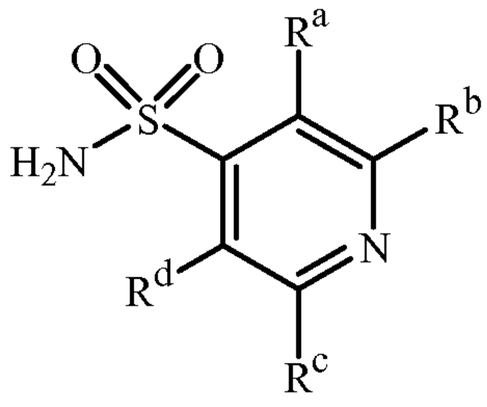
TABLE I-11



R^a	R^b	R^c	R^d	R^a	R^b	R^c	R^d
H	H	H	H	Me	H	H	H
H	H	H	Me	Me	H	H	Me
H	H	H	CF_3	Me	H	H	CF_3
H	H	H	Cl	Me	H	H	Cl
H	H	H	Br	Me	H	H	Br
H	H	Me	H	Me	H	Me	H
H	H	Me	Me	Me	H	Me	Me
H	H	Me	CF_3	Me	H	Me	CF_3
H	H	Me	Cl	Me	H	Me	Cl
H	H	Me	Br	Me	H	Me	Br
H	Cl	H	H	Me	Cl	H	H
H	Cl	H	Me	Me	Cl	H	Me
H	Cl	H	CF_3	Me	Cl	H	CF_3
H	Cl	H	Cl	Me	Cl	H	Cl
H	Cl	H	Br	Me	Cl	H	Br
H	Cl	Me	H	Me	Cl	Me	H
H	Cl	Me	Me	Me	Cl	Me	Me
H	Cl	Me	CF_3	Me	Cl	Me	CF_3
H	Cl	Me	Cl	Me	Cl	Me	Cl
H	Cl	Me	Br	Me	Cl	Me	Br
H	Me	H	H	Me	Me	H	H
H	Me	H	Me	Me	Me	H	Me
H	Me	H	CF_3	Me	Me	H	CF_3
H	Me	H	Cl	Me	Me	H	Cl
H	Me	H	Br	Me	Me	H	Br
H	Me	Me	H	Me	Me	Me	H
H	Me	Me	Me	Me	Me	Me	Me
H	Me	Me	CF_3	Me	Me	Me	CF_3
H	Me	Me	Cl	Me	Me	Me	Cl

H	Me	Me	Br	Me	Me	Me	Br
H	CF_3	H	H	Me	CF_3	H	H
H	CF_3	H	Me	Me	CF_3	H	Me
H	CF_3	H	CF_3	Me	CF_3	H	CF_3
H	CF_3	H	Cl	Me	CF_3	H	Cl
H	CF_3	H	Br	Me	CF_3	H	Br
H	CF_3	Me	H	Me	CF_3	Me	H
H	CF_3	Me	Me	Me	CF_3	Me	Me
H	CF_3	Me	CF_3	Me	CF_3	Me	CF_3
H	CF_3	Me	Cl	Me	CF_3	Me	Cl
H	CF_3	Me	Br	Me	CF_3	Me	Br
H	OMe	H	H	Me	OMe	H	H
H	OMe	H	Me	Me	OMe	H	Me
H	OMe	H	CF_3	Me	OMe	H	CF_3
H	OMe	H	Cl	Me	OMe	H	Cl
H	OMe	H	Br	Me	OMe	H	Br
H	OMe	Me	H	Me	OMe	Me	H
H	OMe	Me	Me	Me	OMe	Me	Me
H	OMe	Me	CF_3	Me	OMe	Me	CF_3
H	OMe	Me	Cl	Me	OMe	Me	Cl
H	OMe	Me	Br	Me	OMe	Me	Br

TABLE I-12



R^a	R^b	R^c	R^d	R^a	R^b	R^c	R^d
H	H	H	H	Me	H	H	H
H	H	H	Me	Me	H	H	Me
H	H	H	Cl	Me	H	H	Cl
H	H	Me	H	Me	H	Me	H
H	H	Me	Me	Me	H	Me	Me
H	H	Me	Cl	Me	H	Me	Cl

It is recognized that some reagents and reaction conditions described above for preparing compounds of Formula **1** may not be compatible with certain functionalities present in the intermediates. In these instances, the incorporation of protection/deprotection sequences or functional group interconversions into the synthesis will aid in obtaining the desired products. The use and choice of the protecting groups will be apparent to one skilled in chemical synthesis (see, for example, Greene, T. W.; Wuts, P. G. M. *Protective Groups in Organic Synthesis*, 2nd ed.; Wiley: New York, 1991). One skilled in the art will recognize that, in some cases, after the introduction of a given reagent as it is depicted in any individual scheme, it may be necessary to perform additional routine synthetic steps not described in detail to complete the synthesis of compounds of Formula **1**. One skilled in the art will also recognize that it may be necessary to perform a combination of the steps illustrated in the above schemes in an order other than that implied by the particular sequence presented to prepare the compounds of Formula **1**.

One skilled in the art will also recognize that compounds of Formula **1** and the intermediates described herein can be subjected to various electrophilic, nucleophilic, radical, organometallic, oxidation, and reduction reactions to add substituents or modify existing substituents.

Without further elaboration, it is believed that one skilled in the art using the preceding description can utilize the present invention to its fullest extent. The following Synthesis Examples are, therefore, to be construed as merely illustrative, and not limiting of the disclosure in any way whatsoever. Steps in the following Synthesis Examples illustrate a procedure for each step in an overall synthetic transformation, and the starting material for each step may not have necessarily been prepared by a particular preparative run whose procedure is described in other Examples or Steps. ^{1}H NMR spectra are reported in ppm downfield from tetramethylsilane; "s" means singlet, "d" means doublet, "dd" means doublet of doublets, "br s" means broad singlet. Room temperature is between about 20 and 25 °C.

SYNTHESIS EXAMPLE 1

Preparation of 8-chloro-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide

Step A: Preparation of 2-chloro-5-methoxybenzenesulfonyl chloride

To a 3-neck flask equipped with a dry ice condenser was added acetic acid (80 mL) and copper chloride (0.8 g). The mixture was cooled to 0 °C, sulfur dioxide (5 mL) was condensed into the reaction flask, and then the reaction mixture was stirred for 30 minutes. To a separate 200 mL round-bottom flask was added concentrated hydrochloric acid (32 mL), acetic acid (8 mL) and 2-chloro-5-methylaniline hydrochloride (3.2 g, 16 mmol). This mixture was cooled to 0 °C, and sodium nitrite (1.25 g, 18.1 mmol) in water (8 mL) was added dropwise while keeping the temperature below 10 °C. The reaction mixture was stirred for 30 minutes and then added dropwise to the sulfur dioxide solution. The resulting reaction mixture was stirred at room temperature for 1 h. Water was added dropwise, and a tan solid precipitated. The solid was isolated by filtration and washed with water to afford 2.5 g the title compound. ^{1}H NMR ($CDCl_3$) δ 7.64 (d, 1H), 7.52 (d, 1H), 7.17 (d, 1H), 3.89 (s, 3H).

Step B: Preparation of 2-chloro-5-methoxybenzenesulfonamide

To a solution of 2-chloro-5-methoxybenzenesulfonyl chloride (2.5 g, 10.4 mmol) (i.e. the product of Step A) in tetrahydrofuran (30 mL) was added 30% ammonium hydroxide (3.0 mL, 25.7 mmol) dropwise. The reaction mixture was stirred for 15 minutes, during which time a suspension formed. To this mixture water (10 mL) was added, and the tetrahydrofuran was evaporated under reduced pressure to leave an aqueous suspension of a tan solid. The solid was isolated by filtration and washed with water to afford 2.2 g of the title compound. ^{1}H NMR ($CDCl_3$) δ 7.63 (d, 1H), 7.43 (d, 1H), 7.03 (d, 1H), 5.13 (br s, 2H), 3.85 (s, 3H).

Step C: Preparation of 8-chloro-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxylic acid

To a solution of 2-amino-3-chloro-5-(trifluoromethyl)pyridine (24.7 g, 126 mmol) in 1,2-dimethoxyethane (260 mL) at 0 °C was added ethyl bromopyruvate (17.43 mL, 138 mmol) dropwise. The reaction mixture was warmed to room temperature and stirred for three days to form a suspension. The reaction mixture was then extracted with dichloromethane (2 x 200 mL) and washed with water (2 x 200 mL). The combined dichloromethane extracts were dried over magnesium sulfate and concentrated under reduced pressure to obtain a solid residue. The combined water washes were saturated with sodium carbonate, extracted with ethyl acetate (2 x 200 mL), and dried over magnesium sulfate. The combined ethyl acetate

extracts and the residue obtained from the concentration of the dichloromethane were combined, and the mixture was concentrated under reduced pressure to obtain a solid.

This solid was dissolved in ethanol (800 mL), and aqueous 50 % sodium hydroxide (40 g, 500 mmol) combined with additional water (150 mL) was added dropwise. The reaction mixture was stirred at room temperature overnight to form a suspension. The reaction mixture was acidified to pH 2 with concentrated hydrochloric acid and then cooled and stirred for several hours to precipitate a solid. The solid product was isolated by filtration using a glass-fritted filter funnel, washed with water, and air dried under a stream of air overnight to afford 13 g of the title compound as a solid. ^{1}H NMR ($CDCl_3$) δ 8.51 (s, 1H), 8.40 (s, 1H), 7.55 (s, 1H).

Step D: Preparation of 8-chloro-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide

To the carboxylic acid from Step C (243 mg, 0.92 mmol) was added a solution of 4-(dimethylamino)pyridine (340 mg, 2.76 mmol) and 1-(3-dimethyl-aminopropyl)-3-ethylcarbodiimide hydrochloride (232 mg, 2.3 mmol) in *t*-butanol (5 mL) and dichloromethane (5 mL). The reaction mixture was stirred for 15 min, 2-chloro-5-methoxybenzenesulfonamide (190 mg, 0.86 mmol) was added, and the reaction mixture was stirred at room temperature overnight. Dichloromethane (200 mL) was then added, the mixture was extracted with 1 N hydrochloric acid (3 x 100 mL), and the separated organic phase was dried over magnesium sulfate and concentrated under reduced pressure to afford a solid. The solid was rinsed with diethyl ether to afford 240 mg of the title compound, a compound of the present invention, as a white solid, m.p. 211-212 °C. ^{1}H NMR ($CDCl_3$) δ 10.10 (br s, 1H), 8.46 (s, 1H), 8.27 (s, 1H), 7.86 (d, 1H), 7.54 (s, 1H), 7.38 (d,1H), 7.09 (dd, 1H) 3.91 (s, 3H).

SYNTHESIS EXAMPLE 2

Preparation of 8-chloro-*N*-[(4-cyano-2,5-dimethylphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide

Step A: Preparation of 4-bromo-2,5-dimethylbenzenesulfonamide

To chlorosulfonic acid (4.2 mL, 63 mmol) cooled to 10 °C was added 2-bromo-*p*-xylene (5.0 g, 27 mmol) dropwise over 15 min. The reaction mixture was stirred further for 10 min, and then poured with stirring onto 125 mL of crushed ice to precipitate a white solid. The solid was isolated by filtration and washed with water. The solid was dissolved in tetrahydrofuran (40 mL) and an aqueous 30% ammonium hydroxide solution (8.0 mL) was added. The reaction mixture was stirred for 10 min and concentrated under reduced pressure to precipitate a white solid. The solid was isolated by filtration and washed with water to

afford 4.6 g of the title compound as a solid. ^{1}H NMR ($CDCl_3$) δ 7.87 (s, 1H), 7.52 (s, 1H), 4.75 (br s, 2H), 2.61 (s, 3H), 2.41 (s, 3H).

Step B: Preparation of 4-cyano-2,5-dimethylbenzenesulfonamide

To a solution of 4-bromo-2,5-dimethylbenzenesulfonamide (4.6 g, 22 mmol, the product of Step A) in *N*-methyl pyrrolidinone (30 mL) was added copper cyanide (2.5 g, 28 mmol), and the reaction mixture was heated at 200 °C for 30 min. The reaction was then allowed to cool and poured into 200 mL of crushed ice to precipitate a solid. To this mixture was added dichloromethane (500 mL), and the mixture was warmed to dissolve the white solid. The mixture was then filtered to remove any undissolved solids, the phases were separated, and the dichloromethane was washed with water (2 x 100 mL), dried over magnesium sulfate, and evaporated under reduced pressure to obtain an oil. The oil was dissolved in tetrahydrofuran (30 mL) and water (30 mL), and the solution was concentrated under reduced pressure to precipitate a solid. This solid was isolated by filtration and washed with water to afford 2.5 g of the title compound. ^{1}H NMR ($CDCl_3$) δ 7.98 (s, 1H), 7.56 (s, 1H), 4.89 (br s, 2H), 2.66 (s, 3H), 2.58 (s, 3H).

Step C: Preparation of 8-chloro-*N*-[(4-cyano-2,5-dimethylphenyl)sulfonyl]-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide

To a solution of 8-chloro-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxylic acid (2.5 g, 9.5 mmol, prepared as described in Example 1 Step C) in *t*-butanol (70 mL) and dichloromethane (70 mL) was added 4-(dimethylamino)pyridine (3.47 g, 28.4 mmol) and 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (4.54 g, 23.7 mmol). The reaction mixture was stirred for 15 min after which time 4-cyano-2,5-dimethylbenzenesulfonamide (1.85 g, 8.85 mmol) was added, and stirring was continued at room temperature overnight. Dichloromethane (200 mL) was then added, the mixture was washed with 1 N hydrochloric acid (3 x 100 mL), the organic phase was collected and dried over magnesium sulfate and then concentrated under reduced pressure to afford a solid. The solid was isolated by filtration, rinsed with diethyl ether, and recrystallized from hexane/ethyl acetate to afford 1.5 g of the title compound, a compound of the present invention, as a solid, m.p. 228-229 °C. ^{1}H NMR ($CDCl_3$) δ 9.97 (br s, 1H), 8.47 (s, 1H), 8.26 (s, 1H), 8.24 (s, 1H), 7.56 (s, 1H), 7.54 (s, 1H), 2.71 (s, 3H), 2.63 (s, 3H).

SYNTHESIS EXAMPLE 3

Preparation of 8-chloro-*N*-[(2-chloro-5-ethylphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide

Step A: Preparation of 2-chloro-5-ethylbezenesulfonyl chloride

Chlorosulfonic acid (4.0 mL, 59 mmol) was cooled to 0 °C and 1-chloro-4-ethylbenzene (1.0 mL, 7.5 mmol) was added dropwise over 30 min. The reaction mixture was stirred for 45 min at 0 °C, poured with stirring onto 125 mL of crushed ice, and then extracted with ethyl acetate (2 x 100 mL). The ethyl acetate layers were combined, washed with water (100 mL), and dried over magnesium sulfate. The ethyl acetate was concentrated under reduced pressure to obtain an oil determined to be approximately a 1:1 mixture of isomers. This mixture was chromatographed on silica gel eluting with a hexane/ethyl acetate gradient to afford 0.41 g of the title compound. ^{1}H NMR ($CDCl_3$) δ 7.97 (s, 1H), 7.53 (d, 1H), 7.49 (d, 1H), 2.75 (q, 2H), 1.29 (t, 3H).

Step B: Preparation of 2-chloro-5-ethylbezenesulfonamide

To a solution of 2-chloro-5-ethylbezenesulfonyl chloride (0.41 g, 1.7 mmol, the product of Step A) in tetrahydrofuran (30 mL) was added 30% ammonium hydroxide (0.41 mL, 3.5 mmol) dropwise. The reaction mixture was stirred for 15 minutes, during which time a suspension formed. To this mixture water (10 mL) was added, and the tetrahydrofuran was evaporated under reduced pressure to precipitate a solid. The solid was dissolved in diethyl ether, dried over magnesium sulfate, and concentrated under reduced pressure. Diethyl ether and hexane were added to precipitate a solid. The solid was isolated by filtration to afford 190 mg of the title compound. ^{1}H NMR ($CDCl_3$) δ 7.95 (s, 1H), 7.43 (d, 1H), 7.35 (d, 1H), 5.08 (br s, 2H), 2.71 (q, 2H), 1.25 (t, 3H).

Step C: Preparation of 8-chloro-*N*-[(2-chloro-5-ethylphenyl)sulfonyl]-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide

To a solution of 8-chloro-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxylic acid (100 mg, 0.38 mmol, prepared as described in Example 1 Step C) in a 1:1 mixture of *t*-butanol (5 mL) and dichloromethane (5 mL) was added 4-(dimethylamino)pyridine (138 mg, 1.1 mmol) and 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (182 mg, 0.95 mmol). The reaction mixture was stirred for 15 min, 2-chloro-5-ethylbenzenesulfonamide (74 mg, 0.34 mmol) was added, and the reaction mixture was stirred at room temperature overnight. Dichloromethane (100 mL) was then added, the mixture was washed with 1 N

hydrochloric acid (3 x 50 mL), and the organic phase was dried over magnesium sulfate and concentrated under reduced pressure to afford a solid. The solid was rinsed with diethyl ether to afford 84 mg of the title compound, a compound of the present invention, as a solid, m.p. 214-215 °C. ^{1}H NMR ($CDCl_3$) δ 10.12 (br s, 1H), 8.45 (s, 1H), 8.26 (s, 1H), 8.20 (s, 1H), 7.53 (s, 1H), 7.40 (s, 2H), 2.77 (q, 2H), 1.30(t, 3H).

SYNTHESIS EXAMPLE 4

Preparation of 8-chloro-*N*-[(1-ethyl-3-methyl-1*H*-pyrazol-4-yl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide

Step A: Preparation of 1-ethyl-3-methyl-1*H*-pyrazole-4-sulfonamide

To a solution of 1-ethyl-3-methyl-1*H*-pyrazole-4-sulfonylchloride (0.154 g, 0.73 mmol, Matrix Scientific) in tetrahydrofuran (10 mL) was added dropwise an aqueous solution of 30% ammonium hydroxide (0.20 mL, 1.7 mmol). The reaction mixture was stirred for 1 hour, water (2 mL) was added, and the solvent was concentrated under reduced pressure to precipitate a solid. The solid was isolated by filtration, rinsed with water, and dried to afford 41 mg of the title compound. ^{1}H NMR ($CDCl_3$) δ 7.80 (s, 1H), 4.75 (br s, 1H), 4.11 (q, 2H), 2.44 (s, 3H), 1.49 (t, 3H).

Step B: Preparation of 8-chloro-*N*-[(1-ethyl-3-methyl-1*H*-pyrazol-4-yl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide

To a solution of 8-chloro-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxylic acid (63 mg, 0.24 mmol, prepared as described in Example 1 Step C) in a 1:1 mixture of *t*-butanol (5 mL) and dichloromethane (5 mL) was added 4-(dimethylamino)pyridine (88 mg, 0.71 mmol) and 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (117 mg, 0.60 mmol). The reaction mixture was stirred for 15 min, after which time 1-ethyl-3-methyl-1*H*-pyrazole-4-sulfonamide (41 mg, 0.22 mmol, the product of Step A) was added, and the reaction mixture was stirred at room temperature overnight. Dichloromethane (100 mL) was added and the mixture was washed with 1 N hydrochloric acid (3 x 50 mL). The organic phase was separated, dried over magnesium sulfate, and concentrated under reduced pressure to afford a solid. The solid was suspended in a mixture of diethyl ether and hexane, filtered, and dried to afford 25 mg of the title compound, a compound of the present invention, as a solid, m.p. 189-190 °C. ^{1}H NMR ($CDCl_3$) δ 9.85 (br s, 1H), 8.47 (s, 1H), 8.29 (s, 1H), 8.10 (s, 1H), 7.53 (s, 1H), 4.14 (q, 2H), 2.51 (s, 3H), 1.51 (t, 3H).

SYNTHESIS EXAMPLE 5

Preparation of 8-chloro-*N*-[(3-chloro-1-ethyl-1*H*-pyrazol-4-yl)sulfonyl]-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide

Step A: Preparation of 1-ethyl-1*H*-pyrazol-3-ylamine

To a solution of potassium carbonate (2.76 g, 20.0 mmol) in water (10 mL) was added ethyl hydrazine oxalate (3.0 g, 20 mmol) followed by the dropwise addition of 2-chloroacrylonitrile (1.6 mL, 20 mmol) over 30 min. The mixture was stirred at room temperature for 2 h, and then heated at 50 °C for 2 h. The reaction mixture was cooled and extracted with ethyl acetate (2 x 100 mL). The ethyl acetate was dried over magnesium sulfate and evaporated under reduced pressure to obtain an oil. The oil was chromatographed on silica gel eluting with hexane and ethyl acetate as eluent to afford 540 mg of the title compound. ^{1}H NMR ($CDCl_3$) δ 7.12 (d, 1H) 5.57 (d, 1H), 3.96 (q, 2 H), 3.59 (br s, 1H), 1.42 (t, 3H).

Step B: Preparation of 3-chloro-1-ethyl-1*H*-pyrazole

To a solution of 1-ethyl-1*H*-pyrazol-3-ylamine (0.54 g, 4.86 mmol, the product of Step A) in concentrated hydrochloric acid (5 mL) at 0 °C was added a solution of sodium nitrite (369 mg, 5.35 mmol) in water (1 mL) dropwise while maintaining the temperature below 10 °C. The reaction mixture was stirred for 30 min, a solution of copper (I) chloride in concentrated hydrochloric acid (2 mL) was added dropwise, and the resulting reaction mixture was then heated to 60 °C. A catalytic amount of copper chloride was added at 60 °C (initiating the evolution of gas). The reaction mixture was stirred for 5 min and then poured onto 100 mL of crushed ice containing 50 % sodium hydroxide (5 mL) and stirred well. The aqueous mixture was extracted with dichloromethane (2 x 150 mL), and the organic layer was separated, washed with water, dried over magnesium sulfate and concentrated under reduced pressure to obtain 0.42 g of the title compound. ^{1}H NMR ($CDCl_3$) δ 7.31 (d, 1H), 6.15 (d, 1H), 4.11 (q, 2H), 1.47 (t, 3H).

Step C: Preparation of 3-chloro-1-ethyl-1*H*-pyrazole-4-sulfonyl chloride

3-Chloro-1-ethyl-1*H*-pyrazole (0.42 g, 3.2 mmol, the product of Step B) was added to chlorosulfonic acid (2.0 mL, 30 mmol) at room temperature and the mixture was slowly warmed to 100 °C, and then heated at 100-110 °C for 2 hours. The reaction mixture was cooled, poured with stirring onto 150 mL of crushed ice, and extracted into diethyl ether (2 x 100 mL). The ether extracts were combined, washed with water (100 mL), dried over

magnesium sulfate and concentrated under reduced pressure to obtain 0.5 g of the title compound as an oil. ^{1}H NMR ($CDCl_3$) δ 8.00 (s, 1 H), 4.20 (q, 2 H), 1.56 (t, 3H).

Step D: Preparation of 3-chloro-1-ethyl-1*H*-pyraxole-4-sulfonamide

To a solution of 3-chloro-1-ethyl-1*H*-pyrazole-4-sulfonyl chloride (0.5 g , 2.2 mmol, the product of Step D) in tetrahydrofuran (20 mL) was added 30% ammonium hydroxide (3.0 mL, 24 mmol) dropwise. The reaction mixture was heated to boiling with a heat gun and then stirred for 30 min. Tetrahydrofuran was removed under reduced pressure, water (50 mL) was added, the reaction mixture was extracted into ethyl acetate (2 x 100 mL). The ethyl acetate was dried over magnesium sulfate and concentrated under reduced pressure to afford a solid. The solid was washed with hexane, and dried to afford 282 mg of the title compound. ^{1}H NMR ($CDCl_3$) δ 7.84 (s, 1H), 4.94 (br s, 1H), 4.15 (q, 2H), 1.51 (t, 3H).

Step E: Preparation of 8-chloro-*N*-[(3-chloro-1-ethyl-1*H*-pyrazol-4-yl)sulfonyl]-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide

To a solution of 8-chloro-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxylic acid (110 mg, 0.42 mmol, prepared as described in Example 1 Step C) in a 1:1 mixture of *t*-butanol (5 mL) and dichloromethane (5 mL) was added 4-(dimethylamino)pyridine (152 mg, 1.25 mmol) and 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (96 mg, 0.5 mmol). The reaction mixture was stirred for 15 min after which time 3-chloro-1-ethyl-1*H*-pyrazole-4-sulfonamide (81 mg, 0.38 mmol, the product of Step D) was added and stirring was continued at room temperature overnight. Dichloromethane (100 mL) was then added and the mixture was extracted with 1 N hydrochloric acid (3 x 50 mL). The separated organic phases were combined, dried over magnesium sulfate, and concentrated under reduced pressure to afford a solid. The solid was suspended in a mixture of diethyl ether and hexane and filtered to afford 85 mg of the title compound, a compound of the present invention, as a solid, m.p. 184-185 °C. ^{1}H NMR ($CDCl_3$) δ 9.96 (br s, 1H), 8.47 (s, 1H), 8.29 (s, 1H), 8.16 (s, 1H), 7.54 (s, 1H), 4.17 (q, 2H), 1.54 (t, 3H).

SYNTHESIS EXAMPLE 6

Preparation of 8-bromo-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide

Step A: Preparation of 8-bromo-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxylic acid

To a solution of 2-amino-3-bromo-5-(trifluoromethyl)pyridine (10.0 g, 41.5 mmol) in 1,2 dimethoxyethane (300 mL) at room temperature was added ethyl bromopyruvate (9.889 g, 45.64 mmol) dropwise. The reaction mixture was heated to reflux for 18 h. The 1,2-dimethoxyethane was removed under reduced pressure and the residual solid was recrystalized from 1-chlorobutane. The solid was isolated by filtration and dried to afford an off-white solid, 8-bromo-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxylic acid, ethyl ester (11.044 g).

The solid obtained above was dissolved in tetrahydrofuran (150 mL) and a solution of LiOH (2.353 g, 98.29 mmol) in water (100 mL) was added. The reaction mixture was stirred at room temperature for 4 h. The tetrahydrofuran was removed under reduced pressure to provide an aqueous solution which was cooled to 5 °C. Dilute HCl was added dropwise until a pH < 5.0 was achieved. After several minutes a solid began to precipitate from the solution. The solid was collected by filtration, washed once with water (50 mL), and dried in a vacuum oven for 18 h at 80 °C to afford 8.632 g of the title compound as a solid. ^{1}H NMR (dmso-d_6) δ 13.17 (br s, 1H), 9.31 (s, 1H), 8.69 (s, 1H), 8.03 (s, 1H).

Step B: Preparation of 8-bromo-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide

To the product of Step A (200 mg, 0.647 mmol) was added a solution of 4-(dimethylamino)pyridine (237 mg, 1.94 mmol) and 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (309 mg, 1.62 mmol) in a 1:1 mixture of *t*-butanol (5 mL) and dichloromethane (5 mL). The reaction mixture was stirred for 15 min, 2-chloro-5-methoxybenzenesulfonamide (129 mg, 0.582 mmol) was added, and the reaction mixture was stirred at room temperature overnight. Dichloromethane (200 mL) was then added, the mixture was extracted with 1 N hydrochloric acid (3 x 100 mL), and the separated organic phases were combined, dried over magnesium sulfate, and concentrated under reduced pressure to afford a solid. The solid was rinsed with diethyl ether to afford 234 mg of the title compound, a compound of the present invention, as a white solid, m.p. 191-192 °C. ^{1}H NMR ($CDCl_3$) δ 10.1 (br s, 1H), 8.51 (s, 1H), 8.30 (s, 1H), 7.87 (d, 1H), 7.72 (s, 1H), 7.38 (d,1H), 7.08 (dd, 1H) 3.91 (s, 3H).

SYNTHESIS EXAMPLE 7

Preparation of 8-chloro-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-3-methyl-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide

Step A: Preparation of 3-bromo-2-oxo-butyric acid ethyl ester

2-Oxo-butyric acid (10.0 g, 97.2 mmol) was dissolved in ethanol (100 mL) and *p*-toluene sulfonic acid mono hydrate (0.1 g) was added. The reaction mixture was heated to reflux for 48 h. After cooling the reaction mixture to room temperature, the ethanol was removed under reduced pressure to give 11.4 g of 2-oxo-butyric acid ethyl ester.

The 2-oxo-butyric acid ethyl ester prepared above was dissolved in chloroform (100 mL) and bromine (20.964 g, 131.19 mmol) was added dropwise at room temperature. The reaction mixture was allowed to stir for 18 h. Concentration of the reaction mixture under reduced pressure provided 12.0 g of the title compound as an orange oil. ^{1}H NMR ($CDCl_3$) δ 4.39 (q, 2H), 4.32 (q, 1H), 1.88 (d, 3H), 1.39 (t, 3H).

Step B: Preparation of 8-chloro-3-methyl-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxylic acid

To a solution of 2-amino-3-chloro-5-(trifluoromethyl)pyridine (11.3 g, 57.5 mmol) in dioxane (200 mL) at room temperature was added dropwise 3-bromo-2-oxo-butyric acid ethyl ester (12.017 g, 57.49 mmol, the product of Step A). The reaction mixture was heated to reflux for 24 h, cooled, and the dioxane was removed under reduced pressure. Chromatography on silica gel eluting with a hexane/ethyl acetate gradient afforded 17.3 g of 8-chloro-3-methyl-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxylic acid ethyl ester as a solid.

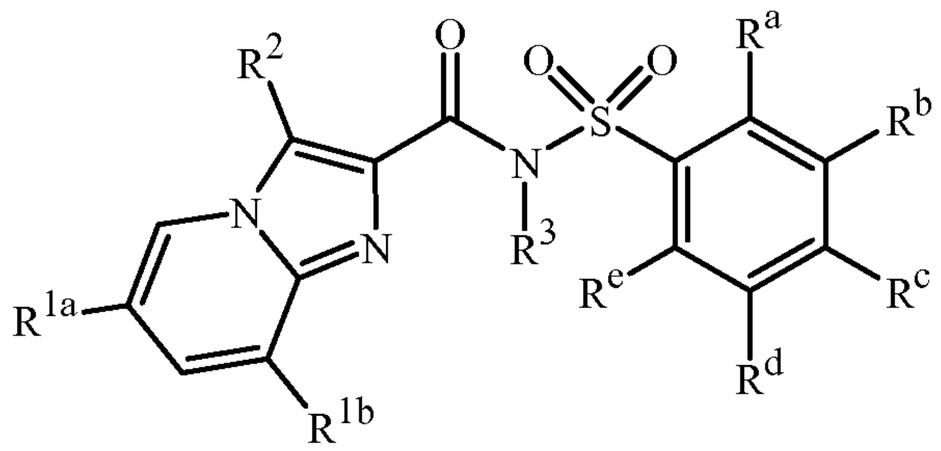
The solid prepared above was dissolved in tetrahydrofuran (100 mL) and a solution of LiOH (3.365 g, 140.8 mmol) in water (50 mL) was added. The reaction mixture was stirred at room temperature for 18 h. The tetrahydrofuran was removed under reduced pressure to provide an aqueous solution which was cooled to 5 °C. Dilute HCl was added dropwise until a pH < 5.0 was achieved. After several minutes a solid began to precipitate. The solid was collected by filtration, washed with water (50 mL), and dried at 80 °C in a vacuum oven for 18 h to afford 15.7 g of a solid. ^{1}H NMR (dmso-d_6) δ 13.1 (br s, 1H), 8.84 (s, 1H), 7.80 (s, 1H), 2.82 (s, 3H).

Step C: Preparation of 8-chloro-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-3-methyl-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide

To the carboxylic acid prepared in Step B (200 mg, 0.72 mmol) was added a solution of 4-(dimethylamino)pyridine (262 mg, 2.15 mmol) and 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (344 mg, 1.79 mmol) in a 1:1 solvent mixture of *t*-butanol (5 mL) and dichloromethane (5 mL). The reaction mixture was stirred for 15 minutes, 2-chloro-5-methoxybenzenesulfonamide (143 mg, 0.65 mmol) was added, and the reaction mixture was stirred at room temperature overnight. Dichloromethane (200 mL) was then added, the mixture was extracted with 1 N hydrochloric acid (3 x 100 mL), and the separated organic layers were combined, dried over magnesium sulfate, and concentrated under reduced pressure to afford a solid. The solid was rinsed with diethyl ether to afford 118 mg of the title compound, a compound of the present invention, as a white solid, m.p. 222-223 °C. ^{1}H NMR (dmso-d_6) δ 10.0 (br s, 1H), 8.94 (s, 1H), 7.96 (s, 1H), 7.65 (d, 1H), 7.59 (d, 1H), 7.30 (dd,1H), 3.87 (s, 3H) 2.71 (s, 3H).

By the procedures described herein together with methods known in the art, the following compounds of Tables 1 to 22 can be prepared. The following abbreviations are used in the Tables which follow: Me means methyl, Et means ethyl, OMe means methoxy, SMe means methylthio, and NMe_2 means dimethylamino.

TABLE 1



R^{1a} is CF_3, R^{1b} is Cl, R^2 and R^3 are H

R^a	R^b	R^c	R^d	R^e	R^a	R^b	R^c	R^d	R^e
H	H	H	H	H	Me	H	H	H	H
H	Me	H	H	H	Me	Me	H	H	H
H	Et	H	H	H	Me	Et	H	H	H
H	F	H	H	H	Me	F	H	H	H
H	Cl	H	H	H	Me	Cl	H	H	H
H	Br	H	H	H	Me	Br	H	H	H
H	CF_3	H	H	H	Me	CF_3	H	H	H
H	cyano	H	H	H	Me	cyano	H	H	H
H	OMe	H	H	H	Me	OMe	H	H	H

H	SMe	H	H	H	Me	SMe	H	H	H
F	H	H	H	H	Cl	H	H	H	H
F	Me	H	H	H	Cl	Me	H	H	H
F	Et	H	H	H	Cl	Et	H	H	H
F	F	H	H	H	Cl	F	H	H	H
F	Cl	H	H	H	Cl	Cl	H	H	H
F	Br	H	H	H	Cl	Br	H	H	H
F	CF_3	H	H	H	Cl	CF_3	H	H	H
F	cyano	H	H	H	Cl	cyano	H	H	H
F	OMe	H	H	H	Cl	OMe	H	H	H
F	SMe	H	H	H	Cl	SMe	H	H	H
Br	H	H	H	H	CF_3	H	H	H	H
Br	Me	H	H	H	CF_3	Me	H	H	H
Br	Et	H	H	H	CF_3	Et	H	H	H
Br	F	H	H	H	CF_3	F	H	H	H
Br	Cl	H	H	H	CF_3	Cl	H	H	H
Br	Br	H	H	H	CF_3	Br	H	H	H
Br	CF_3	H	H	H	CF_3	CF_3	H	H	H
Br	cyano	H	H	H	CF_3	cyano	H	H	H
Br	OMe	H	H	H	CF_3	OMe	H	H	H
Br	SMe	H	H	H	CF_3	SMe	H	H	H
cyano	H	H	H	H	cyano	Br	H	H	H
cyano	Me	H	H	H	cyano	CF_3	H	H	H
cyano	Et	H	H	H	cyano	cyano	H	H	H
cyano	F	H	H	H	cyano	OMe	H	H	H
cyano	Cl	H	H	H	cyano	SMe	H	H	H
H	H	H	H	H	Me	H	H	H	H
H	H	Me	H	H	Me	H	Me	H	H
H	H	Et	H	H	Me	H	Et	H	H
H	H	F	H	H	Me	H	F	H	H
H	H	Cl	H	H	Me	H	Cl	H	H
H	H	Br	H	H	Me	H	Br	H	H
H	H	CF_3	H	H	Me	H	CF_3	H	H
H	H	cyano	H	H	Me	H	cyano	H	H
H	H	OMe	H	H	Me	H	OMe	H	H
H	H	SMe	H	H	Me	H	SMe	H	H
F	H	H	H	H	Cl	H	H	H	H
F	H	Me	H	H	Cl	H	Me	H	H

F	H	Et	H	H	Cl	H	Et	H	H
F	H	F	H	H	Cl	H	F	H	H
F	H	Cl	H	H	Cl	H	Cl	H	H
F	H	Br	H	H	Cl	H	Br	H	H
F	H	CF_3	H	H	Cl	H	CF_3	H	H
F	H	cyano	H	H	Cl	H	cyano	H	H
F	H	OMe	H	H	Cl	H	OMe	H	H
F	H	SMe	H	H	Cl	H	SMe	H	H
Br	H	H	H	H	CF_3	H	H	H	H
Br	H	Me	H	H	CF_3	H	Me	H	H
Br	H	Et	H	H	CF_3	H	Et	H	H
Br	H	F	H	H	CF_3	H	F	H	H
Br	H	Cl	H	H	CF_3	H	Cl	H	H
Br	H	Br	H	H	CF_3	H	Br	H	H
Br	H	CF_3	H	H	CF_3	H	CF_3	H	H
Br	H	cyano	H	H	CF_3	H	cyano	H	H
Br	H	OMe	H	H	CF_3	H	OMe	H	H
Br	H	SMe	H	H	CF_3	H	SMe	H	H
cyano	H	H	H	H	cyano	H	Br	H	H
cyano	H	Me	H	H	cyano	H	CF_3	H	H
cyano	H	Et	H	H	cyano	H	cyano	H	H
cyano	H	F	H	H	cyano	H	OMe	H	H
cyano	H	Cl	H	H	cyano	H	SMe	H	H
H	H	H	H	H	Me	H	H	H	H
H	H	H	Me	H	Me	H	H	Me	H
H	H	H	Et	H	Me	H	H	Et	H
H	H	H	F	H	Me	H	H	F	H
H	H	H	Cl	H	Me	H	H	Cl	H
H	H	H	Br	H	Me	H	H	Br	H
H	H	H	CF_3	H	Me	H	H	CF_3	H
H	H	H	cyano	H	Me	H	H	cyano	H
H	H	H	OMe	H	Me	H	H	OMe	H
H	H	H	SMe	H	Me	H	H	SMe	H
H	H	H	CO_2Me	H	Me	H	H	CO_2Me	H
H	H	H	C(O)Me	H	Me	H	H	C(O)Me	H
H	H	H	NMe_2	H	Me	H	H	NMe_2	H
H	H	H	nitro	H	Me	H	H	nitro	H
F	H	H	H	H	Cl	H	H	H	H

F	H	H	Me	H	Cl	H	H	Me	H
F	H	H	Et	H	Cl	H	H	Et	H
F	H	H	F	H	Cl	H	H	F	H
F	H	H	Cl	H	Cl	H	H	Cl	H
F	H	H	Br	H	Cl	H	H	Br	H
F	H	H	CF_3	H	Cl	H	H	CF_3	H
F	H	H	cyano	H	Cl	H	H	cyano	H
F	H	H	OMe	H	Cl	H	H	OMe	H
F	H	H	SMe	H	Cl	H	H	SMe	H
F	H	H	CO_2Me	H	Cl	H	H	CO_2Me	H
F	H	H	C(O)Me	H	Cl	H	H	C(O)Me	H
F	H	H	NMe_2	H	Cl	H	H	NMe_2	H
F	H	H	nitro	H	Cl	H	H	nitro	H
Br	H	H	H	H	CF_3	H	H	H	H
Br	H	H	Me	H	CF_3	H	H	Me	H
Br	H	H	Et	H	CF_3	H	H	Et	H
Br	H	H	F	H	CF_3	H	H	F	H
Br	H	H	Cl	H	CF_3	H	H	Cl	H
Br	H	H	Br	H	CF_3	H	H	Br	H
Br	H	H	CF_3	H	CF_3	H	H	CF_3	H
Br	H	H	cyano	H	CF_3	H	H	cyano	H
Br	H	H	OMe	H	CF_3	H	H	OMe	H
Br	H	H	SMe	H	CF_3	H	H	SMe	H
Br	H	H	CO_2Me	H	CF_3	H	H	CO_2Me	H
Br	H	H	C(O)Me	H	CF_3	H	H	C(O)Me	H
Br	H	H	NMe_2	H	CF_3	H	H	NMe_2	H
Br	H	H	nitro	H	CF_3	H	H	nitro	H
cyano	H	H	H	H	cyano	H	H	cyano	H
cyano	H	H	Me	H	cyano	H	H	OMe	H
cyano	H	H	Et	H	cyano	H	H	SMe	H
cyano	H	H	F	H	cyano	H	H	CO_2Me	H
cyano	H	H	Cl	H	cyano	H	H	C(O)Me	H
cyano	H	H	Br	H	cyano	H	H	NMe_2	H
cyano	H	H	CF_3	H	cyano	H	H	nitro	H
H	H	Me	H	H	Me	H	Me	H	H
H	H	Me	Me	H	Me	H	Me	Me	H
H	H	Me	Et	H	Me	H	Me	Et	H
H	H	Me	F	H	Me	H	Me	F	H

H	H	Me	Cl	H	Me	H	Me	Cl	H
H	H	Me	Br	H	Me	H	Me	Br	H
H	H	Me	CF_3	H	Me	H	Me	CF_3	H
H	H	Me	cyano	H	Me	H	Me	cyano	H
H	H	Me	OMe	H	Me	H	Me	OMe	H
H	H	Me	SMe	H	Me	H	Me	SMe	H
H	H	Me	CO_2Me	H	Me	H	Me	CO_2Me	H
H	H	Me	C(O)Me	H	Me	H	Me	C(O)Me	H
H	H	Me	NMe_2	H	Me	H	Me	NMe_2	H
H	H	Me	nitro	H	Me	H	Me	nitro	H
F	H	Me	H	H	Cl	H	Me	H	H
F	H	Me	Me	H	Cl	H	Me	Me	H
F	H	Me	Et	H	Cl	H	Me	Et	H
F	H	Me	F	H	Cl	H	Me	F	H
F	H	Me	Cl	H	Cl	H	Me	Cl	H
F	H	Me	Br	H	Cl	H	Me	Br	H
F	H	Me	CF_3	H	Cl	H	Me	CF_3	H
F	H	Me	cyano	H	Cl	H	Me	cyano	H
F	H	Me	OMe	H	Cl	H	Me	OMe	H
F	H	Me	SMe	H	Cl	H	Me	SMe	H
F	H	Me	CO_2Me	H	Cl	H	Me	CO_2Me	H
F	H	Me	C(O)Me	H	Cl	H	Me	C(O)Me	H
F	H	Me	NMe_2	H	Cl	H	Me	NMe_2	H
F	H	Me	nitro	H	Cl	H	Me	nitro	H
Br	H	Me	H	H	CF_3	H	Me	H	H
Br	H	Me	Me	H	CF_3	H	Me	Me	H
Br	H	Me	Et	H	CF_3	H	Me	Et	H
Br	H	Me	F	H	CF_3	H	Me	F	H
Br	H	Me	Cl	H	CF_3	H	Me	Cl	H
Br	H	Me	Br	H	CF_3	H	Me	Br	H
Br	H	Me	CF_3	H	CF_3	H	Me	CF_3	H
Br	H	Me	cyano	H	CF_3	H	Me	cyano	H
Br	H	Me	OMe	H	CF_3	H	Me	OMe	H
Br	H	Me	SMe	H	CF_3	H	Me	SMe	H
Br	H	Me	CO_2Me	H	CF_3	H	Me	CO_2Me	H
Br	H	Me	C(O)Me	H	CF_3	H	Me	C(O)Me	H
Br	H	Me	NMe_2	H	CF_3	H	Me	NMe_2	H
Br	H	Me	nitro	H	CF_3	H	Me	nitro	H

cyano	H	Me	H	H	cyano	H	Me	cyano	H
cyano	H	Me	Me	H	cyano	H	Me	OMe	H
cyano	H	Me	Et	H	cyano	H	Me	SMe	H
cyano	H	Me	F	H	cyano	H	Me	CO_2Me	H
cyano	H	Me	Cl	H	cyano	H	Me	C(O)Me	H
cyano	H	Me	Br	H	cyano	H	Me	NMe_2	H
cyano	H	Me	CF_3	H	cyano	H	Me	nitro	H
H	H	Cl	H	H	Me	H	Cl	H	H
H	H	Cl	Me	H	Me	H	Cl	Me	H
H	H	Cl	Et	H	Me	H	Cl	Et	H
H	H	Cl	F	H	Me	H	Cl	F	H
H	H	Cl	Cl	H	Me	H	Cl	Cl	H
H	H	Cl	Br	H	Me	H	Cl	Br	H
H	H	Cl	CF_3	H	Me	H	Cl	CF_3	H
H	H	Cl	cyano	H	Me	H	Cl	cyano	H
H	H	Cl	OMe	H	Me	H	Cl	OMe	H
H	H	Cl	SMe	H	Me	H	Cl	SMe	H
H	H	Cl	CO_2Me	H	Me	H	Cl	CO_2Me	H
H	H	Cl	C(O)Me	H	Me	H	Cl	C(O)Me	H
H	H	Cl	NMe_2	H	Me	H	Cl	NMe_2	H
H	H	Cl	nitro	H	Me	H	Cl	nitro	H
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F	H	Cl	CF_3	H	Cl	H	Cl	CF_3	H
F	H	Cl	cyano	H	Cl	H	Cl	cyano	H
F	H	Cl	OMe	H	Cl	H	Cl	OMe	H
F	H	Cl	SMe	H	Cl	H	Cl	SMe	H
F	H	Cl	CO_2Me	H	Cl	H	Cl	CO_2Me	H
F	H	Cl	C(O)Me	H	Cl	H	Cl	C(O)Me	H
F	H	Cl	NMe_2	H	Cl	H	Cl	NMe_2	H
F	H	Cl	nitro	H	Cl	H	Cl	nitro	H
Br	H	Cl	H	H	CF_3	H	Cl	H	H
Br	H	Cl	Me	H	CF_3	H	Cl	Me	H
Br	H	Cl	Et	H	CF_3	H	Cl	Et	H

Br	H	Cl	F	H	CF_3	H	Cl	F	H
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Br	H	Cl	NMe_2	H	CF_3	H	Cl	NMe_2	H
Br	H	Cl	nitro	H	CF_3	H	Cl	nitro	H
cyano	H	Cl	H	H	cyano	H	Cl	cyano	H
cyano	H	Cl	Me	H	cyano	H	Cl	OMe	H
cyano	H	Cl	Et	H	cyano	H	Cl	SMe	H
cyano	H	Cl	F	H	cyano	H	Cl	CO_2Me	H
cyano	H	Cl	Cl	H	cyano	H	Cl	C(O)Me	H
cyano	H	Cl	Br	H	cyano	H	Cl	NMe_2	H
cyano	H	Cl	CF_3	H	cyano	H	Cl	nitro	H
H	H	cyano	H	H	Me	H	cyano	H	H
H	H	cyano	Me	H	Me	H	cyano	Me	H
H	H	cyano	Et	H	Me	H	cyano	Et	H
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H	H	cyano	Br	H	Me	H	cyano	Br	H
H	H	cyano	CF_3	H	Me	H	cyano	CF_3	H
H	H	cyano	cyano	H	Me	H	cyano	cyano	H
H	H	cyano	OMe	H	Me	H	cyano	OMe	H
H	H	cyano	SMe	H	Me	H	cyano	SMe	H
H	H	cyano	CO_2Me	H	Me	H	cyano	CO_2Me	H
H	H	cyano	C(O)Me	H	Me	H	cyano	C(O)Me	H
H	H	cyano	NMe_2	H	Me	H	cyano	NMe_2	H
H	H	cyano	nitro	H	Me	H	cyano	nitro	H
F	H	cyano	H	H	Cl	H	cyano	H	H
F	H	cyano	Me	H	Cl	H	cyano	Me	H
F	H	cyano	Et	H	Cl	H	cyano	Et	H
F	H	cyano	F	H	Cl	H	cyano	F	H
F	H	cyano	Cl	H	Cl	H	cyano	Cl	H
F	H	cyano	Br	H	Cl	H	cyano	Br	H

F	H	cyano	CF_3	H	Cl	H	cyano	CF_3	H
F	H	cyano	cyano	H	Cl	H	cyano	cyano	H
F	H	cyano	OMe	H	Cl	H	cyano	OMe	H
F	H	cyano	SMe	H	Cl	H	cyano	SMe	H
F	H	cyano	CO_2Me	H	Cl	H	cyano	CO_2Me	H
F	H	cyano	C(O)Me	H	Cl	H	cyano	C(O)Me	H
F	H	cyano	NMe_2	H	Cl	H	cyano	NMe_2	H
F	H	cyano	nitro	H	Cl	H	cyano	nitro	H
Br	H	cyano	H	H	CF_3	H	cyano	H	H
Br	H	cyano	Me	H	CF_3	H	cyano	Me	H
Br	H	cyano	Et	H	CF_3	H	cyano	Et	H
Br	H	cyano	F	H	CF_3	H	cyano	F	H
Br	H	cyano	Cl	H	CF_3	H	cyano	Cl	H
Br	H	cyano	Br	H	CF_3	H	cyano	Br	H
Br	H	cyano	CF_3	H	CF_3	H	cyano	CF_3	H
Br	H	cyano	cyano	H	CF_3	H	cyano	cyano	H
Br	H	cyano	OMe	H	CF_3	H	cyano	OMe	H
Br	H	cyano	SMe	H	CF_3	H	cyano	SMe	H
Br	H	cyano	CO_2Me	H	CF_3	H	cyano	CO_2Me	H
Br	H	cyano	C(O)Me	H	CF_3	H	cyano	C(O)Me	H
Br	H	cyano	NMe_2	H	CF_3	H	cyano	NMe_2	H
Br	H	cyano	nitro	H	CF_3	H	cyano	nitro	H
cyano	H	cyano	H	H	cyano	H	cyano	cyano	H
cyano	H	cyano	Me	H	cyano	H	cyano	OMe	H
cyano	H	cyano	Et	H	cyano	H	cyano	SMe	H
cyano	H	cyano	F	H	cyano	H	cyano	CO_2Me	H
cyano	H	cyano	Cl	H	cyano	H	cyano	C(O)Me	H
cyano	H	cyano	Br	H	cyano	H	cyano	NMe_2	H
cyano	H	cyano	CF_3	H	cyano	H	cyano	nitro	H
H	H	H	H	H	Me	H	H	H	H
H	H	H	H	Me	Me	H	H	H	Me
H	H	H	H	F	Me	H	H	H	F
H	H	H	H	Cl	Me	H	H	H	Cl
H	H	H	H	Br	Me	H	H	H	Br
F	H	H	H	H	Cl	H	H	H	H
F	H	H	H	Me	Cl	H	H	H	Me
F	H	H	H	F	Cl	H	H	H	F
F	H	H	H	Cl	Cl	H	H	H	Cl

F	H	H	H	Br	Cl	H	H	H	Br
Br	H	H	H	H	CF_3	H	H	H	H
Br	H	H	H	Me	CF_3	H	H	H	Me
Br	H	H	H	F	CF_3	H	H	H	F
Br	H	H	H	Cl	CF_3	H	H	H	Cl
Br	H	H	H	Br	CF_3	H	H	H	Br
cyano	H	H	H	H	cyano	H	H	H	F
cyano	H	H	H	Me	cyano	H	H	H	Cl
Cl	H	H	OCF_3	H	cyano	H	H	H	Br
OCF_3	H	H	Cl	H					

TABLE 2

Table 2 is constructed the same as Table 1, except that R^2 is Cl. For example, the first compound in Table 2 wherein R^{1a} is CF_3, R^{1b} is Cl, R^2 is Cl, R^3 and R^a through R^e are H is the structure shown immediately below.

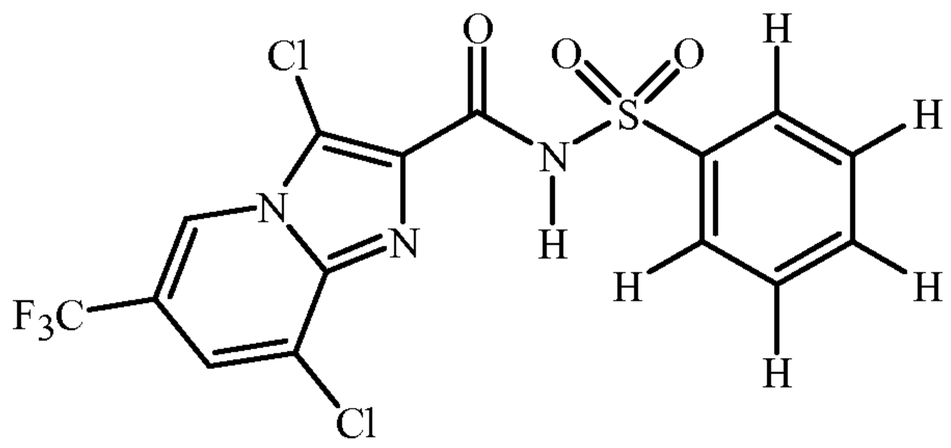


TABLE 3

Table 3 is constructed the same as Table 1, except that R^2 is Br. For example, the first compound in Table 3 wherein R^{1a} is CF_3, R^{1b} is Cl, R^2 is Br, R^3 and R^a through R^e are H is the structure shown immediately below.

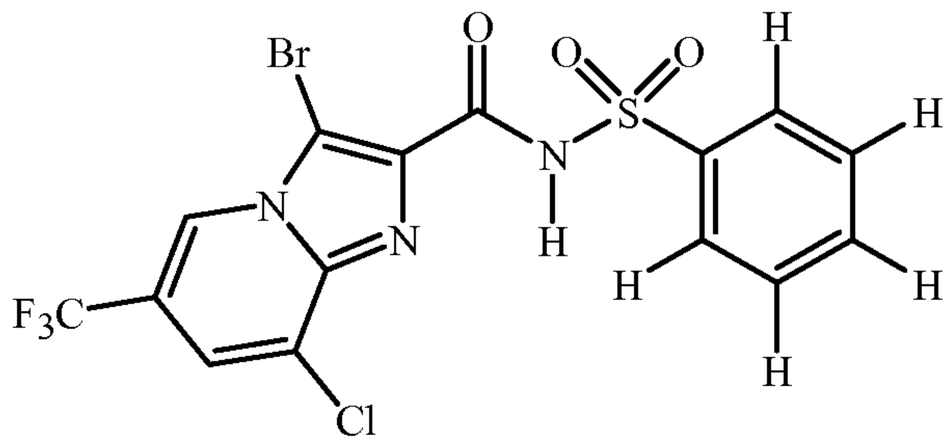


TABLE 4

Table 4 is constructed the same as Table 1, except that R^2 is Me. For example, the first compound in Table 4 wherein R^{1a} is CF_3, R^{1b} is Cl, R^2 is Me, R^3 and R^a through R^e are H is the structure shown immediately below.

74

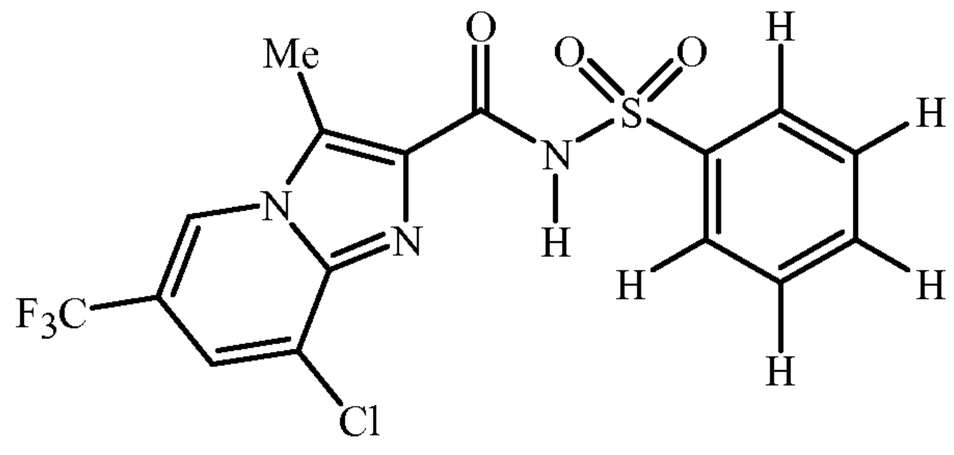


TABLE 5

Table 5 is constructed the same as Table 1, except that R^{1a} and R^{1b} are H. For example, the first compound in Table 5 wherein R^{1a} is H, R^{1b} is H, and R^2, R^3 and R^a through R^e are H is the structure shown immediately below.

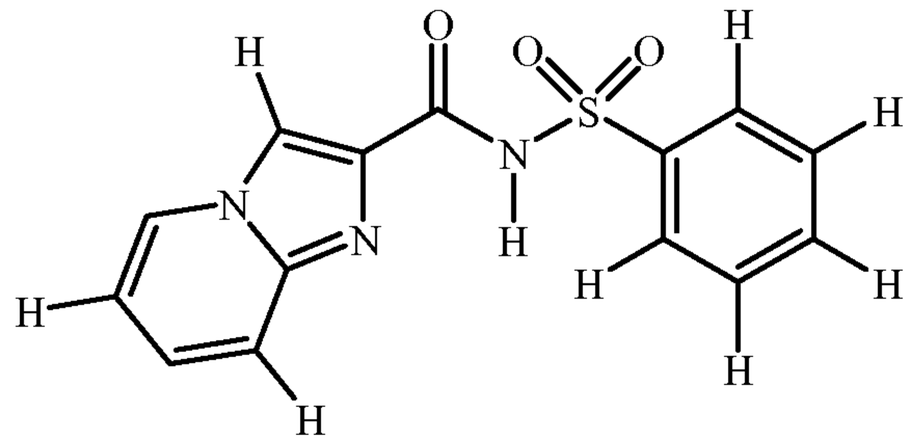


TABLE 5a

Table 5a is constructed the same as Table 1, except that R^{1a} is Cl and R^{1b} is H. For example, the first compound in Table 5a wherein R^{1a} is Cl, R^{1b} is H, and R^2, R^3 and R^a through R^e are H is the structure shown immediately below.

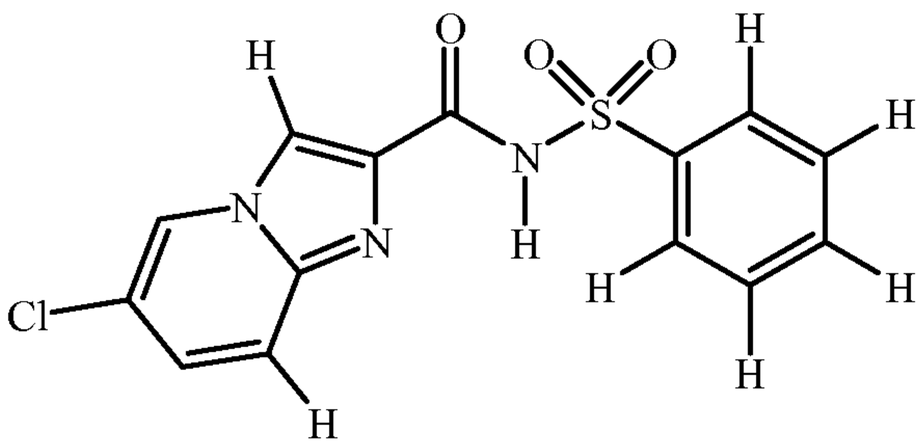


TABLE 5b

Table 5b is constructed the same as Table 1, except that R^{1a} is Br and R^{1b} is H. For example, the first compound in Table 5b wherein R^{1a} is Br, R^{1b} is H, and R^2, R^3 and R^a through R^e are H is the structure shown immediately below.

75

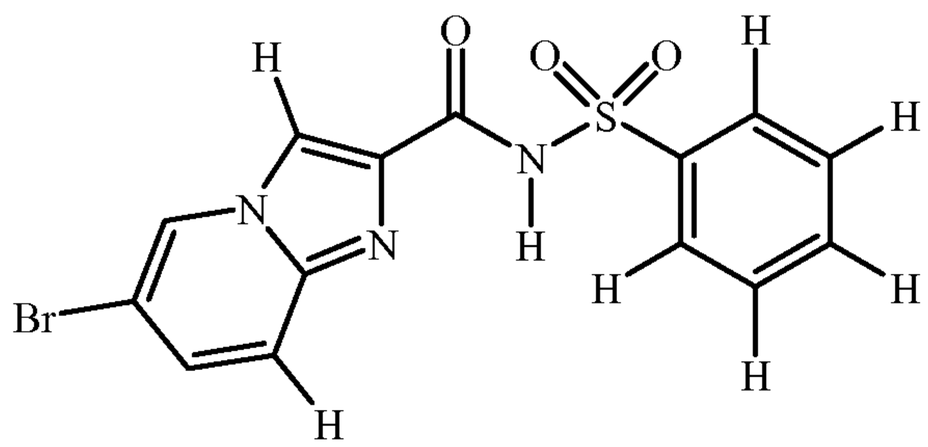


TABLE 5c

Table 5c is constructed the same as Table 1, except that R^{1b} is H. For example, the first compound in Table 5c wherein R^{1a} is CF_3, R^{1b} is H, and R^2, R^3 and R^a through R^e are H is the structure shown immediately below.

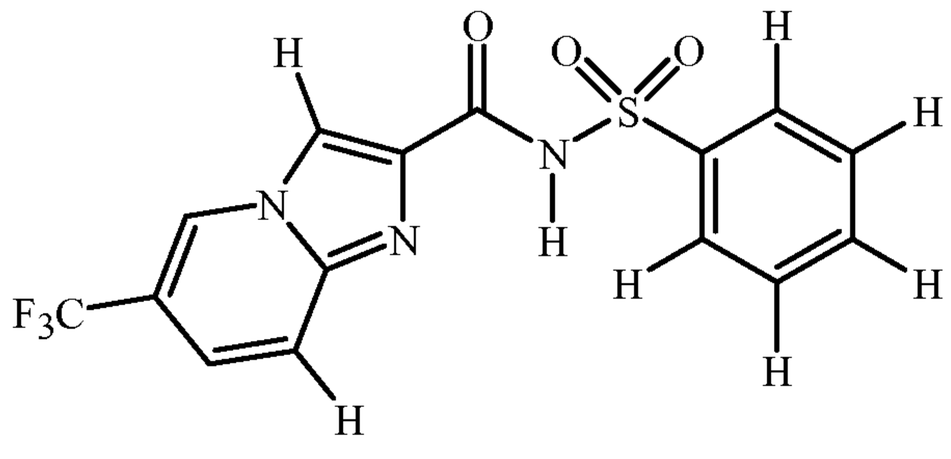


TABLE 6

Table 6 is constructed the same as Table 1, except that R^{1b} is Br. For example, the first compound in Table 6 wherein R^{1a} is CF_3, R^{1b} is Br, and R^2, R^3 and R^a through R^e are H is the structure shown immediately below.

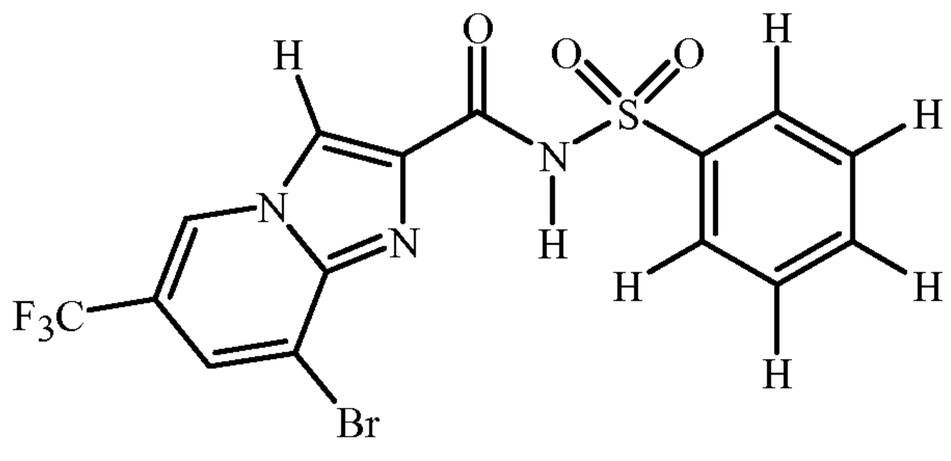


TABLE 6a

Table 6 is constructed the same as Table 1, except that R^{1b} is F. For example, the first compound in Table 6 wherein R^{1a} is CF_3, R^{1b} is F, and R^2, R^3 and R^a through R^e are H is the structure shown immediately below.

76

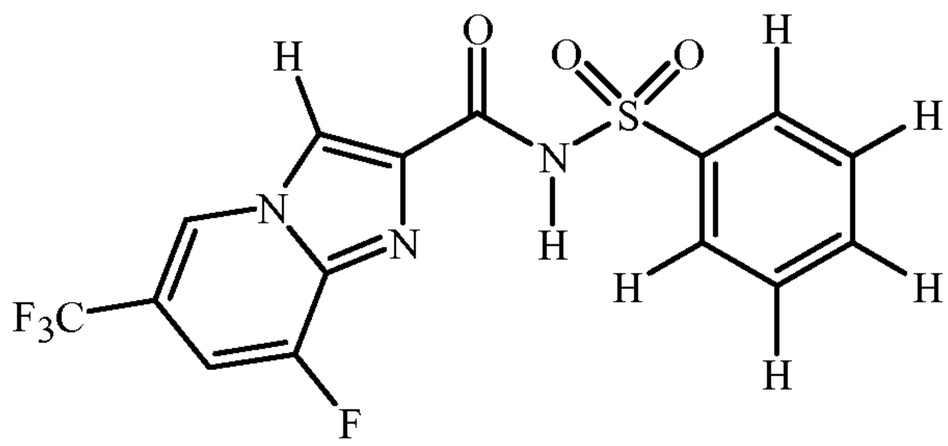


TABLE 7

Table 7 is constructed the same as Table 1, except that R^{1a} and R^{1b} are Cl. For example, the first compound in Table 7 wherein R^{1a} and R^{1b} are Cl, and R^2, R^3 and R^a through R^e are H is the structure shown immediately below.

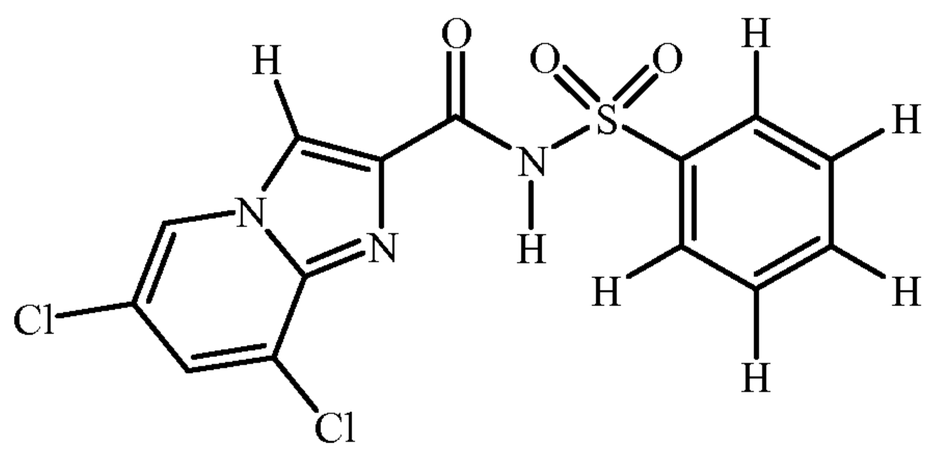


TABLE 8

Table 8 is constructed the same as Table 1, except that R^{1a} and R^{1b} are Br. For example, the first compound in Table 8 wherein R^{1a} and R^{1b} are Br, and R^2, R^3 and R^a through R^e are H is the structure shown immediately below.

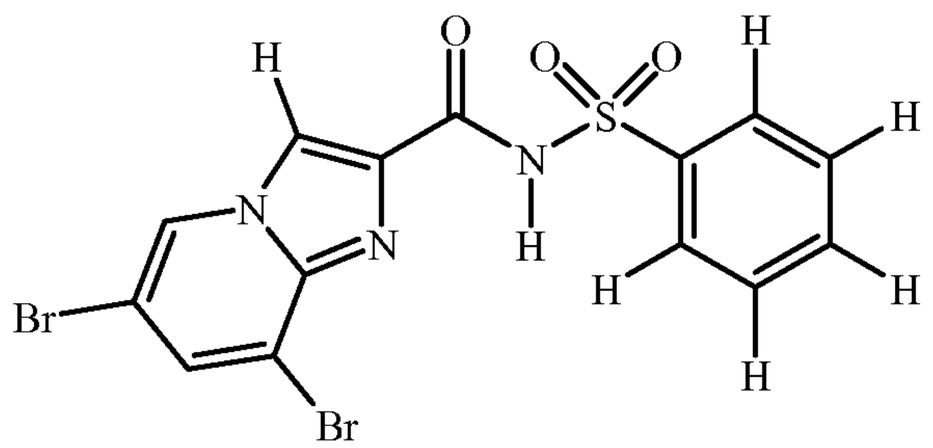


TABLE 9

Table 9 is constructed the same as Table 1, except that R^3 is Me. For example, the first compound in Table 9 wherein R^{1a} is CF_3, R^{1b} is Cl, R^3 is Me, and R^2 and R^a through R^e are H is the structure shown immediately below.

77

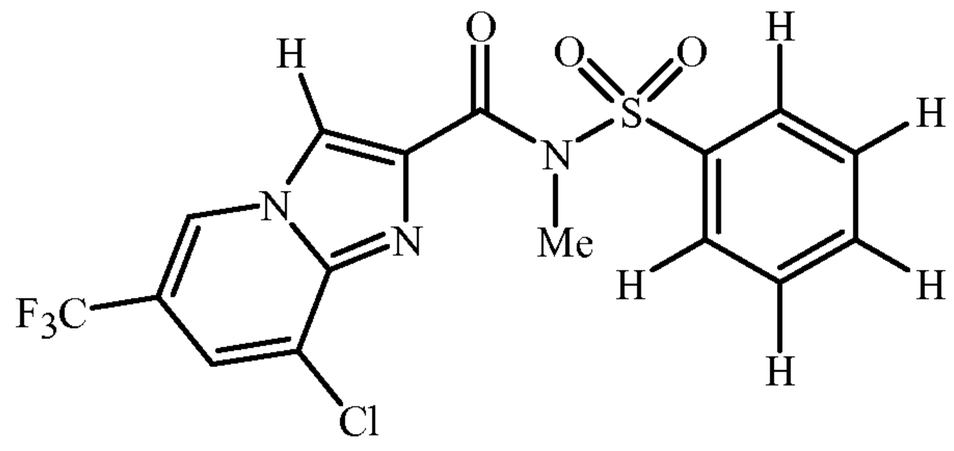


TABLE 10

Table 10 is constructed the same as Table 1, except that R^3 is Et. For example, the first compound in Table 10 wherein R^{1a} is CF_3, R^{1b} is Cl, R^3 is Et, and R^2 and R^a through R^e are H is the structure shown immediately below.

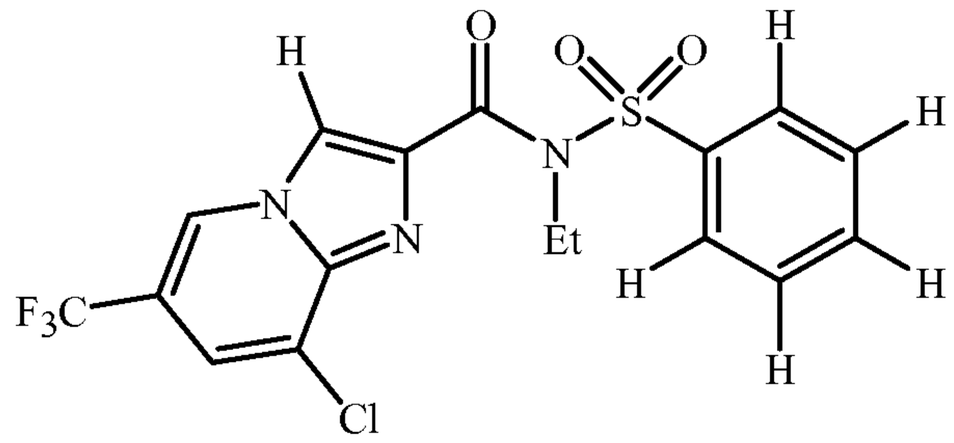


TABLE 11

Table 11 is constructed the same as Table 1, except that R^3 is propargyl (i.e. $CH_2C{\equiv}CH$). For example, the first compound in Table 11 wherein R^{1a} is CF_3, R^{1b} is Cl, R^3 is propargyl, and R^2 and R^a through R^e are H is the structure shown immediately below.

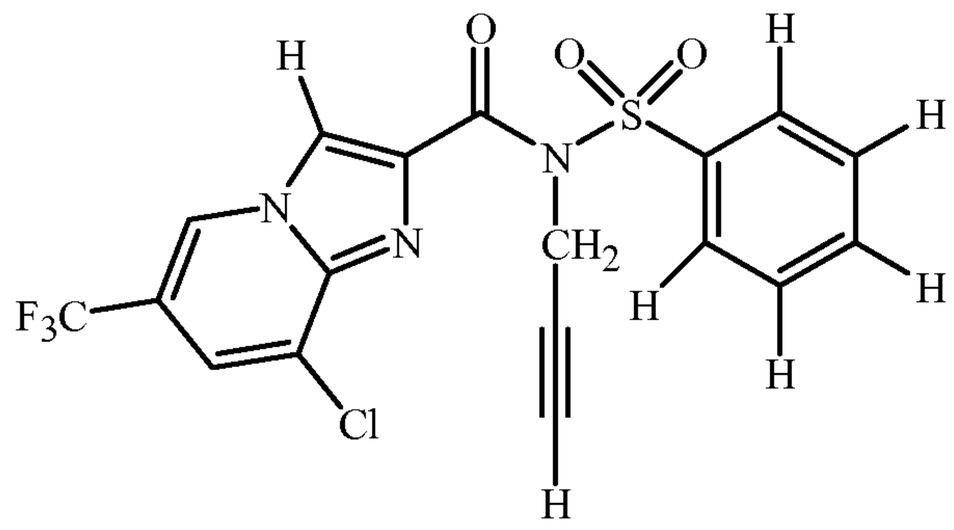


TABLE 12

Table 12 is constructed the same as Table 1, except that R^3 is benzyl (i.e. $CH_2C_6H_5$). For example, the first compound in Table 12 wherein R^{1a} is CF_3, R^{1b} is Cl, R^3 is benzyl, and R^2 and R^a through R^e are H is the structure shown immediately below.

78

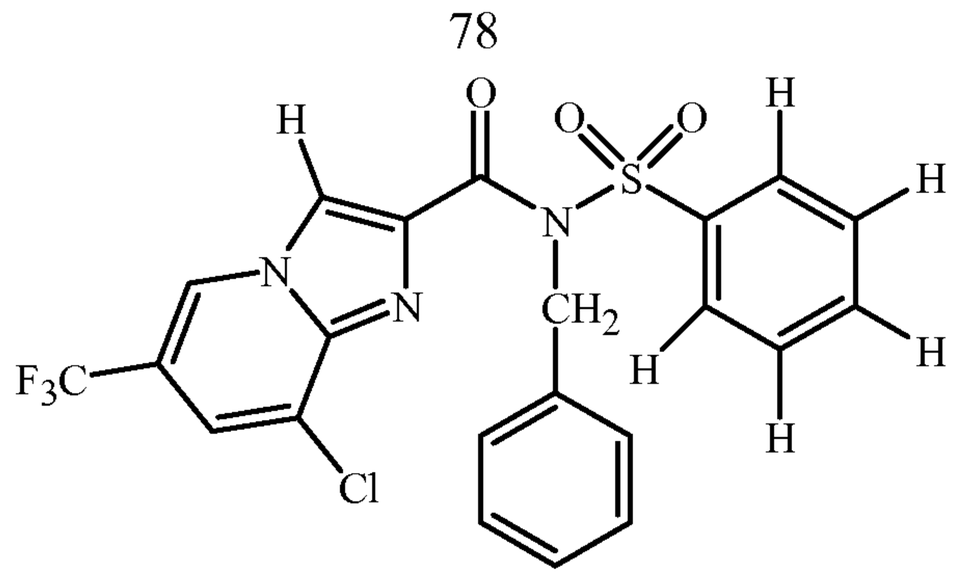
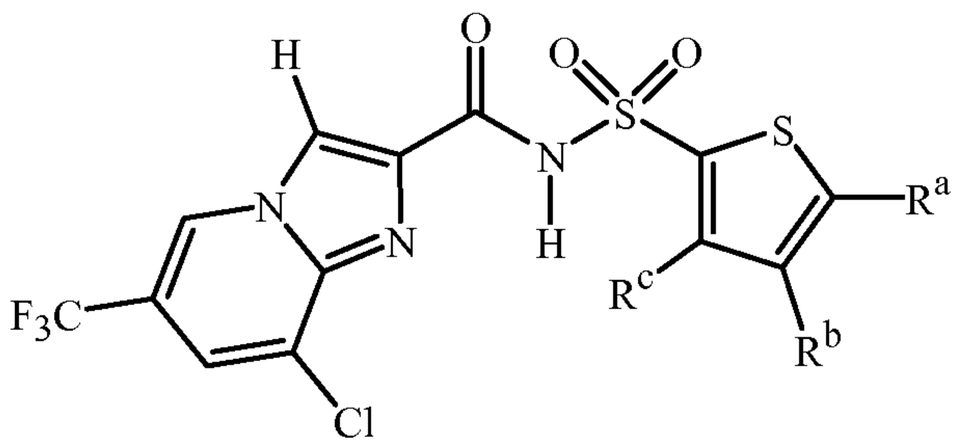


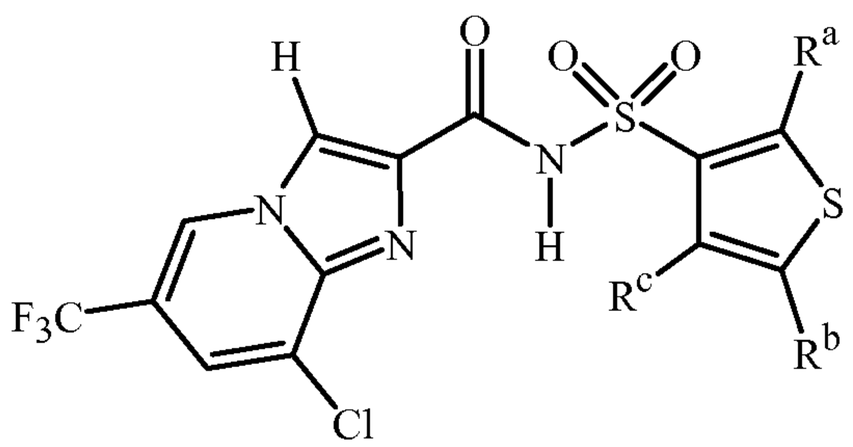
TABLE 13



R^a	R^b	R^c	R^a	R^b	R^c	R^a	R^b	R^c
H	H	H	Me	H	H	Cl	H	H
H	H	Me	Me	H	Me	Cl	H	Me
H	H	Cl	Me	H	Cl	Cl	H	Cl
H	H	Cl	Me	H	Cl	Cl	H	Cl
H	H	Br	Me	H	Br	Cl	H	Br
H	Me	H	Me	Me	H	Cl	Me	H
H	Me	Me	Me	Me	Me	Cl	Me	Me
H	Me	Cl	Me	Me	Cl	Cl	Me	Cl
H	Me	Br	Me	Me	Br	Cl	Me	Br
H	Et	H	Me	Et	H	Cl	Et	H
H	Et	Me	Me	Et	Me	Cl	Et	Me
H	Et	Cl	Me	Et	Cl	Cl	Et	Cl
H	Et	Br	Me	Et	Br	Cl	Et	Br
H	Cl	H	Me	Cl	H	Cl	Cl	H
H	Cl	Me	Me	Cl	Me	Cl	Cl	Me
H	Cl	Cl	Me	Cl	Cl	Cl	Cl	Cl
H	Cl	Br	Me	Cl	Br	Cl	Cl	Br
Br	H	H	Et	H	H			
Br	H	Me	Et	H	Me			
Br	H	Cl	Et	H	Cl			
Br	H	Br	Et	H	Br			
Br	Me	H	Et	Me	H			
Br	Me	Me	Et	Me	Me			

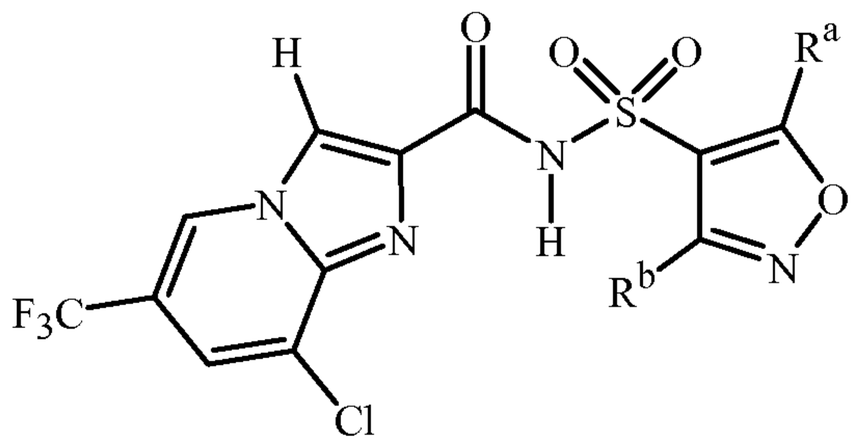
Br	Me	Cl	Et	Me	Cl
Br	Me	Br	Et	Me	Br
Br	Et	H	Et	Et	H
Br	Et	Me	Et	Et	Me
Br	Et	Cl	Et	Et	Cl
Br	Et	Br	Et	Et	Br
Br	Cl	H	Et	Cl	H
Br	Cl	Me	Et	Cl	Me
Br	Cl	Cl	Et	Cl	Cl
Br	Cl	Br	Et	Cl	Br

TABLE 14



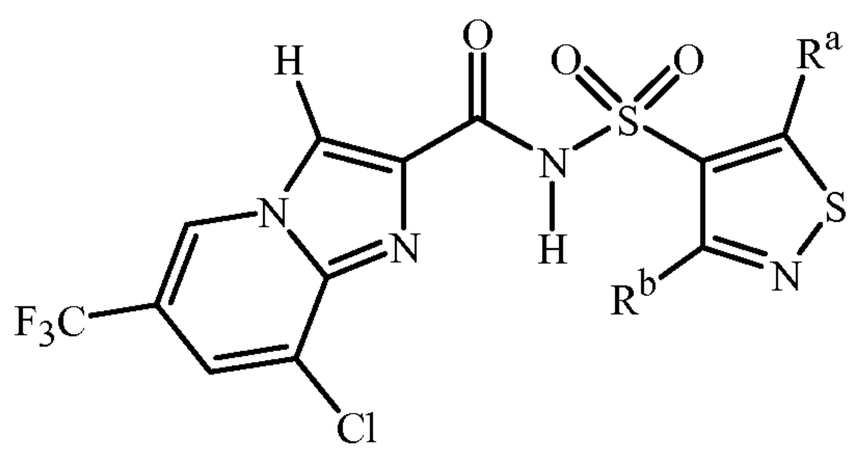
R^a	R^b	R^c	R^a	R^b	R^c	R^a	R^b	R^c
H	H	H	Me	H	H	Cl	H	H
H	H	Me	Me	H	Me	Cl	H	Me
H	H	Cl	Me	H	Cl	Cl	H	Cl
H	Me	H	Me	Me	H	Cl	Me	H
H	Me	Me	Me	Me	Me	Cl	Me	Me
H	Me	Cl	Me	Me	Cl	Cl	Me	Cl
H	Et	H	Me	Et	H	Cl	Et	H
H	Et	Me	Me	Et	Me	Cl	Et	Me
H	Et	Cl	Me	Et	Cl	Cl	Et	Cl
Et	H	H	Br	H	H			
Et	H	Me	Br	H	Me			
Et	H	Cl	Br	H	Cl			
Et	Me	H	Br	Me	H			
Et	Me	Me	Br	Me	Me			
Et	Me	Cl	Br	Me	Cl			
Et	Et	H	Br	Et	H			
Et	Et	Me	Br	Et	Me			
Et	Et	Cl	Br	Et	Cl			

TABLE 15



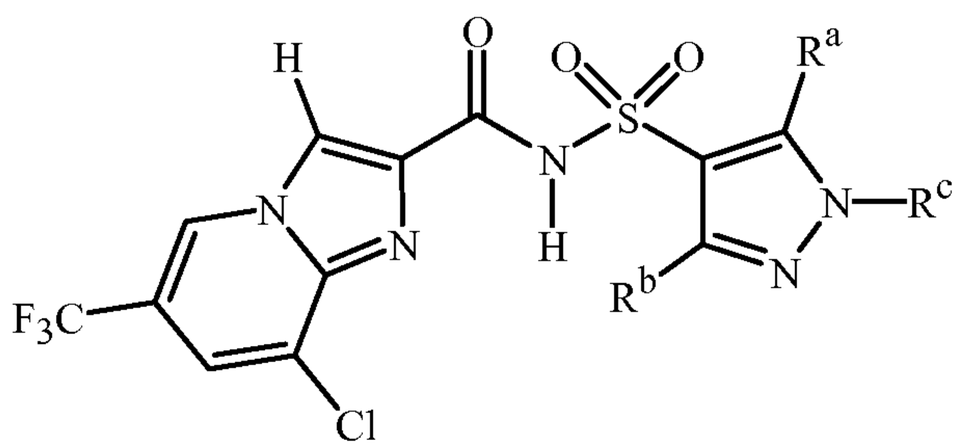
R^a	R^b	R^a	R^b	R^a	R^b
H	H	Me	H	Cl	H
H	Me	Me	Me	Cl	Me
H	Cl	Me	Cl	Cl	Cl

TABLE 16



R^a	R^b	R^a	R^b	R^a	R^b
H	H	Me	H	Cl	H
H	Me	Me	Me	Cl	Me
H	Cl	Me	Cl	Cl	Cl

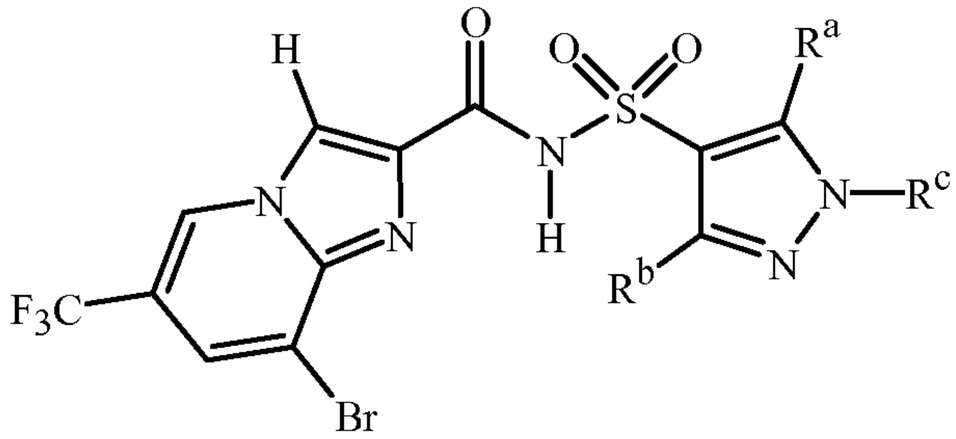
TABLE 17



R^a	R^b	R^c	R^a	R^b	R^c	R^a	R^b	R^c
H	H	Me	Me	H	Me	Cl	H	Me
H	H	Et	Me	H	Et	Cl	H	Et
H	H	*i*-Pr	Me	H	*i*-Pr	Cl	H	*i*-Pr
H	H	*n*-Pr	Me	H	*n*-Pr	Cl	H	*n*-Pr
Br	H	Me	H	Me	Me	Me	Me	Me
Br	H	Et	H	Me	Et	Me	Me	Et
Br	H	*i*-Pr	H	Me	*i*-Pr	Me	Me	*i*-Pr

Br	H	*n*-Pr	H	Me	*n*-Pr	Me	Me	*n*-Pr
Cl	Me	Me	Br	Me	Me	H	Cl	Me
Cl	Me	Et	Br	Me	Et	H	Cl	Et
Cl	Me	*i*-Pr	Br	Me	*i*-Pr	H	Cl	*i*-Pr
Cl	Me	*n*-Pr	Br	Me	*n*-Pr	H	Cl	*n*-Pr
Me	Cl	Me	Cl	Cl	Me	Br	Cl	Me
Me	Cl	Et	Cl	Cl	Et	Br	Cl	Et
Me	Cl	*i*-Pr	Cl	Cl	*i*-Pr	Br	Cl	*i*-Pr
Me	Cl	*n*-Pr	Cl	Cl	*n*-Pr	Br	Cl	*n*-Pr
H	Br	Me	Me	Br	Me	Cl	Br	Me
H	Br	Et	Me	Br	Et	Cl	Br	Et
H	Br	*i*-Pr	Me	Br	*i*-Pr	Cl	Br	*i*-Pr
H	Br	*n*-Pr	Me	Br	*n*-Pr	Cl	Br	*n*-Pr
Br	Br	Me						
Br	Br	Et						
Br	Br	*i*-Pr						
Br	Br	*n*-Pr						

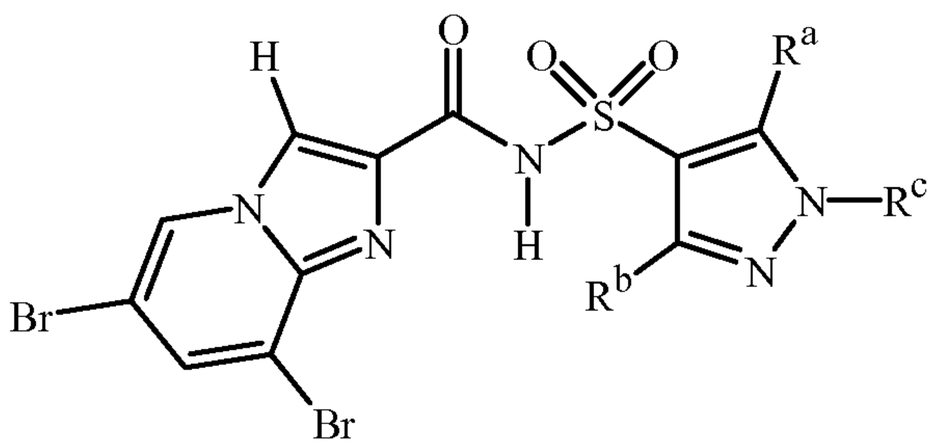
TABLE 17a



R^a	R^b	R^c	R^a	R^b	R^c	R^a	R^b	R^c
H	H	Me	Me	H	Me	Cl	H	Me
H	H	Et	Me	H	Et	Cl	H	Et
H	H	*i*-Pr	Me	H	*i*-Pr	Cl	H	*i*-Pr
H	H	*n*-Pr	Me	H	*n*-Pr	Cl	H	*n*-Pr
Br	H	Me	H	Me	Me	Me	Me	Me
Br	H	Et	H	Me	Et	Me	Me	Et
Br	H	*i*-Pr	H	Me	*i*-Pr	Me	Me	*i*-Pr
Br	H	*n*-Pr	H	Me	*n*-Pr	Me	Me	*n*-Pr
Cl	Me	Me	Br	Me	Me	H	Cl	Me
Cl	Me	Et	Br	Me	Et	H	Cl	Et
Cl	Me	*i*-Pr	Br	Me	*i*-Pr	H	Cl	*i*-Pr
Cl	Me	*n*-Pr	Br	Me	*n*-Pr	H	Cl	*n*-Pr

Me	Cl	Me	Cl	Cl	Me	Br	Cl	Me
Me	Cl	Et	Cl	Cl	Et	Br	Cl	Et
Me	Cl	*i*-Pr	Cl	Cl	*i*-Pr	Br	Cl	*i*-Pr
Me	Cl	*n*-Pr	Cl	Cl	*n*-Pr	Br	Cl	*n*-Pr
H	Br	Me	Me	Br	Me	Cl	Br	Me
H	Br	Et	Me	Br	Et	Cl	Br	Et
H	Br	*i*-Pr	Me	Br	*i*-Pr	Cl	Br	*i*-Pr
H	Br	*n*-Pr	Me	Br	*n*-Pr	Cl	Br	*n*-Pr
Br	Br	Me						
Br	Br	Et						
Br	Br	*i*-Pr						
Br	Br	*n*-Pr						

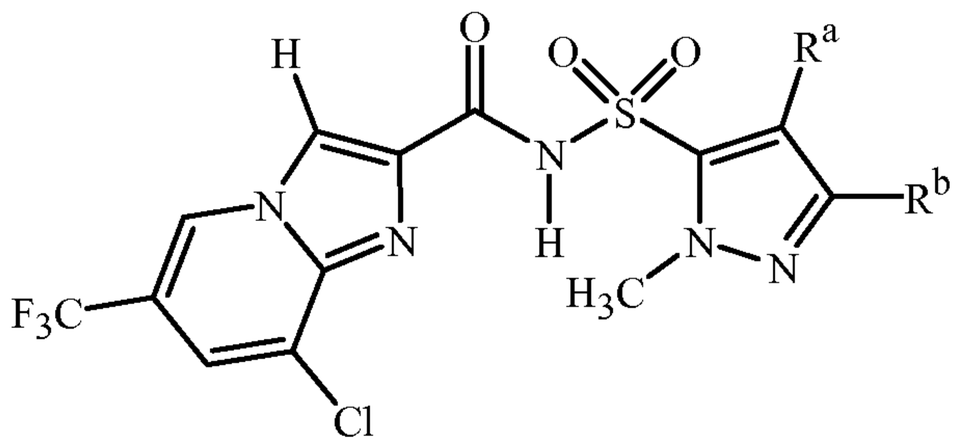
TABLE 17b



R^a	R^b	R^c	R^a	R^b	R^c	R^a	R^b	R^c
H	H	Me	Me	H	Me	Cl	H	Me
H	H	Et	Me	H	Et	Cl	H	Et
H	H	*i*-Pr	Me	H	*i*-Pr	Cl	H	*i*-Pr
H	H	*n*-Pr	Me	H	*n*-Pr	Cl	H	*n*-Pr
Br	H	Me	H	Me	Me	Me	Me	Me
Br	H	Et	H	Me	Et	Me	Me	Et
Br	H	*i*-Pr	H	Me	*i*-Pr	Me	Me	*i*-Pr
Br	H	*n*-Pr	H	Me	*n*-Pr	Me	Me	*n*-Pr
Cl	Me	Me	Br	Me	Me	H	Cl	Me
Cl	Me	Et	Br	Me	Et	H	Cl	Et
Cl	Me	*i*-Pr	Br	Me	*i*-Pr	H	Cl	*i*-Pr
Cl	Me	*n*-Pr	Br	Me	*n*-Pr	H	Cl	*n*-Pr
Me	Cl	Me	Cl	Cl	Me	Br	Cl	Me
Me	Cl	Et	Cl	Cl	Et	Br	Cl	Et
Me	Cl	*i*-Pr	Cl	Cl	*i*-Pr	Br	Cl	*i*-Pr
Me	Cl	*n*-Pr	Cl	Cl	*n*-Pr	Br	Cl	*n*-Pr
H	Br	Me	Me	Br	Me	Cl	Br	Me

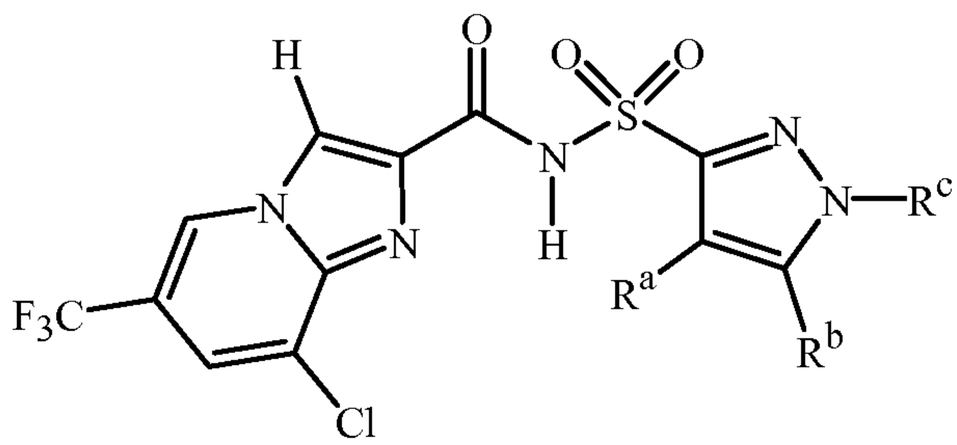
H	Br	Et	Me	Br	Et	Cl	Br	Et
H	Br	*i*-Pr	Me	Br	*i*-Pr	Cl	Br	*i*-Pr
H	Br	*n*-Pr	Me	Br	*n*-Pr	Cl	Br	*n*-Pr
Br	Br	Me						
Br	Br	Et						
Br	Br	*i*-Pr						
Br	Br	*n*-Pr						

TABLE 18



R^a	R^b	R^a	R^b	R^a	R^b	R^a	R^b
H	H	Me	H	Cl	H	Br	H
H	Cl	Me	Cl	Cl	Cl	Br	Cl
H	Me	Me	Me	Cl	Me	Br	Me
H	Et	Me	Et	Cl	Et	Br	Et
H	*i*-Pr	Me	*i*-Pr	Cl	*i*-Pr	Br	*i*-Pr
H	*n*-Pr	Me	*n*-Pr	Cl	*n*-Pr	Br	*n*-Pr
H	OMe	Me	OMe	Cl	OMe	Br	OMe

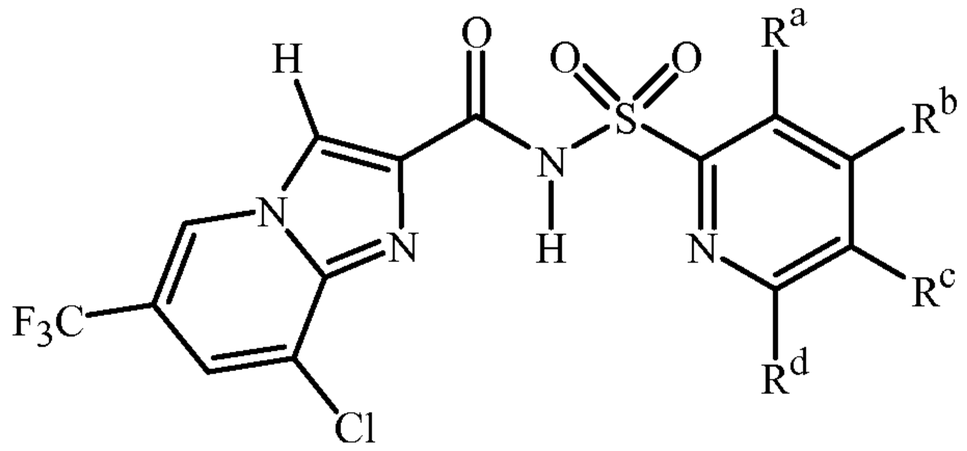
TABLE 19



R^a	R^b	R^c	R^a	R^b	R^c	R^a	R^b	R^c
H	H	Me	Me	H	Me	Cl	H	Me
H	H	Et	Me	H	Et	Cl	H	Et
H	H	*i*-Pr	Me	H	*i*-Pr	Cl	H	*i*-Pr
H	H	*n*-Pr	Me	H	*n*-Pr	Cl	H	*n*-Pr
Br	H	Me	H	Me	Me	Me	Me	Me

Br	H	Et	H	Me	Et	Me	Me	Et
Br	H	*i*-Pr	H	Me	*i*-Pr	Me	Me	*i*-Pr
Br	H	*n*-Pr	H	Me	*n*-Pr	Me	Me	*n*-Pr
Cl	Me	Me	Br	Me	Me	H	Cl	Me
Cl	Me	Et	Br	Me	Et	H	Cl	Et
Cl	Me	*i*-Pr	Br	Me	*i*-Pr	H	Cl	*i*-Pr
Cl	Me	*n*-Pr	Br	Me	*n*-Pr	H	Cl	*n*-Pr
Cl	Me	*n*-Pr	Br	Me	*n*-Pr	H	Cl	*n*-Pr
Me	Cl	Me	Cl	Cl	Me	Br	Cl	Me
Me	Cl	Et	Cl	Cl	Et	Br	Cl	Et
Me	Cl	*i*-Pr	Cl	Cl	*i*-Pr	Br	Cl	*i*-Pr
Me	Cl	*n*-Pr	Cl	Cl	*n*-Pr	Br	Cl	*n*-Pr
H	Br	Me	Me	Br	Me	Cl	Br	Me
H	Br	Et	Me	Br	Et	Cl	Br	Et
H	Br	*i*-Pr	Me	Br	*i*-Pr	Cl	Br	*i*-Pr
H	Br	*n*-Pr	Me	Br	*n*-Pr	Cl	Br	*n*-Pr
Br	Br	Me						
Br	Br	Et						
Br	Br	*i*-Pr						
Br	Br	*n*-Pr						

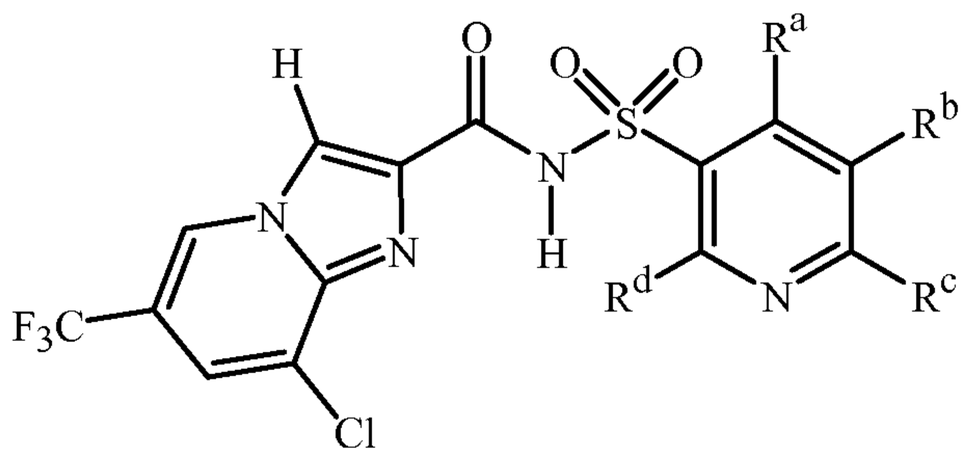
TABLE 20



R^a	R^b	R^c	R^d	R^a	R^b	R^c	R^d
Me	H	H	H	Cl	H	H	H
Me	H	H	Me	Cl	H	H	Me
Me	H	H	OMe	Cl	H	H	OMe
Me	OMe	H	H	Cl	OMe	H	H
Me	OMe	H	Me	Cl	OMe	H	Me
Me	OMe	H	OMe	Cl	OMe	H	OMe
Me	H	Me	H	Cl	H	Me	H
Me	H	Me	Me	Cl	H	Me	Me
Me	H	Me	OMe	Cl	H	Me	OMe
Me	OMe	Me	H	Cl	OMe	Me	H

Me	OMe	Me	Me	Cl	OMe	Me	Me
Me	OMe	Me	OMe	Cl	OMe	Me	OMe
Me	Me	H	H	Cl	Me	H	H
Me	Me	H	Me	Cl	Me	H	Me
Me	Me	H	OMe	Cl	Me	H	OMe
Me	Me	Me	H	Cl	Me	Me	H
Me	Me	Me	Me	Cl	Me	Me	Me
Me	Me	Me	OMe	Cl	Me	Me	OMe
Br	H	H	H	Br	OMe	Me	H
Br	H	H	Me	Br	OMe	Me	Me
Br	H	H	OMe	Br	OMe	Me	OMe
Br	OMe	H	H	Br	Me	H	H
Br	OMe	H	Me	Br	Me	H	Me
Br	OMe	H	OMe	Br	Me	H	OMe
Br	H	Me	H	Br	Me	Me	H
Br	H	Me	Me	Br	Me	Me	Me
Br	H	Me	OMe	Br	Me	Me	OMe

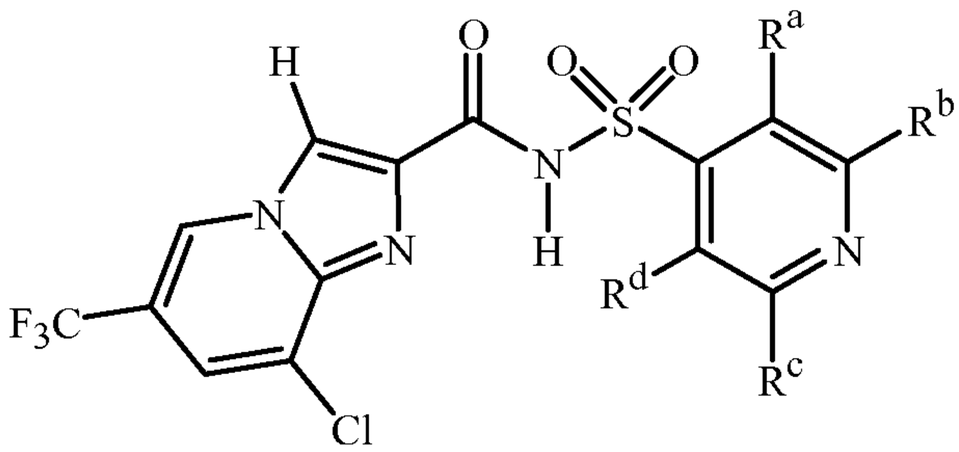
TABLE 21



R^a	R^b	R^c	R^d	R^a	R^b	R^c	R^d
H	H	H	H	Me	H	H	H
H	H	H	Me	Me	H	H	Me
H	H	H	CF_3	Me	H	H	CF_3
H	H	H	Cl	Me	H	H	Cl
H	H	H	Br	Me	H	H	Br
H	H	Me	H	Me	H	Me	H
H	H	Me	Me	Me	H	Me	Me
H	H	Me	CF_3	Me	H	Me	CF_3
H	H	Me	Cl	Me	H	Me	Cl
H	H	Me	Br	Me	H	Me	Br
H	Cl	H	H	Me	Cl	H	H
H	Cl	H	Me	Me	Cl	H	Me

H	Cl	H	CF_3	Me	Cl	H	CF_3
H	Cl	H	Cl	Me	Cl	H	Cl
H	Cl	H	Br	Me	Cl	H	Br
H	Cl	Me	H	Me	Cl	Me	H
H	Cl	Me	Me	Me	Cl	Me	Me
H	Cl	Me	CF_3	Me	Cl	Me	CF_3
H	Cl	Me	Cl	Me	Cl	Me	Cl
H	Cl	Me	Br	Me	Cl	Me	Br
H	Me	H	H	Me	Me	H	H
H	Me	H	Me	Me	Me	H	Me
H	Me	H	CF_3	Me	Me	H	CF_3
H	Me	H	Cl	Me	Me	H	Cl
H	Me	H	Br	Me	Me	H	Br
H	Me	Me	H	Me	Me	Me	H
H	Me	Me	Me	Me	Me	Me	Me
H	Me	Me	CF_3	Me	Me	Me	CF_3
H	Me	Me	Cl	Me	Me	Me	Cl
H	Me	Me	Br	Me	Me	Me	Br
H	CF_3	H	H	Me	CF_3	H	H
H	CF_3	H	Me	Me	CF_3	H	Me
H	CF_3	H	CF_3	Me	CF_3	H	CF_3
H	CF_3	H	Cl	Me	CF_3	H	Cl
H	CF_3	H	Br	Me	CF_3	H	Br
H	CF_3	Me	H	Me	CF_3	Me	H
H	CF_3	Me	Me	Me	CF_3	Me	Me
H	CF_3	Me	CF_3	Me	CF_3	Me	CF_3
H	CF_3	Me	Cl	Me	CF_3	Me	Cl
H	CF_3	Me	Br	Me	CF_3	Me	Br
H	OMe	H	H	Me	OMe	H	H
H	OMe	H	Me	Me	OMe	H	Me
H	OMe	H	CF_3	Me	OMe	H	CF_3
H	OMe	H	Cl	Me	OMe	H	Cl
H	OMe	H	Br	Me	OMe	H	Br
H	OMe	Me	H	Me	OMe	Me	H
H	OMe	Me	Me	Me	OMe	Me	Me
H	OMe	Me	CF_3	Me	OMe	Me	CF_3
H	OMe	Me	Cl	Me	OMe	Me	Cl
H	OMe	Me	Br	Me	OMe	Me	Br

TABLE 22



R^a	R^b	R^c	R^d	R^a	R^b	R^c	R^d
H	H	H	H	Me	H	H	H
H	H	H	Me	Me	H	H	Me
H	H	H	Cl	Me	H	H	Cl
H	H	Me	H	Me	H	Me	H
H	H	Me	Me	Me	H	Me	Me
H	H	Me	Cl	Me	H	Me	Cl

A compound of this invention will generally be used as a parasitic nematode control active ingredient in a composition, i.e. formulation, with at least one additional component selected from the group consisting of surfactants, solid diluents and liquid diluents, which serves as a carrier. The formulation or composition ingredients are selected to be consistent with the physical properties of the active ingredient, mode of application and environmental factors such as soil type, moisture and temperature.

Useful formulations include both liquid and solid compositions. Liquid compositions include solutions (including emulsifiable concentrates), suspensions, emulsions (including microemulsions and/or suspo-emulsions) and the like, which optionally can be thickened into gels. The general types of aqueous liquid compositions are soluble concentrate, suspension concentrate, capsule suspension, concentrated emulsion, microemulsion and suspo-emulsion. The general types of nonaqueous liquid compositions are emulsifiable concentrate, microemulsifiable concentrate, dispersible concentrate and oil dispersion.

The general types of solid compositions are dusts, powders, granules, pellets, prills, pastilles, tablets, filled films (including seed coatings) and the like, which can be water-dispersible ("wettable") or water-soluble. Films and coatings formed from film-forming solutions or flowable suspensions are particularly useful for seed treatment. Active ingredient can be (micro)encapsulated and further formed into a suspension or solid formulation; alternatively the entire formulation of active ingredient can be encapsulated (or "overcoated"). Encapsulation can control or delay release of the active ingredient. An emulsifiable granule combines the advantages of both an emulsifiable concentrate formulation and a dry granular formulation. High-strength compositions are primarily used as intermediates for further formulation.

Sprayable formulations are typically extended in a suitable medium before spraying. Such liquid and solid formulations are formulated to be readily diluted in the spray medium, usually water. Spray volumes can range from about one to several thousand liters per hectare, but more typically are in the range from about ten to several hundred liters per hectare. Sprayable formulations can be tank mixed with water or another suitable medium for foliar treatment by aerial or ground application, or for application to the growing medium of the plant. Liquid and dry formulations can be metered directly into drip irrigation systems or metered into the furrow during planting. Liquid and solid formulations can be applied onto seeds of crops and other desirable vegetation as seed treatments before planting to protect developing roots and other subterranean plant parts and/or foliage through systemic uptake.

The formulations will typically contain effective amounts of active ingredient, diluent and surfactant within the following approximate ranges which add up to 100 percent by weight.

	Weight Percent		
	Active Ingredient	Diluent	Surfactant
Water-Dispersible and Water-soluble Granules, Tablets and Powders	0.001–90	0–99.999	0–15
Oil Dispersions, Suspensions, Emulsions, Solutions (including Emulsifiable Concentrates)	1–50	40–99	0–50
Dusts	1–25	70–99	0–5
Granules and Pellets	0.001–95	5–99.999	0–15
High Strength Compositions	90–99	0–10	0–2

Solid diluents include, for example, clays such as bentonite, montmorillonite, attapulgite and kaolin, gypsum, cellulose, titanium dioxide, zinc oxide, starch, dextrin, sugars (e.g., lactose, sucrose), silica, talc, mica, diatomaceous earth, urea, calcium carbonate, sodium carbonate and bicarbonate, and sodium sulfate. Typical solid diluents are described in Watkins et al., *Handbook of Insecticide Dust Diluents and Carriers*, 2nd Ed., Dorland Books, Caldwell, New Jersey.

Liquid diluents include, for example, water, *N*,*N*-dimethylalkanamides (e.g., *N*,*N*-dimethylformamide), limonene, dimethyl sulfoxide, *N*-alkylpyrrolidones (e.g., *N*-methylpyrrolidinone), ethylene glycol, triethylene glycol, propylene glycol, dipropylene glycol, polypropylene glycol, propylene carbonate, butylene carbonate, paraffins (e.g., white mineral oils, normal paraffins, isoparaffins), alkylbenzenes, alkylnaphthalenes, glycerine,

glycerol triacetate, sorbitol, triacetin, aromatic hydrocarbons, dearomatized aliphatics, alkylbenzenes, alkylnaphthalenes, ketones such as cyclohexanone, 2-heptanone, isophorone and 4-hydroxy-4-methyl-2-pentanone, acetates such as isoamyl acetate, hexyl acetate, heptyl acetate, octyl acetate, nonyl acetate, tridecyl acetate and isobornyl acetate, other esters such as alkylated lactate esters, dibasic esters and γ-butyrolactone, and alcohols, which can be linear, branched, saturated or unsaturated, such as methanol, ethanol, *n*-propanol, isopropyl alcohol, *n*-butanol, isobutyl alcohol, *n*-hexanol, 2-ethylhexanol, *n*-octanol, decanol, isodecyl alcohol, isooctadecanol, cetyl alcohol, lauryl alcohol, tridecyl alcohol, oleyl alcohol, cyclohexanol, tetrahydrofurfuryl alcohol, diacetone alcohol and benzyl alcohol. Liquid diluents also include glycerol esters of saturated and unsaturated fatty acids (typically C_6–C_{22}), such as plant seed and fruit oils (e.g, oils of olive, castor, linseed, sesame, corn (maize), peanut, sunflower, grapeseed, safflower, cottonseed, soybean, rapeseed, coconut and palm kernel), animal-sourced fats (e.g., beef tallow, pork tallow, lard, cod liver oil, fish oil), and mixtures thereof. Liquid diluents also include alkylated fatty acids (e.g., methylated, ethylated, butylated) wherein the fatty acids may be obtained by hydrolysis of glycerol esters from plant and animal sources, and can be purified by distillation. Typical liquid diluents are described in Marsden, *Solvents Guide*, 2nd Ed., Interscience, New York, 1950.

The solid and liquid compositions of the present invention often include one or more surfactants. When added to a liquid, surfactants (also known as "surface-active agents") generally modify, most often reduce, the surface tension of the liquid. Depending on the nature of the hydrophilic and lipophilic groups in a surfactant molecule, surfactants can be useful as wetting agents, dispersants, emulsifiers or defoaming agents.

Surfactants can be classified as nonionic, anionic or cationic. Nonionic surfactants useful for the present compositions include, but are not limited to: alcohol alkoxylates such as alcohol alkoxylates based on natural and synthetic alcohols (which may be branched or linear) and prepared from the alcohols and ethylene oxide, propylene oxide, butylene oxide or mixtures thereof; amine ethoxylates, alkanolamides and ethoxylated alkanolamides; alkoxylated triglycerides such as ethoxylated soybean, castor and rapeseed oils; alkylphenol alkoxylates such as octylphenol ethoxylates, nonylphenol ethoxylates, dinonyl phenol ethoxylates and dodecyl phenol ethoxylates (prepared from the phenols and ethylene oxide, propylene oxide, butylene oxide or mixtures thereof); block polymers prepared from ethylene oxide or propylene oxide and reverse block polymers where the terminal blocks are prepared from propylene oxide; ethoxylated fatty acids; ethoxylated fatty esters and oils; ethoxylated methyl esters; ethoxylated tristyrylphenol (including those prepared from ethylene oxide, propylene oxide, butylene oxide or mixtures thereof); fatty acid esters, glycerol esters, lanolin-based derivatives, polyethoxylate esters such as polyethoxylated sorbitan fatty acid esters, polyethoxylated sorbitol fatty acid esters and polyethoxylated

glycerol fatty acid esters; other sorbitan derivatives such as sorbitan esters; polymeric surfactants such as random copolymers, block copolymers, alkyd peg (polyethylene glycol) resins, graft or comb polymers and star polymers; polyethylene glycols (pegs); polyethylene glycol fatty acid esters; silicone-based surfactants; and sugar-derivatives such as sucrose esters, alkyl polyglycosides and alkyl polysaccharides.

Useful anionic surfactants include, but are not limited to: alkylaryl sulfonic acids and their salts; carboxylated alcohol or alkylphenol ethoxylates; diphenyl sulfonate derivatives; lignin and lignin derivatives such as lignosulfonates; maleic or succinic acids or their anhydrides; olefin sulfonates; phosphate esters such as phosphate esters of alcohol alkoxylates, phosphate esters of alkylphenol alkoxylates and phosphate esters of styryl phenol ethoxylates; protein-based surfactants; sarcosine derivatives; styryl phenol ether sulfate; sulfates and sulfonates of oils and fatty acids; sulfates and sulfonates of ethoxylated alkylphenols; sulfates of alcohols; sulfates of ethoxylated alcohols; sulfonates of amines and amides such as *N*,*N*-alkyltaurates; sulfonates of benzene, cumene, toluene, xylene, and dodecyl and tridecylbenzenes; sulfonates of condensed naphthalenes; sulfonates of naphthalene and alkyl naphthalene; sulfonates of fractionated petroleum; sulfosuccinamates; and sulfosuccinates and their derivatives such as dialkyl sulfosuccinate salts.

Useful cationic surfactants include, but are not limited to: amides and ethoxylated amides; amines such as *N*-alkyl propanediamines, tripropylenetriamines and dipropylenetetramines, and ethoxylated amines, ethoxylated diamines and propoxylated amines (prepared from the amines and ethylene oxide, propylene oxide, butylene oxide or mixtures thereof); amine salts such as amine acetates and diamine salts; quaternary ammonium salts such as quaternary salts, ethoxylated quaternary salts and diquaternary salts; and amine oxides such as alkyldimethylamine oxides and bis-(2-hydroxyethyl)-alkylamine oxides.

Also useful for the present compositions are mixtures of nonionic and anionic surfactants or mixtures of nonionic and cationic surfactants. Nonionic, anionic and cationic surfactants and their recommended uses are disclosed in a variety of published references including *McCutcheon's Emulsifiers and Detergents*, annual American and International Editions published by McCutcheon's Division, The Manufacturing Confectioner Publishing Co.; Sisely and Wood, *Encyclopedia of Surface Active Agents*, Chemical Publ. Co., Inc., New York, 1964; and A. S. Davidson and B. Milwidsky, *Synthetic Detergents*, Seventh Edition, John Wiley and Sons, New York, 1987.

Compositions of this invention may also contain formulation auxiliaries and additives, known to those skilled in the art as formulation aids (some of which may be considered to also function as solid diluents, liquid diluents or surfactants). Such formulation auxiliaries and additives may control: pH (buffers), foaming during processing (antifoams such polyorganosiloxanes), sedimentation of active ingredients (suspending agents), viscosity

(thixotropic thickeners), in-container microbial growth (antimicrobials), product freezing (antifreezes), color (dyes/pigment dispersions), wash-off (film formers or stickers), evaporation (evaporation retardants), and other formulation attributes. Film formers include, for example, polyvinyl acetates, polyvinyl acetate copolymers, polyvinylpyrrolidone-vinyl acetate copolymer, polyvinyl alcohols, polyvinyl alcohol copolymers and waxes. Examples of formulation auxiliaries and additives include those listed in *McCutcheon's Volume 2: Functional Materials*, annual International and North American editions published by McCutcheon's Division, The Manufacturing Confectioner Publishing Co.; and PCT Publication WO 03/024222.

The compound of Formula **1** and any other active ingredients are typically incorporated into the present compositions by dissolving the active ingredient in a solvent or by grinding in a liquid or dry diluent. Solutions, including emulsifiable concentrates, can be prepared by simply mixing the ingredients. If the solvent of a liquid composition intended for use as an emulsifiable concentrate is water-immiscible, an emulsifier is typically added to emulsify the active-containing solvent upon dilution with water. Active ingredient slurries, with particle diameters of up to 2,000 μm can be wet milled using media mills to obtain particles with average diameters below 3 μm. Aqueous slurries can be made into finished suspension concentrates (see, for example, U.S. 3,060,084) or further processed by spray drying to form water-dispersible granules. Dry formulations usually require dry milling processes, which produce average particle diameters in the 2 to 10 μm range. Dusts and powders can be prepared by blending and usually grinding (such as with a hammer mill or fluid-energy mill). Granules and pellets can be prepared by spraying the active material upon preformed granular carriers or by agglomeration techniques. See Browning, "Agglomeration", *Chemical Engineering*, December 4, 1967, pp 147–48, *Perry's Chemical Engineer's Handbook*, 4th Ed., McGraw-Hill, New York, 1963, pages 8–57 and following, and WO 91/13546. Pellets can be prepared as described in U.S. 4,172,714. Water-dispersible and water-soluble granules can be prepared as taught in U.S. 4,144,050, U.S. 3,920,442 and DE 3,246,493. Tablets can be prepared as taught in U.S. 5,180,587, U.S. 5,232,701 and U.S. 5,208,030. Films can be prepared as taught in GB 2,095,558 and U.S. 3,299,566.

For further information regarding the art of formulation, see T. S. Woods, "The Formulator's Toolbox – Product Forms for Modern Agriculture" in *Pesticide Chemistry and Bioscience, The Food–Environment Challenge*, T. Brooks and T. R. Roberts, Eds., Proceedings of the 9th International Congress on Pesticide Chemistry, The Royal Society of Chemistry, Cambridge, 1999, pp. 120–133. See also U.S. 3,235,361, Col. 6, line 16 through Col. 7, line 19 and Examples 10–41; U.S. 3,309,192, Col. 5, line 43 through Col. 7, line 62 and Examples 8, 12, 15, 39, 41, 52, 53, 58, 132, 138–140, 162–164, 166, 167 and 169–182; U.S. 2,891,855, Col. 3, line 66 through Col. 5, line 17 and Examples 1–4; Klingman, *Weed*

Control as a Science, John Wiley and Sons, Inc., New York, 1961, pp 81–96; Hance et al., *Weed Control Handbook*, 8th Ed., Blackwell Scientific Publications, Oxford, 1989; and *Developments in formulation technology*, PJB Publications, Richmond, UK, 2000.

In the following Examples, all formulations are prepared in conventional ways. Compound numbers refer to compounds in Index Tables A–D. Without further elaboration, it is believed that one skilled in the art using the preceding description can utilize the present invention to its fullest extent. The following Examples are, therefore, to be construed as merely illustrative, and not limiting of the disclosure in any way whatsoever. Percentages are by weight except where otherwise indicated.

Example A

High Strength Concentrate

Compound 7	98.5%
silica aerogel	0.5%
synthetic amorphous fine silica	1.0%

Example B

Wettable Powder

Compound 19	65.0%
dodecylphenol polyethylene glycol ether	2.0%
sodium ligninsulfonate	4.0%
sodium silicoaluminate	6.0%
montmorillonite (calcined)	23.0%

Example C

Granule

Compound 30	10.0%
attapulgite granules (low volatile matter, 0.71/0.30 mm; U.S.S. No. 25–50 sieves)	90.0%

Example D

Extruded Pellet

Compound 170	25.0%
anhydrous sodium sulfate	10.0%
crude calcium ligninsulfonate	5.0%
sodium alkylnaphthalenesulfonate	1.0%
calcium/magnesium bentonite	59.0%

Example E

Emulsifiable Concentrate

Compound 179	10.0%
polyoxyethylene sorbitol hexoleate	20.0%
C_6–C_{10} fatty acid methyl ester	70.0%

Example F

Microemulsion

Compound 180	5.0%
polyvinylpyrrolidone-vinyl acetate copolymer	30.0%
alkylpolyglycoside	30.0%
glyceryl monooleate	15.0%
water	20.0%

Example G

Seed Treatment

Compound 68	20.00%
polyvinylpyrrolidone-vinyl acetate copolymer	5.00%
montan acid wax	5.00%
calcium ligninsulfonate	1.00%
polyoxyethylene/polyoxypropylene block copolymers	1.00%
stearyl alcohol (POE 20)	2.00%
polyorganosilane	0.20%
colorant red dye	0.05%
water	65.75%

Example H

Fertilizer Stick

Compound 382	2.50%
pyrrolidone-styrene copolymer	4.80%
tristyrylphenyl 16-ethoxylate	2.30%
talc	0.80%
corn starch	5.00%
Nitrophoska® Permanent 15-9-15 slow-release fertilizer (BASF)	36.00%
kaolin	38.00%
water	10.60%

Compounds of this invention exhibit activity against a wide spectrum of parasitic pests. These pests include invertebrates inhabiting a variety of environments such as, for example, plant foliage, roots, soil, harvested crops or other foodstuffs, building structures or

animal integuments. These pests include, for example, invertebrates feeding on foliage (including leaves, stems, flowers and fruits), seeds, wood, textile fibers or animal blood or tissues, and thereby causing injury or damage to, for example, growing or stored agronomic crops, forests, greenhouse crops, ornamentals, nursery crops, stored foodstuffs or fiber products, or houses or other structures or their contents, or being harmful to animal health or public health. Those skilled in the art will appreciate that not all compounds are equally effective against all growth stages of all pests.

These present compounds and compositions are thus useful agronomically for protecting field crops from parasitic nematodes, and also nonagronomically for protecting other horticultural crops and plants from phytophagous parasitic nematodes. This utility includes protecting crops and other plants (i.e. both agronomic and nonagronomic) that contain genetic material introduced by genetic engineering (i.e. transgenic) or modified by mutagenesis to provide advantageous traits. Examples of such traits include tolerance to herbicides, resistance to phytophagous pests (e.g., insects, mites, aphids, spiders, nematodes, snails, plant-pathogenic fungi, bacteria and viruses), improved plant growth, increased tolerance of adverse growing conditions such as high or low temperatures, low or high soil moisture, and high salinity, increased flowering or fruiting, greater harvest yields, more rapid maturation, higher quality and/or nutritional value of the harvested product, or improved storage or process properties of the harvested products. Transgenic plants can be modified to express multiple traits. Examples of plants containing traits provided by genetic engineering or mutagenesis include varieties of corn, cotton, soybean and potato expressing an insecticidal *Bacillus thuringiensis* toxin such as YIELD GARD®, KNOCKOUT®, STARLINK®, BOLLGARD®, NuCOTN® and NEWLEAF®, and herbicide-tolerant varieties of corn, cotton, soybean and rapeseed such as ROUNDUP READY®, LIBERTY LINK®, IMI®, STS® and CLEARFIELD®, as well as crops expressing *N*-acetyltransferase (GAT) to provide resistance to glyphosate herbicide, or crops containing the HRA gene providing resistance to herbicides inhibiting acetolactate synthase (ALS). The present compounds and compositions may interact synergistically with traits introduced by genetic engineering or modified by mutagenesis, thus enhancing phenotypic expression or effectiveness of the traits or increasing the parasitic nematode control effectiveness of the present compounds and compositions. In particular, the present compounds and compositions may interact synergistically with the phenotypic expression of proteins or other natural products toxic to parasitic nematodes to provide greater-than-additive control of these pests.

Compositions of this invention can also optionally comprise plant nutrients, e.g., a fertilizer composition comprising at least one plant nutrient selected from nitrogen, phosphorus, potassium, sulfur, calcium, magnesium, iron, copper, boron, manganese, zinc, and molybdenum. Of note are compositions comprising at least one fertilizer composition comprising at least one plant nutrient selected from nitrogen, phosphorus, potassium, sulfur,

calcium and magnesium. Compositions of the present invention which further comprise at least one plant nutrient can be in the form of liquids or solids. Of note are solid formulations in the form of granules, small sticks or tablets. Solid formulations comprising a fertilizer composition can be prepared by mixing the compound or composition of the present invention with the fertilizer composition together with formulating ingredients and then preparing the formulation by methods such as granulation or extrusion. Alternatively solid formulations can be prepared by spraying a solution or suspension of a compound or composition of the present invention in a volatile solvent onto a previous prepared fertilizer composition in the form of dimensionally stable mixtures, e.g., granules, small sticks or tablets, and then evaporating the solvent.

Compounds of this invention can exhibit activity against a wide spectrum of parasitic nematodes that live or grow inside or feed on plants (e.g., foliage, fruit, stems, roots or seeds) or animals and humans (e.g., vascular or digestive systems or other tissues) and therefore damage growing and stored agronomic crops, forestry, greenhouse crops, ornamentals and nursery crops, or afflict animal and human health. Crops of particular interest are fruiting vegetables such as solanaceous and cucurbit crops, plantation crops such as banana and coffee, root crops such as potatoes, onion and carrots, and field crops such as tobacco, peanut, cotton, sugarcane and soybean.

Compounds of this invention can have activity on members of both classes Adenophorea and Secernentea of the Phylum Nematoda, including economically important members of the orders Enoplida, Dorylaimida, Rhabditida, Strongylida, Ascarida, Oxyurida, Spirurida, Tylenchida and Aphelenchida, such as but not limited to economically important agricultural pests such as root-knot nematodes of the genus *Meloidogyne,* cyst nematodes of the genera *Heterodera* and *Globodera*, lesion nematodes of the genus *Pratylenchus,* reniform nematodes of the genus *Rotylenchulus,* burrowing nematodes of the genus *Radopholus*, sting nematodes of the genus *Belonolaimus,* spiral nematodes of the genera *Helicotylenchus* and *Scutellonema*, citrus nematodes of the genus *Tylenchulus*, stubby root nematodes of the genera *Trichodorus* and *Paratrichodorus*, dagger nematodes of the genus *Xiphinema*, stunt nematodes of the genus *Tylenchorhynchus*, needle nematodes of the genera *Longidorus* and *Paralongidorus*, lance nematodes of the genus *Hoplolaimus*, ring nematodes of the family Criconematidae, stem nematodes of the genera *Ditylenchus* and *Anguina*, and foliar/stem nematodes of the genera *Aphelenchoides* and *Rhadinaphelenchus*; and animal and human health parasites (i.e. economically important roundworms such as *Strongylus vulgaris* in horses, *Toxocara canis* in dogs, *Haemonchus contortus* in sheep, *Dirofilaria immitis* in dogs, etc.).

Of note is use of compounds of this invention for controlling southern root-knot nematode (*Meloidogyne incognita*). Those skilled in the art will appreciate that not all compounds are equally effective against all growth stages of all nematodes.

Compounds of this invention can also have activity on members of the Phylum Platyhelminthes, classes Cestoda (Tapeworms) and Trematoda (Flukes), including parasites (i.e. economically important flukes and tapeworms) afflicting animal and human health (e.g., *Anoplocephala perfoliata* in horses, *Fasciola hepatica* in ruminants, etc.).

Compounds of this invention can also be mixed with one or more other biologically active compounds or agents including insecticides, fungicides, nematocides, bactericides, acaricides, herbicides, herbicide safeners, growth regulators such as insect molting inhibitors and rooting stimulants, chemosterilants, semiochemicals, repellents, attractants, pheromones, feeding stimulants, other biologically active compounds or entomopathogenic bacteria, virus or fungi to form a multi-component pesticide giving an even broader spectrum of agronomic and nonagronomic utility. Thus the present invention also pertains to a composition comprising a compound of Formula **1**, an *N*-oxide, or salt thereof, and an effective amount of at least one additional biologically active compound or agent and can further comprise at least one of surfactants, solid diluents or liquid diluents. For mixtures of the present invention, the other biologically active compounds or agents can be formulated together with the present compounds, including the compounds of Formula **1**, to form a premix, or the other biologically active compounds or agents can be formulated separately from the present compounds, including the compounds of Formula **1**, and the two formulations combined together before application (e.g., in a spray tank) or, alternatively, applied in succession.

Examples of such biologically active compounds or agents with which compounds of this invention can be formulated are insecticides such as abamectin, acephate, acequinocyl, acetamiprid, acrinathrin, amidoflumet, amitraz, avermectin, azadirachtin, azinphos-methyl, bifenthrin, bifenazate, bistrifluron, borate, buprofezin, cadusafos, carbaryl, carbofuran, cartap, carzol, chlorantraniliprole, chlorfenapyr, chlorfluazuron, chlorpyrifos, chlorpyrifos-methyl, chromafenozide, clofentezin, clothianidin, cyantraniliprole, cyflumetofen, cyfluthrin, beta-cyfluthrin, cyhalothrin, gamma-cyhalothrin, lambda-cyhalothrin, cypermethrin, alpha-cypermethrin, zeta-cypermethrin, cyromazine, deltamethrin, diafenthiuron, diazinon, dieldrin, diflubenzuron, dimefluthrin, dimehypo, dimethoate, dinotefuran, diofenolan, emamectin, endosulfan, esfenvalerate, ethiprole, etofenprox, etoxazole, fenbutatin oxide, fenothiocarb, fenoxycarb, fenpropathrin, fenvalerate, fipronil, flonicamid, flubendiamide, flucythrinate, flufenerim, flufenoxuron, fluvalinate, tau-fluvalinate, fonophos, formetanate, fosthiazate, halofenozide, hexaflumuron, hexythiazox, hydramethylnon, imidacloprid, indoxacarb, insecticidal soaps, isofenphos, lufenuron, malathion, metaflumizone, metaldehyde, methamidophos, methidathion, methiodicarb, methomyl, methoprene, methoxychlor, metofluthrin, monocrotophos, methoxyfenozide, nitenpyram, nithiazine, novaluron, noviflumuron, oxamyl, parathion, parathion-methyl, permethrin, phorate, phosalone, phosmet, phosphamidon, pirimicarb, profenofos, profluthrin, propargite, protrifenbute, pymetrozine, pyrafluprole, pyrethrin, pyridaben, pyridalyl, pyrifluquinazon,

pyriprole, pyriproxyfen, rotenone, ryanodine, spinetoram, spinosad, spirodiclofen, spiromesifen, spirotetramat, sulprofos, tebufenozide, tebufenpyrad, teflubenzuron, tefluthrin, terbufos, tetrachlorvinphos, tetramethrin, thiacloprid, thiamethoxam, thiodicarb, thiosultap-sodium, tolfenpyrad, tralomethrin, triazamate, trichlorfon, triflumuron, *Bacillus thuringiensis* delta-endotoxins, entomopathogenic bacteria, entomopathogenic viruses and entomopathogenic fungi.

Of note are insecticides such as abamectin, acetamiprid, acrinathrin, amitraz, avermectin, azadirachtin, bifenthrin, buprofezin, cadusafos, carbaryl, cartap, chlorantraniliprole, chlorfenapyr, chlorpyrifos, clothianidin, cyantraniliprole, cyfluthrin, beta-cyfluthrin, cyhalothrin, gamma-cyhalothrin, lambda-cyhalothrin, cypermethrin, alpha-cypermethrin, zeta-cypermethrin, cyromazine, deltamethrin, dieldrin, dinotefuran, diofenolan, emamectin, endosulfan, esfenvalerate, ethiprole, etofenprox, etoxazole, fenothiocarb, fenoxycarb, fenvalerate, fipronil, flonicamid, flubendiamide, flufenoxuron, fluvalinate, formetanate, fosthiazate, hexaflumuron, hydramethylnon, imidacloprid, indoxacarb, lufenuron, metaflumizone, methiodicarb, methomyl, methoprene, methoxyfenozide, nitenpyram, nithiazine, novaluron, oxamyl, pymetrozine, pyrethrin, pyridaben, pyridalyl, pyriproxyfen, ryanodine, spinetoram, spinosad, spirodiclofen, spiromesifen, spirotetramat, tebufenozide, tetramethrin, thiacloprid, thiamethoxam, thiodicarb, thiosultap-sodium, tralomethrin, triazamate, triflumuron, *Bacillus thuringiensis* delta-endotoxins, all strains of *Bacillus thuringiensis* and all strains of *Nucleo polyhydrosis* viruses.

One embodiment of biological agents for mixing with compounds of this invention include entomopathogenic bacteria such as *Bacillus thuringiensis,* and the encapsulated delta-endotoxins of *Bacillus thuringiensis* such as MVP® and MVPII® bioinsecticides prepared by the CellCap® process (CellCap®, MVP® and MVPII® are trademarks of Mycogen Corporation, Indianapolis, Indiana, USA); entomopathogenic fungi such as green muscardine fungus; and entomopathogenic (both naturally occurring and genetically modified) viruses including baculovirus, nucleopolyhedro virus (NPV) such as *Helicoverpa zea* nucleopolyhedrovirus (HzNPV), *Anagrapha falcifera* nucleopolyhedrovirus (AfNPV); and granulosis virus (GV) such as *Cydia pomonella* granulosis virus (CpGV).

Of particular note is such a combination where the other invertebrate pest control active ingredient belongs to a different chemical class or has a different site of action than the compound of Formula **1**. In certain instances, a combination with at least one other invertebrate pest control active ingredient having a similar spectrum of control but a different site of action will be particularly advantageous for resistance management. Thus, a composition of the present invention can further comprise at least one additional invertebrate pest control active ingredient having a similar spectrum of control but belonging to a different chemical class or having a different site of action. These additional biologically

active compounds or agents include, but are not limited to, sodium channel modulators such as bifenthrin, cypermethrin, cyhalothrin, lambda-cyhalothrin, cyfluthrin, beta-cyfluthrin, deltamethrin, dimefluthrin, esfenvalerate, fenvalerate, indoxacarb, metofluthrin, profluthrin, pyrethrin and tralomethrin; cholinesterase inhibitors such as chlorpyrifos, methomyl, oxamyl, thiodicarb and triazamate; neonicotinoids such as acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, nithiazine, thiacloprid and thiamethoxam; insecticidal macrocyclic lactones such as spinetoram, spinosad, abamectin, avermectin and emamectin; GABA (γ–aminobutyric acid)-gated chloride channel antagonists such as avermectin or blockers such as ethiprole and fipronil; chitin synthesis inhibitors such as buprofezin, cyromazine, flufenoxuron, hexaflumuron, lufenuron, novaluron, noviflumuron and triflumuron; juvenile hormone mimics such as diofenolan, fenoxycarb, methoprene and pyriproxyfen; octopamine receptor ligands such as amitraz; molting inhibitors and ecdysone agonists such as azadirachtin, methoxyfenozide and tebufenozide; ryanodine receptor ligands such as ryanodine, anthranilic diamides such as chlorantraniliprole, cyantraniliprole and flubendiamide; nereistoxin analogs such as cartap; mitochondrial electron transport inhibitors such as chlorfenapyr, hydramethylnon and pyridaben; lipid biosynthesis inhibitors such as spirodiclofen and spiromesifen; cyclodiene insecticides such as dieldrin or endosulfan; pyrethroids; carbamates; insecticidal ureas; and biological agents including nucleopolyhedro viruses (NPV), members of *Bacillus thuringiensis*, encapsulated delta-endotoxins of *Bacillus thuringiensis*, and other naturally occurring or genetically modified insecticidal viruses.

Further examples of biologically active compounds or agents with which compounds of this invention can be formulated are: fungicides such as acibenzolar, aldimorph, amisulbrom, azaconazole, azoxystrobin, benalaxyl, benomyl, benthiavalicarb, benthiavalicarb-isopropyl, binomial, biphenyl, bitertanol, blasticidin-S, Bordeaux mixture (Tribasic copper sulfate), boscalid/nicobifen, bromuconazole, bupirimate, buthiobate, carboxin, carpropamid, captafol, captan, carbendazim, chloroneb, chlorothalonil, chlozolinate, clotrimazole, copper oxychloride, copper salts such as copper sulfate and copper hydroxide, cyazofamid, cyflunamid, cymoxanil, cyproconazole, cyprodinil, dichlofluanid, diclocymet, diclomezine, dicloran, diethofencarb, difenoconazole, dimethomorph, dimoxystrobin, diniconazole, diniconazole-M, dinocap, discostrobin, dithianon, dodemorph, dodine, econazole, etaconazole, edifenphos, epoxiconazole, ethaboxam, ethirimol, ethridiazole, famoxadone, fenamidone, fenarimol, fenbuconazole, fencaramid, fenfuram, fenhexamide, fenoxanil, fenpiclonil, fenpropidin, fenpropimorph, fentin acetate, fentin hydroxide, ferbam, ferfurazoate, ferimzone, fluazinam, fludioxonil, flumetover, fluopicolide, fluoxastrobin, fluquinconazole, fluquinconazole, flusilazole, flusulfamide, flutolanil, flutriafol, folpet, fosetyl-aluminum, fuberidazole, furalaxyl, furametapyr, hexaconazole, hymexazole, guazatine, imazalil, imibenconazole, iminoctadine,

iodicarb, ipconazole, iprobenfos, iprodione, iprovalicarb, isoconazole, isoprothiolane, kasugamycin, kresoxim-methyl, mancozeb, mandipropamid, maneb, mapanipyrin, mefenoxam, mepronil, metalaxyl, metconazole, methasulfocarb, metiram, metominostrobin/fenominostrobin, mepanipyrim, metrafenone, miconazole, myclobutanil, neo-asozin (ferric methanearsonate), nuarimol, octhilinone, ofurace, orysastrobin, oxadixyl, oxolinic acid, oxpoconazole, oxycarboxin, paclobutrazol, penconazole, pencycuron, penthiopyrad, perfurazoate, phosphonic acid, phthalide, picobenzamid, picoxystrobin, polyoxin, probenazole, prochloraz, procymidone, propamocarb, propamocarb-hydrochloride, propiconazole, propineb, proquinazid, prothioconazole, pyraclostrobin, pryazophos, pyrifenox, pyrimethanil, pyrifenox, pyrolnitrine, pyroquilon, quinconazole, quinoxyfen, quintozene, silthiofam, simeconazole, spiroxamine, streptomycin, sulfur, tebuconazole, techrazene, tecloftalam, tecnazene, tetraconazole, thiabendazole, thifluzamide, thiophanate, thiophanate-methyl, thiram, tiadinil, tolclofos-methyl, tolyfluanid, triadimefon, triadimenol, triarimol, triazoxide, tridemorph, trimoprhamide tricyclazole, trifloxystrobin, triforine, triticonazole, uniconazole, validamycin, vinclozolin, zineb, ziram, and zoxamide; nematocides such as aldicarb, imicyafos, oxamyl and fenamiphos; bactericides such as streptomycin; acaricides such as amitraz, chinomethionat, chlorobenzilate, cyhexatin, dicofol, dienochlor, etoxazole, fenazaquin, fenbutatin oxide, fenpropathrin, fenpyroximate, hexythiazox, propargite, pyridaben and tebufenpyrad.

In certain instances, combinations of a compound of this invention with other biologically active (particularly invertebrate pest control) compounds or agents (i.e. active ingredients) can result in a greater-than-additive (i.e. synergistic) effect. Reducing the quantity of active ingredients released in the environment while ensuring effective pest control is always desirable. When synergism with invertebrate pest control active ingredients occurs at application rates giving agronomically satisfactory levels of invertebrate pest control, such combinations can be advantageous for reducing crop production cost and decreasing environmental load.

Compounds of this invention and compositions thereof can be applied to plants genetically transformed to express proteins toxic to invertebrate pests (such as *Bacillus thuringiensis* delta-endotoxins). Such an application may provide a broader spectrum of plant protection and be advantageous for resistance management. The effect of the exogenously applied compounds of this invention may be synergistic with the expressed toxin proteins.

General references for these agricultural protectants (i.e. insecticides, fungicides, nematocides, acaricides, herbicides and biological agents) include *The Pesticide Manual, 13th Edition*, C. D. S. Tomlin, Ed., British Crop Protection Council, Farnham, Surrey, U.K., 2003 and *The BioPesticide Manual*, 2^{nd} *Edition*, L. G. Copping, Ed., British Crop Protection Council, Farnham, Surrey, U.K., 2001.

For embodiments where one or more of these various mixing partners are used, the weight ratio of these various mixing partners (in total) to a compound of Formula **1** is typically between about 1:3000 and about 3000:1. Of note are weight ratios between about 1:300 and about 300:1 (for example ratios between about 1:30 and about 30:1). One skilled in the art can easily determine through simple experimentation the biologically effective amounts of active ingredients necessary for the desired spectrum of biological activity. It will be evident that including these additional components can expand the spectrum of parasitic nematodes controlled beyond the spectrum controlled by a compound of Formula **1** alone.

Table A lists specific combinations of a compound of Formula **1** with other invertebrate pest control agents illustrative of the mixtures, compositions and methods of the present invention and includes additional embodiments of weight ratio ranges for application rates. The first column of Table A lists the specific invertebrate control agents (e.g., "Abamectin" in the first line). The second column of Table A lists the mode of action (if known) or chemical class of the invertebrate pest control agents. The third column of Table A lists embodiment(s) of ranges of weight ratios for rates at which the invertebrate pest control agent can be applied relative to a compound of Formula **1** (e.g., "50:1 to 1:50" of abamectin relative to a compound of Formula **1** by weight). Thus, for example, the first line of Table A specifically discloses the combination of a compound of Formula **1** with abamectin can be applied in a weight ratio between 50:1 to 1:50. The remaining lines of Table A are to be construed similarly.

Table A

Invertebrate Pest Control Agent	Mode of Action or Chemical Class	Typical Weight Ratio
Abamectin	macrocyclic lactones	50:1 to 1:50
Acetamiprid	neonicotinoids	150:1 to 1:200
Amitraz	octopamine receptor ligands	200:1 to 1:100
Avermectin	macrocyclic lactones	50:1 to 1:50
Azadirachtin	ecdysone agonists	100:1 to 1:120
Beta-cyfluthrin	sodium channel modulators	150:1 to 1:200
Bifenthrin	sodium channel modulators	100:1 to 1:10
Buprofezin	chitin synthesis inhibitors	500:1 to 1:50
Cartap	nereistoxin analogs	100:1 to 1:200
Chlorantraniliprole	ryanodine receptor ligands	100:1 to 1:120
Chlorfenapyr	mitochondrial electron transport inhibitors	300:1 to 1:200
Chlorpyrifos	cholinesterase inhibitors	500:1 to 1:200
Clothianidin	neonicotinoids	100:1 to 1:400
Cyantraniliprole	ryanodine receptor ligands	100:1 to 1:120

Invertebrate Pest Control Agent	Mode of Action or Chemical Class	Typical Weight Ratio
Cyfluthrin	sodium channel modulators	150:1 to 1:200
Cyhalothrin	sodium channel modulators	150:1 to 1:200
Cypermethrin	sodium channel modulators	150:1 to 1:200
Cyromazine	chitin synthesis inhibitors	400:1 to 1:50
Deltamethrin	sodium channel modulators	50:1 to 1:400
Dieldrin	cyclodiene insecticides	200:1 to 1:100
Dinotefuran	neonicotinoids	150:1 to 1:200
Diofenolan	molting inhibitor	150:1 to 1:200
Emamectin	macrocyclic lactones	50:1 to 1:10
Endosulfan	cyclodiene insecticides	200:1 to 1:100
Esfenvalerate	sodium channel modulators	100:1 to 1:400
Ethiprole	GABA-regulated chloride channel blockers	200:1 to 1:100
Fenothiocarb		150:1 to 1:200
Fenoxycarb	juvenile hormone mimics	500:1 to 1:100
Fenvalerate	sodium channel modulators	150:1 to 1:200
Fipronil	GABA-regulated chloride channel blockers	150:1 to 1:100
Flonicamid		200:1 to 1:100
Flubendiamide	ryanodine receptor ligands	100:1 to 1:120
Flufenoxuron	chitin synthesis inhibitors	200:1 to 1:100
Hexaflumuron	chitin synthesis inhibitors	300:1 to 1:50
Hydramethylnon	mitochondrial electron transport inhibitors	150:1 to 1:250
Imidacloprid	neonicotinoids	1000:1 to 1:1000
Indoxacarb	sodium channel modulators	200:1 to 1:50
Lambda-cyhalothrin	sodium channel modulators	50:1 to 1:250
Lufenuron	chitin synthesis inhibitors	500:1 to 1:250
Metaflumizone		200:1 to 1:200
Methomyl	cholinesterase inhibitors	500:1 to 1:100
Methoprene	juvenile hormone mimics	500:1 to 1:100
Methoxyfenozide	ecdysone agonists	50:1 to 1:50
Nitenpyram	neonicotinoids	150:1 to 1:200
Nithiazine	neonicotinoids	150:1 to 1:200
Novaluron	chitin synthesis inhibitors	500:1 to 1:150
Oxamyl	cholinesterase inhibitors	200:1 to 1:200

Invertebrate Pest Control Agent	Mode of Action or Chemical Class	Typical Weight Ratio
Pymetrozine		200:1 to 1:100
Pyrethrin	sodium channel modulators	100:1 to 1:10
Pyridaben	mitochondrial electron transport inhibitors	200:1 to 1:100
Pyridalyl		200:1 to 1:100
Pyriproxyfen	juvenile hormone mimics	500:1 to 1:100
Ryanodine	ryanodine receptor ligands	100:1 to 1:120
Spinetoram	macrocyclic lactones	150:1 to 1:100
Spinosad	macrocyclic lactones	500:1 to 1:10
Spirodiclofen	lipid biosynthesis inhibitors	200:1 to 1:200
Spiromesifen	lipid biosynthesis inhibitors	200:1 to 1:200
Tebufenozide	ecdysone agonists	500:1 to 1:250
Thiacloprid	neonicotinoids	100:1 to 1:200
Thiamethoxam	neonicotinoids	1250:1 to 1:1000
Thiodicarb	cholinesterase inhibitors	500:1 to 1:400
Thiosultap-sodium		150:1 to 1:100
Tralomethrin	sodium channel modulators	150:1 to 1:200
Triazamate	cholinesterase inhibitors	250:1 to 1:100
Triflumuron	chitin synthesis inhibitors	200:1 to 1:100
Bacillus thuringiensis	biological agents	50:1 to 1:10
Bacillus thuringiensis delta-endotoxin	biological agents	50:1 to 1:10
NPV (e.g., Gemstar)	biological agents	50:1 to 1:10

Of note is the composition of the present invention wherein the at least one additional biologically active compound or agent is selected from the invertebrate pest control agents listed in Table A above.

The weight ratios of a compound of Formula **1**, an *N*-oxide, or a salt thereof, to the additional invertebrate pest control agent typically are between 1000:1 and 1:1000, with one embodiment being between 500:1 and 1:500, another embodiment being between 250:1 and 1:200 and another embodiment being between 100:1 and 1:50.

Listed below in Tables B1 to B14 are embodiments of specific compositions comprising a compound of Formula **1** (compound numbers (Cmpd. No.) refer to compounds in Index Tables A–D) and an additional invertebrate pest control agent.

Table B1

Mixture No.	Cmpd. No.	and	Invertebrate Pest Control Agent	Mixture No.	Cmpd. No.	and	Invertebrate Pest Control Agent
B1-1	7	and	Abamectin	B1-36	7	and	Imidacloprid

Mixture No.	Cmpd. No.	and	Invertebrate Pest Control Agent
B1-2	7	and	Acetamiprid
B1-3	7	and	Amitraz
B1-4	7	and	Avermectin
B1-5	7	and	Azadirachtin
B1-5a	7	and	Bensultap
B1-6	7	and	Beta-cyfluthrin
B1-7	7	and	Bifenthrin
B1-8	7	and	Buprofezin
B1-9	7	and	Cartap
B1-10	7	and	Chlorantraniliprole
B1-11	7	and	Chlorfenapyr
B1-12	7	and	Chlorpyrifos
B1-13	7	and	Clothianidin
B1-14	7	and	Cyantraniliprole
B1-15	7	and	Cyfluthrin
B1-16	7	and	Cyhalothrin
B1-17	7	and	Cypermethrin
B1-18	7	and	Cyromazine
B1-19	7	and	Deltamethrin
B1-20	7	and	Dieldrin
B1-21	7	and	Dinotefuran
B1-22	7	and	Diofenolan
B1-23	7	and	Emamectin
B1-24	7	and	Endosulfan
B1-25	7	and	Esfenvalerate
B1-26	7	and	Ethiprole
B1-27	7	and	Fenothiocarb
B1-28	7	and	Fenoxycarb
B1-29	7	and	Fenvalerate
B1-30	7	and	Fipronil
B1-31	7	and	Flonicamid
B1-32	7	and	Flubendiamide
B1-33	7	and	Flufenoxuron
B1-34	7	and	Hexaflumuron
B1-35	7	and	Hydramethylnon
B1-37	7	and	Indoxacarb
B1-38	7	and	Lambda-cyhalothrin
B1-39	7	and	Lufenuron
B1-40	7	and	Metaflumizone
B1-41	7	and	Methomyl
B1-42	7	and	Methoprene
B1-43	7	and	Methoxyfenozide
B1-44	7	and	Nitenpyram
B1-45	7	and	Nithiazine
B1-46	7	and	Novaluron
B1-47	7	and	Oxamyl
B1-48	7	and	Phosmet
B1-49	7	and	Pymetrozine
B1-50	7	and	Pyrethrin
B1-51	7	and	Pyridaben
B1-52	7	and	Pyridalyl
B1-53	7	and	Pyriproxyfen
B1-54	7	and	Ryanodine
B1-55	7	and	Spinetoram
B1-56	7	and	Spinosad
B1-57	7	and	Spirodiclofen
B1-58	7	and	Spiromesifen
B1-59	7	and	Spirotetramat
B1-60	7	and	Tebufenozide
B1-61	7	and	Thiacloprid
B1-62	7	and	Thiamethoxam
B1-63	7	and	Thiodicarb
B1-64	7	and	Thiosultap-sodium
B1-65	7	and	Tolfenpyrad
B1-66	7	and	Tralomethrin
B1-67	7	and	Triazamate
B1-68	7	and	Triflumuron
B1-69	7	and	*Bacillus thuringiensis*
B1-70	7	and	*Bacillus thuringiensis* delta-endotoxin
B1-71	7	and	NPV (e.g., Gemstar)

Table B2

Table B2 is identical to Table B1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 19. For example, the first mixture in Table B2 is designated B2-1 and is a mixture of compound 19 and the additional invertebrate pest control agent abamectin.

Table B3

Table B3 is identical to Table B1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 30. For example, the first mixture in Table B3 is designated B3-1 and is a mixture of compound 30 and the additional invertebrate pest control agent abamectin.

Table B4

Table B4 is identical to Table B1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 68. For example, the first mixture in Table B4 is designated B4-1 and is a mixture of compound 20 and the additional invertebrate pest control agent abamectin.

Table B5

Table B5 is identical to Table B1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 170. For example, the first mixture in Table B5 is designated B5-1 and is a mixture of compound 170 and the additional invertebrate pest control agent abamectin.

Table B6

Table B6 is identical to Table B1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 179 For example, the first mixture in Table B6 is designated B6-1 and is a mixture of compound 179 and the additional invertebrate pest control agent abamectin.

Table B7

Table B7 is identical to Table B1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 180. For example, the first mixture in Table B7 is designated B7-1 and is a mixture of compound 180 and the additional invertebrate pest control agent abamectin.

Table B8

Table B8 is identical to Table B1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 356. For example, the first mixture in Table B8 is designated B8-1 and is a mixture of compound 356 and the additional invertebrate pest control agent abamectin.

Table B9

Table B9 is identical to Table B1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 357. For example, the first mixture in Table B9 is designated B9-1 and is a mixture of compound 357 and the additional invertebrate pest control agent abamectin.

Table B10

Table B10 is identical to Table B1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 382. For example, the first mixture in Table B10 is designated B10-1 and is a mixture of compound 382 and the additional invertebrate pest control agent abamectin.

Table B11

Table B11 is identical to Table B1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 413. For example, the first mixture in Table B11 is designated B11-1 and is a mixture of compound 413 and the additional invertebrate pest control agent abamectin.

Table B12

Table B12 is identical to Table B1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 465. For example, the first mixture in Table B12 is designated B12-1 and is a mixture of compound 465 and the additional invertebrate pest control agent abamectin.

Table B13

Table B13 is identical to Table B1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 474. For example, the first mixture in Table B13 is designated B13-1 and is a mixture of compound 474 and the additional invertebrate pest control agent abamectin.

Table B14

Table B14 is identical to Table B1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 394. For example, the first mixture in Table B14 is designated B14-1 and is a mixture of compound 394 and the additional invertebrate pest control agent abamectin.

The specific mixtures listed in Tables B1 to B14 typically combine a compound of Formula **1** with the other invertebrate pest agent in the ratios specified in Table A.

Listed below in Tables C1 to C14 are embodiments of specific compositions comprising a compound of Formula **1** (compound numbers (Cmpd. No.) refer to compounds in Index Tables A–D) and an additional fungicide.

Table C1

Mixture No.	Cmpd. No.	and	Fungicide	Mixture No.	Cmpd. No.	and	Fungicide
C1-1	7	and	Probenazole	C1-17	7	and	Difenoconazole
C1-2	7	and	Tiadinil	C1-18	7	and	Cyproconazole
C1-3	7	and	Isotianil	C1-19	7	and	Propiconazole
C1-4	7	and	Pyroquilon	C1-20	7	and	Fenoxanil
C1-5	7	and	Metominostrobin	C1-21	7	and	Ferimzone
C1-6	7	and	Flutolanil	C1-22	7	and	Fthalide
C1-7	7	and	Validamycin	C1-23	7	and	Kasugamycin
C1-8	7	and	Furametpyr	C1-24	7	and	Picoxystrobin
C1-9	7	and	Pencycuron	C1-25	7	and	Penthiopyrad
C1-10	7	and	Simeconazole	C1-26	7	and	Famoxadone
C1-11	7	and	Orysastrobin	C1-27	7	and	Cymoxanil
C1-12	7	and	Trifloxystrobin	C1-28	7	and	Proquinazid
C1-13	7	and	Isoprothiolane	C1-29	7	and	Flusilazole
C1-14	7	and	Azoxystrobin	C1-30	7	and	Mancozeb
C1-15	7	and	Tricyclazole	C1-31	7	and	Copper hydroxide
C1-16	7	and	Hexaconazole	C1-32	7	and	(a)

(a) 1-[4-[4-[5-(2,6-difluorophenyl)-4,5-dihydro-3-isoxazolyl]-2-thiazolyl]-1-piperidinyl]-2-[5-methyl-3-(trifluoromethyl)-1*H*-pyrazol-1-yl]ethanone

Table C2

Table C2 is identical to Table C1, except that each reference to compound 7 in the column headed “Cmpd. No.” is replaced by a reference to compound 19. For example, the first mixture in Table C2 is designated C2-1 and is a mixture of compound 19 and the additional fungicide probenazole.

Table C3

Table C3 is identical to Table C1, except that each reference to compound 7 in the column headed “Cmpd. No.” is replaced by a reference to compound 30. For example, the first mixture in Table C3 is designated C3-1 and is a mixture of compound 30 and the additional fungicide probenazole.

Table C4

Table C4 is identical to Table C1, except that each reference to compound 7 in the column headed “Cmpd. No.” is replaced by a reference to compound 68. For example, the first mixture in Table C4 is designated C4-1 and is a mixture of compound 68 and the additional fungicide probenazole.

Table C5

Table C5 is identical to Table C1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 170. For example, the first mixture in Table C5 is designated C5-1 and is a mixture of compound 170 and the additional fungicide probenazole.

Table C6

Table C6 is identical to Table C1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 179. For example, the first mixture in Table C6 is designated C6-1 and is a mixture of compound 179 and the additional fungicide probenazole.

Table C7

Table C7 is identical to Table C1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 180. For example, the first mixture in Table C7 is designated C7-1 and is a mixture of compound 180 and the additional fungicide probenazole.

Table C8

Table C8 is identical to Table C1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 356. For example, the first mixture in Table C8 is designated C8-1 and is a mixture of compound 356 and the additional fungicide probenazole.

Table C9

Table C9 is identical to Table C1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 357. For example, the first mixture in Table C9 is designated C9-1 and is a mixture of compound 357 and the additional fungicide probenazole.

Table C10

Table C10 is identical to Table C1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 382. For example, the first mixture in Table C10 is designated C10-1 and is a mixture of compound 382 and the additional fungicide probenazole.

Table C11

Table C11 is identical to Table C1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 413. For example, the first mixture in Table C11 is designated C11-1 and is a mixture of compound 413 and the additional fungicide probenazole.

Table C12

Table C12 is identical to Table C1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 465. For example, the first mixture in Table C12 is designated C12-1 and is a mixture of compound 465 and the additional fungicide probenazole.

Table C13

Table C13 is identical to Table C1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 474. For example, the first mixture in Table C13 is designated C13-1 and is a mixture of compound 474 and the additional fungicide probenazole.

Table C14

Table C14 is identical to Table C1, except that each reference to compound 7 in the column headed "Cmpd. No." is replaced by a reference to compound 394. For example, the first mixture in Table C14 is designated C14-1 and is a mixture of compound 394 and the additional fungicide probenazole.

Parasitic nematodes are controlled in agronomic and nonagronomic applications by applying one or more compounds of this invention, typically in the form of a composition, in a biologically effective amount, to the environment of the pests, including the agronomic and/or nonagronomic locus of infestation, to the area to be protected, or directly on the pests to be controlled.

Thus the present invention comprises a method for controlling a parasitic nematode in agronomic and/or nonagronomic applications, comprising contacting the parasitic nematode or its environment with a biologically effective amount of one or more of the compounds of the invention, or with a composition comprising at least one such compound or a composition comprising at least one such compound and at least one additional biologically active compound or agent. Examples of suitable compositions comprising a compound of the invention and at least one additional biologically active compound or agent include granular compositions wherein the additional active compound is present on the same granule as the compound of the invention or on granules separate from those of the compound of the invention.

To achieve contact with a compound or composition of the invention to protect a field crop from parasitic nematodes, the compound or composition is typically applied to the seed of the crop before planting, to the foliage (e.g., leaves, stems, flowers, fruits) of crop plants, or to the soil or other growth medium before or after the crop is planted.

One embodiment of a method of contact is by spraying. Alternatively, a granular composition comprising a compound of the invention can be applied to the plant foliage or the soil. Compounds of this invention can also be effectively delivered through plant uptake

by contacting the plant with a composition comprising a compound of this invention applied as a soil drench of a liquid formulation, a granular formulation to the soil, a nursery box treatment or a dip of transplants. Of note is a composition of the present invention in the form of a soil drench liquid formulation. Also of note is a method for controlling a parasitic nematode comprising contacting the parasitic nematode or its environment with a biologically effective amount of a compound of the present invention or with a composition comprising a biologically effective amount of a compound of the present invention. Of further note is this method wherein the environment is soil and the composition is applied to the soil as a soil drench formulation. Of further note is that compounds of this invention are also effective by localized application to the locus of infestation. Other methods of contact include application of a compound or a composition of the invention by direct and residual sprays, aerial sprays, gels, seed coatings, microencapsulations, systemic uptake, baits, ear tags, boluses, foggers, fumigants, aerosols, dusts and many others. One embodiment of a method of contact involves a dimensionally stable fertilizer granule, stick or tablet comprising a compound or composition of the invention. The compounds of this invention can also be impregnated into materials for fabricating invertebrate control devices (e.g., insect netting).

Compounds of this invention are also useful in seed treatments for protecting seeds from parasitic nematodes. In the context of the present disclosure and claims, treating a seed means contacting the seed with a biologically effective amount of a compound of this invention, which is typically formulated as a composition of the invention. This seed treatment protects the seed from invertebrate soil pests and generally can also protect roots and other plant parts in contact with the soil of the seedling developing from the germinating seed. The seed treatment may also provide protection of foliage by translocation of the compound of this invention or a second active ingredient within the developing plant. Seed treatments can be applied to all types of seeds, including those from which plants genetically transformed to express specialized traits will germinate. Representative examples of genetically transformed plants include those expressing proteins toxic to parasitic nematodes, such as *Bacillus thuringiensis* toxin or those expressing herbicide resistance such as glyphosate acetyltransferase, which provides resistance to glyphosate.

One method of seed treatment is by spraying or dusting the seed with a compound of the invention (i.e. as a formulated composition) before sowing the seeds. Compositions formulated for seed treatment generally comprise a film former or adhesive agent. Therefore typically a seed coating composition of the present invention comprises a biologically effective amount of a compound of Formula **1**, an *N*-oxide, or salt thereof, and a film former or adhesive agent. Seed can be coated by spraying a flowable suspension concentrate directly into a tumbling bed of seeds and then drying the seeds. Alternatively, other formulation types such as wetted powders, solutions, suspo-emulsions, emulsifiable

concentrates and emulsions in water can be sprayed on the seed. This process is particularly useful for applying film coatings on seeds. Various coating machines and processes are available to one skilled in the art. Suitable processes include those listed in P. Kosters et al., *Seed Treatment: Progress and Prospects*, 1994 BCPC Mongraph No. 57, and references listed therein.

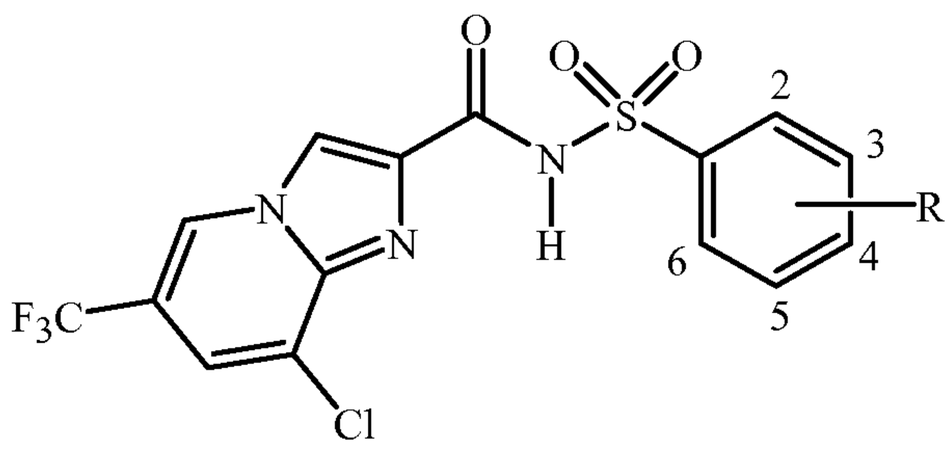
The treated seed typically comprises a compound of the present invention in an amount from about 0.1 g to 1 kg per 100 kg of seed (i.e. from about 0.0001 to 1% by weight of the seed before treatment). A flowable suspension formulated for seed treatment typically comprises from about 0.5 to about 70% of the active ingredient, from about 0.5 to about 30% of a film-forming adhesive, from about 0.5 to about 20% of a dispersing agent, from 0 to about 5% of a thickener, from 0 to about 5% of a pigment and/or dye, from 0 to about 2% of an antifoaming agent, from 0 to about 1% of a preservative, and from 0 to about 75% of a volatile liquid diluent.

For agronomic applications, the rate of application required for effective control (i.e. "biologically effective amount") will depend on such factors as the species of nematode to be controlled, the nematode's life cycle, life stage, its size, location, time of year, host crop or animal, feeding behavior, mating behavior, ambient moisture, temperature, and the like. Under normal circumstances, application rates of about 0.01 to 2 kg of active ingredients per hectare are sufficient to control nematodes in agronomic ecosystems, but as little as 0.0001 kg/hectare may be sufficient or as much as 8 kg/hectare may be required. For nonagronomic applications, effective use rates will range from about 1.0 to 50 mg/square meter but as little as 0.1 mg/square meter may be sufficient or as much as 150 mg/square meter may be required. One skilled in the art can easily determine the biologically effective amount necessary for the desired level of parasitic nematode control.

The compounds of this invention prepared by the methods described herein are shown in Index Tables A–E. For mass spectral data, the numerical value reported in the column "AP^+ (M+1)", is the molecular weight of the observed molecular ion formed by addition of H^+ (molecular weight of 1) to the molecule having the greatest isotopic abundance (i.e. M); the numerical value reported in the column "AP^- (M-1)", is the molecular weight of the observed molecular ion formed by loss of H^+ (molecular weight of 1) from the molecule having the greatest isotopic abundance (i.e. M). The presence of molecular ions containing one or more higher atomic weight isotopes of lower abundance (e.g., ^{37}Cl, ^{81}Br) is not reported. The reported M+1 and M-1 peaks were observed by mass spectrometry using atmospheric pressure chemical ionization (AP^+).

The following abbreviations are used in the Index Tables which follow: Cmpd means Compound. The variables "R" and "$(R^1)_n$" represent one or a combination of substituents as listed in the Index Tables. The abbreviation "Ex." stands for "Example" and is followed by a number indicating in which Synthesis Example the compound is prepared.

INDEX TABLE A



Cmpd	R **	m.p. (°C)	AP+ (M+1)	AP- (M-1)
1	2-methoxy, 5-chloro	248-250		
2	2-methoxy, 5-methyl	250		
3	2-methoxy, 5-cyano	250		
4	2-difluoromethyl, 5-fluoro	231-232		
5	2-methoxy, 5-trifluoromethyl	250		
6	2-difluoromethyl, 5-methoxy	196-197		
7 (Ex. 1)	2-chloro, 5-methoxy	211-212		
8	2-difluoromethoxy, 5-methyl	216-217		
9	2-difluoromethyl, 5-chloro	229-230		
10	2-chloro, 5-cyano	250		
11	2-methyl, 5-bromo	216-217		
12	2-methyl, 5- CO_2CH_3	206-207		
13	2-methyl, 5-isopropyl	226-227		
14	2-methoxy, 5-CO_2CH_3	>250		
15	2-methyl, 5-$S(O)_2CH_3$	248-249		
16	2-SCH_2CH_3, 5-chloro	229-230		
17	2-nitro, 5-chloro	>250		
18	2-SCH_3, 5-chloro	>250		
19	2-chloro, 5-$C(O)CH_3$	244-245		
20	2-trifluoromethyl, 5-chloro	219-220		
21	2-SCH_3, 5-methoxy	236-237		
22	2-chloro, 5-OCH_2Ph	>250		
23	2-chloro-5-$S(O)_2CH_3$	241-242		
24	2,4-dichloro, 5-CO_2CH_3	164-165		
25	2-chloro, 4-cyano	224-225		
26	2-iodo	243-244		

Cmpd	R **	m.p. (°C)	AP+ (M+1)	AP- (M-1)
27	2-iodo, 4-trifluoromethyl	229-230		
28	2-chloro, 5-CO_2CH_3	245-246		
29	2,4,6-trifluoro	222-223		
30 (Ex. 2)	2,5-dimethyl, 4-cyano	228-229		
31	2-difluoromethyl	193-194		
32	2-methyl, 3-chloro	196-197		
33	4-CO_2CH_3	243-244		
34	2-$NHC(O)CH_3$	242-243		
35	2-SCH_3, 3-chloro	200-201		
36	2-methyl, 6-difluoromethoxy	237-238		
37	2-difluoromethoxy, 4-methyl	182-183		
38	2-methyl, 4-difluoromethoxy	197-198		
39	3-chloro, 4-nitro	198-199		
40	3-nitro, 4-chloro	196-197		
41	2-chloro, 6-CH_2OCH_3	207-208		
42	4-$S(O)_2CH_3$	>250		
43	2-(2-pyridinyl)	>250		
44	2-phenyl	251-252		
45	3-nitro, 4-methoxy	245-246		
46	2-methoxy, 3-propyl	168-169		
47	2-$OC(CH_3)_3$	208-209		
48	2-CO_2CH_3, 4-methyl	>250		
49	2-$CH_2CO_2CH_3$	162-163		
50	2-(2-(1,3,4-oxadiazinyl))	>250		
51	2-(1-(1,3,4-triazinyl))	>250		
52	2-(5-isoxazolyl)	>250		
53	2-(2-oxazolyl)	>250		
54	2-(4-isoxazolyl)	231-232		
55	2-(1-imidazolyl)	157-158		
56	2-(1-pyrazolyl)	>250		
57	2-cyano, 3-chloro	215-216		
58	2-nitro, 3-methyl	241-242		
59	2-nitro, 5-methyl	249-250		
60	2-($CH(CH_3)OCH_3$	224-225		
61	2-ethoxy, 3-methyl	157-158		
62	2-methoxy, 3-chloro	191-192		

Cmpd	R **	m.p. (°C)	AP+ (M+1)	AP- (M-1)
63	2,5-dimethyl, 4-chloro	213-214		
64	2-fluoro, 6-CH_2OCH_3	182-183		
65	2-isopropyl, 4-cyano, 5-methyl	216-217		
66	2,5-dimethyl, 4-bromo	224-225		
67	2,5-dimethyl, 4-isopropyl	193-194		
68	2-nitro, 5-methoxy	233-234		
69	3-methyl, 4-cyano	231-232		
70	2,5-diisopropyl, 4-cyano	209-210		
71	2,5-diethyl, 4-cyano	237-238		
72	2,5-dipropyl, 4-cyano	181-182		
73	2,5-diethyl, 4-fluoro	187-188		
74	2,5-diisopropyl, 4-nitro	198-199		
75	2,5-diisopropyl, 4-methoxy	141-142		
76	2,6-dimethyl	>250		
77	3-isopropyl, 4-methoxy	182-183		
78	2,5-diisopropyl, 4-methyl	185-186		
79	2-cyano, 3-fluoro	227-228		
80	2-$S(O)_2N(CH_3)_2$, 3-methoxy	157-158		
81	2-ethyl	190-191		
82	3-chloro, 4-methoxy	204-205		
83	2,3-dimethyl, 5-nitro	>250		
85	2-isopropyl	190-191		
86	2-methyl	193-194		
87	2-iodo	149-150		
88	2-$S(O)CH_3$, 5-methoxy	147-149		
89	2-fluoro, 4,5-dimethoxy	159-160		
90	2-methyl, 4,5-dimethoxy	196-197		
91	2,3,4,5-tetramethyl	>250		
92	2,3,4,6-tetramethyl	220-221		
93	2,4,5-trimethyl	208-209		
94	-		404	402
95	4-methoxy			432
96	4-methyl		418	416
97	4-chloro		438	436
98	3-chloro		438	436
99	4-cyano			427

Cmpd	R **	m.p. (°C)	AP+ (M+1)	AP- (M-1)
100	3,5-dichloro		472	470
101	2,5-dichloro			470
102	2-methyl, 4-fluoro	245-250		
103	2-methyl, 5-fluoro		436	434
104	2-trifluoromethyl		472	470
105	2-bromo		482	
106	3,4-dichloro		472	470
107	2,4-dichloro		472	470
108	2-fluoro	*		
109	2-methyl		418	416
110	2,3,4-trichloro			504
111	2-methyl, 5-chloro		452	450
112	2-chloro, 5-nitro		483	
113	2,4,5-trichloro			504
114	2,3-dichloro		472	470
115	2-methoxy		434	432
116	2-methyl, 5-nitro		463	461
117	2,6-difluoro		440	438
118	2-cyclopropyl		444	442
119	2-trifluoromethoxy		488	486
120	2,4,6-trimethyl			444
121	2-cyano		429	427
122	2-CO_2CH_3		462	460
123	2-nitro		449	
124	2-$S(O)_2CH_3$		482	480
125	$OCH_2C{\equiv}CH$		458	456
126	2-trifluoromethoxy, 4-bromo		566	564
127	2,5-dimethoxy		464	462
128	2-$SCH_2CH_2CH_3$			476
129	2,3,4,5,6-pentafluoro		494	492
130	2-chloro, 4-methyl		452	450
131	2,4-difluoro		440	438
132	2,5-difluoro		440	438
133	2-fluoro, 5-chloro		456	454
134	3-fluoro		422	420
135	3,5-difluoro		440	438

Cmpd	R **	m.p. (°C)	AP+ (M+1)	AP- (M-1)
136	2-fluoro, 4-chloro		456	454
137	2-fluoro, 5-methyl	204-205		
138	2-chloro, 4-trifluoromethyl		506	504
139	2,5-dimethyl		432	430
140	3-methoxy	*		
141	3-nitro		449	447
142	2-(1-methyltetrazolyl)		486	484
143	2-fluoro, 5-trifluoromethyl		490	488
144	3-cyano		429	427
145	3-trifluoromethyl		472	470
146	3-bromo		482	480
147	2,6-dichloro, 4-trifluoromethyl		542	540
148	3-amino			417
149	2-bromo, 4-fluoro		502	500
150	2-bromo, 4-trifluoromethyl		550	
151	2-methyl, 5-difluoromethoxy	225-226		
319	2-bromo, 5-trifluoromethyl	*		
329	2-methyl, 5-trifluoromethyl	257-258		
330	2,4-dichloro, 5-methyl	234-235		
331	2-methyl, 4-bromo, 5-methoxy	228-229		
332	2-methyl, 4-cyano, 5-methoxy	160-162		
333	2-methyl, 4,5-dichloro	160-161		
334	2-acetyl	222-223		
335	4-nitro	>250		
336	2-iodo, 4-methoxy	204-205		
337	2-trifluoromethoxy, 5-chloro	212-213		
338	2-dimethylamino, 5-nitro	220-221		
339	3,5-dicarbomethoxy	231-232		
340	3,5-di(trifluoromethyl)	>250		
341	2,5-dibromo, 4-isopropyl	143-144		
342	2-methyl, 4-bromo	207-208		
343	2-methyl, 5-methoxy	206-207		
344	2,5-difluoro, 4-bromo	208-209		
345	2-nitro, 4-isopropyl, 5-bromo	210-211		
346	2,6-dibromo, 4-methyl	198-199		
347	2-methyl, 4-chloro	209-210		

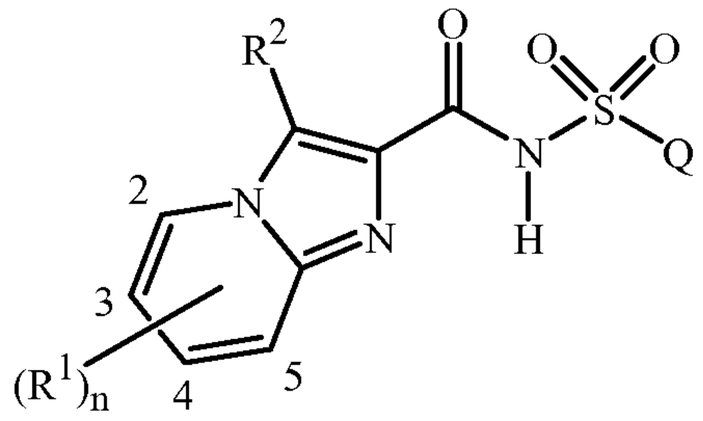
Cmpd	R **	m.p. (°C)	AP+ (M+1)	AP- (M-1)
348	3-dimethylamino	126-127		
349	4-fluoro	242-243		
350	4-(CF_2CF_2H)	194-195		
351	2-iodo, 3-nitro	246-247		
352	2-fluoro, 3-chloro	239-240		
353	2-bromo, 3-methyl	206-207		
354	2,5-dicarbomethoxy	234-235		
355	2,5-diethyl, 4-bromo	184-185		
356	2-chloro, 5-methyl	>250		
357	2-bromo, 5-methyl	251-252		
358	2-$SO_2N(CH_3)_2$, 5-methylthio	225-226		
359	2-chloro, 5-ethoxy	255-256		
360	2,5-dichloro, 4-nitro	225-226		
361	2,5-dimethyl, 4-methoxy	233-234		
362	2-$C(CH_3)_3$	175-176		
363	2-($CH=NOCH_3$)	200-201		
364	2,5-dimethyl, 4-iodo	219-220		
365	2,5-dimethyl, 4-($C\equiv CSi(CH_3)_3$)	201-202		
366	2,5-dimethyl, 4-($C\equiv CH$)	171-172		
367	2-chloro, 5-isopropoxy	217-218		
368	3-$SO_2N(CH_3)_2$	219-220		
369	2,5-di($C(O)N(CH_3)_2$)	198-199		
370	2,5-di($SO_2N(CH_3)_2$)	171-172		
371	2-chloro, 5-OCH_2CF_3	>250		
372	2,4-dichloro, 5-$OCH_2C\equiv CH$	202-203		
373	2-chloro, 5-amino	195-196		
374	2-chloro, 5-hydroxy	139-140		
375	2-chloro, 5-$NHC(O)CH_3$	206-207		
376	2-chloro, 5-$OCH_2CH=CH_2$	251-252		
377	2-chloro, 5-$OCH_2C\equiv CH$	217-218		
378	2-chloro, 5-$NHC(O)OCH_3$	255-256		
379	2-chloro, 5-bromo	>250		
380	2-chloro, 5-($C\equiv CSi(CH_3)_3$)	>250		
381	2-chloro, 5-($C\equiv CH$)	238-240		
382 (Ex. 3)	2-chloro, 5-ethyl	214-215		
383	2-chloro, 5-dimethylamino	>250		

Cmpd	R **	m.p. (°C)	AP+ (M+1)	AP- (M-1)
384	2-methyl, 5-dimethylamino	>250		
385	2-chloro, 4-bromo, 5-methoxy	224-225		
386	2-chloro, 4-cyano, 5-methoxy	>250		
387	2-chloro, 4-bromo, 5-methyl	210-211		
388	2-chloro, 4-cyano, 5-methyl	229-230		
389	2-chloro, 5-methylthio	255-256		
390	3-$NHC(O)CH_2CH_2CH_3$	167-168		
391	$NHC(O)NHCH_3$	188-189		
392	2-chloro, 5-$OC(O)CH_3$	178-179		
393	3-NHC(O)(4-fluorophenyl)	201-202		
394	2-methyl, 5-acetyl	222-223		
395	2-bromo, 5-propyl	213-214		
396	2-propyl, 5-bromo	244-245		
397	2-bromo, 5-isopropyl	204-205		
398	2-isopropyl, 5-bromo	129-130		
399	2-ethyl, 5-chloro	219-220		
480	2-chloro, 5-trifluoromethoxy	217-218		

* See Index Table E for ^1H NMR data.

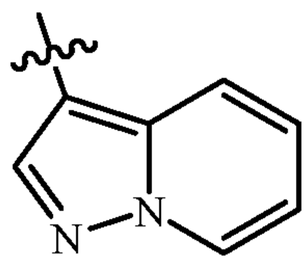
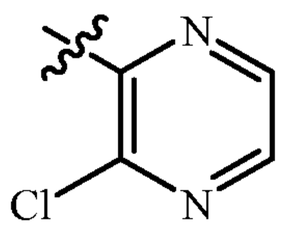
** "-" denotes R is H (i.e. the phenyl ring is unsubstituted)

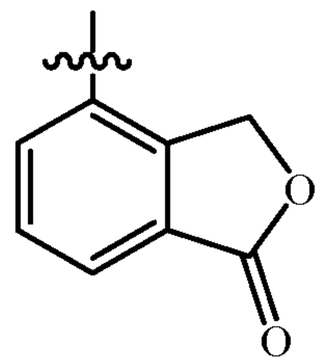
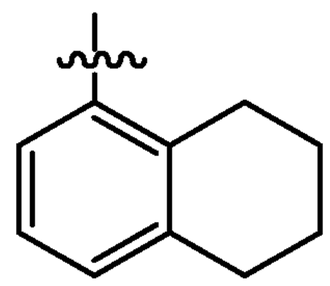
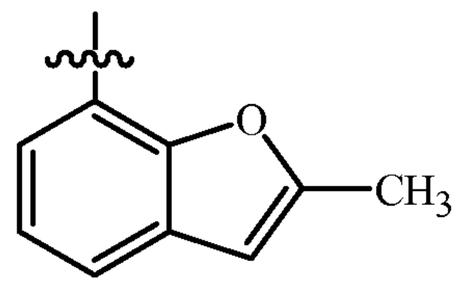
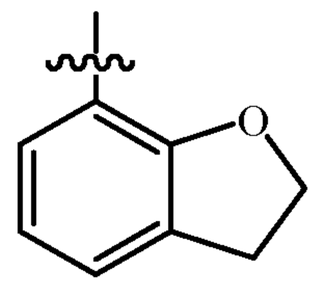
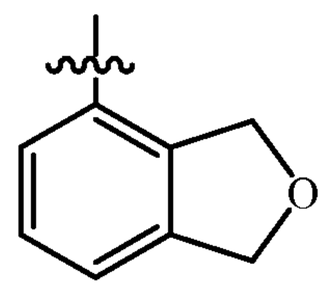
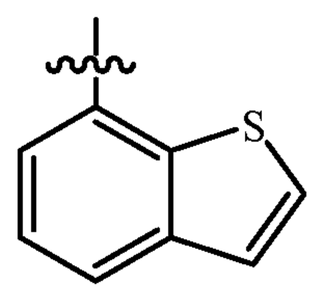
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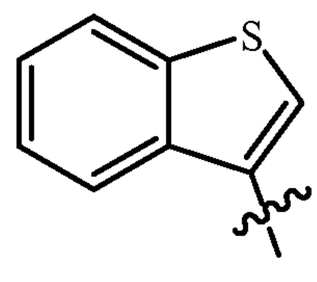
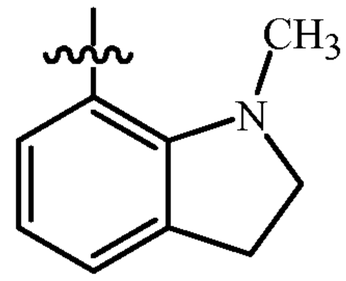
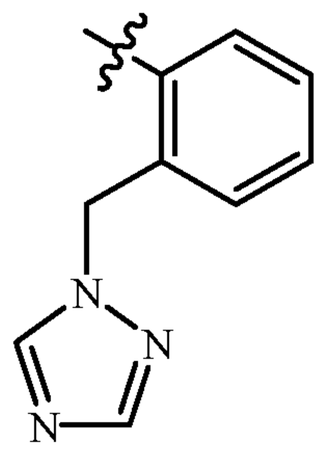
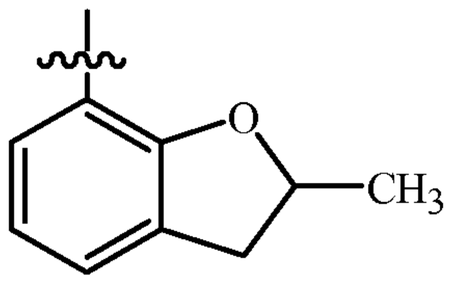


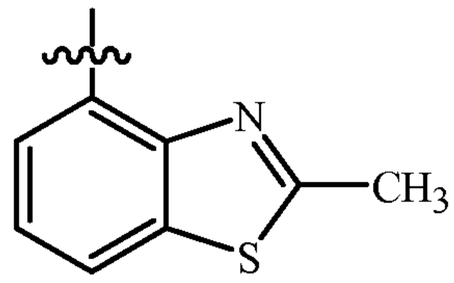
R^2 is H

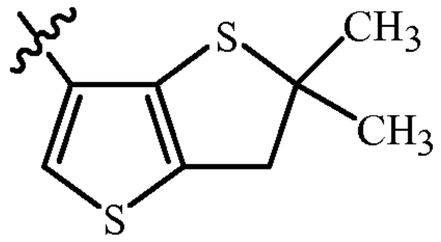
Cmpd	$(R^1)_n$	Q	m.p. (°C)	AP+ (M+1)	AP- (M-1)
152	3-CF_3, 5-Cl	3-chloro-2-pyridinyl	196-197		
153	3-CF_3, 5-Cl	6-chloro-2-pyridinyl	236-237		
154	3-CF_3, 5-Cl	3-bromo-2-pyridinyl	192-193		
155	3-CF_3, 5-Cl	3-CF_3-6-OCH_3-2-pyridinyl	211-212		
156	3-CF_3, 5-Cl	3-CO_2CH_3-6-CF_3-2-pyridinyl	212-213		

Cmpd	$(R^1)_n$	Q	m.p. (°C)	AP+ (M+1)	AP- (M-1)
157	3-CF_3, 5-Cl	3-OCH_2CF_3-6-CF_3-2-pyridinyl	244-245		
158	3-CF_3, 5-Cl	3-iodo-6-chloro-2-pyridinyl	241-242		
159	3-CF_3, 5-Cl	3-CF_3-2-pyridinyl	176-177		
160	3-CF_3, 5-Cl	6-CF_3-2-pyridinyl	236-237		
161	3-CF_3, 5-Cl	3-$C(O)N(CH_3)_2$-6-CF_3-2-pyridinyl	152-153		
162	3-CF_3, 5-Cl	4-chloro-3-pyridinyl	196-197		
163	3-CF_3, 5-Cl	2-chloro-3-pyridinyl	194-195		
164	3-CF_3, 5-Cl	2-SCH_2CH_3-3-pyridinyl	255-256		
165	3-CF_3, 5-Cl	2-OCH_2CH_3-3-pyridinyl	192-193		
166	3-CF_3, 5-Cl	4-CF_3-2-pyridinyl	229-230		
167	3-CF_3, 5-Cl	2-chloro-5-thiazolyl	208-209		
168	3-CF_3, 5-Cl	2-chloro-5-thienyl	216-217		
169	3-CF3, 5-Cl		252-253		
170	3-CF_3, 5-Cl	1-methyl-3-chloro-4-pyrazolyl	202-203		
171	3-CF_3, 5-Cl	1-methyl-4-chloro-3-pyrazolyl	>250		
172	3-CF_3, 5-Cl	1-methyl-5-chloro-4-pyrazolyl	>250		
173	3-CF_3, 5-Cl		190-191		
174	3-CF_3, 5-Cl	1-methyl-5-ethyl-4-pyrazolyl	212-214		
175	3-CF_3, 5-Cl	1,3,5-trimethyl-4-pyrazolyl	>250		
176	3-CF_3, 5-Cl	2,4-dimethyl-5-thiazolyl	202-203		
177	3-CF_3, 5-Cl	2-cyano-3-thienyl	251-252		
178	3-CF_3, 5-Cl	2-methyl-1,3,4-thiadiazol-5-yl	204-205		
179	3-CF_3, 5-Cl	3-methyl-2-thienyl	218-219		
180	3-CF_3, 5-Cl	4-methyl-2-thienyl	195-196		
181	3-CF_3, 5-Cl	1-ethyl-5-pyrazolyl	169		
182	3-CF_3, 5-Cl	1,5-dimethyl-4-pyrazolyl	242-243		
183	3-CF_3, 5-Cl	4-methyl-2-pyridinyl	212-213		
184	3-CF_3, 5-Cl	1-methyl-5-pyrazolyl	176-177		
185	3-CF_3, 5-Cl	1-methyl-4-pyrazolyl	240-241		
186	3-CF_3, 5-Cl	2-furanyl	216-217		

Cmpd	$(R^1)_n$	Q	m.p. (°C)	AP+ (M+1)	AP- (M-1)
187	3-CF_3, 5-Cl		>250		
188	3-CF_3, 5-Cl		210-211		
189	3-CF_3, 5-Cl		223-224		
190	3-CF_3, 5-Cl	3-nitro-2-thienyl	233-234		
191	3-CF_3, 5-Cl	1-methyl-4-SCH_3-5-pyrazolyl	178-179		
192	3-CF_3, 5-Cl	1-methyl-2SCH_3-3-pyrrolyl	226-227		
193	3-CF_3, 5-Cl		233-235		
194	3-CF_3, 5-Cl		238-240		
195	3-CF_3, 5-Cl	2-(2-thienyl)phenyl	243-244		
196	3-CF_3, 5-Cl	1-methyl-5-SO_2CH_3-4-pyrazolyl	>250		
197	3-CF_3, 5-Cl	2-(3-methyl-1,2,4-oxadiazol-5-yl)	252-253		
198	3-CF_3, 5-Cl	2-cyano-3-benzothiazolyl	205-206		
199	3-CF_3, 5-Cl		243-244		

Cmpd	$(R^1)_n$	Q	m.p. (°C)	AP+ (M+1)	AP- (M-1)
200	3-CF_3, 5-Cl		222-223		
201	3-CF_3, 5-Cl		206-207		
202	3-CF_3, 5-Cl		236-237		
203	3-CF_3, 5-Cl	2-(3-methyl-5-isoxazolyl)phenyl	234-235		
204	3-CF_3, 5-Cl	2-(1-methyl-4-pyrazolyl)phenyl	211-212		
205	3-CF_3, 5-Cl	1-benzyl-4-imidazolyl	>250		
206	3-CF_3, 5-Cl	1-benzyl-4-pyrazolyl	226-227		
208	3-CF_3, 5-Cl	2-methyl-4-CO_2CH_3-5-oxazolyl	171-172		
209	3-CF_3, 5-Cl	1-methyl-4-$CO_2CH_2CH_3$-3-pyrazolyl	>250		
210	3-CF_3, 5-Cl	1,3-dimethyl-5-CO_2CH_3-4-pyrazolyl	232-233		
211	3-CF_3, 5-Cl	3-$CO_2CH(CH_3)_2$-2-furanyl	173-174		
212	3-CF_3, 5-Cl	1-methyl-4-$CON(CH_3)_2$-5-pyrazolyl	254-255		
213	3-CF_3, 5-Cl	1-cyano-3-naphthalenyl	226-227		
214	3-CF_3, 5-Cl	1-cyano-4-naphthalenyl	203-204		
215	3-CF_3, 5-Cl	1-methyl-5-$CON(CH_3)_2$-4-pyrrolyl	178-179		
216	3-CF_3, 5-Cl	1-methyl-3-(5-oxazolyl)-4-pyrazolyl	252-253		
217	3-CF_3, 5-Cl	3-methyl-2-benzothienyl	229-230		
218	3-CF_3, 5-Cl		>250		
219	3-CF_3, 5-Cl	3-SO_2CH_3-2-furanyl	243-244		
220	3-CF_3, 5-Cl	2-(1,2,4-triazol-1-yl)-3-pyridinyl	>250		
221	3-CF_3, 5-Cl	3-$CON(CH_3)_2$-2-thienyl	219-220		

Cmpd	$(R^1)_n$	Q	m.p. (°C)	AP+ (M+1)	AP- (M-1)
222	3-CF_3, 5-Cl		246-247		
223	3-CF_3, 5-Cl	1-phenyl-2-imidazolyl	211-212		
224	3-CF_3, 5-Cl	2-$CON(CH_3)_2$-3-furanyl	200-201		
225	3-CF_3, 5-Cl	3-CO_2CH_3-1,2,5-thiadiazol-4-yl	195-196		
226	3-CF_3, 5-Cl	4-CO_2CH_3-5-thiazolyl	220-221		
227	3-CF_3, 5-Cl	2-methyl-1-naphthalenyl	219-220		
228	3-CF_3, 5-Cl	2-CO_2CH_3-3-thienyl	224-225		
229	3-Cl	phenyl			334
230	3-Cl	4-methylphenyl		350	348
231	3-Cl	4-chlorophenyl			368
232	3-Cl	4-methoxyphenyl		366	364
233	3-Cl	4-cyanophenyl			359
234	3-Cl	3-chlorophenyl			368
237	3-Cl	3,5-dichlorophenyl			402
238	3-Cl	2,5-dichlorophenyl	230-232		
239	3-Cl	2-methyl-4-fluorophenyl	265-270		
240	3-Cl	2-methyl-5-fluorophenyl			366
241	3-CF_3, 5-Cl	2-pyridinyl			403
242	3-Cl, 5-Cl	2-chlorophenyl		404	402
243	3-Cl, 5-Cl	2,5-dichlorophenyl		438	436
244	3-CF_3, 5-Cl	3-methyl-2-pyridinyl		419	417
245	3-CF_3, 5-Cl	2-thienyl		410	408
246	3-Cl, 5-Cl	2-chloro-5-(trifluoromethyl)phenyl		472	470
247	3-Cl, 5-Cl	2-chloro-6-methylphenyl		418	416
248	3-CF_3	2-chlorophenyl		404	402
249	3-Cl	2-chlorophenyl			368
250	5-CF_3	2-chlorophenyl		404	402
251	3-CF_3, 5-Cl	1,3-dimethyl-4-pyrazolyl	*		
252	3-Br, 5-Br	2-chlorophenyl		492	490
253	3-I	2-chlorophenyl		462	460
254	5-CN	2-chlorophenyl			359
255	3-CF_3, 5-Cl	3-chloro-2-thienyl			442
256	3-CF_3, 5-Cl	2,5-dichloro-3-thienyl		478	476

Cmpd	$(R^1)_n$	Q	m.p. (°C)	AP+ (M+1)	AP- (M-1)
257	3-Br	2-chlorophenyl		414	412
258	3-CF_3, 5-Cl	3-bromo-2-thienyl		490	488
259	-	2-chlorophenyl		336	334
260	3-CF_3, 5-Cl	2-$CON(CH_3)_2$-3-thienyl			479
261	3-CF_3, 5-Cl			496	494
262	3-CF_3, 5-Cl	5-imadazolyl		394	392
263	3-CF_3, 5-Cl	4,5-dichloro-2-thienyl			476
264	3-CF_3, 5-Cl	5-bromo-6-chloro-3-pyridinyl			515
265	3-CF_3, 5-Cl	4,5-dibromo-2-thienyl			564
266	3-CH_3, 5-Cl	3-methoxyphenyl		380	378
267	3-CH_3, 5-Cl	2,5-dimethylphenyl		378	376
268	3-CF_3, 5-Cl	4-bromo-3-thienyl		488	
269	3-CH_3, 5-Cl	2-chlorophenyl		384	382
270	3-CH_3, 5-Cl	2-thienyl		356	354
271	3-CH_3, 5-Cl	3,5-dimethyl-4-isoxazolyl		369	367
272	3-CF_3, 5-Cl	3-thienyl		410	408
273	3-CH_3, 5-Cl	2-chloro-5-(trifluoromethyl)phenyl		452	
274	3-CF_3, 5-Cl	5-chloro-1,3-dimethyl-4-pyrazolyl		456	454
275	3-CF_3, 5-Cl	1-methyl-4-imidazolyl		408	406
276	3-CF_3	3,5-dimethyl-4-isoxazolyl		389	387
277	3-Br, 5-Br	3,5-dimethyl-4-isoxazolyl		477	475
278	3-Br, 5-Br	2-chloro-5-(trifluoromethyl)phenyl	*		
279	3-Br, 5-Br	2,5-dimethylphenyl	*		
280	3-Br, 5-Br	2-thienyl	*		
281	3-Br, 5-Br	3-methoxyphenyl	*		
282	3-CN	2-fluorophenyl		345	343
283	3-CN	2-thienyl			331
284	3-CN	2-chloro-5-(trifluoromethyl)phenyl	*		
285	3-CN	2,5-dimethylphenyl			353
286	3-CN	2-chlorophenyl			359
287	3-CF_3, 5-CF_3	2-fluorophenyl		456	454
288	3-CF_3, 5-CF_3	2-chloro-5-(trifluoromethyl)phenyl		540	
289	3-$C(O)NH_2$	2-fluorophenyl	*		

Cmpd	$(R^1)_n$	Q	m.p. (°C)	AP+ (M+1)	AP- (M-1)
290	5-Cl	2-thienyl			340
291	3-CF_3	2-thienyl		328	
292	3-CF_3	2,5-dimethylphenyl		398	396
293	5-Cl	2-chloro-5-(trifluoromethyl)phenyl		438	
294	5-Cl	2-chlorophenyl		370	368
295	5-Cl	2-fluorophenyl		354	352
296	5-Cl	2,5-dimethylphenyl		364	362
297	3-CF_3	2,5-dibromophenyl		560	
298	3-CF_3	2-fluorophenyl		388	386
299	3-CF_3	2-methylphenyl		384	382
300	3-CF_3	2-chloro-4-(trifluoromethyl)phenyl		472	470
301	3-CF_3	2-chloro-4-fluorophenyl			420
302	2-CF_3	2,5-dimethylphenyl		398	396
303	2-CF_3	2-chlorophenyl		404	402
304	2-CF_3	2-thienyl		376	324
305	2-CF_3	3-methoxyphenyl		400	398
306	2-CF_3	2-fluorophenyl		388	386
307	4-CF_3	2,5-dimethylphenyl		398	396
308	4-CF_3	2-chlorophenyl		404	402
309	4-CF_3	2-thienyl		376	374
310	4-CF_3	3-methoxyphenyl		400	398
311	4-CF_3	2-fluorophenyl		388	386
312	2-CF_3	2-chloro-5-(trifluoromethyl)phenyl		472	470
313	4-CF_3	2-chloro-5-(trifluoromethyl)phenyl		472	470
314	3-CF_3, 5-Br	2-chloro-5-(trifluoromethyl)phenyl		550	548
315	3-CF_3, 5-Br	2-bromo-5-(trifluoromethyl)phenyl	*		
316	3-CF_3, 5-Br	2-fluorophenyl		466	465
400	3-CF_3, 5-Cl	2,5-dichloro-4-bromo-3-thienyl	245-246		
401	3-CF_3, 5-Br	2-chlorophenyl	188-193		
403	3-CF_3, 5-Br	2,5-dimethylphenyl	>250		
404	3-CF_3, 5-Br	3,5-dimethyl-4-isoxazolyl	224-225		
405	3-CF_3, 5-Br	4-cyano-2,5-dimethylphenyl	193-194		
406	3-CF_3, 5-F	2,5-dimethylphenyl	181-182		
407	3-CF_3, 5-F	2-chloro-5-(trifluoromethyl)phenyl	186-187		
408	3-CF_3, 5-F	4-chloro-2,5-dimethylphenyl	185-186		
409	3-CF_3, 5-F	3,5-dimethyl-4-isoxazolyl	176-177		

Cmpd	$(R^1)_n$	Q	m.p. (°C)	AP+ (M+1)	AP- (M-1)
410	3-CF_3, 5-Br	4-chloro-2,5-dimethylphenyl	190-191		
411	3-CF_3, 5-Br	4,5-dimethoxy-2-methylphenyl	110-111		
412	3-CF_3, 5-F	4,5-dimethoxy-2-methylphenyl	100-101		
413 (Ex. 6)	3-CF_3, 5-Br	2-chloro-5-methoxyphenyl	191-192		
414	3-CF_3, 5-F	2-chloro-5-methoxyphenyl	193-194		
415	3-CF_3, 5-F	4-cyano-2,5-dimethylphenyl	206-207		
416	3-CF_3, 5-OCH_2CH_3	2,5-dimethylphenyl	195-196		
417	3-CF_3, 5-OCH_2CH_3	2-chloro-5-(trifluoromethyl)phenyl	189-190		
418	3-CF_3, 5-OCH_2CH_3	4-chloro-2,5-dimethylphenyl	194-195		
419	3-CF_3, 5-OCH_2CH_3	3,5-dimethyl-4-isoxazolyl	196-197		
420	3-CF_3	5-acetyl-2-chlorophenyl	217-218		
421	3-CF_3	4,5-dimethoxy-2-methylphenyl	164-165		
422	-	2-chloro-5-methoxyphenyl	>250		
423	-	4-cyano-2,5-dimethylphenyl	>250		
424	3-CF_3	2-chloro-5-(trifluoromethyl)phenyl	>250		
425	-	3,5-dimethyl-4-isoxazolyl	239-240		
426	3-CF_3, 5-Cl	6-chloro-5-(trifluoromethyl)-2-pyridinyl	236-237		
427	3-CF_3	4-cyano-5-methoxy-2-methylphenyl	227-228		
432	-	2-chloro-5-(trifluoromethyl)phenyl	>250		
433	3-CF_3, 5-Cl	3-methyl-6-methylamino-2-pyridinyl	>250		
434	3-CF_3, 5-Cl	3-chloro-6-methylamino-2-pyridinyl	190-191		
435	3-CF_3, 5-Cl	3-cyano-4,6-dimethyl-2-pyridinyl	195-196		
436	3-CF_3, 5-Cl	3,5-dichloro-6-dimethylamino-2-pyridinyl	238-239		
437	3-CF_3, 5-Cl	3-iodo-6-methylamino-2-pyridinyl	156-157		
438	-	2-bromo-5-(trifluoromethyl)phenyl	>250		
439	3-CF_3	5-methoxy-2-methylphenyl	179-180		
440	3-CF_3	2-acetylamino-4-methyl-5-thiazolyl	248-249		
445	3-CF_3, 5-CN	2,5-dimethylphenyl	202-203		
446	3-CF_3, 5-Cl	6-dimethylamino-3-iodo-2-pyridinyl	179-180		
447	3-CF_3, 5-$C(O)NH_2$	4-cyano-2,5-dimethylphenyl	>250		
448	3-CF_3, 5-CN	2-cyano-5-(trifluoromethyl)phenyl	*		
449	3-CF_3	2-chloro-5-ethoxyphenyl	224-225		
451	3-CF_3, 5-SCH_2CH_3	2-chloro-5-methoxyphenyl	195-196		
455	3-CF_3, 5-Cl	5-(2-methoxyethyl)-2-thienyl	167-168		
456	3-CF_3, 5-Cl	2-acetyl-3-thienyl	178-179		
457	3-CF_3, 5-Cl	4-nitro-2-thienyl	192-193		

Cmpd	$(R^1)_n$	Q	m.p. (°C)	AP+ (M+1)	AP- (M-1)
458	3-CF_3, 5-CH_3	2-chloro-5-(trifluoromethyl)phenyl	184-185		
459	3-CF_3, 5-CH_3	2,5-dimethylphenyl	235-236		
460	3-CF_3	2-chloro-5-methylphenyl	219-220		
461	3-CF_3	5-methyl-2-nitrophenyl	>250		
462	3-CF_3	2-chloro-5-ethylphenyl	217-218		
463	3-CF_3	5-$C(CH_3)_3$-2-nitrophenyl	202-203		
464	3-CF_3, 5-Cl	5-methyl-4-isoxazolyl	170-171		
465 (Ex. 4)	3-CF_3, 5-Cl	1-ethyl-3-methyl-4-imidazolyl	189-190		
466	3-CF_3	1-ethyl-3-methyl-4-imidazolyl	148-149		
467	3-CF_3	5-bromo-2-chlorophenyl	>250		
468	3-CF_3	2-bromo-5-(trifluoromethyl)phenyl	>250		
469	3-CF_3	5-methoxy-2-nitrophenyl	228-229		
470	3-CF_3	5-acetyl-2-methylphenyl	206-207		
471	3-CF_3	2-bromo-5-propylphenyl	189-190		
474 (Ex. 5)	3-CF_3, 5-Cl	3-chloro-1-ethyl-4-imidazolyl	184-185		
475	3-CF_3, 5-Cl	3-chloro-1-isopropyl-4-imidazolyl	221-222		
476	3-CF_3, 5-Cl	1-isopropyl-3-methyl-4-imidazolyl	163-164		

* See Index Table E for ^{1}H NMR data.

R^2 is Br

Cmpd	$(R^1)_n$	Q	m.p. (°C)	AP+ (M+1)	AP- (M-1)
317	3-CF_3, 5-Cl	2-fluorophenyl	*		
318	3-CF_3, 5-Cl	2-chloro-5-(trifluoromethyl)phenyl			582
402	3-CF_3, 5-Cl	2,5-dimethylphenyl	189-190		
441	3-CF_3, 5-Cl	2-chloro-5-methoxyphenyl	202-203		
442	3-CF_3, 5-Cl	3,5-dimethyl-4-isoxazolyl	194-195		
443	3-CF_3, 5-Cl	4-cyano-5-methoxy-2-methylphenyl	232-233		
444	3-CF_3, 5-Cl	4-cyano-2,5-dimethylphenyl	108-109		

* See Index Table E for ^{1}H NMR data.

R^2 is CH_3

Cmpd	$(R^1)_n$	Q	m.p. (°C)
428	3-CF_3, 5-Cl	2,5-dimethylphenyl	191-192
429	3-CF_3, 5-Cl	2-chloro-5-(trifluoromethyl)phenyl	229-230
430	3-CF_3, 5-Cl	3,5-dimethyl-4-isoxazolyl	176-177

Cmpd	$(R^1)_n$	Q	m.p. (°C)
431 (Ex. 7)	3-CF_3, 5-Cl	2-chloro-5-methoxyphenyl	222-223
472	3-CF_3	2-chloro-5-methoxyphenyl	222-223
473	3-CF_3	2-bromo-5-propylphenyl	204-205

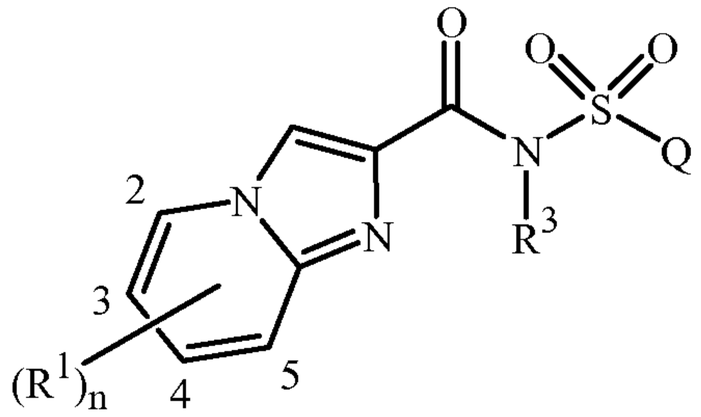
R^2 is CN

Cmpd	$(R^1)_n$	Q	m.p. (°C)
450	3-CF_3, 5-Cl	2,5-dimethylphenyl	>250

R^2 is CH_2CH_3

Cmpd	$(R^1)_n$	Q	m.p. (°C)
452	3-CF_3, 5-Cl	2,5-dimethylphenyl	202-203
453	3-CF_3, 5-Cl	2-chloro-5-(trifluoromethyl)phenyl	188-189
454	3-CF_3, 5-Cl	2-chloro-5-methoxyphenyl	161-162

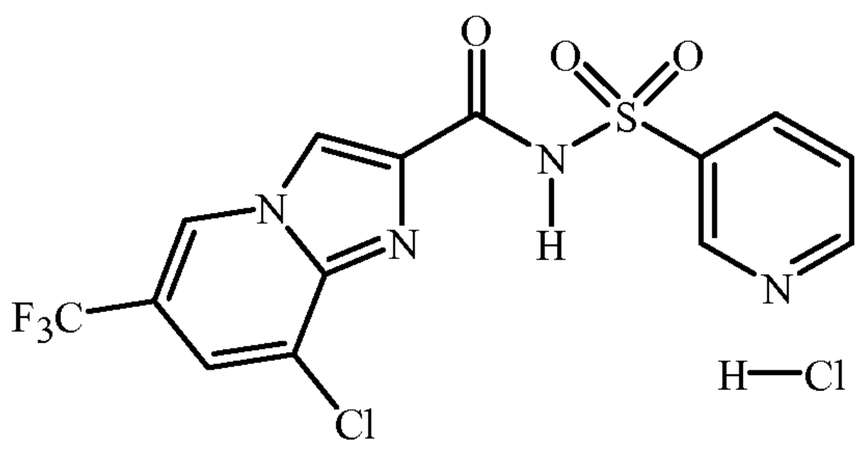
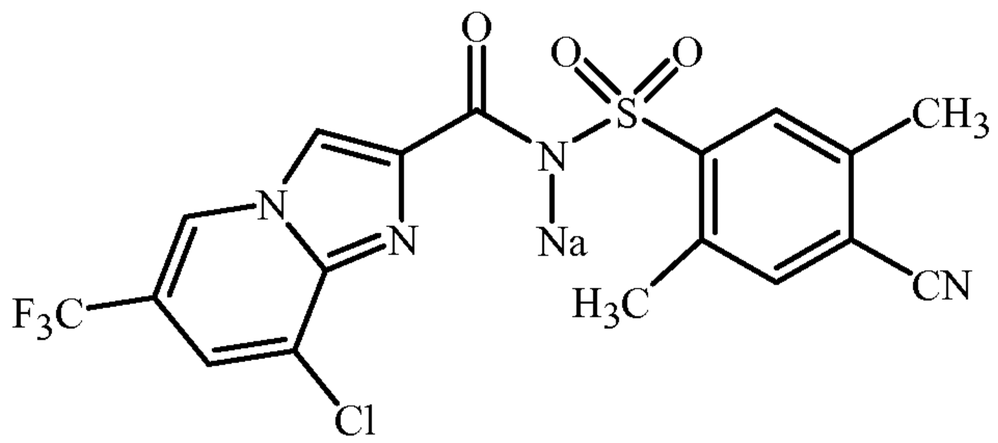
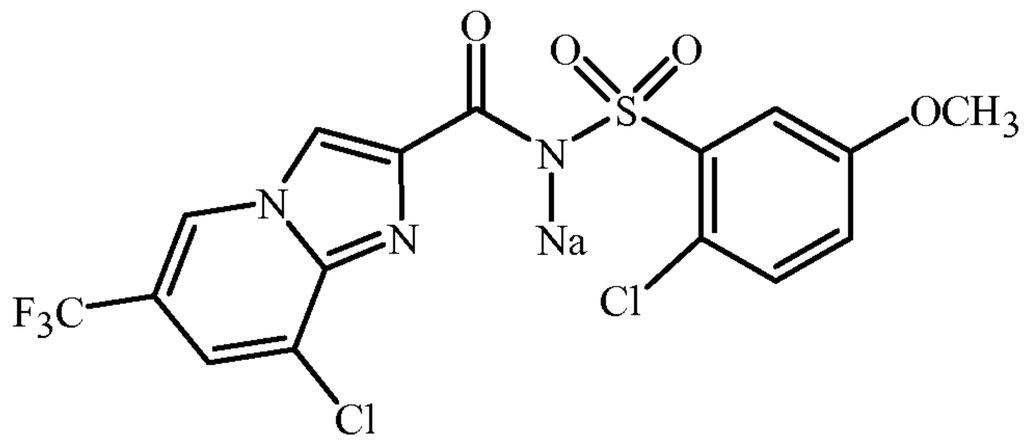
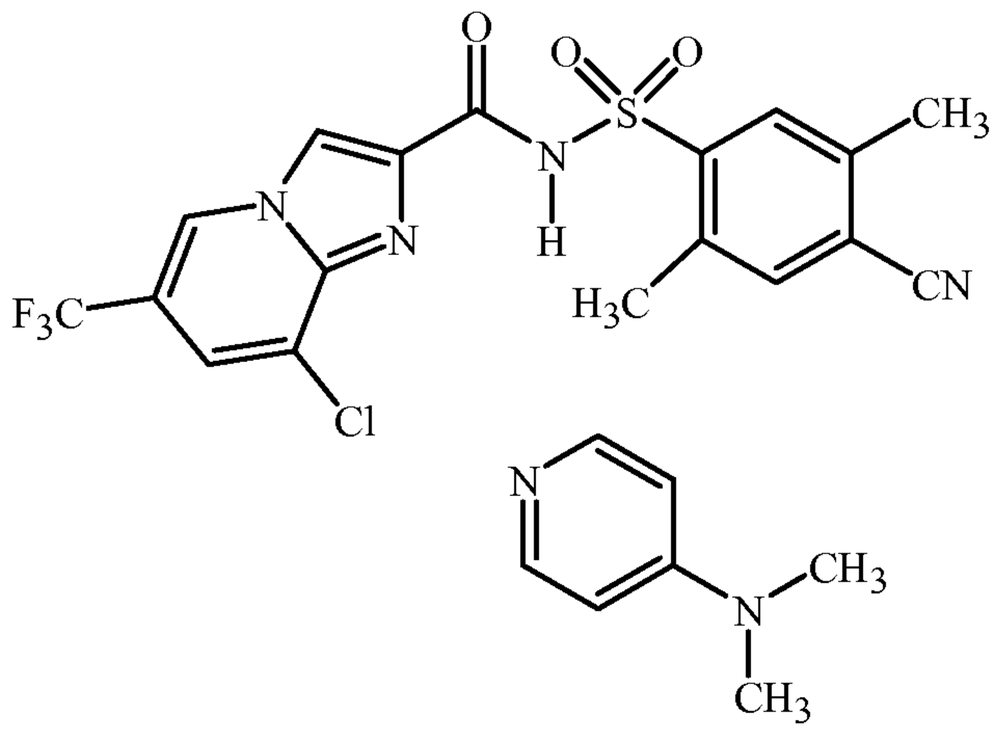
INDEX TABLE C



Cmpd	$(R^1)_n$	R^3	Q	m.p. (°C)
320	3-CF_3, 5-Cl	CH_3	4-methylphenyl	*
321	3-Cl	CH_3	4-methylphenyl	*
322	3-CF_3, 5-Cl	CH_3	2-chlorophenyl	*
323	3-CF_3, 5-Cl	CH_2CH_3	2-chlorophenyl	*
324	3-CF_3, 5-Cl	CH_2CF_3	2-chlorophenyl	*
325	3-CF_3, 5-Cl	$CH_2C{\equiv}CH$	2-chlorophenyl	*
326	3-CF_3, 5-Cl	$CH_2CH{=}CH_2$	2-chlorophenyl	*

* See Index Table E for ^{1}H NMR data.

INDEX TABLE D

Cmpd	Structure	m.p. (°C)
328		*
477		>250
478		>250
479		185-186

* See Index Table E for ^{1}H NMR data.

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INDEX TABLE E

Cmpd No.	^{1}H NMR Data [a]
322	δ (acetone-d_6) 9.15 (s, 1H), 8.60 (s, 1H), 8.27 (d, 1H), 7.8-7.6 (m, 4H), 3.98 (s, 3H).
323	δ (acetone-d_6) 9.15 (s, 1H), 8.59 (s, 1H), 8.26 (d, 1H), 7.8-7.6 (m, 4H), 4.73 (q, 2H), 1.56 (t, 3H).
324	δ (acetone-d_6) 9.17 (s, 1H), 8.69 (s, 1H), 8.33 (d, 1H), 7.84 (s, 1H), 7.8-7.65 (m, 3H), 6.0 (br s, 2H).
325	δ (acetone-d_6) 9.18 (s, 1H), 8.66 (s, 1H), 8.30 (d, 1H), 7.8-7.6 (m, 4H), 5.71 (s, 2H), 2.83 (s, 1H).
326	δ (acetone-d_6) 9.14 (s, 1H), 8.59 (s, 1H), 8.30 (d, 1H), 7.8-7.6 (m, 4H), 6.2 (m, 1H), 5.46 (s, 2H), 5.4 (d, 1H), 5.2 (d, 1H).
108	δ (acetone-d_6) 11.25 (br s, 1H), 9.18 (s, 1H), 8.68 (s, 1H), 8.15 (t, 1H), 7.8 (m, 2H), 7.5 (t, 1H), 7.4 (dd, 1H).
140	δ (dmso-d_6) 9.29 (s, 1H), 8.72 (s, 1H), 7.97 (d, 1H), 7.64-7.48 (m, 3H), 7.29 (d, 1H), 3.88-3.78 (m, 3H).
319	δ (dmso-d_6) 9.33 (s, 1H), 8.79 (s, 1H), 8.40 (s, 1H), 8.11 (d, 1H), 7.96 (s, 2H).
278	δ (dmso-d_6) 9.03 (d, 1H), 8.65 (s, 1H), 8.37 (d, 1H), 8.09 (dd, 1H), 7.97 (d, 1H), 7.92 (d, 1H).
279	δ (dmso-d_6) 9.01 (s, 1H), 8.63 (s, 1H), 7.96 (s, 1H), 7.86 (s, 1H), 7.47-7.35 (m, 1H), 7.28 (d, 1H), 2.57 (s, 3H), 2.37 (s, 3H).
280	δ (dmso-d_6) 9.04-9.01 (m, 1H), 8.63 (s, 1H), 8.05 (dd, 1H), 7.97 (d, 1H), 7.86 (dd, 1H), 7.22 (dd, 1H).
281	δ (dmso-d_6) 8.98 (d, 1H), 8.58 (s, 1H), 7.97 (d, 1H), 7.67-7.48 (m, 3H), 7.27 (s, 1H), 3.83 (s, 3H).
284	δ (dmso-d_6) 9.47 (s, 1H), 8.58 (s, 1H), 8.35 (d, 1H), 7.99 (br s, 1H), 7.83 (br s, 3H).
289	δ (dmso-d_6) 9.23 (br s, 1H), 8.57 (s, 1H), 8.22 (br s, 2H), 7.93 (br s, 2H), 7.66 (br s, 3H), 7.33 (br s, 2H).
297	δ (dmso-d_6) 9.34 (s, 1H), 8.81 (s, 1H), 8.26 (d, 1H), 7.96 (d, 1H), 7.81 (d, 2H).
317	δ (dmso-d_6) 8.63 (d, 1H), 7.92 (d, 1H), 7.85 (m, 1H), 7.51-7.42 (m, 1H), 7.24 (m, 1H), 7.17 (d, 1H).
328	δ (dmso-d_6) 9.29 (s, 1H), 9.15 (s, 1H), 8.88 (s, 1H), 8.72 (s, 1H), 8.45-8.34 (m, 1H), 7.97 (d, 1H), 7.70 (dd, 1H).
251	δ 8.46 (s, 1H), 8.28 (s, 1H), 8.1 (s, 1H), 7.52 (s, 1H), 3.86 (s, 3H), 2.48 (s, 3H).
315	δ (dmso-d_6) 9.35 (d, 1H), 8.79 (s, 1H), 8.39 (d, 1H), 8.08 (s, 1H), 8.04 (d, 1H), 7.97 (s, 1H).
448	δ (dmso-d_6) 9.57 (br s, 1H), 8.73 (s, 1H), 8.48 (s, 1H), 8.34 (s, 1H), 8.23 (d, 1H), 8.13 (d, 1H), 7.96 (s, 1H).
320	δ 8.48 (m, 1H), 8.25 (s, 1H), 8.07 (m, 2H), 7.48 (m, 1H), 7.37) (m, 2H), 3.72 (s, 3H), 2.45 (s, 3H).

321 δ 8.16 (m, 1H), 8.07 (s, 1H), 7.99 (m, 2H), 7.57 (m, 2H), 7.34 (m, 2H), 7.23 (m, 1H), 3.80 (s, 3H), 2.43 (s, 3H).

[a] ^{1}H NMR data are in ppm downfield from tetramethylsilane. $CDCl_3$ solution unless indicated otherwise; "acetone-d_6" is $CD_3C(=O)CD_3$; "dmso-d_6" is $CD_3S(=O)CD_3$. Couplings are designated by (s)-singlet, (d)-doublet, (t)-triplet, (m)-multiplet, (dd)-doublet of doublets, (br s)-broad singlet.

The following Tests demonstrate the control efficacy of compounds of this invention on specific pests. "Control efficacy" represents inhibition of parasitic nematode development (including mortality) that causes significantly reduced feeding. The pest control protection afforded by the compounds is not limited, however, to these species.

BIOLOGICAL EXAMPLES OF THE INVENTION

TEST A

Control of the southern root-knot nematode (*Meloidogyne incognita*) through contact and/or systemic means was evaluated in test units consisting of small open containers filled with a sandy soil mixture and cucumber seedlings.

Test compounds were formulated using a solution containing 50% acetone and 50% water. Test compounds were applied directly to the soil of the test units at concentrations of 250 or 50 ppm active ingredient. Each test was replicated 3 times. After treatment, the test units were allowed to dry for 1 hour, after which time about 250 second-stage juvenile (J2) larvae were pipetted into the soil. The test units were held at 27 °C and watered as needed for 7 days.

Nematocidal efficacy was determined by the amount of root gall formation observed when compared to an untreated control. No gall formation was indicative of 100% nematode control. Gall formation equivalent to that found in the untreated control was indicative of 0% control. No nematode control rating was given to compounds showing significant phytotoxicity.

Of the compounds tested at a concentration of 250 ppm, the following provided good levels of plant protection (50% or more reduction in root galling, compared to solvent-treated controls) and exhibited no significant phytotoxicity: 4, 5, 6, 7, 9, 10, 11, 12, 13, 17, 19, 24, 25, 28, 29, 30, 32, 34, 38, 57, 59, 63, 65, 66, 67, 68, 69, 70, 71, 72, 73, 75, 83, 89, 90, 93, 101, 106, 107, 108, 109, 110, 111, 112, 113, 114, 116, 117, 120, 126, 130, 131, 132, 133, 134, 136, 137, 139, 140, 143, 145, 149, 152, 157, 159, 162, 163, 167, 169, 170, 171, 172, 174, 175, 176, 179, 180, 181, 184, 186, 188, 193, 206, 241, 244, 245, 248, 251, 252, 253, 257, 258, 259, 272, 274, 279, 285, 292, 294, 297, 298, 299, 301, 313, 314, 315, 317, 318, 319, 323, 329, 331, 332, 333, 334, 340, 341, 342, 344, 345, 347, 348, 355, 359, 360, 361, 364, 365, 366, 367, 371, 372, 373, 375, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386,

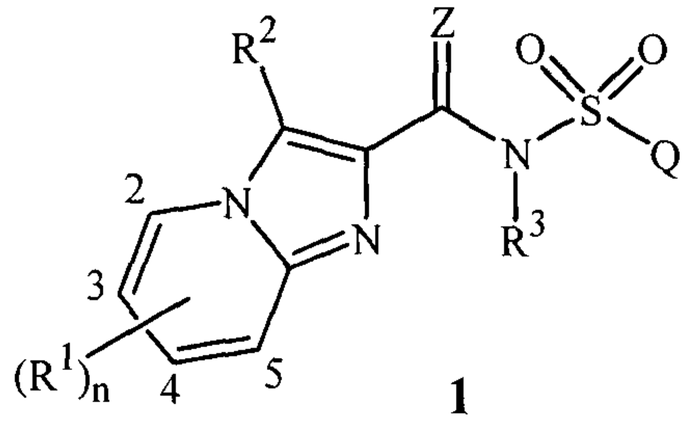
387, 388, 393, 394, 395, 396, 397, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 417, 418, 419, 420, 421, 422, 424, 425, 426, 427, 429, 430, 436, 439, 441, 442, 443, 444, 445, 449, 450, 451, 458, 459, 460, 461, 462, 464, 465, 466, 467, 468, 469, 470, 471, 472, 474, 475, 476, 477, 478 and 479.

Of the compounds tested at a concentration of 50 ppm, the following provided good levels of plant protection (50% or more reduction in root galling, compared to solvent-treated controls) and exhibited no significant phytotoxicity: 2, 4, 7, 9, 10, 11, 13, 19, 30, 59, 63, 66, 67, 68, 69, 71, 73, 86, 90, 94, 101, 103, 105, 107, 108, 109, 110, 111, 113, 114, 116, 117, 130, 132, 133, 137, 139, 140, 143, 149, 151, 157, 162, 163, 167, 170, 175, 176, 179, 180, 241, 245, 248, 251, 252, 258, 259, 268, 272, 274, 279, 292, 297, 298, 314, 315, 316, 317, 318, 319, 329, 331, 332, 337, 341, 342, 343, 348, 356, 357, 359, 366, 367, 371, 372, 373, 377, 378, 379, 380, 381, 382, 383, 384, 386, 388, 394, 395, 396, 397, 401, 402, 403, 405, 406, 407, 408, 410, 411, 413, 414, 415, 416, 419, 420, 424, 427, 428, 429, 430, 431, 436, 439, 441, 442, 443, 444, 445, 449, 451, 458, 459, 460, 462, 465, 466, 467, 469, 470, 471, 474, 475, 477, 478 and 479.

CLAIMS

What is claimed is:

1. A compound selected from Formula **1**, an *N*-oxide, or a salt thereof,



1

wherein

Z is O or S;

each R^1 is independently halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$ or $N(R^{10})S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl,

$C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

R^2 is H, halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$ or $N(R^{10})S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

R^3 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro,

OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or C_1–C_6 alkyl substituted with 1 or 2 substituents independently selected from the group consisting of phenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$; or phenyl optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

Q is phenyl, naphthalenyl, a 5- or 6-membered heteroaromatic ring or an 8- to 10-membered heteroaromatic bicyclic ring system, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(X)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$, $N(R^{10})S(O)_2NR^{11}R^{12}$ and R^{14};

each X is independently O or S;

each R^4 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, $C(X)R^{7a}$,

$C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{4a} is independently H, C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^5 is independently H, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{5a} is independently H or C_1–C_6 alkyl;

each R^6 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$;

each R^{6a} is independently H, C_1–C_6 alkyl, $C(O)R^{13}$ or $C(O)OR^{13}$;

each R^7 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{7a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^8 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{8a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^9 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{9a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^{10} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$;

each R^{10a} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl;

each R^{11} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group

consisting of cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11a}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11a}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11a}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11a}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10a})C(O)R^{7a}$;

each R^{11a} is independently H, C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl;

each R^{12} is independently H, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{13} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$;

each R^{14} is independently C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{15} is independently C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each m is independently 0, 1 or 2; and

n is 0, 1, 2, 3 or 4;

provided that when n is 2 and one R^1 is CF_3 in the 3-position of Formula **1** and the other R^1 is Cl in the 5-position of Formula **1**, and R^2 and R^3 are H, then Q is other than 2-chlorophenyl, 2-chloro-6-methylphenyl, 2,6-dichlorophenyl, 2-chloro-4-fluorophenyl, 2,5-bis(2,2,2-trifluoroethoxy)phenyl, 2,4,6-trichlorophenyl, 2-chloro-5-(trifluoromethyl)phenyl or 3,5-dimethyl-4-isoxazolyl.

2. A compound of Claim 1 wherein:

Z is O; and

Q is phenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(X)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

3. A compound of Claim 2 wherein:

Q is phenyl, pyridyl, pyrazolyl, oxazolyl, thiazolyl, isoxazolyl, isothiazolyl, furanyl or thienyl, each optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(X)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$.

4. A compound of Claim 2 or 3 wherein:

each R^1 is independently halogen, cyano, nitro, OR^4, C_1–C_6 alkyl or C_1–C_6 haloalkyl;

R^2 is H, halogen or C_1–C_6 alkyl;

R^3 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, $C(X)R^7$, $C(O)OR^8$ or $S(O)_mR^9$; or C_1–C_6 alkyl substituted with 1 or 2 OR^4; and

n is 1 or 2.

5. A compound of Claim 1 that is selected from the group consisting of:

8-chloro-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,

8-chloro-*N*-[(4-cyano-2,5-dimethylphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,

N-[(5-acetyl-2-chlorophenyl)sulfonyl]-8-chloro-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,

8-chloro-*N*-[(3-methyl-2-thienyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,

8-chloro-*N*-[(4-methyl-2-thienyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,

8-chloro-*N*-[(3-chloro-1-methyl-1*H*-pyrazol-4-yl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,

8-chloro-*N*-[(5-methoxy-2-nitrophenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide;

8-chloro-*N*-[(2-chloro-5-ethylphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,

8-chloro-*N*-[(1-ethyl-3-methyl-1*H*-pyrazol-4-yl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,

8-bromo-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,

N-[(2-bromo-5-methylphenyl)sulfonyl]-8-chloro-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,

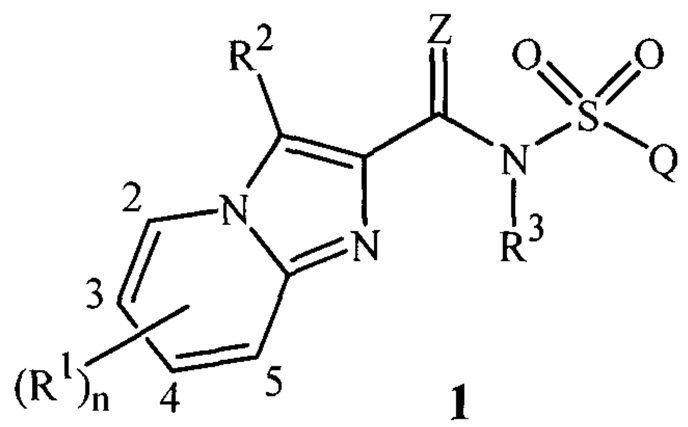
8-chloro-*N*-[(2-chloro-5-methylphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide,

8-chloro-*N*-[(3-chloro-1-ethyl-1*H*-pyrazol-4-yl)sulfonyl]-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide, and

N-[(5-acetyl-2-methylphenyl)sulfonyl]-8-chloro-6-(trifluoromethyl)imidazo[1,2-*a*]pyridine-2-carboxamide.

6. A compound of claim 5, wherein said compound is 8-chloro-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide.

7. A composition comprising a compound of Formula **1**, an *N*-oxide, or a salt thereof,



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wherein

Z is O or S;

each R^1 is independently halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$ or $N(R^{10})S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a}

and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

R^2 is H, halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$ or $N(R^{10})S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

R^3 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or C_1–C_6 alkyl substituted with 1 or 2 substituents independently selected from the group consisting of phenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$; or phenyl optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

Q is phenyl, naphthalenyl, a 5- or 6-membered heteroaromatic ring or an 8- to 10-membered heteroaromatic bicyclic ring system, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(X)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$,

$N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$, $N(R^{10})S(O)_2NR^{11}R^{12}$ and R^{14};

each X is independently O or S;

each R^4 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{4a} is independently H, C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^5 is independently H, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{5a} is independently H or C_1–C_6 alkyl;

each R^6 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$;

each R^{6a} is independently H, C_1–C_6 alkyl, $C(O)R^{13}$ or $C(O)OR^{13}$;

each R^7 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{7a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^8 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each

substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{8a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^9 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{9a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^{10} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$;

each R^{10a} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl;

each R^{11} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11a}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11a}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11a}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11a}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10a})C(O)R^{7a}$;

each R^{11a} is independently H, C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl;

each R^{12} is independently H, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl,

$C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{13} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$;

each R^{14} is independently C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{15} is independently C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 5 substituents independently selected from the group

consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each m is independently 0, 1 or 2; and

n is 0, 1, 2, 3 or 4;

and at least one additional component selected from the group consisting of surfactants, solid diluents and liquid diluents.

8. The composition of Claim 7 wherein said composition further comprises at least one additional biologically active compound or agent.

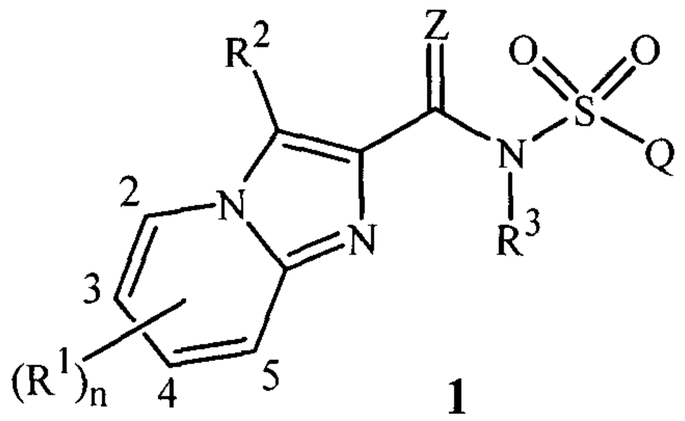
9. The composition of Claim 8 wherein the at least one additional biologically active compound or agent is selected from the group consisting of abamectin, acephate, acequinocyl, acetamiprid, acrinathrin, amidoflumet, amitraz, avermectin, azadirachtin, azinphos-methyl, bifenthrin, bifenazate, bistrifluron, borate, buprofezin, carbaryl, carbofuran, cartap, carzol, chlorantraniliprole, chlorfenapyr, chlorfluazuron, chlorpyrifos, chlorpyrifos-methyl, chromafenozide, clofentezin, clothianidin, cyantraniliprole, cyflumetofen, cyfluthrin, beta-cyfluthrin, cyhalothrin, gamma-cyhalothrin, lambda-cyhalothrin, cypermethrin, alpha-cypermethrin, zeta-cypermethrin, cyromazine, deltamethrin, diafenthiuron, diazinon, dieldrin, diflubenzuron, dimefluthrin, dimehypo, dimethoate, dinotefuran, diofenolan, emamectin, endosulfan, esfenvalerate, ethiprole, etofenprox, etoxazole, fenbutatin oxide, fenothiocarb, fenoxycarb, fenpropathrin, fenvalerate, fipronil, flonicamid, flubendiamide, flucythrinate, flufenerim, flufenoxuron, fluvalinate, tau-fluvalinate, fonophos, formetanate, fosthiazate, halofenozide, hexaflumuron, hexythiazox, hydramethylnon, imidacloprid, indoxacarb, insecticidal soaps, isofenphos, lufenuron, malathion, metaflumizone, metaldehyde, methamidophos, methidathion, methiodicarb, methomyl, methoprene, methoxychlor, metofluthrin, monocrotophos, methoxyfenozide, nitenpyram, nithiazine, novaluron, noviflumuron, oxamyl, parathion, parathion-methyl, permethrin, phorate, phosalone, phosmet, phosphamidon, pirimicarb, profenofos, profluthrin, propargite, protrifenbute, pymetrozine, pyrafluprole, pyrethrin, pyridaben, pyridalyl, pyrifluquinazon, pyriprole,

pyriproxyfen, rotenone, ryanodine, spinetoram, spinosad, spirodiclofen, spiromesifen, spirotetramat, sulprofos, tebufenozide, tebufenpyrad, teflubenzuron, tefluthrin, terbufos, tetrachlorvinphos, tetramethrin, thiacloprid, thiamethoxam, thiodicarb, thiosultap-sodium, tolfenpyrad, tralomethrin, triazamate, trichlorfon, triflumuron, all strains of *Bacillus thuringiensis*, entomopathogenic bacteria, all strains of *Nucleo polyhydrosis* viruses, entomopathogenic viruses and entomopathogenic fungi.

10. The composition of Claim 9 wherein the at least one additional biologically active compound or agent is selected from the group consisting of abamectin, acetamiprid, acrinathrin, amitraz, avermectin, azadirachtin, bifenthrin, buprofezin, carbaryl, cartap, chlorantraniliprole, chlorfenapyr, chlorpyrifos, clothianidin, cyantraniliprole, cyfluthrin, beta-cyfluthrin, cyhalothrin, lambda-cyhalothrin, gamma-cyhalothrin, cypermethrin, alpha-cypermethrin, zeta-cypermethrin, cyromazine, deltamethrin, dieldrin, dinotefuran, diofenolan, emamectin, endosulfan, esfenvalerate, ethiprole, etofenprox, etoxazole, fenothiocarb, fenoxycarb, fenvalerate, fipronil, flonicamid, flubendiamide, flufenoxuron, fluvalinate, formetanate, hexaflumuron, hydramethylnon, imidacloprid, indoxacarb, lufenuron, metaflumizone, methiodicarb, methomyl, methoprene, methoxyfenozide, nitenpyram, nithiazine, novaluron, oxamyl, pymetrozine, pyrethrin, pyridaben, pyridalyl, pyriproxyfen, ryanodine, spinetoram, spinosad, spirodiclofen, spiromesifen, spirotetramat, tebufenozide, tetramethrin, thiacloprid, thiamethoxam, thiodicarb, thiosultap-sodium, tralomethrin, triazamate, triflumuron, all strains of *Bacillus thuringiensis* and all strains of *Nucleo polyhydrosis* viruses.

11. The composition of any one of claims 7-10, wherein said compound is 8-chloro-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide.

12. A method for controlling a parasitic nematode on a plant or a seed comprising contacting the parasitic nematode or its environment with a biologically effective amount of a compound of Formula **1**, an *N*-oxide, or a salt thereof,



1

wherein

Z is O or S;

each R^1 is independently halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$ or $N(R^{10})S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

R^2 is H, halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6

haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$ or $N(R^{10})S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

R^3 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or C_1–C_6 alkyl substituted with 1 or 2 substituents independently selected from the group consisting of phenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano,

nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$; or phenyl optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

Q is phenyl, naphthalenyl, a 5- or 6-membered heteroaromatic ring or an 8- to 10-membered heteroaromatic bicyclic ring system, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(X)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$, $N(R^{10})S(O)_2NR^{11}R^{12}$ and R^{14};

each X is independently O or S;

each R^4 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$,

OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{4a} is independently H, C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^5 is independently H, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{5a} is independently H or C_1–C_6 alkyl;

each R^6 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$;

each R^{6a} is independently H, C_1–C_6 alkyl, $C(O)R^{13}$ or $C(O)OR^{13}$;

each R^7 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8

cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{7a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^8 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{8a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^9 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each

optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{9a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^{10} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$;

each R^{10a} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl;

each R^{11} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11a}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11a}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of

halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11a}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11a}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10a})C(O)R^{7a}$;

each R^{11a} is independently H, C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl;

each R^{12} is independently H, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{13} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$;

each R^{14} is independently C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen,

cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{15} is independently C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each m is independently 0, 1 or 2; and

n is 0, 1, 2, 3 or 4.

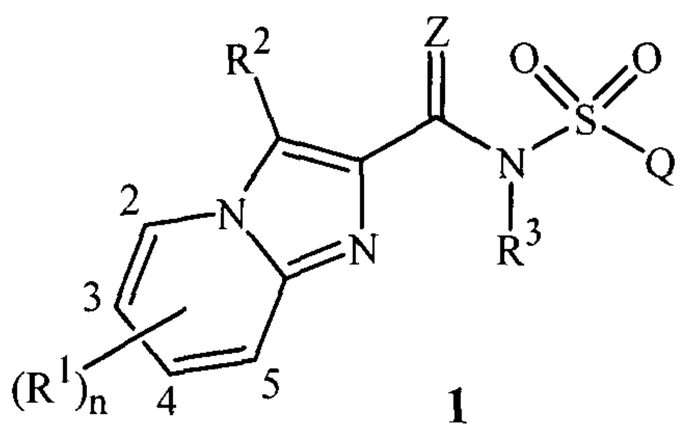
13. The method of Claim 12 wherein the environment is a plant.

14. The method of Claim 12 wherein the environment is a seed.

15. The method of Claim 14 wherein the seed is coated with the compound of Formula **1**, an *N*-oxide or salt thereof, formulated as a composition comprising a film former or adhesive agent.

16. The method of any one of claims 12 to 15 wherein the compound is 8-chloro-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide.

17. Use of a biologically effective amount of a compound for control of a parasitic nematode, the compound comprising a compound of Formula 1, an *N*-oxide or salt thereof,



1

wherein

Z is O or S;

each R^1 is independently halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$ or $N(R^{10})S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl,

naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

R^2 is H, halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$ or $N(R^{10})S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

R^3 is H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently

selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or C_1–C_6 alkyl substituted with 1 or 2 substituents independently selected from the group consisting of phenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$; or phenyl optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

Q is phenyl, naphthalenyl, a 5- or 6-membered heteroaromatic ring or an 8- to 10-membered heteroaromatic bicyclic ring system, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, SF_5, OCN, SCN, $Si(R^{15})_3$, OR^4, NR^5R^6, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(X)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^7$, $OC(O)OR^8$, $OC(O)NR^{11}R^{12}$, $OS(O)_2R^9$, $OS(O)_2NR^{11}R^{12}$, $N(R^{10})C(O)R^7$, $N(R^{10})C(O)NR^{11}R^{12}$, $N(R^{10})S(O)_2R^9$, $N(R^{10})S(O)_2NR^{11}R^{12}$ and R^{14};

each X is independently O or S;

each R^4 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{4a} is independently H, C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^5 is independently H, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{5a} is independently H or C_1–C_6 alkyl;

each R^6 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8

cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$;

each R^{6a} is independently H, C_1–C_6 alkyl, $C(O)R^{13}$ or $C(O)OR^{13}$;

each R^7 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{7a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^8 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano,

nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{8a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^9 is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{9a} is independently C_1–C_6 alkyl or C_1–C_6 haloalkyl;

each R^{10} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11}R^{12}$;

each R^{10a} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl;

each R^{11} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^{4a}, $NR^{5a}R^{6a}$, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11a}R^{12}$, $S(O)_mR^{9a}$ or $S(O)_2NR^{11a}R^{12}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11a}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11a}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10a})C(O)R^{7a}$;

each R^{11a} is independently H, C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl;

each R^{12} is independently H, $NR^{5a}R^{6a}$, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl, C_2–C_6 haloalkynyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ or $S(O)_2NR^{11}R^{12}$; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 3 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, $C(X)R^{7a}$, $C(O)OR^{8a}$, $C(O)NR^{11}R^{12}$, OR^{4a}, C_2–C_6 alkoxyalkyl, $S(O)_mR^{9a}$, $S(O)_2NR^{11}R^{12}$, $NR^{5a}R^{6a}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{13} is independently H, C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$;

each R^{14} is independently C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl, C_6–C_{14} cycloalkylcycloalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or C_1–C_6 alkyl, C_2–C_6 alkenyl or C_2–C_6 alkynyl, each substituted with 1 to 4 substituents independently selected from the group consisting of cyano, nitro, OR^4, NR^5R^6, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$ and $S(O)_2NR^{11}R^{12}$; or phenyl, naphthalenyl or a 5- or 6-membered heteroaromatic ring, each optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl, $C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each R^{15} is independently C_1–C_6 alkyl, C_1–C_6 haloalkyl, C_2–C_6 alkenyl, C_2–C_6 haloalkenyl, C_2–C_6 alkynyl or C_2–C_6 haloalkynyl; or C_3–C_7 cycloalkyl, C_4–C_8 cycloalkylalkyl or C_5–C_7 cycloalkenyl, each optionally substituted with 1 to 4 substituents independently selected from the group consisting of halogen, cyano, nitro, C_1–C_4 alkyl, C_1–C_4 haloalkyl, OR^{4a} and $S(O)_mR^{9a}$; or phenyl optionally substituted with 1 to 5 substituents independently selected from the group consisting of halogen, cyano, nitro, OR^4, NR^5R^6, C_1–C_4 alkyl, C_2–C_4 alkenyl, C_2–C_4 alkynyl, C_1–C_4 haloalkyl, C_2–C_4 haloalkenyl, C_2–C_6 alkoxyalkyl,

$C(X)R^7$, $C(O)OR^8$, $C(O)NR^{11}R^{12}$, $S(O)_mR^9$, $S(O)_2NR^{11}R^{12}$, $OC(O)R^{7a}$ and $N(R^{10})C(O)R^{7a}$;

each m is independently 0, 1 or 2; and

n is 0, 1, 2, 3 or 4.

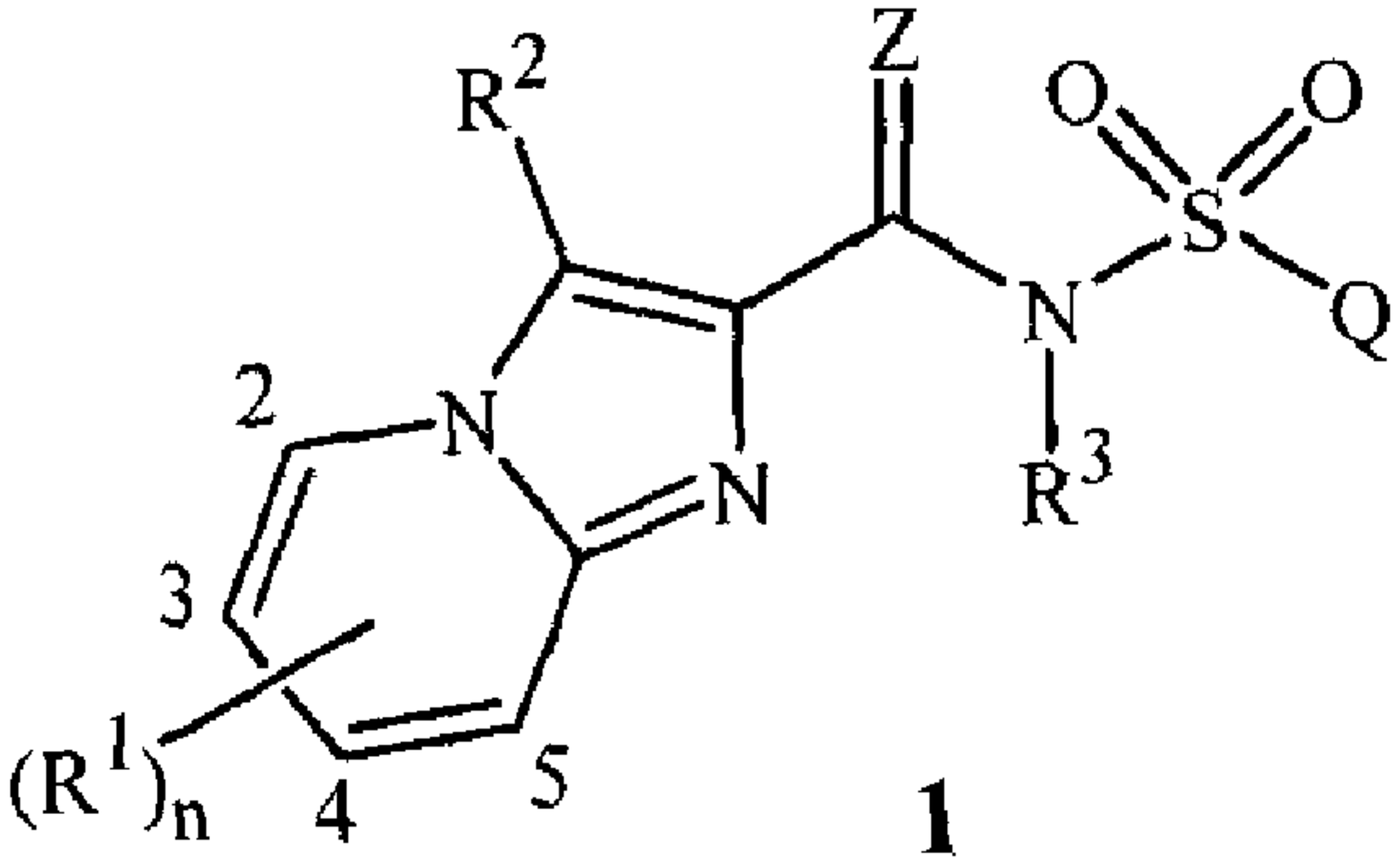
18. The use of claim 17, wherein said biologically effective amount of a compound is formulated for application to the parasitic nematode or its environment.

19. The use of claim 18, wherein the environment is a plant.

20. The use of claim 18, wherein the environment is a seed.

21. The use of claim 20, wherein the seed is coated with the compound of Formula 1, an *N*-oxide or salt thereof, formulated as a composition comprising a film former or adhesive agent.

22. The use of any one of claims 17 to 21, wherein the compound is 8-chloro-*N*-[(2-chloro-5-methoxyphenyl)sulfonyl]-6-(trifluoromethyl)-imidazo[1,2-*a*]pyridine-2-carboxamide.



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