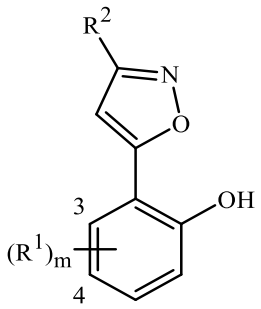
CLAIMS

What is claimed is:

1. A method for preparing a compound of Formula **1**



1

wherein

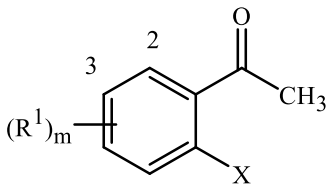
each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

R^2 is cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl; and

m is 0, 1, 2 or 3;

the method comprising

treating a compound of Formula **2**



2

wherein

each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

m is 0, 1, 2 or 3; and

X is halogen;

with a compound of Formula **3**

$$R^2(C{=}O)LG$$

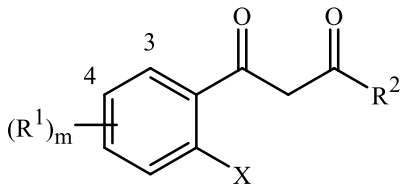
3

wherein

R^2 is cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl; and

LG is chloro, C_1–C_4 alkoxy or $-O(C{=}O)R^2$;

in the presence of an alkali metal base to provide a compound of Formula **4** or an alkali metal salt thereof



4

wherein

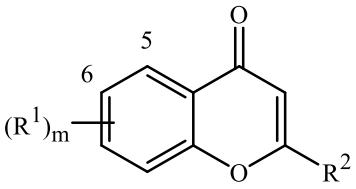
each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

R^2 is cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

m is 0, 1, 2 or 3; and

X is halogen;

heating the compound of Formula **4** or the alkali metal salt thereof to provide a compound of Formula **5**



5

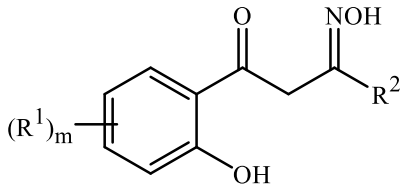
wherein

each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

R^2 is cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl; and

m is 0, 1, 2 or 3;

treating the compound of Formula **5** with a hydroxylamine salt to provide a compound of Formula **6**



6

wherein

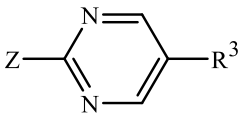
each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

R^2 is cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl; and

m is 0, 1, 2 or 3; and

treating the compound of Formula **6** with acid.

2. The method of Claim 1 further comprising treating the compound of Formula **1** with a compound of Formula **7**



7

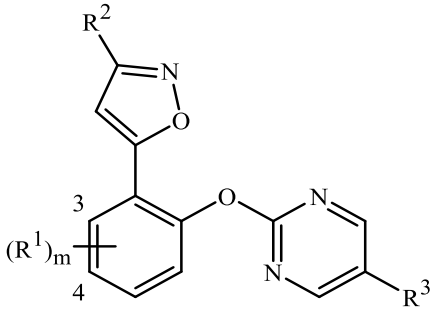
wherein

Z is halogen or SO_2R^4;

R^3 is halogen, C_1–C_4 alkyl or C_1–C_4 haloalkyl; and

R^4 is C_1–C_4 alkyl;

in the presence of a second base to provide a compound of Formula **8**



8

wherein

each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

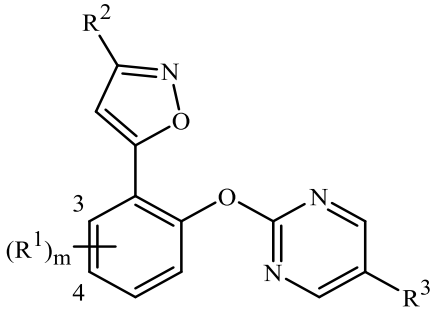
R^2 is cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

R^3 is halogen, C_1–C_4 alkyl or C_1–C_4 haloalkyl; and

m is 0, 1, 2 or 3.

3. The method of Claim 2 wherein R^3 is chlorine.

4. A method for preparing a compound of Formula **8**



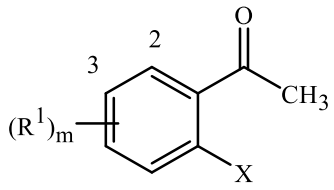
8

wherein

each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;
R^2 is cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;
R^3 is halogen, C_1–C_4 alkyl or C_1–C_4 haloalkyl; and
m is 0, 1, 2 or 3;

the method comprising

treating a compound of Formula **2**



2

wherein

each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;
m is 0, 1, 2 or 3; and
X is halogen;

with a compound of Formula **3**

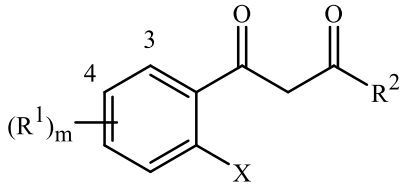
$$R^2(C{=}O)LG$$

3

wherein

R^2 is cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl; and
LG is chloro, C_1–C_4 alkoxy or $-O(C{=}O)R^2$;

in the presence of a base to provide a salt of a compound of Formula **4**

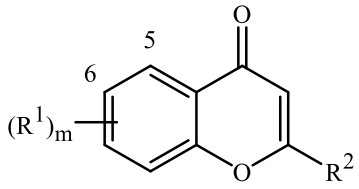


4

wherein

each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;
R^2 is cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;
m is 0, 1, 2 or 3; and
X is halogen;

heating the salt of the compound of Formula **4** to provide a compound of Formula **5**



5

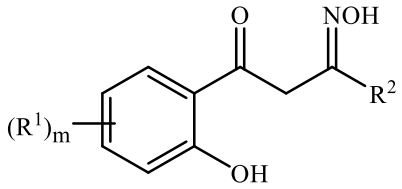
wherein

each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

R^2 is cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl; and

m is 0, 1, 2 or 3;

treating the compound of Formula **5** with a hydroxylamine salt to provide a compound of Formula **6**



6

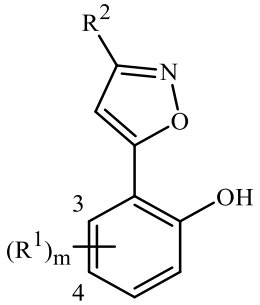
wherein

each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

R^2 is cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl; and

m is 0, 1, 2 or 3;

treating the compound of Formula **6** with acid to provide a compound of Formula **1**



1

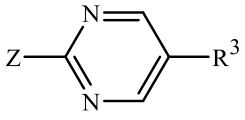
wherein

each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

R^2 is cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl; and

m is 0, 1, 2 or 3; and

treating the compound of Formula **1** with a compound of Formula **7**



7

wherein

Z is halogen or SO_2R^4;

R^3 is halogen, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

R^4 is C_1–C_4 alkyl;

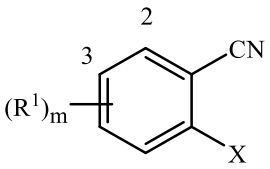
in the presence of a second base.

5. The method of Claim 1 or Claim 4 wherein

R^2 is C_1-C_4 haloalkyl; and

m is 0, 1 or 2.

6. The method of Claim 1 or Claim 5 wherein the compound of Formula **2** is prepared by treating a compound of Formula **9**



9

wherein

each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

X is halogen;

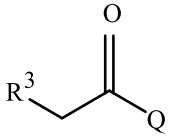
and

m is 0, 1, 2 or 3;

with a methyl magnesium halide followed by treatment with water or aqueous acid.

7. The method of Claim 2 or Claim 4 wherein Z is SO_2R^4.

8. The method of Claim 7 wherein the compound of Formula **7** is prepared by treating a compound of Formula **10**



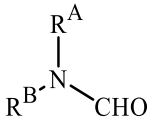
10

wherein

R^3 is halogen, C_1–C_4 alkyl or C_1–C_4 haloalkyl; and

Q is Cl or OH;

in the presence of a halogenating agent and a compound of Formula **11**



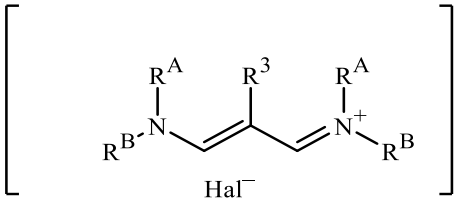
11

wherein

R^A and R^B are each independently C_1–C_4 alkyl; or

R^A and R^B are taken together to be $–(CH_2)_4–$, $–(CH_2)_5–$ or $–CH_2CH_2OCH_2CH_2–$;

to provide an intermediate of Formula **12**



12

wherein

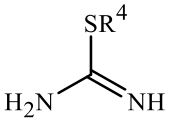
R^3 is halogen, C_1–C_4 alkyl or C_1–C_4 haloalkyl; and

R^A and R^B are each independently C_1–C_4 alkyl; or

R^A and R^B are taken together to be $–(CH_2)_4–$, $–(CH_2)_5–$ or $–CH_2CH_2OCH_2CH_2–$; and

$Hal^–$ is chloride or bromide ion;

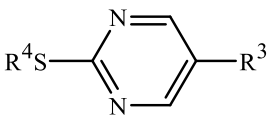
treating the intermediate of Formula **12** with an acid salt of a compound of Formula **13**



13

wherein R^4 is C_1–C_4 alkyl

in the presence of a base to provide a compound of Formula **14**



14

wherein

R^3 is halogen, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

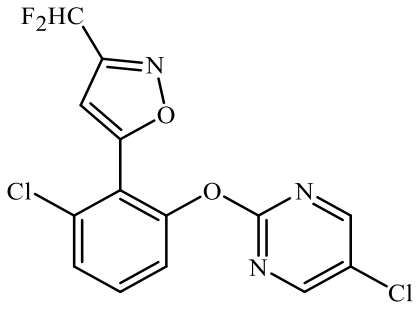
R^4 is C_1–C_4 alkyl; and

treating the compound of Formula **14** with an oxidant.

9. The method of Claim 2 or Claim 4 wherein the compound of Formula **8** is selected from the group consisting of

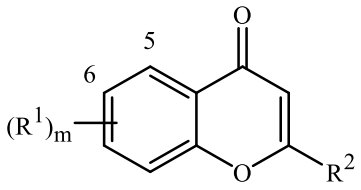
2-[2-(3-bromo-5-isoxazolyl)phenoxy]-5-chloropyrimidine,
5-chloro-2-[2-[3-(difluoromethyl)-5-isoxazolyl]phenoxy]pyrimidine,
5-chloro-2-[2-[3-(trifluoromethyl)-5-isoxazolyl]phenoxy]pyrimidine,
5-chloro-2-[2-[3-(difluoromethyl)-5-isoxazolyl]-3-fluorophenoxy]pyrimidine,
5-bromo-2-[2-[3-(difluoromethyl)-5-isoxazolyl]-3-fluorophenoxy]pyrimidine,
5-chloro-2-[2-[3-(trifluoromethyl)-5-isoxazolyl]-3-chlorophenoxy]pyrimidine,
5-chloro-2-[2-[3-(trifluoromethyl)-5-isoxazolyl]-3-fluorophenoxy]pyrimidine,
5-chloro-2-[2-[3-(difluoromethyl)-5-isoxazolyl]-3-chlorophenoxy]pyrimidine,
5-bromo-2-[2-[3-(difluoromethyl)-5-isoxazolyl]-3-chlorophenoxy]pyrimidine,
5-bromo-2-[2-[3–(trifluoromethyl)-5-isoxazolyl]-3-chlorophenoxy]pyrimidine and
5-chloro-2-[2-[3-(difluoromethyl)-5-isoxazolyl]-3-bromophenoxy]pyrimidine.

10. The method of Claim 9 wherein the compound of Formula **8** is the compound of Formula **8A**



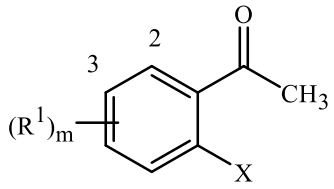
8A

11. A method for preparing a compound of Formula **5**



5

wherein
each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;
R^2 is C_1–C_4 haloalkyl; and
m is 0, 1, 2 or 3; the method comprising;
treating a compound of Formula **2**



2

wherein

each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

m is 0, 1, 2 or 3; and

X is halogen;

with a compound of Formula **3A**

$R^2(C=O)LG$

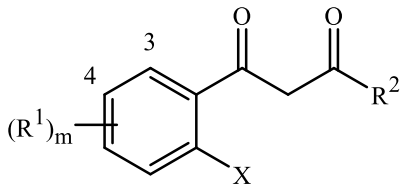
3A

wherein

R^2 is C_1–C_4 haloalkyl; and

LG is chloro, C_1–C_4 alkoxy or $-O(C=O)R^2$;

in the presence of an alkali metal base to provide a compound of Formula **4** or an alkali metal salt thereof



4

wherein

each R^1 is independently halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

R^2 is C_1–C_4 haloalkyl;

m is 0, 1, 2 or 3; and

X is halogen; and;

heating the compound of Formula **4** or the alkali metal salt thereof.

12. The method of Claim 11 wherein R^2 is C_1-C_2 haloalkyl; and m is 0, 1 or 2.

13. The method of Claim 5 or Claim 12 wherein each R^1 is independently halogen or cyano; R^2 is C_1-C_2 fluoroalkyl; and R^3 is halogen.

14. The method of Claim 13 wherein

R^1 is halogen;

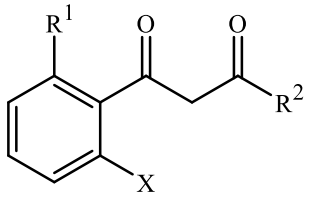
R^2 is C_1 fluoroalkyl;

m is 1; and

R^1 is attached to the remainder of Formula **1** at the 3–position.

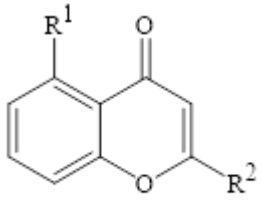
15. The method of Claim 14 wherein R^1 is chlorine; and R^2 is CHF_2; and R^3 is Cl.

16. A compound of Formula **4A** or an alkali metal salt thereof



4A

or a compound of Formula **5A**



5A

wherein

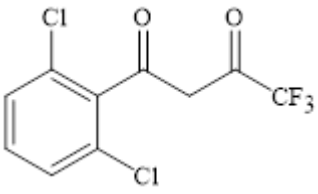
R^1 is halogen, cyano, C_1–C_4 alkyl or C_1–C_4 haloalkyl;

R^2 is C_1–C_2 haloalkyl; and

X is halogen;

wherein when R^1 is fluoro, R^2 is other than trifluoromethyl;

and with the proviso that the compound is not



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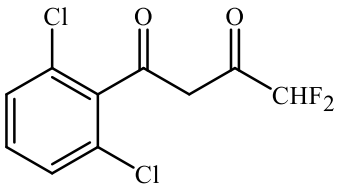
17. The compound of Claim 16 wherein R^2 is C_1-C_2 fluoroalkyl.

18. The compound of Claim 17 wherein R^1 is halogen; and R^2 is C_1 fluoroalkyl.

19. The compound of Claim 18 wherein R^1 is chlorine; and R^2 is CHF_2.

20. The compound of Claim 19 that is the compound of Formula **4C** or its sodium salt



4C

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