(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
9 March 2017 (09.03.2017)

WIPO | PCT

(10) International Publication Number
WO 2017/040194 A1

(51) International Patent Classification:
C07C 275/26 (2006.01) *A01N 47/42* (2006.01)
A01N 43/48 (2006.01) *A01N 53/00* (2006.01)
A01N 43/72 (2006.01) *C07D 307/34* (2006.01)

(21) International Application Number:
PCT/US2016/048633

(22) International Filing Date:
25 August 2016 (25.08.2016)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/214345 4 September 2015 (04.09.2015) US
62/214348 4 September 2015 (04.09.2015) US

(71) Applicant: **DOW AGROSCIENCES LLC** [US/US]; 9330 Zionsville Road, Indianapolis, IN 46268 (US).

(72) Inventors: **GIAMPIETRO, Natalie C.**; 9330 Zionsville Road, Indianapolis, IN 46268 (US). **CROUSE, Gary D.**; 9330 Zionsville Road, Indianapolis, IN 46268 (US). **SPARKS, Thomas C.**; 9330 Zionsville Road, Indianapolis, IN 46268 (US). **DEMETER, David A.**; 9330 Zionsville Road, Indianapolis, IN 46268 (US).

(74) Agent: **LEE, Yung-Hui**; Dow AgroSciences LLC, 9330 Zionsville Road, Indianapolis, Indiana 46268 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

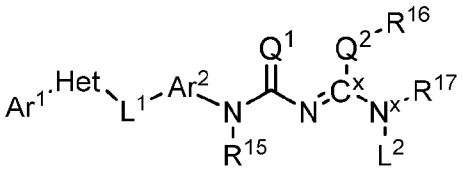
— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(54) Title: MOLECULES HAVING PESTICIDAL UTILITY, AND INTERMEDIATES, COMPOSITIONS, AND PROCESSES, RELATED THERETO



(I)

(57) Abstract: This disclosure relates to the field of molecules having pesticidal utility against pests in Phyla Arthropoda, Mollusca, and Nematoda, processes to produce such molecules, intermediates used in such processes, pesticidal compositions containing such molecules, and processes of using such pesticidal compositions aga inst such pests. These pesticidal compositions may be used, for example, as acaricides, insecticides, miticides, molluscicides, and nematicides. This document discloses molecules having the following formula ("Formula One").

WO 2017/040194 A1

Molecules having pesticidal utility, and intermediates, compositions, and processes, related thereto

Cross Reference to Related Applications

This application claims the benefit of U.S. Provisional Patent Application Serial Nos. 62/214,345 and 62/214,348, both filed September 4, 2015.

Field of this disclosure

This disclosure relates to the field of molecules having pesticidal utility against pests in Phyla Arthropoda, Mollusca, and Nematoda, processes to produce such molecules, intermediates used in such processes, pesticidal compositions containing such molecules, and processes of using such pesticidal compositions against such pests. These pesticidal compositions may be used, for example, as acaricides, insecticides, miticides, molluscicides, and nematicides.

Background of this disclosure

"Many of the most dangerous human diseases are transmitted by insect vectors" (Rivero et al.). "Historically, malaria, dengue, yellow fever, plague, filariasis, louse–borne typhus, trypanomiasis, leishmaniasis, and other vector borne diseases were responsible for more human disease and death in the 17th through the early 20th centuries than all other causes combined" (Gubler). Vector–borne diseases are responsible for about 17% of the global parasitic and infectious diseases. Malaria alone causes over 800,000 deaths a year, 85% of which occur in children under five years of age. Each year there are about 50 to about 100 million cases of dengue fever. A further 250,000 to 500,000 cases of dengue hemorrhagic fever occur each year (Matthews). Vector control plays a critical role in the prevention and control of infectious diseases. However, insecticide resistance, including resistance to multiple insecticides, has arisen in all insect species that are major vectors of human diseases (Rivero et al.). Recently, more than 550 arthropod species have developed resistance to at least one pesticide (Whalon et al.). Furthermore, the cases of insect resistance continue to exceed by far the number of cases of herbicide and fungicide resistance (Sparks et al.).

Each year insects, plant pathogens, and weeds, destroy more than 40% of all food production. This loss occurs despite the application of pesticides and the use of a wide array of non–chemical controls, such as, crop rotations, and biological controls. If just some of this food could be saved, it could be used to feed the more than three billion people in the world who are malnourished (Pimental).

Plant parasitic nematodes are among the most widespread pests, and are frequently one of the most insidious and costly. It has been estimated that losses

attributable to nematodes are from about 9% in developed countries to about 15% in undeveloped countries. However, in the United States of America a survey of 35 States on various crops indicated nematode–derived losses of up to 25% (Nicol et al.).

It is noted that gastropods (slugs and snails) are pests of less economic importance than other arthropods or nematodes, but in certain places, they may reduce yields substantially, severely affecting the quality of harvested products, as well as, transmitting human, animal, and plant diseases. While only a few dozen species of gastropods are serious regional pests, a handful of species are important pests on a worldwide scale. In particular, gastropods affect a wide variety of agricultural and horticultural crops, such as, arable, pastoral, and fiber crops; vegetables; bush and tree fruits; herbs; and ornamentals (Speiser).

Termites cause damage to all types of private and public structures, as well as to agricultural and forestry resources. In 2005, it was estimated that termites cause over US$50 billion in damage worldwide each year (Korb).

Consequently, for many reasons, including those mentioned above, there is an on–going need for the costly (estimated to be about US$256 million per pesticide in 2010), time–consuming (on average about 10 years per pesticide), and difficult, development of new pesticides (CropLife America).

Certain references cited in this disclosure

CropLife America, The Cost of New Agrochemical Product Discovery, Development & Registration, and Research & Development predictions for the Future, 2010.

Drewes, M., Tietjen, K., Sparks, T.C., High–Throughput Screening in Agrochemical Research, *Modern Methods in Crop Protection Research*, Part I, *Methods for the Design and Optimization of New Active Ingredients*, Edited by Jeschke, P., Kramer, W., Schirmer, U., and Matthias W., p. 1–20, 2012.

Gubler, D., Resurgent Vector–Borne Diseases as a Global Health Problem, Emerging Infectious Diseases, Vol. 4, No. 3, p. 442–450, 1998.

Korb, J., Termites, *Current Biology*, Vol. 17, No. 23, 2007.

Matthews, G., Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases, Ch. 1, p. 1, 2011.

Nicol, J., Turner S., Coyne, L., den Nijs, L., Hocksland, L., Tahna–Maafi, Z., Current Nematode Threats to World Agriculture, *Genomic and Molecular Genetics of Plant – Nematode Interactions*, p. 21–43, 2011.

Pimental, D., Pest Control in World Agriculture, *Agricultural Sciences* – Vol. II, 2009.

Rivero, A., Vezilier, J., Weill, M., Read, A., Gandon, S., Insect Control of Vector–Borne Diseases: When is Insect Resistance a Problem? *Public Library of Science Pathogens*, Vol. 6, No. 8, p. 1–9, 2010.

Sparks T.C., Nauen R., IRAC: Mode of action classification and insecticide resistance management, *Pesticide Biochemistry and Physiology* (2014) available online 4 December 2014.

Speiser, B., Molluscicides, *Encyclopedia of Pest Management*, Ch. 219, p. 506–508, 2002.

Whalon, M., Mota–Sanchez, D., Hollingworth, R., Analysis of Global Pesticide Resistance in Arthropods, *Global Pesticide Resistance in Arthropods*, Ch. 1, p. 5–33, 2008.

Definitions used in this disclosure

The examples given in these definitions are generally non–exhaustive and must not be construed as limiting this disclosure. It is understood that a substituent should comply with chemical bonding rules and steric compatibility constraints in relation to the particular molecule to which it is attached. These definitions are only to be used for the purposes of this disclosure.

The phrase "**active ingredient**" means a material having activity useful in controlling pests, and/or that is useful in helping other materials have better activity in controlling pests, examples of such materials include, but are not limited to, acaricides, algicides, antifeedants, avicides, bactericides, bird repellents, chemosterilants, fungicides, herbicide safeners, herbicides, insect attractants, insect repellents, insecticides, mammal repellents, mating disrupters, molluscicides, nematicides, plant activators, plant growth regulators, rodenticides, synergists, and virucides (see alanwood.net). Specific examples of such materials include, but are not limited to, the materials listed in active ingredient group alpha.

The phrase "**active ingredient group alpha**" (hereafter "**AIGA**") means collectively the following materials:

(1) (3-ethoxypropyl)mercury bromide, 1,2-dibromoethane, 1,2-dichloroethane, 1,2-dichloropropane, 1,3-dichloropropene, 1-MCP, 1-methylcyclopropene, 1-naphthol, 2-(octylthio)ethanol, 2,3,3-TPA, 2,3,5-tri-iodobenzoic acid, 2,3,6-TBA, 2,4,5-T, 2,4,5-TB, 2,4,5-TP, 2,4-D, 2,4-DB, 2,4-DEB, 2,4-DEP, 2,4-DES, 2,4-DP, 2,4-MCPA, 2,4-MCPB, 2iP, 2-methoxyethylmercury chloride, 2-phenylphenol, 3,4-DA, 3,4-DB, 3,4-DP, 3,6-dichloropicolinic acid, 4-aminopyridine, 4-CPA, 4-CPB, 4-CPP, 4-hydroxyphenethyl alcohol, 8-hydroxyquinoline sulfate, 8-phenylmercurioxyquinoline, abamectin, abamectin-aminomethyl, abscisic acid, ACC, acephate, acequinocyl, acetamiprid, acethion, acetochlor, acetofenate, acetophos,

acetoprole, acibenzolar, acifluorfen, aclonifen, ACN, acrep, acrinathrin, acrolein, acrylonitrile, acypetacs, afidopyropen, afoxolaner, alachlor, alanap, alanycarb, albendazole, aldicarb, aldicarb sulfone, aldimorph, aldoxycarb, aldrin, allethrin, allicin, allidochlor, allosamidin, alloxydim, allyl alcohol, allyxycarb, alorac, *alpha*-cypermethrin, *alpha*-endosulfan, alphamethrin, altretamine, aluminium phosphide, aluminum phosphide, ametoctradin, ametridione, ametryn, ametryne, amibuzin, amicarbazone, amicarthiazol, amidithion, amidoflumet, amidosulfuron, aminocarb, aminocyclopyrachlor, aminopyralid, aminotriazole, amiprofos-methyl, amiprophos, amiprophos-methyl, amisulbrom, amiton, amitraz, amitrole, ammonium sulfamate, amobam, amorphous silica gel, amorphous silicon dioxide, ampropylfos, AMS, anabasine, ancymidol, anilazine, anilofos, anisuron, anthraquinone, antu, apholate, aramite, arprocarb, arsenous oxide, asomate, aspirin, asulam, athidathion, atraton, atrazine, aureofungin, avermectin B1, AVG, aviglycine, azaconazole, azadirachtin, azafenidin, azamethiphos, azidithion, azimsulfuron, azinphosethyl, azinphos-ethyl, azinphosmethyl, azinphos-methyl, aziprotryn, aziprotryne, azithiram, azobenzene, azocyclotin, azothoate, azoxystrobin, bachmedesh, barban, barbanate, barium hexafluorosilicate, barium polysulfide, barium silicofluoride, barthrin, basic copper carbonate, basic copper chloride, basic copper sulfate, BCPC, beflubutamid, benalaxyl, benalaxyl-M, benazolin, bencarbazone, benclothiaz, bendaqingbingzhi, bendiocarb, bendioxide, benefin, benfluralin, benfuracarb, benfuresate, benmihuangcaoan, benodanil, benomyl, benoxacor, benoxafos, benquinox, bensulfuron, bensulide, bensultap, bentaluron, bentazon, bentazone, benthiavalicarb, benthiazole, benthiocarb, bentranil, benzadox, benzalkonium chloride, benzamacril, benzamizole, benzamorf, benzene hexachloride, benzfendizone, benzimine, benzipram, benzobicyclon, benzoepin, benzofenap, benzofluor, benzohydroxamic acid, benzomate, benzophosphate, benzothiadiazole, benzovindiflupyr, benzoximate, benzoylprop, benzthiazuron, benzuocaotong, benzyl benzoate, benzyladenine, berberine, *beta*-cyfluthrin, *beta*-cypermethrin, bethoxazin, BHC, bialaphos, bicyclopyrone, bifenazate, bifenox, bifenthrin, bifujunzhi, bilanafos, binapacryl, bingqingxiao, bioallethrin, bioethanomethrin, biopermethrin, bioresmethrin, biphenyl, bisazir, bismerthiazol, bismerthiazol-copper, bisphenylmercury methylenedi(x-naphthalene-y-sulphonate), bispyribac, bistrifluron, bisultap, bitertanol, bithionol, bixafen, blasticidin-S, borax, Bordeaux mixture, boric acid, boscalid, BPPS, brassinolide, brassinolide-ethyl, brevicomin, brodifacoum, brofenprox, brofenvalerate, broflanilide, brofluthrinate, bromacil, bromadiolone, bromchlophos, bromethalin, bromethrin, bromfenvinfos, bromoacetamide, bromobonil, bromobutide, bromociclen, bromocyclen, bromo-DDT, bromofenoxim, bromofos, bromomethane, bromophos, bromophos-ethyl, bromopropylate, bromothalonil, bromoxynil, brompyrazon, bromuconazole, bronopol, BRP, BTH, bucarpolate, bufencarb, buminafos, bupirimate, buprofezin, Burgundy

mixture, busulfan, busulphan, butacarb, butachlor, butafenacil, butam, butamifos, butane-fipronil, butathiofos, butenachlor, butene-fipronil, butethrin, buthidazole, buthiobate, buthiuron, butifos, butocarboxim, butonate, butopyronoxyl, butoxycarboxim, butralin, butrizol, butroxydim, buturon, butylamine, butylate, butylchlorophos, butylene-fipronil, cacodylic acid, cadusafos, cafenstrole, calciferol, calcium arsenate, calcium chlorate, calcium cyanamide, calcium cyanide, calcium polysulfide, calvinphos, cambendichlor, camphechlor, camphor, captafol, captan, carbam, carbamorph, carbanolate, carbaril, carbaryl, carbasulam, carbathion, carbendazim, carbendazol, carbetamide, carbofenotion, carbofuran, carbon disulfide, carbon tetrachloride, carbonyl sulfide, carbophenothion, carbophos, carbosulfan, carboxazole, carboxide, carboxin, carfentrazone, carpropamid, cartap, carvacrol, carvone, CAVP, CDAA, CDEA, CDEC, cellocidin, CEPC, ceralure, cerenox, cevadilla, Cheshunt mixture, chinalphos, chinalphos-méthyl, chinomethionat, chinomethionate, chiralaxyl, chitosan, chlobenthiazone, chlomethoxyfen, chloralose, chloramben, chloramine phosphorus, chloramphenicol, chloraniformethan, chloranil, chloranocryl, chlorantraniliprole, chlorazifop, chlorazine, chlorbenside, chlorbenzuron, chlorbicyclen, chlorbromuron, chlorbufam, chlordane, chlordecone, chlordimeform, chlorempenthrin, chloretazate, chlorethephon, chlorethoxyfos, chloreturon, chlorfenac, chlorfenapyr, chlorfenazole, chlorfenethol, chlorfenidim, chlorfenprop, chlorfenson, chlorfensulphide, chlorfenvinphos, chlorfenvinphos-methyl, chlorfluazuron, chlorflurazole, chlorflurecol, chlorfluren, chlorflurenol, chloridazon, chlorimuron, chlorinate, chlor-IPC, chlormephos, chlormequat, chlormesulone, chlormethoxynil, chlornidine, chlornitrofen, chloroacetic acid, chlorobenzilate, chlorodinitronaphthalenes, chlorofénizon, chloroform, chloromebuform, chloromethiuron, chloroneb, chlorophacinone, chlorophos, chloropicrin, chloropon, chloroprallethrin, chloropropylate, chlorothalonil, chlorotoluron, chloroxifenidim, chloroxuron, chloroxynil, chlorphonium, chlorphoxim, chlorprazophos, chlorprocarb, chlorpropham, chlorpyrifos, chlorpyrifos-methyl, chlorquinox, chlorsulfuron, chlorthal, chlorthiamid, chlorthiophos, chlortoluron, chlozolinate, chltosan, cholecalciferol, choline chloride, chromafenozide, cicloheximide, cimectacarb, cimetacarb, cinerin I, cinerin II, cinerins, cinidon-ethyl, cinmethylin, cinosulfuron, cintofen, ciobutide, cisanilide, cismethrin, clacyfos, clefoxydim, clenpirin, clenpyrin, clethodim, climbazole, cliodinate, clodinafop, cloethocarb, clofencet, clofenotane, clofentezine, clofenvinfos, clofibric acid, clofop, clomazone, clomeprop, clonitralid, cloprop, cloproxydim, clopyralid, cloquintocet, cloransulam, closantel, clothianidin, clotrimazole, cloxyfonac, cloxylacon, clozylacon, CMA, CMMP, CMP, CMU, codlelure, colecalciferol, colophonate, copper 8-quinolinolate, copper acetate, copper acetoarsenite, copper arsenate, copper carbonate, basic, copper hydroxide, copper naphthenate, copper oleate, copper oxychloride, copper silicate, copper sulfate, copper sulfate, basic, copper zinc chromate, coumachlor, coumafène,

coumafos, coumafuryl, coumaphos, coumatetralyl, coumethoxystrobin, coumithoate, coumoxystrobin, CPMC, CPMF, CPPC, credazine, cresol, cresylic acid, crimidine, crotamiton, crotoxyfos, crotoxyphos, crufomate, cryolite, cue-lure, cufraneb, cumyleron, cumyluron, cuprobam, cuprous oxide, curcumenol, CVMP, cyanamide, cyanatryn, cyanazine, cyanofenphos, cyanogen, cyanophos, cyanthoate, cyantraniliprole, cyanuric acid, cyazofamid, cybutryne, cyclafuramid, cyclanilide, cyclaniliprole, cyclethrin, cycloate, cycloheximide, cycloprate, cycloprothrin, cyclopyrimorate, cyclosulfamuron, cycloxydim, cycluron, cyenopyrafen, cyflufenamid, cyflumetofen, cyfluthrin, cyhalodiamide, cyhalofop, cyhalothrin, cyhexatin, cymiazole, cymoxanil, cyometrinil, cypendazole, cypermethrin, cyperquat, cyphenothrin, cyprazine, cyprazole, cyproconazole, cyprodinil, cyprofuram, cypromid, cyprosulfamide, cyromazine, cythioate, cytrex, daimuron, dalapon, daminozide, dayoutong, dazomet, DBCP, *d*-camphor, DCB, DCIP, DCPA (Japan), DCPA (USA), DCPTA, DCU, DDD, DDPP, DDT, DDVP, debacarb, decafentin, decamethrin, decarbofuran, deet, dehydroacetic acid, deiquat, delachlor, delnav, deltamethrin, demephion, demephion-O, demephion-S, demeton, demeton-methyl, demeton-O, demeton-O-methyl, demeton-S, demeton-S-methyl, demeton-S-methyl sulphone, demeton-S-methylsulphon, DEP, depalléthrine, derris, desmedipham, desmetryn, desmetryne, d-fanshiluquebingjuzhi, diafenthiuron, dialifor, dialifos, diallate, di-allate, diamidafos, dianat, diatomaceous earth, diatomite, diazinon, dibrom, dibutyl phthalate, dibutyl succinate, dicamba, dicapthon, dichlobenil, dichlobentiazox, dichlofenthion, dichlofluanid, dichlone, dichloralurea, dichlorbenzuron, dichlorfenidim, dichlorflurecol, dichlorflurenol, dichlormate, dichlormid, dichloromethane, dichlorophen, dichlorprop, dichlorprop-P, dichlorvos, dichlozolin, dichlozoline, diclobutrazol, diclocymet, diclofop, diclomezine, dicloran, dicloromezotiaz, diclosulam, dicofol, dicophane, dicoumarol, dicresyl, dicrotophos, dicryl, dicumarol, dicyclanil, dicyclonon, dieldrin, dienochlor, diethamquat, diethatyl, diethion, diéthion, diethofencarb, dietholate, diéthon, diethyl pyrocarbonate, diethyltoluamide, difenacoum, difenoconazole, difenopenten, difenoxuron, difenzoquat, difethialone, diflovidazin, diflubenzuron, diflufenican, diflufenicanil, diflufenzopyr, diflumetorim, dikegulac, dilor, dimatif, dimefluthrin, dimefox, dimefuron, dimehypo, dimepiperate, dimetachlone, dimetan, dimethacarb, dimethachlone, dimethachlor, dimethametryn, dimethenamid, dimethenamid-P, dimethipin, dimethirimol, dimethoate, dimethomorph, dimethrin, dimethyl carbate, dimethyl disulfide, dimethyl phthalate, dimethylvinphos, dimetilan, dimexano, dimidazon, dimoxystrobin, dimpylate, dimuron, dinex, dingjunezuo, diniconazole, diniconazole-M, dinitramine, dinitrophenols, dinobuton, dinocap, dinocap-4, dinocap-6, dinocton, dinofenate, dinopenton, dinoprop, dinosam, dinoseb, dinosulfon, dinotefuran, dinoterb, dinoterbon, diofenolan, dioxabenzofos, dioxacarb, dioxathion, dioxation, diphacin, diphacinone, diphenadione, diphenamid, diphenamide, diphenyl sulfone,

diphenylamine, diphenylsulphide, diprogulic acid, dipropalin, dipropetryn, dipterex, dipymetitrone, dipyrithione, diquat, disodium tetraborate, disosultap, disparlure, disugran, disul, disulfiram, disulfoton, ditalimfos, dithianon, dithicrofos, dithioether, dithiométon, dithiopyr, diuron, dixanthogen, d-limonene, DMDS, DMPA, DNOC, dodemorph, dodicin, dodine, dofenapyn, doguadine, dominicalure, doramectin, DPC, drazoxolon, DSMA, d-trans-allethrin, d-trans-resmethrin, dufulin, dymron, EBEP, EBP, ebufos, ecdysterone, echlomezol, EDB, EDC, EDDP, edifenphos, eglinazine, emamectin, EMPC, empenthrin, enadenine, endosulfan, endothal, endothall, endothion, endrin, enestroburin, enilconazole, enoxastrobin, ephirsulfonate, EPN, epocholeone, epofenonane, epoxiconazole, eprinomectin, epronaz, epsilon-metofluthrin, epsilon-momfluorothrin, EPTC, erbon, ergocalciferol, erlujixiancaoan, esdépalléthrine, esfenvalerate, ESP, esprocarb, etacelasil, etaconazole, etaphos, etem, ethaboxam, ethachlor, ethalfluralin, ethametsulfuron, ethaprochlor, ethephon, ethidimuron, ethiofencarb, ethiolate, ethion, ethiozin, ethiprole, ethirimol, ethoate-methyl, ethobenzanid, ethofumesate, ethohexadiol, ethoprop, ethoprophos, ethoxyfen, ethoxyquin, ethoxysulfuron, ethychlozate, ethyl formate, ethyl pyrophosphate, ethylan, ethyl-DDD, ethylene, ethylene dibromide, ethylene dichloride, ethylene oxide, ethylicin, ethylmercury 2,3-dihydroxypropyl mercaptide, ethylmercury acetate, ethylmercury bromide, ethylmercury chloride, ethylmercury phosphate, etinofen, ETM, etnipromid, etobenzanid, etofenprox, etoxazole, etridiazole, etrimfos, étrimphos, eugenol, EXD, famoxadone, famphur, fenac, fenamidone, fenaminosulf, fenaminstrobin, fenamiphos, fenapanil, fenarimol, fenasulam, fenazaflor, fenazaquin, fenbuconazole, fenbutatin oxide, fenchlorazole, fenchlorphos, fenclofos, fenclorim, fenethacarb, fenfluthrin, fenfuram, fenhexamid, fenidin, fenitropan, fenitrothion, fénizon, fenjuntong, fenobucarb, fenolovo, fenoprop, fenothiocarb, fenoxacrim, fenoxanil, fenoxaprop, fenoxaprop-P, fenoxasulfone, fenoxycarb, fenpiclonil, fenpirithrin, fenpropathrin, fenpropidin, fenpropimorph, fenpyrazamine, fenpyroximate, fenquinotrione, fenridazon, fenson, fensulfothion, fenteracol, fenthiaprop, fenthion, fenthion-ethyl, fentiaprop, fentin, fentrazamide, fentrifanil, fenuron, fenuron-TCA, fenvalerate, ferbam, ferimzone, ferric phosphate, ferrous sulfate, fipronil, flamprop, flamprop-M, flazasulfuron, flocoumafen, flometoquin, flonicamid, florasulam, florpyrauxifen, fluacrypyrim, fluazaindolizine, fluazifop, fluazifop-P, fluazinam, fluazolate, fluazuron, flubendiamide, flubenzimine, flubrocythrinate, flucarbazone, flucetosulfuron, fluchloralin, flucofuron, flucycloxuron, flucythrinate, fludioxonil, fluénéthyl, fluenetil, fluensulfone, flufenacet, flufenerim, flufenican, flufenoxuron, flufenoxystrobin, flufenprox, flufenpyr, flufenzine, flufiprole, fluhexafon, flumethrin, flumetover, flumetralin, flumetsulam, flumezin, flumiclorac, flumioxazin, flumipropyn, flumorph, fluometuron, fluopicolide, fluopyram, fluorbenside, fluoridamid, fluoroacetamide, fluoroacetic acid, fluorochloridone, fluorodifen, fluoroglycofen,

fluoroimide, fluoromide, fluoromidine, fluoronitrofen, fluoroxypyr, fluothiuron, fluotrimazole, fluoxastrobin, flupoxam, flupropacil, flupropadine, flupropanate, flupyradifurone, flupyrsulfuron, fluquinconazole, fluralaner, flurazole, flurecol, flurenol, fluridone, flurochloridone, fluromidine, fluroxypyr, flurprimidol, flursulamid, flurtamone, flusilazole, flusulfamide, flutenzine, fluthiacet, fluthiamide, flutianil, flutolanil, flutriafol, fluvalinate, fluxametamide, fluxapyroxad, fluxofenim, folpel, folpet, fomesafen, fonofos, foramsulfuron, forchlorfenuron, formaldehyde, formetanate, formothion, formparanate, fosamine, fosetyl, fosmethilan, fospirate, fosthiazate, fosthietan, frontalin, fthalide, fuberidazole, fucaojing, fucaomi, fujunmanzhi, fulumi, fumarin, funaihecaoling, fuphenthiourea, furalane, furalaxyl, furamethrin, furametpyr, furan tebufenozide, furathiocarb, furcarbanil, furconazole, furconazole-*cis*, furethrin, furfural, furilazole, furmecyclox, furophanate, furyloxyfen, *gamma*-BHC, *gamma*-cyhalothrin, *gamma*-HCH, genit, gibberellic acid, gibberellin A3, gibberellins, gliftor, glitor, glucochloralose, glufosinate, glufosinate-P, glyodin, glyoxime, glyphosate, glyphosine, gossyplure, grandlure, griseofulvin, guanoctine, guazatine, halacrinate, halauxifen, halfenprox, halofenozide, halosafen, halosulfuron, haloxydine, haloxyfop, haloxyfop-P, haloxyfop-R, HCA, HCB, HCH, hemel, hempa, HEOD, heptachlor, heptafluthrin, heptenophos, heptopargil, herbimycin, herbimycin A, heterophos, hexachlor, hexachloran, hexachloroacetone, hexachlorobenzene, hexachlorobutadiene, hexachlorophene, hexaconazole, hexaflumuron, hexafluoramin, hexaflurate, hexalure, hexamide, hexazinone, hexylthiofos, hexythiazox, HHDN, holosulf, homobrassinolide, huancaiwo, huanchongjing, huangcaoling, huanjunzuo, hydramethylnon, hydrargaphen, hydrated lime, hydrogen cyanamide, hydrogen cyanide, hydroprene, hydroxyisoxazole, hymexazol, hyquincarb, IAA, IBA, IBP, icaridin, imazalil, imazamethabenz, imazamox, imazapic, imazapyr, imazaquin, imazethapyr, imazosulfuron, imibenconazole, imicyafos, imidacloprid, imidaclothiz, iminoctadine, imiprothrin, inabenfide, indanofan, indaziflam, indoxacarb, inezin, infusorial earth, iodobonil, iodocarb, iodofenphos, iodomethane, iodosulfuron, iofensulfuron, ioxynil, ipazine, IPC, ipconazole, ipfencarbazone, ipfentrifluconazole, iprobenfos, iprodione, iprovalicarb, iprymidam, ipsdienol, ipsenol, IPSP, IPX, isamidofos, isazofos, isobenzan, isocarbamid, isocarbamide, isocarbophos, isocil, isodrin, isofenphos, isofenphos-methyl, isofetamid, isolan, isomethiozin, isonoruron, isopamphos, isopolinate, isoprocarb, isoprocil, isopropalin, isopropazol, isoprothiolane, isoproturon, isopyrazam, isopyrimol, isothioate, isotianil, isouron, isovaledione, isoxaben, isoxachlortole, isoxadifen, isoxaflutole, isoxapyrifop, isoxathion, isuron, ivermectin, ixoxaben, izopamfos, izopamphos, japonilure, japothrins, jasmolin I, jasmolin II, jasmonic acid, jiahuangchongzong, jiajizengxiaolin, jiaxiangjunzhi, jiecaowan, jiecaoxi, Jinganmycin A, jodfenphos, juvenile hormone I, juvenile hormone II, juvenile hormone III, kadethrin, kappa-bifenthrin, kappa-tefluthrin, karbutilate,

karetazan, kasugamycin, kejunlin, kelevan, ketospiradox, kieselguhr, kinetin, kinoprene, kiralaxyl, kresoxim-methyl, kuicaoxi, lactofen, *lambda*-cyhalothrin, lancotrione, latilure, lead arsenate, lenacil, lepimectin, leptophos, lianbenjingzhi, lime sulfur, lindane, lineatin, linuron, lirimfos, litlure, looplure, lufenuron, lüfuqingchongxianan, lüxiancaolin, lvdingjunzhi, lvfumijvzhi, lvxiancaolin, lythidathion, M-74, M-81, MAA, magnesium phosphide, malathion, maldison, maleic hydrazide, malonoben, maltodextrin, MAMA, mancopper, mancozeb, mandestrobin, mandipropamid, maneb, matrine, mazidox, MCC, MCP, MCPA, MCPA-thioethyl, MCPB, MCPP, mebenil, mecarbam, mecarbinzid, mecarphon, mecoprop, mecoprop-P, medimeform, medinoterb, medlure, mefenacet, mefenoxam, mefenpyr, mefentrifluconazole, mefluidide, megatomoic acid, melissyl alcohol, melitoxin, MEMC, menazon, MEP, mepanipyrim, meperfluthrin, mephenate, mephosfolan, mepiquat, mepronil, meptyldinocap, mercaptodimethur, mercaptophos, mercaptophos thiol, mercaptothion, mercuric chloride, mercuric oxide, mercurous chloride, merphos, merphos oxide, mesoprazine, mesosulfuron, mesotrione, mesulfen, mesulfenfos, mesulphen, metacresol, metaflumizone, metalaxyl, metalaxyl-M, metaldehyde, metam, metamifop, metamitron, metaphos, metaxon, metazachlor, metazosulfuron, metazoxolon, metconazole, metepa, metflurazon, methabenzthiazuron, methacrifos, methalpropalin, metham, methamidophos, methasulfocarb, methazole, methfuroxam, methibenzuron, methidathion, methiobencarb, methiocarb, methiopyrisulfuron, methiotepa, methiozolin, methiuron, methocrotophos, métholcarb, methometon, methomyl, methoprene, methoprotryn, methoprotryne, methoquin-butyl, methothrin, methoxychlor, methoxyfenozide, methoxyphenone, methyl apholate, methyl bromide, methyl eugenol, methyl iodide, methyl isothiocyanate, methyl parathion, methylacetophos, methylchloroform, methyldithiocarbamic acid, methyldymron, methylene chloride, methyl-isofenphos, methylmercaptophos, methylmercaptophos oxide, methylmercaptophos thiol, methylmercury benzoate, methylmercury dicyandiamide, methylmercury pentachlorophenoxide, methylneodecanamide, methylnitrophos, methyltriazothion, metiozolin, metiram, metiram-zinc, metobenzuron, metobromuron, metofluthrin, metolachlor, metolcarb, metometuron, metominostrobin, metosulam, metoxadiazone, metoxuron, metrafenone, metriam, metribuzin, metrifonate, metriphonate, metsulfovax, metsulfuron, mevinphos, mexacarbate, miechuwei, mieshuan, miewenjuzhi, milbemectin, milbemycin oxime, milneb, mimanan, mipafox, MIPC, mirex, MNAF, moguchun, molinate, molosultap, momfluorothrin, monalide, monisuron, monoamitraz, monochloroacetic acid, monocrotophos, monolinuron, monomehypo, monosulfiram, monosulfuron, monosultap, monuron, monuron-TCA, morfamquat, moroxydine, morphothion, morzid, moxidectin, MPMC, MSMA, MTMC, muscalure, myclobutanil, myclozolin, myricyl alcohol, *N*-(ethylmercury)-*p*-toluenesulphonanilide, NAA, NAAm, nabam, naftalofos, naled, naphthalene,

naphthaleneacetamide, naphthalic anhydride, naphthalophos, naphthoxyacetic acids, naphthylacetic acids, naphthylindane-1,3-diones, naphthyloxyacetic acids, naproanilide, napropamide, napropamide-M, naptalam, natamycin, NBPOS, neburea, neburon, nendrin, neonicotine, nichlorfos, niclofen, niclosamide, nicobifen, nicosulfuron, nicotine, nicotine sulfate, nifluridide, nikkomycins, NIP, nipyraclofen, nipyralofen, nitenpyram, nithiazine, nitralin, nitrapyrin, nitrilacarb, nitrofen, nitrofluorfen, nitrostyrene, nitrothal-isopropyl, nobormide, nonanol, norbormide, norea, norflurazon, nornicotine, noruron, novaluron, noviflumuron, NPA, nuarimol, nuranone, OCH, octachlorodipropyl ether, octhilinone, o-dichlorobenzene, ofurace, omethoate, o-phenylphenol, orbencarb, orfralure, orthobencarb, ortho-dichlorobenzene, orthosulfamuron, oryctalure, orysastrobin, oryzalin, osthol, osthole, ostramone, ovatron, ovex, oxabetrinil, oxadiargyl, oxadiazon, oxadixyl, oxamate, oxamyl, oxapyrazon, oxapyrazone, oxasulfuron, oxathiapiprolin, oxaziclomefone, oxine-copper, oxine-Cu, oxolinic acid, oxpoconazole, oxycarboxin, oxydemeton-methyl, oxydeprofos, oxydisulfoton, oxyenadenine, oxyfluorfen, oxymatrine, oxytetracycline, oxythioquinox, PAC, paclobutrazol, paichongding, palléthrine, PAP, *para*-dichlorobenzene, parafluron, paraquat, parathion, parathion-methyl, parinol, Paris green, PCNB, PCP, PCP-Na, *p*-dichlorobenzene, PDJ, pebulate, pédinex, pefurazoate, pelargonic acid, penconazole, pencycuron, pendimethalin, penfenate, penflufen, penfluron, penoxalin, penoxsulam, pentachlorophenol, pentachlorophenyl laurate, pentanochlor, penthiopyrad, pentmethrin, pentoxazone, perchlordecone, perfluidone, permethrin, pethoxamid, PHC, phenamacril, phenamacril-ethyl, phénaminosulf, phenazine oxide, phénétacarbe, phenisopham, phenkapton, phenmedipham, phenmedipham-ethyl, phenobenzuron, phenothiol, phenothrin, phenproxide, phenthoate, phenylmercuriurea, phenylmercury acetate, phenylmercury chloride, phenylmercury derivative of pyrocatechol, phenylmercury nitrate, phenylmercury salicylate, phorate, phosacetim, phosalone, phosametine, phosazetim, phosazetin, phoscyclotin, phosdiphen, phosethyl, phosfolan, phosfolan-methyl, phosglycin, phosmet, phosnichlor, phosphamide, phosphamidon, phosphine, phosphinothricin, phosphocarb, phosphorus, phostin, phoxim, phoxim-methyl, phthalide, phthalophos, phthalthrin, picarbutrazox, picaridin, picloram, picolinafen, picoxystrobin, pimaricin, pindone, pinoxaden, piperalin, piperazine, piperonyl butoxide, piperonyl cyclonene, piperophos, piproctanly, piproctanyl, piprotal, pirimetaphos, pirimicarb, piriminil, pirimioxyphos, pirimiphos-ethyl, pirimiphos-methyl, pival, pivaldione, plifenate, PMA, PMP, polybutenes, polycarbamate, polychlorcamphene, polyethoxyquinoline, polyoxin D, polyoxins, polyoxorim, polythialan, potassium arsenite, potassium azide, potassium cyanate, potassium ethylxanthate, potassium naphthenate, potassium polysulfide, potassium thiocyanate, pp'-DDT, prallethrin, precocene I, precocene II, precocene III, pretilachlor, primidophos, primisulfuron, probenazole, prochloraz,

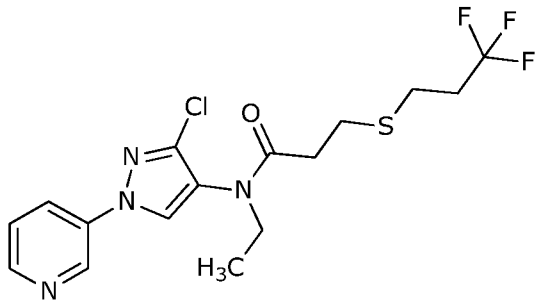
proclonol, procyazine, procymidone, prodiamine, profenofos, profluazol, profluralin, profluthrin, profoxydim, profurite-aminium, proglinazine, prohexadione, prohydrojasmon, promacyl, promecarb, prometon, prometryn, prometryne, promurit, pronamide, propachlor, propafos, propamidine, propamocarb, propanil, propaphos, propaquizafop, propargite, proparthrin, propazine, propetamphos, propham, propiconazole, propidine, propineb, propisochlor, propoxur, propoxycarbazone, propyl isome, propyrisulfuron, propyzamide, proquinazid, prosuler, prosulfalin, prosulfocarb, prosulfuron, prothidathion, prothiocarb, prothioconazole, prothiofos, prothoate, protrifenbute, proxan, prymidophos, prynachlor, psoralen, psoralene, pydanon, pydiflumetofen, pyflubumide, pymetrozine, pyracarbolid, pyraclofos, pyraclonil, pyraclostrobin, pyraflufen, pyrafluprole, pyramat, pyrametostrobin, pyraoxystrobin, pyrasulfotole, pyraziflumid, pyrazolate, pyrazolynate, pyrazon, pyrazophos, pyrazosulfuron, pyrazothion, pyrazoxyfen, pyresmethrin, pyrethrin I, pyrethrin II, pyrethrins, pyribambenz-isopropyl, pyribambenz-propyl, pyribencarb, pyribenzoxim, pyributicarb, pyriclor, pyridaben, pyridafol, pyridalyl, pyridaphenthion, pyridaphenthione, pyridate, pyridinitril, pyrifenox, pyrifluquinazon, pyriftalid, pyrimétaphos, pyrimethanil, pyrimicarbe, pyrimidifen, pyriminobac, pyriminostrobin, pyrimiphos-éthyl, pyrimiphos-méthyl, pyrimisulfan, pyrimitate, pyrinuron, pyriofenone, pyriprole, pyripropanol, pyriproxyfen, pyrisoxazole, pyrithiobac, pyrolan, pyroquilon, pyroxasulfone, pyroxsulam, pyroxychlor, pyroxyfur, qincaosuan, qingkuling, quassia, quinacetol, quinalphos, quinalphos-methyl, quinazamid, quinclorac, quinconazole, quinmerac, quinoclamine, quinofumelin, quinomethionate, quinonamid, quinothion, quinoxyfen, quintiofos, quintozene, quizalofop, quizalofop-P, quwenzhi, quyingding, rabenzazole, rafoxanide, R-diniconazole, rebemide, reglone, renriduron, rescalure, resmethrin, rhodethanil, rhodojaponin-III, ribavirin, rimsulfuron, rizazole, R-metalaxyl, rodéthanil, ronnel, rotenone, ryania, sabadilla, saflufenacil, saijunmao, saisentong, salicylanilide, salifluofen, sanguinarine, santonin, S-bioallethrin, schradan, scilliroside, sebuthylazine, secbumeton, sedaxane, selamectin, semiamitraz, sesamex, sesamolin, sesone, sethoxydim, sevin, shuangjiaancaolin, shuangjianancaolin, S-hydroprene, siduron, sifumijvzhi, siglure, silafluofen, silatrane, silica aerogel, silica gel, silthiofam, silthiopham, silthiophan, silvex, simazine, simeconazole, simeton, simetryn, simetryne, sintofen, S-kinoprene, slaked lime, SMA, S-methoprene, S-metolachlor, sodium arsenite, sodium azide, sodium chlorate, sodium cyanide, sodium fluoride, sodium fluoroacetate, sodium hexafluorosilicate, sodium naphthenate, sodium *o*-phenylphenoxide, sodium orthophenylphenoxide, sodium pentachlorophenate, sodium pentachlorophenoxide, sodium polysulfide, sodium silicofluoride, sodium tetrathiocarbonate, sodium thiocyanate, solan, sophamide, spinetoram, spinosad, spirodiclofen, spiromesifen, spirotetramat, spiroxamine, stirofos, streptomycin, strychnine, sulcatol, sulcofuron,

sulcotrione, sulfallate, sulfentrazone, sulfiram, sulfluramid, sulfodiazole, sulfometuron, sulfosate, sulfosulfuron, sulfotep, sulfotepp, sulfoxaflor, sulfoxide, sulfoxime, sulfur, sulfuric acid, sulfuryl fluoride, sulglycapin, sulphosate, sulprofos, sultropen, swep, tau-fluvalinate, tavron, tazimcarb, TBTO, TBZ, TCA, TCBA, TCMTB, TCNB, TDE, tebuconazole, tebufenozide, tebufenpyrad, tebufloquin, tebupirimfos, tebutam, tebuthiuron, tecloftalam, tecnazene, tecoram, tedion, teflubenzuron, tefluthrin, tefuryltrione, tembotrione, temefos, temephos, tepa, TEPP, tepraloxydim, teproloxydim, terallethrin, terbacil, terbucarb, terbuchlor, terbufos, terbumeton, terbuthylazine, terbutol, terbutryn, terbutryne, terraclor, terramicin, terramycin, tetcyclacis, tetrachloroethane, tetrachlorvinphos, tetraconazole, tetradifon, tetradisul, tetrafluron, tetramethrin, tetramethylfluthrin, tetramine, tetranactin, tetraniliprole, tetrapion, tetrasul, thallium sulfate, thallous sulfate, thenylchlor, *theta*-cypermethrin, thiabendazole, thiacloprid, thiadiazine, thiadifluor, thiamethoxam, thiameturon, thiapronil, thiazafluron, thiazfluron, thiazone, thiazopyr, thicrofos, thicyofen, thidiazimin, thidiazuron, thiencarbazone, thifensulfuron, thifluzamide, thimerosal, thimet, thiobencarb, thiocarboxime, thiochlorfenphim, thiochlorphenphime, thiocyanatodinitrobenzenes, thiocyclam, thiodan, thiodiazole-copper, thiodicarb, thiofanocarb, thiofanox, thiofluoximate, thiohempa, thiomersal, thiometon, thionazin, thiophanate, thiophanate-ethyl, thiophanate-methyl, thiophos, thioquinox, thiosemicarbazide, thiosultap, thiotepa, thioxamyl, thiram, thiuram, thuringiensin, tiabendazole, tiadinil, tiafenacil, tiaojiean, TIBA, tifatol, tiocarbazil, tioclorim, tioxazafen, tioxymid, tirpate, TMTD, tolclofos-methyl, tolfenpyrad, tolprocarb, tolpyralate, tolyfluanid, tolylfluanid, tolylmercury acetate, tomarin, topramezone, toxaphene, TPN, tralkoxydim, tralocythrin, tralomethrin, tralopyril, transfluthrin, transpermethrin, tretamine, triacontanol, triadimefon, triadimenol, triafamone, triallate, tri-allate, triamiphos, triapenthenol, triarathene, triarimol, triasulfuron, triazamate, triazbutil, triaziflam, triazophos, triazothion, triazoxide, tribasic copper chloride, tribasic copper sulfate, tribenuron, tribufos, tributyltin oxide, tricamba, trichlamide, trichlopyr, trichlorfon, trichlormetaphos-3, trichloronat, trichloronate, trichlorotrinitrobenzenes, trichlorphon, triclopyr, triclopyricarb, tricresol, tricyclazole, tricyclohexyltin hydroxide, tridemorph, tridiphane, trietazine, trifenmorph, trifenofos, trifloxystrobin, trifloxysulfuron, trifludimoxazin, triflumezopyrim, triflumizole, triflumuron, trifluralin, triflusulfuron, trifop, trifopsime, triforine, trihydroxytriazine, trimedlure, trimethacarb, trimeturon, trinexapac, triphenyltin, triprene, tripropindan, triptolide, tritac, trithialan, triticonazole, tritosulfuron, trunc-call, tuoyelin, uniconazole, uniconazole-P, urbacide, uredepa, valerate, validamycin, validamycin A, valifenalate, valone, vamidothion, vangard, vaniliprole, vernolate, vinclozolin, vitamin D3, warfarin, xiaochongliulin, xinjunan, xiwojunan, xiwojunzhi, XMC, xylachlor, xylenols, xylylcarb, xymiazole,

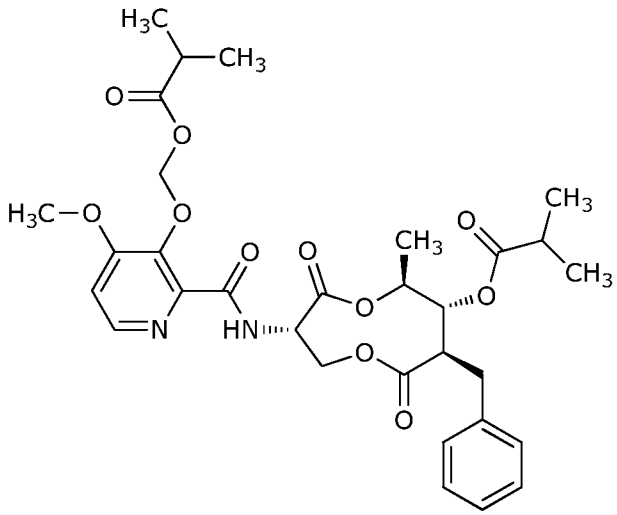
yishijing, zarilamid, zeatin, zengxiaoan, zengxiaolin, *zeta*-cypermethrin, zinc naphthenate, zinc phosphide, zinc thiazole, zinc thiozole, zinc trichlorophenate, zinc trichlorophenoxide, zineb, ziram, zolaprofos, zoocoumarin, zoxamide, zuoanjunzhi, zuocaoan, zuojunzhi, zuomihuanglong, α-chlorohydrin, α-ecdysone, α-multistriatin, α-naphthaleneacetic acids, and β-ecdysone;

(2) the following molecules

(a) *N*–(3–chloro–1–(pyridin–3–yl)–1*H*–pyrazol–4–yl)–*N*–ethyl–3–((3,3,3–trifluoropropyl)thio)propanamide (hereafter "**AI–1**")

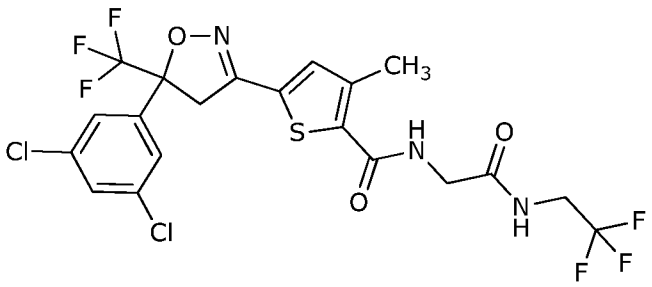


(b) (3*S*,6*S*,7*R*,8*R*)–8–benzyl–3–(3–((isobutyryloxy)methoxy)–4–methoxypicolinamido)–6–methyl–4,9–dioxo–1,5–dioxonan–7–yl isobutyrate (hereafter "**AI–2**")



,

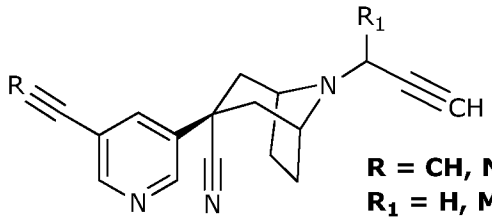
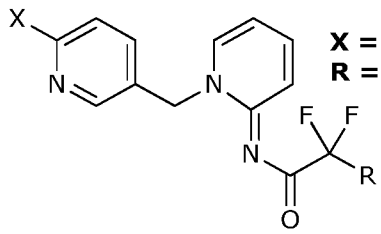
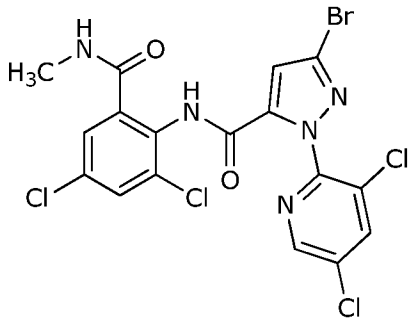
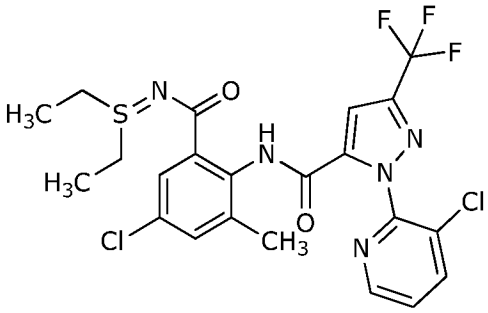
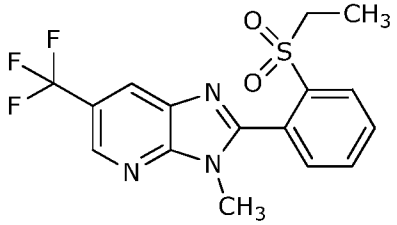
(3) a molecule known as Lotilaner that has the following structure

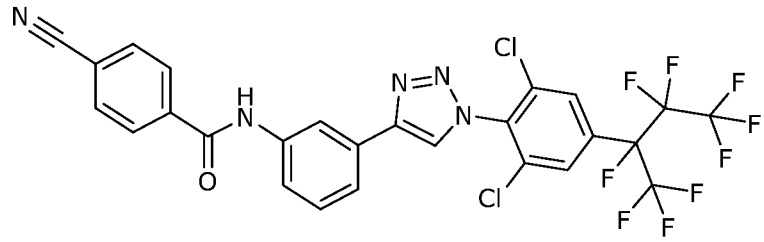


; and

(4) the following molecules in Table A

Table A – Structure of M# – active ingredients

M#	Structure
M1	 **R = CH, N** **R_1 = H, Me**
M2	 **X = F, Cl** **R = H, F**
M3	
M4	
M5	

M6	

As used in this disclosure, each of the above is an active ingredient. For more information consult the "**Compendium of Pesticide Common Names**" located at **Alanwood.net** and various editions, including the on–line edition, of "**The Pesticide Manual**" located at **bcpcdata.com**.

A particularly preferred selection of active ingredients are 1,3-dichloropropene, chlorpyrifos, hexaflumuron, methoxyfenozide, noviflumuron, spinetoram, spinosad, sulfoxaflor, and sulfuryl fluoride (hereafter "**AIGA–2**").

Additionally, another particularly preferred selection of active ingredients are acequinocyl, acetamiprid, acetoprole, avermectin, azinphos–methyl, bifenazate, bifenthrin, carbaryl, carbofuran, chlorfenapyr, chlorfluazuron, chromafenozide, clothianidin, cyfluthrin, cypermethrin, deltamethrin, diafenthiuron, emamectin benzoate, endosulfan, esfenvalerate, ethiprole, etoxazole, fipronil, flonicamid, fluacrypyrim, *gamma*–cyhalothrin, halofenozide, indoxacarb, *lambda*–cyhalothrin, lufenuron, malathion, methomyl, novaluron, permethrin, pyridalyl, pyrimidifen, spirodiclofen, tebufenozide, thiacloprid, thiamethoxam, thiodicarb, tolfenpyrad, and *zeta*–cypermethrin (hereafter "**AIGA–3**").

The term "**alkenyl**" means an acyclic, unsaturated (at least one carbon–carbon double bond), branched or unbranched, substituent consisting of carbon and hydrogen, for example, vinyl, allyl, butenyl, pentenyl, and hexenyl.

The term "**alkenyloxy**" means an alkenyl further consisting of a carbon–oxygen single bond, for example, allyloxy, butenyloxy, pentenyloxy, hexenyloxy.

The term "**alkoxy**" means an alkyl further consisting of a carbon–oxygen single bond, for example, methoxy, ethoxy, propoxy, isopropoxy, butoxy, isobutoxy, and *tert*-butoxy.

The term "**alkyl**" means an acyclic, saturated, branched or unbranched, substituent consisting of carbon and hydrogen, for example, methyl, ethyl, propyl, isopropyl, butyl, and *tert*-butyl.

The term "**alkynyl**" means an acyclic, unsaturated (at least one carbon–carbon triple bond), branched or unbranched, substituent consisting of carbon and hydrogen, for example, ethynyl, propargyl, butynyl, and pentynyl.

The term "**alkynyloxy**" means an alkynyl further consisting of a carbon–oxygen single bond, for example, pentynyloxy, hexynyloxy, heptynyloxy, and octynyloxy.

The term "**aryl**" means a cyclic, aromatic substituent consisting of hydrogen and carbon, for example, phenyl, naphthyl, and biphenyl.

The term "**biopesticide**" means a microbial biological pest control agent that, in general, is applied in a similar manner to chemical pesticides. Commonly they are bacterial, but there are also examples of fungal control agents, including *Trichoderma* spp. and *Ampelomyces quisqualis*. One well–known biopesticide example is *Bacillus* species, a bacterial disease of Lepidoptera, Coleoptera, and Diptera. Biopesticides include products based on entomopathogenic fungi (*e.g. Metarhizium anisopliae*), entomopathogenic nematodes (*e.g. Steinernema feltiae*), and entomopathogenic viruses (*e.g. Cydia pomonella* granulovirus). Other examples of entomopathogenic organisms include, but are not limited to, baculoviruses, protozoa, and Microsporidia. For the avoidance of doubt, biopesticides are active ingredients.

The term "**cycloalkenyl**" means a monocyclic or polycyclic, unsaturated (at least one carbon–carbon double bond) substituent consisting of carbon and hydrogen, for example, cyclobutenyl, cyclopentenyl, cyclohexenyl, norbornenyl, bicyclo[2.2.2]octenyl, tetrahydronaphthyl, hexahydronaphthyl, and octahydronaphthyl.

The term "**cycloalkenyloxy**" means a cycloalkenyl further consisting of a carbon–oxygen single bond, for example, cyclobutenyloxy, cyclopentenyloxy, norbornenyloxy, and bicyclo[2.2.2]octenyloxy.

The term "**cycloalkyl**" means a monocyclic or polycyclic, saturated substituent consisting of carbon and hydrogen, for example, cyclopropyl, cyclobutyl, cyclopentyl, norbornyl, bicyclo[2.2.2]octyl, and decahydronaphthyl.

The term "**cycloalkoxy**" means a cycloalkyl further consisting of a carbon–oxygen single bond, for example, cyclopropyloxy, cyclobutyloxy, cyclopentyloxy, norbornyloxy, and bicyclo[2.2.2]octyloxy.

The term "**halo**" means fluoro, chloro, bromo, and iodo.

The term "**haloalkoxy**" means an alkoxy further consisting of, from one to the maximum possible number of identical or different, halos, for example, fluoromethoxy, trifluoromethoxy, 2,2–difluoropropoxy, chloromethoxy, trichloromethoxy, 1,1,2,2–tetrafluoroethoxy, and pentafluoroethoxy.

The term "**haloalkyl**" means an alkyl further consisting of, from one to the maximum possible number of, identical or different, halos, for example, fluoromethyl, trifluoromethyl, 2,2–difluoropropyl, chloromethyl, trichloromethyl, and 1,1,2,2–tetrafluoroethyl.

The term "**heterocyclyl**" means a cyclic substituent that may be aromatic, fully saturated, or partially or fully unsaturated, where the cyclic structure contains at least

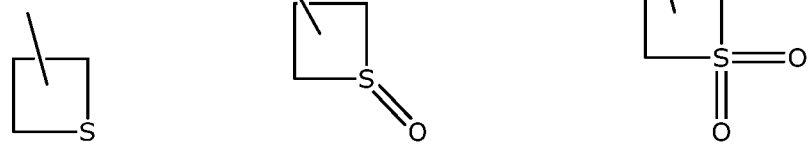
one carbon and at least one heteroatom, where said heteroatom is nitrogen, sulfur, or oxygen. Examples are:

(1) aromatic heterocyclyl substituents include, but are not limited to, benzofuranyl, benzoisothiazolyl, benzoisoxazolyl, benzothienyl, benzothiazolyl, benzoxazolyl, cinnolinyl, furanyl, imidazolyl, indazolyl, indolyl, isoindolyl, isoquinolinyl, isothiazolyl, isoxazolyl, oxadiazolyl, oxazolinyl, oxazolyl, phthalazinyl, pyrazinyl, pyrazolinyl, pyrazolyl, pyridazinyl, pyridyl, pyrimidinyl, pyrrolyl, quinazolinyl, quinolinyl, quinoxalinyl, tetrazolyl, thiazolinyl, thiazolyl, thienyl, triazinyl, and triazolyl;

(2) fully saturated heterocyclyl substituents include, but are not limited to, piperazinyl, piperidinyl, morpholinyl, pyrrolidinyl, tetrahydrofuranyl, and tetrahydropyranyl;

(3) partially or fully unsaturated heterocyclyl substituents include, but are not limited to, 4,5–dihydro–isoxazolyl, 4,5–dihydro–oxazolyl, 4,5–dihydro–1*H*–pyrazolyl, 2,3–dihydro–[1,3,4]–oxadiazolyl, and 1,2,3,4–tetrahydro–quinolinyl; and

(4) Additional examples of heterocyclyls include the following:



thietanyl thietanyl–oxide and thietanyl–dioxide.

The term "**locus**" means a habitat, breeding ground, plant, seed, soil, material, or environment, in which a pest is growing, may grow, or may traverse. For example, a locus may be: where crops, trees, fruits, cereals, fodder species, vines, turf, and/or ornamental plants, are growing; where domesticated animals are residing; the interior or exterior surfaces of buildings (such as places where grains are stored); the materials of construction used in buildings (such as impregnated wood); and the soil around buildings.

The phrase "**MoA Material**" means an active ingredient having a mode of action ("**MoA**") as indicated in IRAC MoA Classification v. 7.4, located at irac–online.org., which describes the following groups.

(1) Acetylcholinesterase (AChE) inhibitors, includes the following active ingredients acephate, alanycarb, aldicarb, azamethiphos, azinphos-ethyl, azinphos-methyl, bendiocarb, benfuracarb, butocarboxim, butoxycarboxim, cadusafos, carbaryl, carbofuran, carbosulfan, chlorethoxyfos, chlorfenvinphos, chlormephos, chlorpyrifos, chlorpyrifos-methyl, coumaphos, cyanophos, demeton-S-methyl, diazinon, dichlorvos/DDVP, dicrotophos, dimethoate, dimethylvinphos, disulfoton, EPN, ethiofencarb, ethion, ethoprophos, famphur, fenamiphos, fenitrothion, fenobucarb,

fenthion, formetanate, fosthiazate, furathiocarb, heptenophos, imicyafos, isofenphos, isoprocarb, isopropyl O-(methoxyaminothio-phosphoryl)salicylate, isoxathion, malathion, mecarbam, methamidophos, methidathion, methiocarb, methomyl, metolcarb, mevinphos, monocrotophos, Naled, omethoate, oxamyl, oxydemeton-methyl, parathion, parathion-methyl, phenthoate, phorate, phosalone, phosmet, phosphamidon, phoxim, pirimicarb, pirimiphos-methyl, profenofos, propetamphos, propoxur, prothiofos, pyraclofos, pyridaphenthion, quinalphos, sulfotep, tebupirimfos, temephos, terbufos, tetrachlorvinphos, thiodicarb, thiofanox, thiometon, triazamate, triazophos, trichlorfon, trimethacarb, vamidothion, XMC, and xylylcarb.

(2) GABA–gated chloride channel antagonists, includes the following active ingredients chlordane, endosulfan, ethiprole, and fipronil.

(3) Sodium channel modulators, includes the following active ingredients acrinathrin, allethrin, *d–cis–trans* allethrin, *d–trans* allethrin, bifenthrin, bioallethrin, bioallethrin S–cyclopentenyl, bioresmethrin, cycloprothrin, cyfluthrin, *beta*–cyfluthrin, cyhalothrin, *lambda*–cyhalothrin, *gamma*–cyhalothrin, cypermethrin, *alpha*–cypermethrin, *beta*–cypermethrin, *theta*–cypermethrin, *zeta*–cypermethrin, cyphenothrin [(1*R*)–*trans*–isomers], deltamethrin, empenthrin [(*EZ*)–(1*R*)–isomers], esfenvalerate, etofenprox, fenpropathrin, fenvalerate, flucythrinate, flumethrin, *tau*–fluvalinate, halfenprox, imiprothrin, kadethrin, permethrin, phenothrin [(1*R*)–*trans*–isomer], prallethrin, pyrethrins (pyrethrum), resmethrin, silafluofen, tefluthrin, tetramethrin, tetramethrin [(1*R*)–isomers], tralomethrin, and transfluthrin, and methoxychlor.

(4) Nicotinic acetylcholine receptor (nAChR) agonists, includes the following active ingredients

(4A) acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid, thiamethoxam,

(4B) nicotine,

(4C) sulfoxaflor,

(4D) flupyradifurone,

(4E) triflumezopyrim and dicloromezotiaz.

(5) Nicotinic acetylcholine receptor (nAChR) allosteric activators, includes the following active ingredients spinetoram and spinosad.

(6) Chloride channel activators, includes the following active ingredients abamectin, emamectin benzoate, lepimectin, and milbemectin.

(7) Juvenile hormone mimics, includes the following active ingredients hydroprene, kinoprene, methoprene, fenoxycarb, and pyriproxyfen.

(8) Miscellaneous nonspecific (multi–site) inhibitors, includes the following active ingredients methyl bromide, chloropicrin, sulfuryl fluoride, borax, boric

acid, disodium octaborate, sodium borate, sodium metaborate, tartar emetic, diazomet, and metam.

(9) Modulators of Chordotonal Organs, includes the following active ingredients pymetrozine and flonicamid.

(10) Mite growth inhibitors, includes the following active ingredients clofentezine, hexythiazox, diflovidazin, and etoxazole.

(11) Microbial disruptors of insect midgut membranes, includes the following active ingredients *Bacillus thuringiensis* subsp. *israelensis, Bacillus thuringiensis* subsp. a*izawai*, *Bacillus thuringiensis* subsp. *kurstaki, Bacillus thuringiensis* subsp. *tenebrionenis*, Bt crop proteins (Cry1Ab, Cry1Ac, Cry1Fa, Cry1A.105, Cry2Ab, Vip3A, mCry3A, Cry3Ab, Cry3Bb, Cry34Ab1/Cry35Ab1), and *Bacillus sphaericus*.

(12) Inhibitors of mitochondrial ATP synthase, includes the following active ingredients tetradifon, propargite, azocyclotin, cyhexatin, fenbutatin oxide, and diafenthiuron.

(13) Uncouplers of oxidative phosphorylation via disruption of the proton gradient, includes the following active ingredients chlorfenapyr, DNOC, and sulfluramid.

(14) Nicotinic acetylcholine receptor (nAChR) channel blockers, includes the following active ingredients bensultap, cartap hydrochloride, thiocyclam, and thiosultap–sodium.

(15) Inhibitors of chitin biosynthesis, type 0, includes the following active ingredients bistrifluron, chlorfluazuron, diflubenzuron, flucycloxuron, flufenoxuron, hexaflumuron, lufenuron, novaluron, noviflumuron, teflubenzuron, and triflumuron.

(16) Inhibitors of chitin biosynthesis, type 1, includes the following active ingredient buprofezin.

(17) Moulting disruptor, Dipteran, includes the following active ingredient cyromazine.

(18) Ecdysone receptor agonists, includes the following active ingredients chromafenozide, halofenozide, methoxyfenozide, and tebufenozide.

(19) Octopamine receptor agonists, includes the following active ingredient amitraz.

(20) Mitochondrial complex III electron transport inhibitors, includes the following active ingredients hydramethylnon, acequinocyl, and fluacrypyrim.

(21) Mitochondrial complex I electron transport inhibitors, includes the following active ingredients fenazaquin, fenpyroximate, pyrimidifen, pyridaben, tebufenpyrad, tolfenpyrad, and rotenone.

(22) Voltage–dependent sodium channel blockers, includes the following active ingredients indoxacarb and metaflumizone.

(23) Inhibitors of acetyl CoA carboxylase, includes the following active ingredients spirodiclofen, spiromesifen, and spirotetramat.

(24) Mitochondrial complex IV electron transport inhibitors, includes the following active ingredients, aluminium phosphide, calcium phosphide, phosphine, zinc phosphide, and cyanide.

(25) Mitochondrial complex II electron transport inhibitors, includes the following active ingredients cyenopyrafen, cyflumetofen, and pyflubumide, and

(28) Ryanodine receptor modulators, includes the following active ingredients chlorantraniliprole, cyantraniliprole, and flubendiamide.

Groups 26 and 27 are unassigned in this version of the classification scheme. Additionally, there is a **Group UN** that contains active ingredients of unknown or uncertain mode of action. This group includes the following active ingredients, azadirachtin, benzoximate, bifenazate, bromopropylate, chinomethionat, cryolite, dicofol, pyridalyl, and pyrifluquinazon.

The term "**pest**" means an organism that is detrimental to humans, or human concerns (such as, crops, food, livestock, etc.), where said organism is from Phyla Arthropoda, Mollusca, or Nematoda. Particular examples are ants, aphids, bed bugs, beetles, bristletails, caterpillars, cockroaches, crickets, earwigs, fleas, flies, grasshoppers, grubs, hornets, jassids, leafhoppers, leaf miners, lice, locusts, maggots, mealybugs, mites, moths, nematodes, plant bugs, planthoppers, psyllids, sawflies, scales, silverfish, slugs, snails, spiders, springtails, stink bugs, symphylans, termites, thrips, ticks, wasps, whiteflies, and wireworms.

Additional examples are pests in

(1) Subphyla Chelicerata, Myriapoda, and Hexapoda.

(2) Classes of Arachnida, Symphyla, and Insecta.

(3) Order Anoplura. A non–exhaustive list of particular genera includes, but is not limited to, *Haematopinus* spp., *Hoplopleura* spp., *Linognathus* spp., *Pediculus* spp., *Polyplax* spp., *Solenopotes* spp., and *Neohaematopinis* spp. A non–exhaustive list of particular species includes, but is not limited to, *Haematopinus asini*, *Haematopinus suis*, *Linognathus setosus*, *Linognathus ovillus*, *Pediculus humanus capitis*, *Pediculus humanus humanus*, and *Pthirus pubis*.

(4) Order Coleoptera. A non–exhaustive list of particular genera includes, but is not limited to, *Acanthoscelides* spp., *Agriotes* spp., *Anthonomus* spp., *Apion* spp., *Apogonia* spp., *Araecerus* spp., *Aulacophora* spp., *Bruchus* spp., *Cerosterna* spp., *Cerotoma* spp., *Ceutorhynchus* spp., *Chaetocnema* spp., *Colaspis* spp., *Ctenicera* spp., *Curculio* spp., *Cyclocephala* spp., *Diabrotica* spp., *Dinoderus* spp., *Gnathocerus* spp., *Hemicoelus* spp., *Heterobostruchus* spp., *Hypera* spp., *Ips* spp., *Lyctus* spp., *Megascelis* spp., *Meligethes* spp., *Mezium* spp., *Niptus* spp., *Otiorhynchus* spp., *Pantomorus* spp.,

Phyllophaga spp., *Phyllotreta* spp., *Ptinus* spp., *Rhizotrogus* spp., *Rhynchites* spp., *Rhynchophorus* spp., *Scolytus* spp., *Sphenophorus* spp., *Sitophilus* spp., *Tenebrio* spp., and *Tribolium* spp. A non–exhaustive list of particular species includes, but is not limited to, *Acanthoscelides obtectus*, *Agrilus planipennis*, *Ahasverus advena*, *Alphitobius diaperinus*, *Anoplophora glabripennis*, *Anthonomus grandis*, *Anthrenus verbasci*, *Anthrenus falvipes*, *Ataenius spretulus*, *Atomaria linearis*, *Attagenus unicolor*, *Bothynoderes punctiventris*, *Bruchus pisorum*, *Callosobruchus maculatus*, *Carpophilus hemipterus*, *Cassida vittata*, *Cathartus quadricollis*, *Cerotoma trifurcata*, *Ceutorhynchus assimilis*, *Ceutorhynchus napi*, *Conoderus scalaris*, *Conoderus stigmosus*, *Conotrachelus nenuphar*, *Cotinis nitida*, *Crioceris asparagi*, *Cryptolestes ferrugineus*, *Cryptolestes pusillus*, *Cryptolestes turcicus*, *Cylindrocopturus adspersus*, *Deporaus marginatus*, *Dermestes lardarius*, *Dermestes maculatus*, *Epilachna varivestis*, *Euvrilletta peltata*, *Faustinus cubae*, *Hylobius pales*, *Hylotrupes bajulus*, *Hypera postica*, *Hypothenemus hampei*, *Lasioderma serricorne*, *Leptinotarsa decemlineata*, *Limonius canus*, *Liogenys fuscus*, *Liogenys suturalis*, *Lissorhoptrus oryzophilus*, *Lophocateres pusillus*, *Lyctus planicollis*, *Maecolaspis joliveti*, *Melanotus communis*, *Meligethes aeneus*, *Melolontha melolontha*, *Necrobia rufipes*, *Oberea brevis*, *Oberea linearis*, *Oryctes rhinoceros*, *Oryzaephilus mercator*, *Oryzaephilus surinamensis*, *Oulema melanopus*, *Oulema oryzae*, *Phyllophaga cuyabana*, *Polycaon stoutti*, *Popillia japonica*, *Prostephanus truncatus*, *Rhyzopertha dominica*, *Sitona lineatus*, *Sitophilus granarius*, *Sitophilus oryzae*, *Sitophilus zeamais*, *Stegobium paniceum*, *Tenebroides mauritanicus*, *Tribolium castaneum*, *Tribolium confusum*, *Trogoderma granarium*, *Trogoderma variabile*, *Xestobium rufovillosum*, and *Zabrus tenebrioides*.

(5) Order Dermaptera. A non–exhaustive list of particular species includes, but is not limited to, *Forficula auricularia*.

(6) Order Blattaria. A non–exhaustive list of particular species includes, but is not limited to, *Blattella germanica*, *Blattella asahinai*, *Blatta orientalis*, *Blatta lateralis*, *Parcoblatta pennsylvanica*, *Periplaneta americana*, *Periplaneta australasiae*, *Periplaneta brunnea*, *Periplaneta fuliginosa*, *Pycnoscelus surinamensis*, and *Supella longipalpa*.

(7) Order Diptera. A non–exhaustive list of particular genera includes, but is not limited to, *Aedes* spp., *Agromyza* spp., *Anastrepha* spp., *Anopheles* spp., *Bactrocera* spp., *Ceratitis* spp., *Chrysops* spp., *Cochliomyia* spp., *Contarinia* spp., *Culex* spp., *Culicoides* spp., *Dasineura* spp., *Delia* spp., *Drosophila* spp., *Fannia* spp., *Hylemya* spp., *Liriomyza* spp., *Musca* spp., *Phorbia* spp., *Pollenia* spp., *Psychoda* spp., *Simulium* spp., *Tabanus* spp., and *Tipula* spp. A non–exhaustive list of particular species includes, but is not limited to, *Agromyza frontella*, *Anastrepha suspensa*, *Anastrepha ludens*, *Anastrepha obliqua*, *Bactrocera cucurbitae*, *Bactrocera dorsalis*, *Bactrocera invadens*, *Bactrocera zonata*, *Ceratitis capitata*, *Dasineura brassicae*, *Delia platura*, *Fannia canicularis*, *Fannia*

scalaris, *Gasterophilus intestinalis*, *Gracillia perseae*, *Haematobia irritans*, *Hypoderma lineatum*, *Liriomyza brassicae*, *Liriomyza sativa*, *Melophagus ovinus*, *Musca autumnalis*, *Musca domestica*, *Oestrus ovis*, *Oscinella frit*, *Pegomya betae*, *Piophila casei*, *Psila rosae*, *Rhagoletis cerasi*, *Rhagoletis pomonella*, *Rhagoletis mendax*, *Sitodiplosis mosellana*, and *Stomoxys calcitrans*.

(8) Order Hemiptera. A non–exhaustive list of particular genera includes, but is not limited to, *Adelges* spp., *Aulacaspis* spp., *Aphrophora* spp., *Aphis* spp., *Bemisia* spp., *Ceroplastes* spp., *Chionaspis* spp., *Chrysomphalus* spp., *Coccus* spp., *Empoasca* spp., *Euschistus* spp., *Lepidosaphes* spp., *Lagynotomus* spp., *Lygus* spp., *Macrosiphum* spp., *Nephotettix* spp., *Nezara* spp., *Nilaparvata* spp., *Philaenus* spp., *Phytocoris* spp., *Piezodorus* spp., *Planococcus* spp., *Pseudococcus* spp., *Rhopalosiphum* spp., *Saissetia* spp., *Therioaphis* spp., *Toumeyella* spp., *Toxoptera* spp., *Trialeurodes* spp., *Triatoma* spp., and *Unaspis* spp. A non–exhaustive list of particular species includes, but is not limited to, *Acrosternum hilare*, *Acyrthosiphon pisum*, *Aleyrodes proletella*, *Aleurodicus dispersus*, *Aleurothrixus floccosus*, *Amrasca biguttula biguttula*, *Aonidiella aurantii*, *Aphis fabae*, *Aphis gossypii*, *Aphis glycines*, *Aphis pomi*, *Aulacorthum solani*, *Bactericera cockerelli*, *Bagrada hilaris*, *Bemisia argentifolii*, *Bemisia tabaci*, *Blissus leucopterus*, *Boisea trivittata*, *Brachycorynella asparagi*, *Brevennia rehi*, *Brevicoryne brassicae*, *Cacopsylla pyri*, *Cacopsylla pyricola*, *Calocoris norvegicus*, *Ceroplastes rubens*, *Cimex hemipterus*, *Cimex lectularius*, *Coccus pseudomagnoliarum*, *Dagbertus fasciatus*, *Dichelops furcatus*, *Diuraphis noxia*, *Diaphorina citri*, *Dysaphis plantaginea*, *Dysdercus suturellus*, *Edessa meditabunda*, *Empoasca vitis*, *Eriosoma lanigerum*, *Erythroneura elegantula*, *Eurygaster maura*, *Euschistus conspersus*, *Euschistus heros*, *Euschistus servus*, *Halyomorpha halys*, *Helopeltis antonii*, *Hyalopterus pruni*, *Helopeltis antonii*, *Helopeltis theivora*, *Icerya purchasi*, *Idioscopus nitidulus*, *Jacobiasca formosana*, *Laodelphax striatellus*, *Lecanium corni*, *Leptocorisa oratorius*, *Leptocorisa varicornis*, *Lygus hesperus*, *Maconellicoccus hirsutus*, *Macrosiphum euphorbiae*, *Macrosiphum granarium*, *Macrosiphum rosae*, *Macrosteles quadrilineatus*, *Mahanarva frimbiolata*, *Megacopta cribraria*, *Metopolophium dirhodum*, *Mictis longicornis*, *Myzus persicae*, *Nasonovia ribisnigri*, *Nephotettix cincticeps*, *Neurocolpus longirostris*, *Nezara viridula*, *Nilaparvata lugens*, *Paracoccus marginatus*, *Paratrioza cockerelli*, *Parlatoria pergandii*, *Parlatoria ziziphi*, *Peregrinus maidis*, *Phylloxera vitifoliae*, *Physokermes piceae*, *Phytocoris californicus*, *Phytocoris relativus*, *Piezodorus guildinii*, *Planococcus citri*, *Planococcus ficus*, *Poecilocapsus lineatus*, *Psallus vaccinicola*, *Pseudacysta perseae*, *Pseudococcus brevipes*, *Quadraspidiotus perniciosus*, *Rhopalosiphum maidis*, *Rhopalosiphum padi*, *Saissetia oleae*, *Scaptocoris castanea*, *Schizaphis graminum*, *Sitobion avenae*, *Sogatella furcifera*, *Trialeurodes vaporariorum*, *Trialeurodes abutiloneus*, *Unaspis yanonensis*, and *Zulia entrerriana*.

(9) Order Hymenoptera. A non–exhaustive list of particular genera includes, but is not limited to, *Acromyrmex* spp., *Atta* spp., *Camponotus* spp., *Diprion* spp., *Dolichovespula* spp., *Formica* spp., *Monomorium* spp., *Neodiprion* spp., *Paratrechina* spp., *Pheidole* spp., *Pogonomyrmex* spp., *Polistes* spp., *Solenopsis* spp., *Technomyrmex* spp., *Tetramorium* spp., *Vespula* spp., *Vespa* spp., and *Xylocopa* spp. A non–exhaustive list of particular species includes, but is not limited to, *Athalia rosae*, *Atta texana*, *Caliroa cerasi*, *Cimbex americana*, *Iridomyrmex humilis*, *Linepithema humile*, *Mellifera Scutellata*, *Monomorium minimum*, *Monomorium pharaonis*, *Neodiprion sertifer*, *Solenopsis invicta*, *Solenopsis geminata*, *Solenopsis molesta*, *Solenopsis richtery*, *Solenopsis xyloni*, *Tapinoma sessile*, and *Wasmannia auropunctata*.

(10) Order Isoptera. A non–exhaustive list of particular genera includes, but is not limited to, *Coptotermes* spp., *Cornitermes* spp., *Cryptotermes* spp., *Heterotermes* spp., *Kalotermes* spp., *Incisitermes* spp., *Macrotermes* spp., *Marginitermes* spp., *Microcerotermes* spp., *Procornitermes* spp., *Reticulitermes* spp., *Schedorhinotermes* spp., and *Zootermopsis* spp. A non–exhaustive list of particular species includes, but is not limited to, *Coptotermes acinaciformis*, *Coptotermes curvignathus*, *Coptotermes frenchi*, *Coptotermes formosanus*, *Coptotermes gestroi*, *Cryptotermes brevis*, *Heterotermes aureus*, *Heterotermes tenuis*, *Incisitermes minor*, *Incisitermes snyderi*, *Microtermes obesi*, *Nasutitermes corniger*, *Odontotermes formosanus*, *Odontotermes obesus*, *Reticulitermes banyulensis*, *Reticulitermes grassei*, *Reticulitermes flavipes*, *Reticulitermes hageni*, *Reticulitermes hesperus*, *Reticulitermes santonensis*, *Reticulitermes speratus*, *Reticulitermes tibialis*, and *Reticulitermes virginicus*.

(11) Order Lepidoptera. A non–exhaustive list of particular genera includes, but is not limited to, *Adoxophyes* spp., *Agrotis* spp., *Argyrotaenia* spp., *Cacoecia* spp., *Caloptilia* spp., *Chilo* spp., *Chrysodeixis* spp., *Colias* spp., *Crambus* spp., *Diaphania* spp., *Diatraea* spp., *Earias* spp., *Ephestia* spp., *Epimecis* spp., *Feltia* spp., *Gortyna* spp., *Helicoverpa* spp., *Heliothis* spp., *Indarbela* spp., *Lithocolletis* spp., *Loxagrotis* spp., *Malacosoma* spp., *Nemapogon* spp., *Peridroma* spp., *Phyllonorycter* spp., *Pseudaletia* spp., *Plutella* spp., *Sesamia* spp., *Spodoptera* spp., *Synanthedon* spp., and *Yponomeuta* spp. A non–exhaustive list of particular species includes, but is not limited to, *Achaea janata*, *Adoxophyes orana*, *Agrotis ipsilon*, *Alabama argillacea*, *Amorbia cuneana*, *Amyelois transitella*, *Anacamptodes defectaria*, *Anarsia lineatella*, *Anomis sabulifera*, *Anticarsia gemmatalis*, *Archips argyrospila*, *Archips rosana*, *Argyrotaenia citrana*, *Autographa gamma*, *Bonagota cranaodes*, *Borbo cinnara*, *Bucculatrix thurberiella*, *Capua reticulana*, *Carposina niponensis*, *Chlumetia transversa*, *Choristoneura rosaceana*, *Cnaphalocrocis medinalis*, *Conopomorpha cramerella*, *Corcyra cephalonica*, *Cossus cossus*, *Cydia caryana*, *Cydia funebrana*, *Cydia molesta*, *Cydia nigricana*, *Cydia pomonella*, *Darna diducta*, *Diaphania nitidalis*, *Diatraea saccharalis*, *Diatraea*

grandiosella, *Earias insulana*, *Earias vittella*, *Ecdytolopha aurantianum*, *Elasmopalpus lignosellus*, *Ephestia cautella*, *Ephestia elutella*, *Ephestia kuehniella*, *Epinotia aporema*, *Epiphyas postvittana*, *Erionota thrax*, *Estigmene acrea*, *Eupoecilia ambiguella*, *Euxoa auxiliaris*, *Galleria mellonella*, *Grapholita molesta*, *Hedylepta indicata*, *Helicoverpa armigera*, *Helicoverpa zea*, *Heliothis virescens*, *Hellula undalis*, *Keiferia lycopersicella*, *Leucinodes orbonalis*, *Leucoptera coffeella*, *Leucoptera malifoliella*, *Lobesia botrana*, *Loxagrotis albicosta*, *Lymantria dispar*, *Lyonetia clerkella*, *Mahasena corbetti*, *Mamestra brassicae*, *Manduca sexta*, *Maruca testulalis*, *Metisa plana*, *Mythimna unipuncta*, *Neoleucinodes elegantalis*, *Nymphula depunctalis*, *Operophtera brumata*, *Ostrinia nubilalis*, *Oxydia vesulia*, *Pandemis cerasana*, *Pandemis heparana*, *Papilio demodocus*, *Pectinophora gossypiella*, *Peridroma saucia*, *Perileucoptera coffeella*, *Phthorimaea operculella*, *Phyllocnistis citrella*, *Phyllonorycter blancardella*, *Pieris rapae*, *Plathypena scabra*, *Platynota idaeusalis*, *Plodia interpunctella*, *Plutella xylostella*, *Polychrosis viteana*, *Prays endocarpa*, *Prays oleae*, *Pseudaletia unipuncta*, *Pseudoplusia includens*, *Rachiplusia nu*, *Scirpophaga incertulas*, *Sesamia inferens*, *Sesamia nonagrioides*, *Setora nitens*, *Sitotroga cerealella*, *Sparganothis pilleriana*, *Spodoptera exigua*, *Spodoptera frugiperda*, *Spodoptera eridania*, *Thecla basilides*, *Tinea pellionella*, *Tineola bisselliella*, *Trichoplusia ni*, *Tuta absoluta*, *Zeuzera coffeae*, and *Zeuzea pyrina*.

(12) Order Mallophaga. A non–exhaustive list of particular genera includes, but is not limited to, *Anaticola* spp., *Bovicola* spp., *Chelopistes* spp., *Goniodes* spp., *Menacanthus* spp., and *Trichodectes* spp. A non–exhaustive list of particular species includes, but is not limited to, *Bovicola bovis*, *Bovicola caprae*, *Bovicola ovis*, *Chelopistes meleagridis*, *Goniodes dissimilis*, *Goniodes gigas*, *Menacanthus stramineus*, *Menopon gallinae*, and *Trichodectes canis*.

(13) Order Orthoptera. A non–exhaustive list of particular genera includes, but is not limited to, *Melanoplus* spp. and *Pterophylla* spp. A non–exhaustive list of particular species includes, but is not limited to, *Acheta domesticus*, *Anabrus simplex*, *Gryllotalpa africana*, *Gryllotalpa australis*, *Gryllotalpa brachyptera*, *Gryllotalpa hexadactyla*, *Locusta migratoria*, *Microcentrum retinerve*, *Schistocerca gregaria*, and *Scudderia furcata*.

(14) Order Psocoptera. A non–exhaustive list of particular species includes, but is not limited to, *Liposcelis decolor*, *Liposcelis entomophila*, *Lachesilla quercus*, and *Trogium pulsatorium*.

(15) Order Siphonaptera. A non–exhaustive list of particular species includes, but is not limited to, *Ceratophyllus gallinae*, *Ceratophyllus niger*, *Ctenocephalides canis*, *Ctenocephalides felis*, and *Pulex irritans*.

(16) Order Thysanoptera. A non–exhaustive list of particular genera includes, but is not limited to, *Caliothrips* spp., *Frankliniella* spp., *Scirtothrips* spp., and *Thrips* spp.

A non–exhaustive list of particular species includes, but is not limited to, *Caliothrips phaseoli*, *Frankliniella bispinosa*, *Frankliniella fusca*, *Frankliniella occidentalis*, *Frankliniella schultzei*, *Frankliniella tritici*, *Frankliniella williamsi*, *Heliothrips haemorrhoidalis*, *Rhipiphorothrips cruentatus*, *Scirtothrips citri*, *Scirtothrips dorsalis*, *Taeniothrips rhopalantennalis*, *Thrips hawaiiensis*, *Thrips nigropilosus*, *Thrips orientalis*, *Thrips palmi*, and *Thrips tabaci*.

(17) Order Thysanura. A non–exhaustive list of particular genera includes, but is not limited to, *Lepisma* spp. and *Thermobia* spp.

(18) Order Acarina. A non–exhaustive list of particular genera includes, but is not limited to, *Acarus* spp., *Aculops* spp., *Argus* spp., *Boophilus* spp., *Demodex* spp., *Dermacentor* spp., *Epitrimerus* spp., *Eriophyes* spp., *Ixodes* spp., *Oligonychus* spp., *Panonychus* spp., *Rhizoglyphus* spp., and *Tetranychus* spp. A non–exhaustive list of particular species includes, but is not limited to, *Acarapis woodi*, *Acarus siro*, *Aceria mangiferae*, *Aculops lycopersici*, *Aculus pelekassi*, *Aculus schlechtendali*, *Amblyomma americanum*, *Brevipalpus obovatus*, *Brevipalpus phoenicis*, *Dermacentor variabilis*, *Dermatophagoides pteronyssinus*, *Eotetranychus carpini*, *Liponyssoides sanguineus*, *Notoedres cati*, *Oligonychus coffeae*, *Oligonychus ilicis*, *Ornithonyssus bacoti*, *Panonychus citri*, *Panonychus ulmi*, *Phyllocoptruta oleivora*, *Polyphagotarsonemus latus*, *Rhipicephalus sanguineus*, *Sarcoptes scabiei*, *Tegolophus perseaflorae*, *Tetranychus urticae*, *Tyrophagus longior*, and *Varroa destructor*.

(19) Order Araneae. A non–exhaustive list of particular genera includes, but is not limited to, *Loxosceles* spp., *Latrodectus* spp., and *Atrax* spp. A non–exhaustive list of particular species includes, but is not limited to, *Loxosceles reclusa*, *Latrodectus mactans*, and *Atrax robustus*.

(20) Class Symphyla. A non–exhaustive list of particular species includes, but is not limited to, *Scutigerella immaculata*.

(21) Subclass Collembola. A non–exhaustive list of particular species includes, but is not limited to, *Bourletiella hortensis*, *Onychiurus armatus*, *Onychiurus fimetarius*, and *Sminthurus viridis*.

(22) Phylum Nematoda. A non–exhaustive list of particular genera includes, but is not limited to, *Aphelenchoides* spp., *Belonolaimus* spp., *Criconemella* spp., *Ditylenchus* spp., *Globodera* spp., *Heterodera* spp., *Hirschmanniella* spp., *Hoplolaimus* spp., *Meloidogyne* spp., *Pratylenchus* spp., and *Radopholus* spp. A non–exhaustive list of particular species includes, but is not limited to, *Dirofilaria immitis*, *Globodera pallida*, *Heterodera glycines*, *Heterodera zeae*, *Meloidogyne incognita*, *Meloidogyne javanica*, *Onchocerca volvulus*, *Pratylenchus penetrans*, *Radopholus similis*, and *Rotylenchulus reniformis*.

(23) Phylum Mollusca. A non-exhaustive list of particular species includes, but is not limited to, *Arion vulgaris*, *Cornu aspersum*, *Deroceras reticulatum*, *Limax flavus*, *Milax gagates*, and *Pomacea canaliculata*.

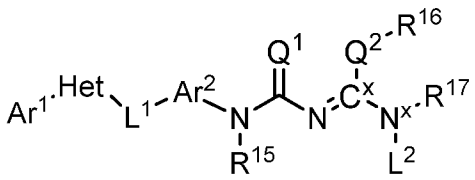
A particularly preferred pest group to control is sap-feeding pests. **Sap-feeding pests**, in general, have piercing and/or sucking mouthparts and feed on the sap and inner plant tissues of plants. Examples of sap-feeding pests of particular concern to agriculture include, but are not limited to, aphids, leafhoppers, moths, scales, thrips, psyllids, mealybugs, stinkbugs, and whiteflies. Specific examples of Orders that have sap-feeding pests of concern in agriculture include but are not limited to, Anoplura and Hemiptera. Specific examples of Hemiptera that are of concern in agriculture include, but are not limited to, *Aulacaspis* spp., *Aphrophora* spp., *Aphis* spp., *Bemisia* spp., *Coccus* spp., *Euschistus* spp., *Lygus* spp., *Macrosiphum* spp., *Nezara* spp., and *Rhopalosiphum* spp.

Another particularly preferred pest group to control is chewing pests. **Chewing pests**, in general, have mouthparts that allow them to chew on the plant tissue including roots, stems, leaves, buds, and reproductive tissues (including, but not limited to flowers, fruit, and seeds). Examples of chewing pests of particular concern to agriculture include, but are not limited to, caterpillars, beetles, grasshoppers, and locusts. Specific examples of Orders that have chewing pests of concern in agriculture include but are not limited to, Coleoptera and Lepidoptera. Specific examples of Coleoptera that are of concern in agriculture include, but are not limited to, *Anthonomus* spp., *Cerotoma* spp., *Chaetocnema* spp., *Colaspis* spp., *Cyclocephala* spp., *Diabrotica* spp., *Hypera* spp., *Phyllophaga* spp., *Phyllotreta* spp., *Sphenophorus* spp., *Sitophilus* spp.

The phrase "**pesticidally effective amount**" means the amount of a pesticide needed to achieve an observable effect on a pest, for example, the effects of necrosis, death, retardation, prevention, removal, destruction, or otherwise diminishing the occurrence and/or activity of a pest in a locus. This effect may come about when pest populations are repulsed from a locus, pests are incapacitated in, or around, a locus, and/or pests are exterminated in, or around, a locus. Of course, a combination of these effects can occur. Generally, pest populations, activity, or both are desirably reduced more than fifty percent, preferably more than 90 percent, and most preferably more than 99 percent. In general, a pesticidally effective amount, for agricultural purposes, is from about 0.0001 grams per hectare to about 5000 grams per hectare, preferably from about 0.0001 grams per hectare to about 500 grams per hectare, and it is even more preferably from about 0.0001 grams per hectare to about 50 grams per hectare.

Detailed description of this disclosure

This document discloses molecules of **Formula One**



Formula One

wherein:

(A) **Ar^1** is selected from the group consisting of furanyl, phenyl, pyridazinyl, pyridyl, pyrimidinyl, or thienyl,

wherein each furanyl, phenyl, pyridazinyl, pyridyl, pyrimidinyl, and thienyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(B) **Het** is a 5- or 6-membered, saturated or unsaturated, heterocyclic ring, containing one or more heteroatoms independently selected from nitrogen, sulfur, or oxygen, and where **Ar^1** and **L^1** are not ortho to each other, but may be meta or para, such as, for a five-membered ring they are 1,3, and for a 6-membered ring they are either 1,3 or 1,4,

wherein each heterocyclic ring may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl,

OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$S(O)_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, $S(O)_n$-(C_1-C_4)alkyl, $S(O)_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$S(O)_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and phenoxy;

(C) **L^1** is selected from the group consisting of $N(R^x)$-(C_1-C_4)alkyl, $N(R^x)$-(C_3-C_8)cycloalkyl, $N(R^x)$-(C_2-C_6)alkenyl, $N(R^x)$-(C_2-C_6)alkynyl, $N(R^x)$-$S(O)_n$-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$N(R^x)$-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$N(R^x)$-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$N(R^x)$, (C_3-C_8)cycloalkyl-$N(R^x)$, (C_2-C_6)alkynyl-$N(R^x)$, (C_1-C_4)alkyl-$S(O)_n$-$N(R^x)$, C(O)-$N(R^x)$, C(S)-$N(R^x)$, $N(R^x)$-C(O), $N(R^x)$-C(S), C(O)-$N(R^x)$-(C_1-C_4)alkyl, C(S)-$N(R^x)$-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$N(R^x)$-C(O), and (C_1-C_4)alkyl-$N(R^x)$-C(S),

wherein each alkyl, cycloalkyl, alkenyl, and alkynyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, and (C_2-C_6)alkynyl;

(D) **Ar^2** is selected from the group consisting of furanyl, phenyl, pyridazinyl, pyridyl, pyrimidinyl, or thienyl,

wherein each furanyl, phenyl, pyridazinyl, pyridyl, pyrimidinyl, and thienyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, $S(O)_n$-(C_1-C_4)alkyl, $S(O)_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$S(O)_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more

substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(E) $\mathbf{R^{15}}$ is selected from the group consisting of H, $(C_1$-$C_4)$alkyl, $(C_3$-$C_8)$cycloalkyl, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-NR^xR^y, C(O)-phenyl, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl,

wherein each alkyl, cycloalkyl, alkenyl, alkynyl, and phenyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(F) $\mathbf{Q^1}$ is selected from the group consisting of O and S;

(G) $\mathbf{Q^2}$ is selected from the group consisting of O and S;

(H) $\mathbf{R^{16}}$ is selected from the group consisting of **(K)**, H, $(C_1$-$C_4)$alkyl, $(C_3$-$C_8)$cycloalkyl, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, C(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkylphenyl, $(C_1$-$C_4)$alkyl-O-phenyl, C(O)-(Het-1), (Het-1), $(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl(NR^xR^y)-C(O)OH, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-$N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl$(N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl)-C(O)OH, $(C_1$-$C_4)$alkyl-C(O)-(Het-1)-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkyl-OC(O)-(Het-1), $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl-$N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-NR^xR^y, $(C_1$-$C_4)$alkyl-$S(O)_n$-(Het-1), and $(C_1$-$C_4)$alkyl-O-(Het-1),

wherein each alkyl, cycloalkyl, alkenyl, alkynyl, phenyl, and (Het-1) may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)OH, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl), phenyl, phenoxy, $Si((C_1$-$C_4)alkyl)_3$, $S(O)_n$-NR^xR^y, and (Het-1);

(I) $\mathbf{R^{17}}$ is selected from the group consisting of **(K)**, H, $(C_1$-$C_4)$alkyl, $(C_3$-$C_8)$cycloalkyl, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, C(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkylphenyl, $(C_1$-$C_4)$alkyl-O-phenyl, C(O)-(Het-1), (Het-1), $(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl(NR^xR^y)-C(O)OH, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-$N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl$(N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl)-C(O)OH, $(C_1$-$C_4)$alkyl-C(O)-(Het-1)-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkyl-OC(O)-(Het-1), $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl-$N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-NR^xR^y, $(C_1$-$C_4)$alkyl-$S(O)_n$-(Het-1), and $(C_1$-$C_4)$alkyl-O-(Het-1),

wherein each alkyl, cycloalkyl, alkenyl, alkynyl, phenyl, and (Het-1) may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)OH, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, phenoxy, $Si((C_1$-$C_4)alkyl)_3$, $S(O)_n$-NR^xR^y, and (Het-1);

(J) $\mathbf{L^2}$ is selected from the group consisting of $(C_3$-$C_8)$cycloalkyl, phenyl, $(C_1$-$C_4)$alkylphenyl, $(C_1$-$C_4)$alkyl-O-phenyl, $(C_2$-$C_6)$alkenyl-O-phenyl, (Het-1), $(C_1$-$C_4)$alkyl-(Het-1), and $(C_1$-$C_4)$alkyl-O-(Het-1),

wherein each alkyl, cycloalkyl, alkenyl, phenyl, and (Het-1) may be optionally substituted with one or more substituents independently selected from the

group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_1$-$C_4)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, O-$(C_1$-$C_4)$alkyl, S-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, phenoxy, and (Het-1),

wherein each alkyl, cycloalkyl, alkenyl, phenyl, and (Het-1) substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_1$-$C_4)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, O-$(C_1$-$C_4)$alkyl, S-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, phenoxy, and (Het-1);

(K) $\mathbf{R^{16}}$ and $\mathbf{R^{17}}$ along with $\mathbf{C^x(Q^2)(N^x)}$, form a 4- to 7-membered saturated or unsaturated, heterocyclic ring, which may further contain one or more heteroatoms selected from the group consisting of nitrogen, sulfur, and oxygen,

wherein each heterocyclic ring may be optionally substituted with one or more substituents independently selected from the group consisting of oxo, $\mathbf{R^{18}}$, and $\mathbf{R^{19}}$,

wherein $\mathbf{R^{18}}$ and $\mathbf{R^{19}}$ are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, thioxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and (Het-1);

(L) $\mathbf{R^x}$ and $\mathbf{R^y}$ are each independently selected from the group consisting of H, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, and phenyl,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, and phenyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and (Het-1);

(M) **(Het-1)** is a 5- or 6-membered, saturated or unsaturated, heterocyclic ring, containing one or more heteroatoms independently selected from the group consisting of nitrogen, sulfur, or oxygen,

wherein each heterocyclic ring may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

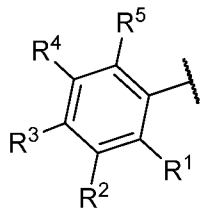
(N) **n** are each independently 0, 1, or 2; and

N–oxides, agriculturally acceptable acid addition salts, salt derivatives, solvates, crystal polymorphs, isotopes, resolved stereoisomers, and tautomers, of the molecules of Formula One.

The molecules of Formula One may exist in different geometric or optical isomeric or different tautomeric forms. One or more centers of chirality may be present in which case molecules of Formula One may be present as pure enantiomers, mixtures of

enantiomers, pure diastereomers or mixtures of diastereomers. It will be appreciated by those skilled in the art that one stereoisomer may be more active than the other stereoisomers. Individual stereoisomers may be obtained by known selective synthetic procedures, by conventional synthetic procedures using resolved starting materials, or by conventional resolution procedures. There may be double bonds present in the molecule, in which case compounds of Formula One may exist as single geometric isomers (*cis* or *trans*, *E* or *Z*) or mixtures of geometric isomers (*cis* and *trans*, *E* and *Z*). Centers of tautomerisation may be present. This disclosure covers all such isomers, tautomers, and mixtures thereof, in all proportions. The structures disclosed in the present disclosure are drawn in only one geometric form for clarity, but are intended to represent all geometric forms of the molecule.

In another embodiment **Ar^1** is **(1a)**



(1a),

wherein:

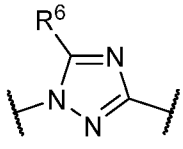
(1) **R^1**, **R^2**, **R^4**, and **R^5** are each independently H; and

(2) **R^3** is (C_1-C_4)haloalkoxy.

This embodiment may be used in combination with the other embodiments of **Het**, **L^1**, **Ar^2**, **R^{15}**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **Ar^1** is **(1a)**, wherein **R^3** is OCF_3. This embodiment may be used in combination with the other embodiments of **R^1**, **R^2**, **R^4**, **R^5**, **Het**, **L^1**, **Ar^2**, **R^{15}**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

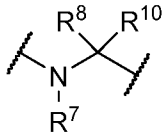
In another embodiment **Het** is **(1b)**



(1b),

wherein, **R^6** is H. This embodiment may be used in combination with the other embodiments of **Ar^1**, **L^1**, **Ar^2**, **R^{15}**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **L^1** is **(1c)**

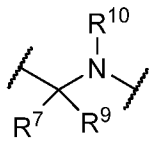


(1c),

wherein, **R^7**, **R^8**, and **R^{10}** are each independently H or (C_1-C_4)alkyl. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **Ar^2**, **R^{15}**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **L^1** is **(1c)** wherein, **R^7** and **R^{10}** are each independently CH_3. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **R^8**, **Ar^2**, **R^{15}**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **L^1** is **(1d)**

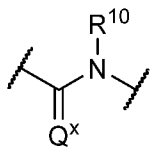


(1d),

wherein, **R^7**, **R^9**, and **R^{10}** are each independently H or (C_1-C_4)alkyl. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **Ar^2**, **R^{15}**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **L^1** is **(1d)** wherein, **R^7** and **R^{10}** are each independently CH_3. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **R^9**, **Ar^2**, **R^{15}**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **L^1** is **(1e)**



(1e),

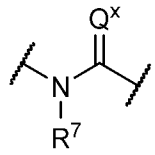
wherein,

(1) **Q^x** is O or S; and

(2) **R^{10}** is H or (C_1-C_4)alkyl. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **Ar^2**, **R^{15}**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **L^1** is **(1e)** wherein, **R^{10}** is CH_3. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **Ar^2**, **R^{15}**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **L^1** is **(1f)**



(1f),

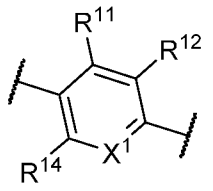
wherein,

(1) **Q^x** is O or S; and

(2) **R^7** is H or (C_1-C_4)alkyl. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **Ar^2**, **R^{15}**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **L^1** is **(1f)** wherein, **R^7** is CH_3. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **Ar^2**, **R^{15}**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **Ar^2** is **(1g)**



(1g),

wherein:

(1) **R^{11}** and **R^{12}** are each independently H;

(2) **X^1** is N or C**R^{13}**, wherein **R^{13}** is H or F; and

(3) **R^{14}** is H or Cl.

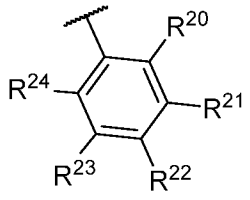
This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **L^1**, **R^{15}**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **R^{15}** is H. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **L^1**, **Ar^2**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **Q^1** is O. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **L^1**, **Ar^2**, **R^{15}**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **Q^2** is S. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **L^1**, **Ar^2**, **R^{15}**, **Q^1**, **R^{16}**, **R^{17}**, and **L^2**.

In another embodiment **L^2** is **(1h)**



(1h),

wherein:

(1) **R^{20}** is $(C_1\text{-}C_4)$alkyl or $(C_1\text{-}C_4)$alkyl-O-$(C_1\text{-}C_4)$alkyl;

(2) **R^{21}**, **R^{22}**, and **R^{24}** are each independently H; and

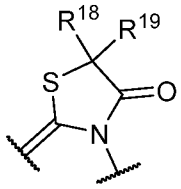
(3) **R^{23}** is $(C_1\text{-}C_4)$alkyl.

This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **L^1**, **Ar^2**, **R^{15}**, **Q^1**, **Q^2**, **R^{16}**, and **R^{17}**.

In another embodiment **L^2** is **(1h)**, wherein **R^{20}** is $CH_2CH_2CH_3$, $CH(CH_3)_2$, CH_2OCH_3, or $CH(CH_3)OCH_3$. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **L^1**, **Ar^2**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, **R^{21}**, **R^{22}**, **R^{23}**, and **R^{24}**.

In another embodiment **L^2** is **(1f)**, wherein **R^{23}** is CH_3. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **L^1**, **Ar^2**, **Q^1**, **Q^2**, **R^{16}**, **R^{17}**, **R^{20}**, **R^{21}**, **R^{22}**, and **R^{24}**.

In another embodiment **R^{16}** and **R^{17}** along with **$C^x(Q^2)(N^x)$**, is **(1i)**

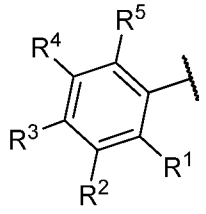


(1i),

wherein, **R^{18}** and **R^{19}** are each independently H. This embodiment may be used in combination with the other embodiments of **Ar^1**, **Het**, **L^1**, **Ar^2**, **R^{15}**, **Q^1**, and **L^2**.

In another embodiment

(A) **Ar^1** is **(1a)**

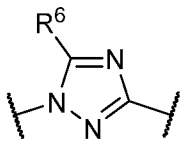


(1a),

wherein, **R¹**, **R²**, **R³**, **R⁴**, and **R⁵** are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(B) **Het** is **(1b)**



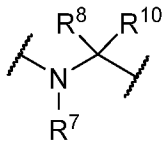
(1b),

wherein, **R⁶** is a substituent selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-

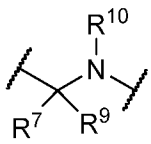
C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-S(O)$_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, S(O)$_n$-(C_1-C_4)alkyl, S(O)$_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-S(O)$_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and phenoxy;

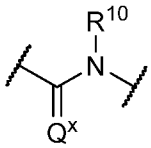
(C) $\mathbf{L^1}$ is selected from the group consisting of



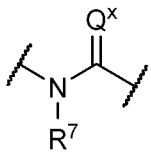
(1c),



(1d),



(1e), and



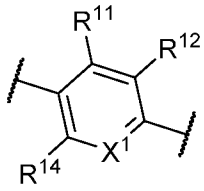
(1f),

wherein:

(1) $\mathbf{Q^x}$ is selected from the group consisting of O and S, and

(2) $\mathbf{R^7}$, $\mathbf{R^8}$, $\mathbf{R^9}$, and $\mathbf{R^{10}}$ are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, and (C_2-C_6)alkynyl;

(D) Ar^2 is **(1g)**



(1g),

wherein:

(1) X^1 is selected from the group consisting of N and CR^{13}, and

(2) R^{11}, R^{12}, R^{13}, and R^{14} are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(E) R^{15} is selected from the group consisting of H, $(C_1$-$C_4)$alkyl, $(C_3$-$C_8)$cycloalkyl, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-NR^xR^y, C(O)-phenyl, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl,

wherein each alkyl, cycloalkyl, alkenyl, alkynyl, and phenyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-

$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(F) $\mathbf{Q^1}$ is selected from the group consisting of O and S;

(G) $\mathbf{Q^2}$ is selected from the group consisting of O and S;

(H) $\mathbf{R^{16}}$ is selected from the group consisting of **(K)**, H, $(C_1$-$C_4)$alkyl, $(C_3$-$C_8)$cycloalkyl, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, C(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkylphenyl, $(C_1$-$C_4)$alkyl-O-phenyl, C(O)-(Het-1), (Het-1), $(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl(NR^xR^y)-C(O)OH, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-$N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl$(N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl)-C(O)OH, $(C_1$-$C_4)$alkyl-C(O)-(Het-1)-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkyl-OC(O)-(Het-1), $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl-$N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-NR^xR^y, $(C_1$-$C_4)$alkyl-$S(O)_n$-(Het-1), and $(C_1$-$C_4)$alkyl-O-(Het-1),

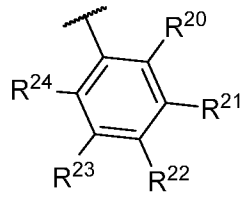
wherein each alkyl, cycloalkyl, alkenyl, alkynyl, phenyl, and (Het-1) may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)OH, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl), phenyl, phenoxy, $Si((C_1$-$C_4)alkyl)_3$, $S(O)_n$-NR^xR^y, and (Het-1);

(I) $\mathbf{R^{17}}$ is selected from the group consisting of **(K)**, H, $(C_1$-$C_4)$alkyl, $(C_3$-$C_8)$cycloalkyl, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, C(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkylphenyl, $(C_1$-$C_4)$alkyl-O-phenyl, C(O)-(Het-1), (Het-1), $(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl(NR^xR^y)-C(O)OH, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-$N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-C(O)-

$N(R^x)(C_1\text{-}C_4)$alkyl$(N(R^x)\text{-}C(O)O\text{-}(C_1\text{-}C_4)$alkyl$)\text{-}C(O)OH$, $(C_1\text{-}C_4)$alkyl-$C(O)$-(Het-1)-$C(O)O$-$(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)O\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)\text{-}(C_3\text{-}C_8)$cycloalkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)$-(Het-1), $(C_1\text{-}C_4)$alkyl-$OC(O)\text{-}(C_1\text{-}C_4)$alkyl-$N(R^x)\text{-}C(O)O\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-NR^xR^y, $(C_1\text{-}C_4)$alkyl-$S(O)_n$-(Het-1), and $(C_1\text{-}C_4)$alkyl-O-(Het-1),

wherein each alkyl, cycloalkyl, alkenyl, alkynyl, phenyl, and (Het-1) may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_3\text{-}C_8)$cycloalkyl, $(C_1\text{-}C_4)$alkoxy, $(C_2\text{-}C_6)$alkenyl, $(C_2\text{-}C_6)$alkynyl, $S(O)_n\text{-}(C_1\text{-}C_4)$alkyl, $S(O)_n\text{-}(C_1\text{-}C_4)$haloalkyl, $OSO_2\text{-}(C_1\text{-}C_4)$alkyl, $OSO_2\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)H$, $C(O)OH$, $C(O)\text{-}NR^xR^y$, $(C_1\text{-}C_4)$alkyl-NR^xR^y, $C(O)\text{-}(C_1\text{-}C_4)$alkyl, $C(O)O\text{-}(C_1\text{-}C_4)$alkyl, $C(O)\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)O\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)\text{-}(C_3\text{-}C_8)$cycloalkyl, $C(O)O\text{-}(C_3\text{-}C_8)$cycloalkyl, $C(O)\text{-}(C_2\text{-}C_6)$alkenyl, $C(O)O\text{-}(C_2\text{-}C_6)$alkenyl, $(C_1\text{-}C_4)$alkyl-$O\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$S(O)_n\text{-}(C_1\text{-}C_4)$alkyl, $C(O)\text{-}(C_1\text{-}C_4)$alkyl-$C(O)O\text{-}(C_1\text{-}C_4)$alkyl, phenyl, phenoxy, $Si((C_1\text{-}C_4)\text{alkyl})_3$, $S(O)_n\text{-}NR^xR^y$, and (Het-1);

(J) $\mathbf{L^2}$ is **(1h)**



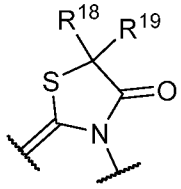
(1h),

wherein, $\mathbf{R^{20}}$, $\mathbf{R^{21}}$, $\mathbf{R^{22}}$, $\mathbf{R^{23}}$, and $\mathbf{R^{24}}$ are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_3\text{-}C_8)$cycloalkyl, $(C_1\text{-}C_4)$alkoxy, $(C_1\text{-}C_4)$haloalkoxy, $(C_2\text{-}C_6)$alkenyl, $(C_2\text{-}C_6)$alkynyl, $S(O)_n\text{-}(C_1\text{-}C_4)$alkyl, $S(O)_n\text{-}(C_1\text{-}C_4)$haloalkyl, $OSO_2\text{-}(C_1\text{-}C_4)$alkyl, $OSO_2\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)H$, $C(O)\text{-}NR^xR^y$, $(C_1\text{-}C_4)$alkyl-NR^xR^y, $C(O)\text{-}(C_1\text{-}C_4)$alkyl, $C(O)O\text{-}(C_1\text{-}C_4)$alkyl, $C(O)\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)O\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)\text{-}(C_3\text{-}C_8)$cycloalkyl, $C(O)O\text{-}(C_1\text{-}C_4)$cycloalkyl, $C(O)\text{-}(C_2\text{-}C_6)$alkenyl, $C(O)O\text{-}(C_2\text{-}C_6)$alkenyl, $O\text{-}(C_1\text{-}C_4)$alkyl, $S\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$O\text{-}(C_1\text{-}C_4)$alkyl, $C(O)\text{-}(C_1\text{-}C_4)$alkyl-$C(O)O\text{-}(C_1\text{-}C_4)$alkyl, phenyl, phenoxy, and (Het-1),

wherein each alkyl, cycloalkyl, alkenyl, phenyl, and (Het-1) substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_3\text{-}C_8)$cycloalkyl, $(C_1\text{-}C_4)$alkoxy, $(C_1\text{-}C_4)$haloalkoxy, $(C_2\text{-}C_6)$alkenyl, $(C_2\text{-}C_6)$alkynyl, $S(O)_n\text{-}(C_1\text{-}C_4)$alkyl, $S(O)_n\text{-}(C_1\text{-}C_4)$haloalkyl, $OSO_2\text{-}(C_1\text{-}C_4)$alkyl, $OSO_2\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)H$, $C(O)\text{-}NR^xR^y$, $(C_1\text{-}C_4)$alkyl-NR^xR^y, $C(O)\text{-}(C_1\text{-}C_4)$alkyl, $C(O)O\text{-}(C_1\text{-}C_4)$alkyl, $C(O)\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)O\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)\text{-}(C_3\text{-}C_8)$cycloalkyl, $C(O)O\text{-}(C_1\text{-}C_4)$cycloalkyl,

C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, O-(C_1-C_4)alkyl, S-(C_1-C_4)alkyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, phenoxy, and (Het-1);

(K) $\mathbf{R^{16}}$ and $\mathbf{R^{17}}$ along with $\mathbf{C^x(Q^2)(N^x)}$, is **(1i)**



(1i),

wherein, $\mathbf{R^{18}}$ and $\mathbf{R^{19}}$ are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, thioxo, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, S(O)$_n$-(C_1-C_4)alkyl, S(O)$_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)H, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-S(O)$_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and (Het-1);

(L) $\mathbf{R^x}$ and $\mathbf{R^y}$ are each independently selected from the group consisting of H, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, S(O)$_n$-(C_1-C_4)alkyl, S(O)$_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)H, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-S(O)$_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, and phenyl,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, and phenyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, S(O)$_n$-(C_1-C_4)alkyl, S(O)$_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)H, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-S(O)$_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and (Het-1);

(M) **(Het-1)** is a 5- or 6-membered, saturated or unsaturated, heterocyclic ring, containing one or more heteroatoms independently selected from the group consisting of nitrogen, sulfur, or oxygen,

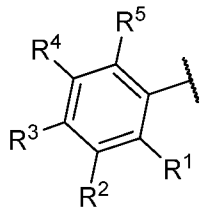
wherein each heterocyclic ring may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy; and

(N) **n** are each independently 0, 1, or 2.

In another embodiment

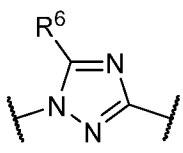
(A) **Ar^1** is **(1a)**



(1a),

wherein, **R^1**, **R^2**, **R^3**, **R^4**, and **R^5** are each independently selected from the group consisting of H and $(C_1$-$C_4)$haloalkoxy;

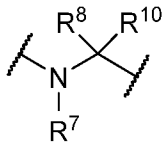
(B) **Het** is **(1b)**



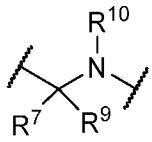
(1b),

wherein, $\mathbf{R^6}$ is H;

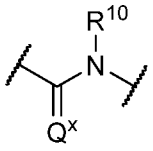
(C) $\mathbf{L^1}$ is selected from the group consisting of



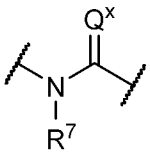
(1c),



(1d),



(1e), and



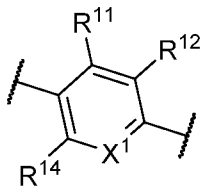
(1f),

wherein:

(1) $\mathbf{Q^x}$ is O, and

(2) $\mathbf{R^7}$, $\mathbf{R^8}$, $\mathbf{R^9}$, and $\mathbf{R^{10}}$ are each independently selected from the group consisting of H and $(C_1\text{-}C_4)$alkyl;

(D) $\mathbf{Ar^2}$ is **(1g)**



(1g),

wherein:

(1) $\mathbf{X^1}$ is selected from the group consisting of N and $C\mathbf{R^{13}}$, and

(2) R^{11}, R^{12}, R^{13}, and R^{14} are each independently selected from the group consisting of H, F, and Cl;

(E) R^{15} is H;

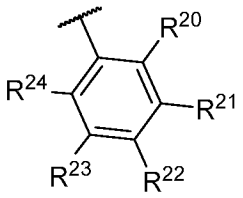
(F) Q^1 is O;

(G) Q^2 is S;

(H) R^{16} is **(K)**;

(I) R^{17} is **(K)**;

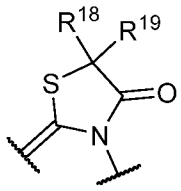
(J) L^2 is **(1h)**



(1h),

wherein, R^{20}, R^{21}, R^{22}, R^{23}, and R^{24} are each independently selected from the group consisting of H, (C_1-C_4)alkyl, and (C_1-C_4)alkyl-O-(C_1-C_4)alkyl; and

(K) R^{16} and R^{17} along with $C^x(Q^2)(N^x)$, is **(1i)**

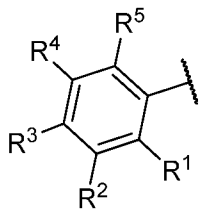


(1i),

wherein, R^{18} and R^{19} are each independently H.

In another embodiment

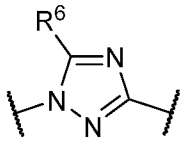
(A) Ar^1 is **(1a)**



(1a),

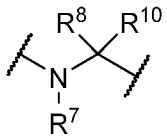
wherein, R^1, R^2, R^3, R^4, and R^5 are each independently selected from the group consisting of H and OCF_3;

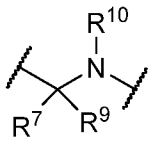
(B) **Het** is **(1b)**

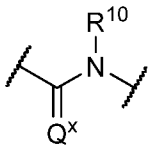

(1b),

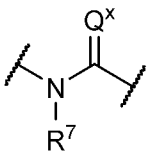
wherein, $\mathbf{R^6}$ is H;

(C) $\mathbf{L^1}$ is selected from the group consisting of


(1c),


(1d),


(1e), and

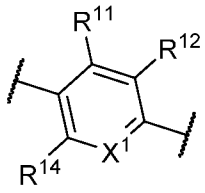

(1f),

wherein:

(1) $\mathbf{Q^x}$ is O, and

(2) $\mathbf{R^7}$, $\mathbf{R^8}$, $\mathbf{R^9}$, and $\mathbf{R^{10}}$ are each independently selected from the group consisting of H and CH_3;

(D) $\mathbf{Ar^2}$ is **(1g)**



(1g),

wherein:

(1) X^1 is selected from the group consisting of N and CR^{13}, and

(2) R^{11}, R^{12}, R^{13}, and R^{14} are each independently selected from the group consisting of H, F, and Cl;

(E) R^{15} is H;

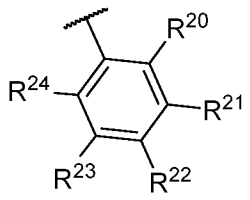
(F) Q^1 is O;

(G) Q^2 is S;

(H) R^{16} is **(K)**;

(I) R^{17} is **(K)**;

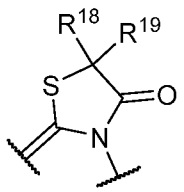
(J) L^2 is **(1h)**



(1h),

wherein, R^{20}, R^{21}, R^{22}, R^{23}, and R^{24} are each independently selected from the group consisting of H, CH_3, $CH_2CH_2CH_3$, $CH(CH_3)_2$, CH_2OCH_3, and $CH(CH_3)OCH_3$; and

(K) R^{16} and R^{17} along with $C^x(Q^2)(N^x)$, is **(1i)**



(1i),

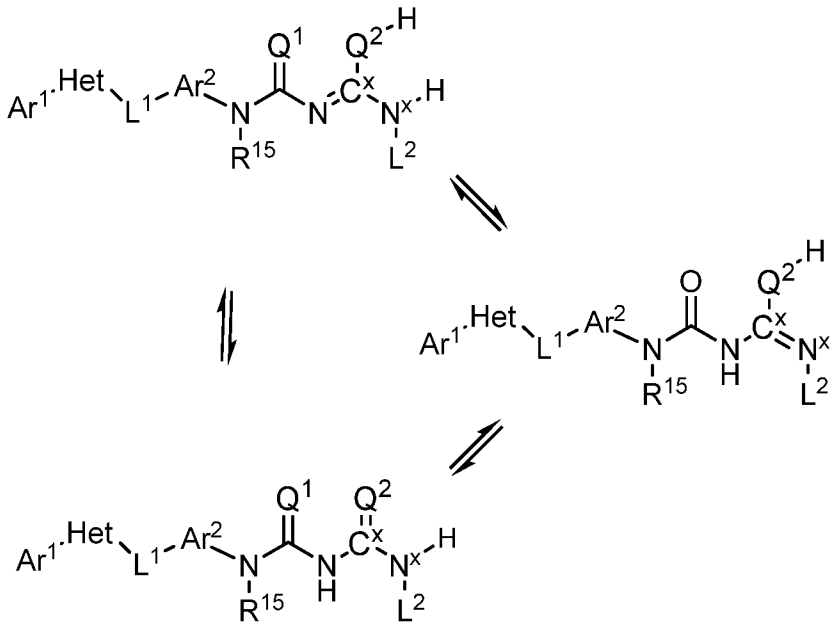
wherein, R^{18} and R^{19} are each independently H.

PREPARATION OF MOLECULES OF FORMULA ONE

Many of the molecules of Formula One may be depicted in two or more tautomeric forms such as when R^{16} and R^{17} are H (Scheme TAU). For the sake of simplifying the schemes, all molecules have been depicted as existing as a single

tautomer. Any and all energetically accessible tautomers are included within the scope of this Formula One, and no inference should be made as to whether the molecule exists as the tautomeric form in which it is drawn.

Scheme TAU

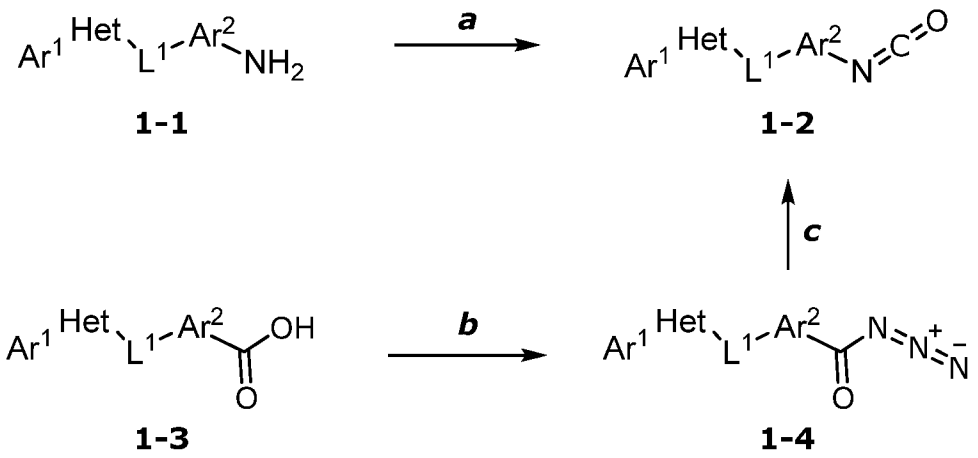


The molecules of Formula One will generally have a molecular mass of about 400 Daltons to about 1200 Daltons.

PREPARATION OF ACYL AZIDES

Molecules of Formula One disclosed herein may be prepared from the corresponding isocyanates **1-2**, wherein **Ar^1**, **Het**, **L^1**, and **Ar^2** are as previously disclosed. In some cases these isocyanates are not isolated, but are instead generated *in situ* from a suitable precursor and used directly in the preparation of molecules of Formula One. One such suitable precursor are amines **1-1**, wherein **Ar^1**, **Het**, **L^1**, and **Ar^2** are as previously disclosed, which may be converted into isocyanates **1-2** by using one of several common reagents such as phosgene, diphosgene, or triphosgene, in a mixed solvent system such as dichloromethane and water or diethyl ether and water, in the presence of a base such as sodium bicarbonate or triethylamine, at temperatures from about -10 °C to about 50 °C (Scheme 1, step a).

Scheme 1



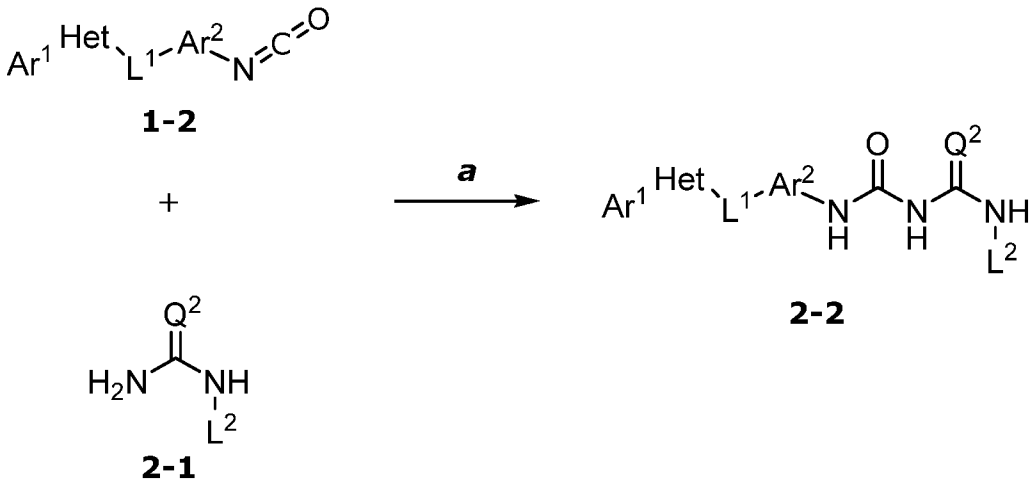
Alternatively, the isocyanates may be generated via the Curtius rearrangement of acyl azides **1-4**, wherein **Ar^1**, **Het**, **L^1**, and **Ar^2** are as previously disclosed, which are, in turn, prepared from the corresponding carboxylic acids **1-3**, wherein **Ar^1**, **Het**, **L^1**, and **Ar^2** are as previously disclosed. Formation of acyl azides **1-4** may occur either by treatment of the acid with ethyl chloroformate and sodium azide in the presence of an amine base such as triethylamine, or with diphenylphosphoryl azide in the presence of an amine base such as trimethylamine (Scheme 1, step b). Acyl azides **1-4** are then made to undergo a thermally-induced Curtius rearrangement, leading to the corresponding isocyanates **1-2**. Depending on the nature of the particular acyl azide, this rearrangement may occur spontaneously at room temperature, or it may require heating from 40 °C to about 100 °C in a solvent, such as toluene, acetonitrile, or an ethereal solvent such as dioxane or tetrahydrofuran. Acyl azides **1-4** are not always fully characterized, but may simply be heated directly without characterization, to generate isocyanates **1-2**.

PREPARATION OF LINEAR BIURETS

Isolated isocyanates **1-2**, isocyanates **1-2** prepared *in situ* from corresponding acyl azides **1-4** via the Curtius rearrangement, or isocyanates **1-2** prepared *in situ* from corresponding carboxylic acids via azide formation and subsequent Curtius rearrangement, may be treated directly with ureas **2-1**, wherein **Q^2** and **L^2** are as previously disclosed, in the presence of about 0.1 equivalents to about 2 equivalents of an inorganic base such as cesium carbonate or sodium hydride, resulting in the formation of biurets **2-2**, wherein **Ar^1**, **Het**, **L^1**, **Ar^2**, **Q^2**, and **L^2** are as previously disclosed (Scheme 2, step a). The reaction can be performed at temperatures from about 0 °C to about 100 °C, preferably from about 20 °C to about 80 °C, in an aprotic solvent or solvent mixture chosen from acetonitrile, acetone, toluene, tetrahydrofuran,

dichloroethane, dichloromethane, or mixtures thereof, but use of acetonitrile is preferred.

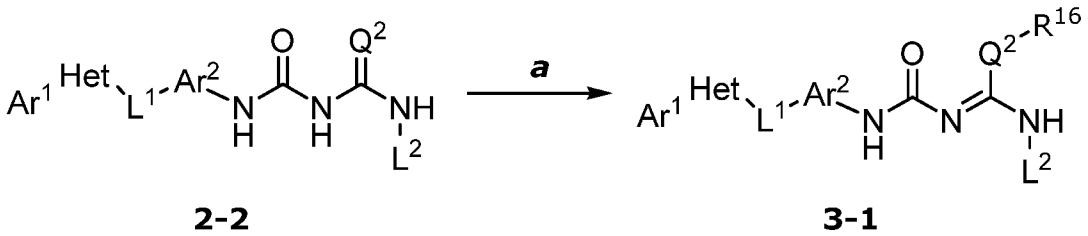
Scheme 2



PREPARATION OF SUBSTITUTED LINEAR BIURETS

Linear biurets **2-2** may be treated with **R^{16}-halo**, wherein **R^{16}** is as previously disclosed, in a protic solvent, such as ethanol, in the presence of a base, such as sodium acetate, at temperatures from about 0 °C to about 60 °C, to yield substituted linear biurets **3-1**, wherein **Ar^1**, **Het**, **L^1**, **Ar^2**, **Q^2**, **R^{16}**, and **L^2** are as previously disclosed (Scheme 3, step a).

Scheme 3



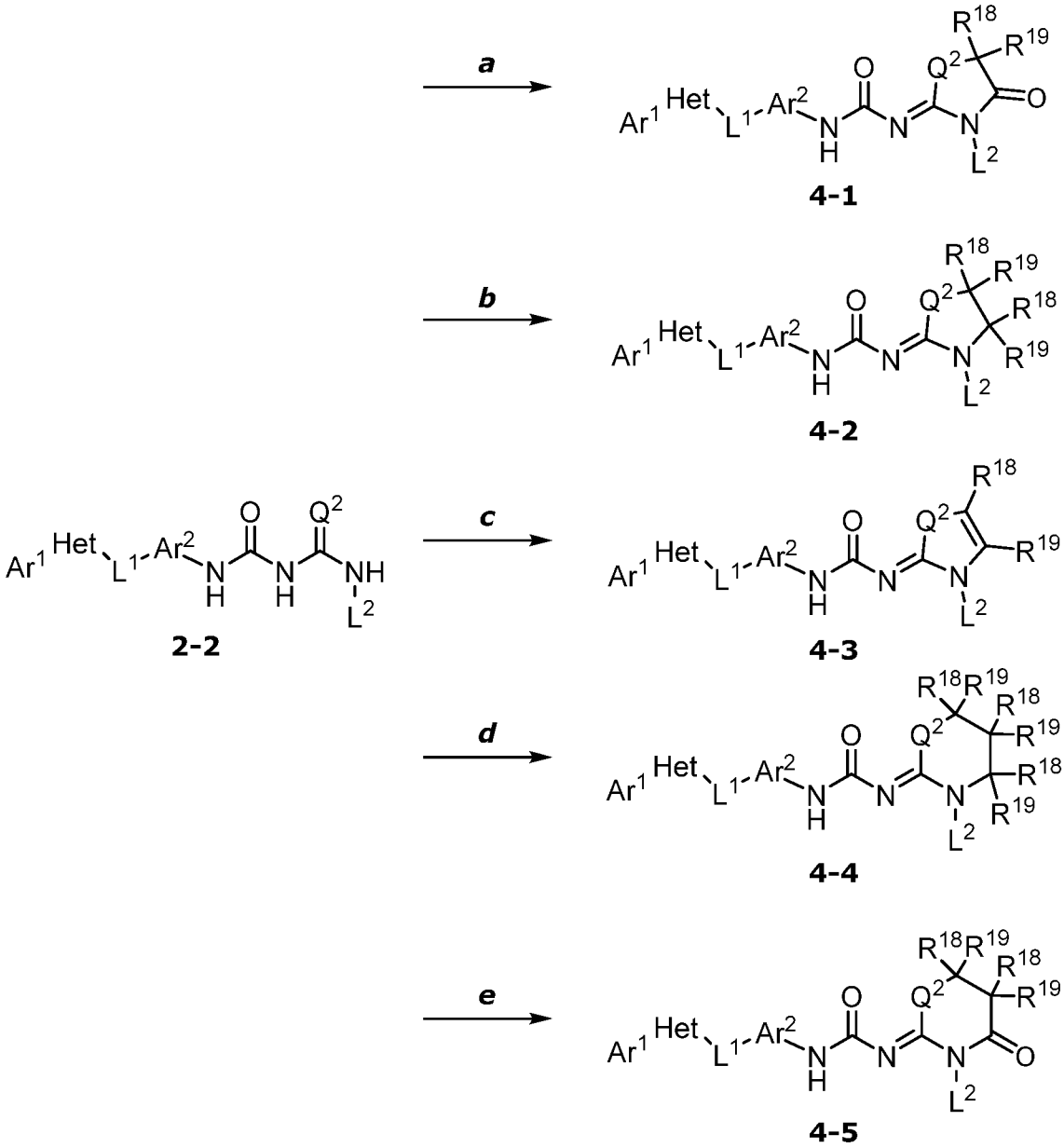
PREPARATION OF CYCLIC BIURETS

Linear biurets **2-2** generated *in situ* may be converted directly without purification into a variety of cyclized analogs (Scheme 4), or they can be isolated from the reaction medium prior to cyclization. Cyclization may be achieved by treatment with an α-halo ester such as methyl bromoacetate to form 2-imino 1,3-chalcogenazolin-4-

ones **4-1**, wherein **Ar^1**, **Het**, **L^1**, **Ar^2**, **Q^2**, **R^{18}**, **R^{19}**, and **L^2** are as previously disclosed (Scheme 4, step a); vicinal dihalides such as 1-bromo-2-chloroethane or 1,2-dichloroethane, to form 2-imino-1,3-chalogenazolines **4-2**, wherein **Ar^1**, **Het**, **L^1**, **Ar^2**, **Q^2**, **R^{18}**, **R^{19}**, and **L^2** are as previously disclosed (Scheme 4, step b); α-halo ketones such as chloroacetone to form 2-imino-1,3-chalcogenazoles **4-3**, wherein **Ar^1**, **Het**, **L^1**, **Ar^2**, **Q^2**, **R^{18}**, **R^{19}**, and **L^2** are as previously disclosed (Scheme 4, step c); 1,3-dihalopropanes such as 1-bromo-3-chloro-propane to form 2-imino-1,3-chalcogenazinanes **4-4**, wherein **Ar^1**, **Het**, **L^1**, **Ar^2**, **Q^2**, **R^{18}**, **R^{19}**, and **L^2** are as previously disclosed (Scheme 4, step d); or α,β-unsaturated acid chlorides such as acryloyl chloride to form 2-imino-1,3-chalcogenazinones **4-5**, wherein **Ar^1**, **Het**, **L^1**, **Ar^2**, **Q^2**, **R^{18}**, **R^{19}**, and **L^2** are as previously disclosed (Scheme 4, step e). With step a in Scheme 4, the use of sodium acetate in a protic solvent such as ethanol or methanol, at temperatures ranging from about 20 °C to about 70 °C is preferred. With step b in Scheme 4, the use of an inorganic base such as potassium carbonate in a solvent such as acetonitrile or (preferably) 2-butanone, at a temperature between about 0 °C and about 80 °C, is preferred.

An alternative method for preparing cyclic biurets is described in Scheme 5. 2-Imino-1,3-chalcogenazoheterocycles **5-1**, wherein **$C^x(Q^2)(N^x)$**, **R^{16}**, **R^{17}**, and **L^2** are as previously disclosed, may be treated directly with isolated isocyanates **1-2**, isocyanates **1-2** prepared *in situ* from corresponding acyl azides **1-4** via the Curtius rearrangement, or isocyanates **1-2** prepared *in situ* from corresponding carboxylic acids via azide formation and subsequent Curtius rearrangement, either in the absence of base or in the presence of about 0.1 equivalents to about 2 equivalents of an inorganic base, such as cesium carbonate or sodium hydride, to form cyclic thiobiurets **5-2**, wherein **Ar^1**, **Het**, **L^1**, **Ar^2**, **Q^2**, **R^{16}**, **R^{17}**, and **L^2** are as previously disclosed (Scheme 5, step a). The reaction may be performed at temperatures from about 0 °C to about 100 °C, preferably from about 20 °C to about 80 °C, in an aprotic solvent or solvent mixture chosen from acetonitrile, acetone, toluene, tetrahydrofuran, 1,2-dichloroethane, dichloromethane, or mixtures thereof, but use of acetonitrile is preferred. Cyclic biurets **4-1**, **4-2**, **4-3**, **4-4**, and **4-5**, wherein **L^1** contains an olefin, may be reduced by treatment with hydrogen in the presence of a transition metal catalyst, such as palladium on carbon or platinum(IV) oxide.

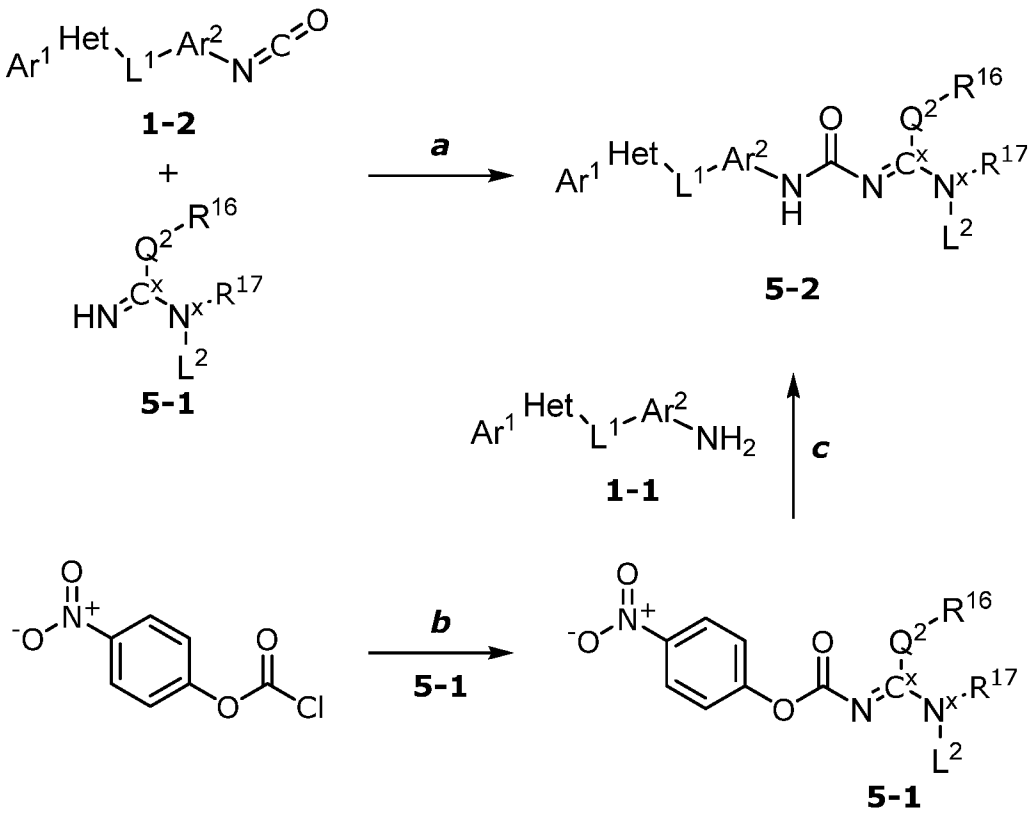
Scheme 4



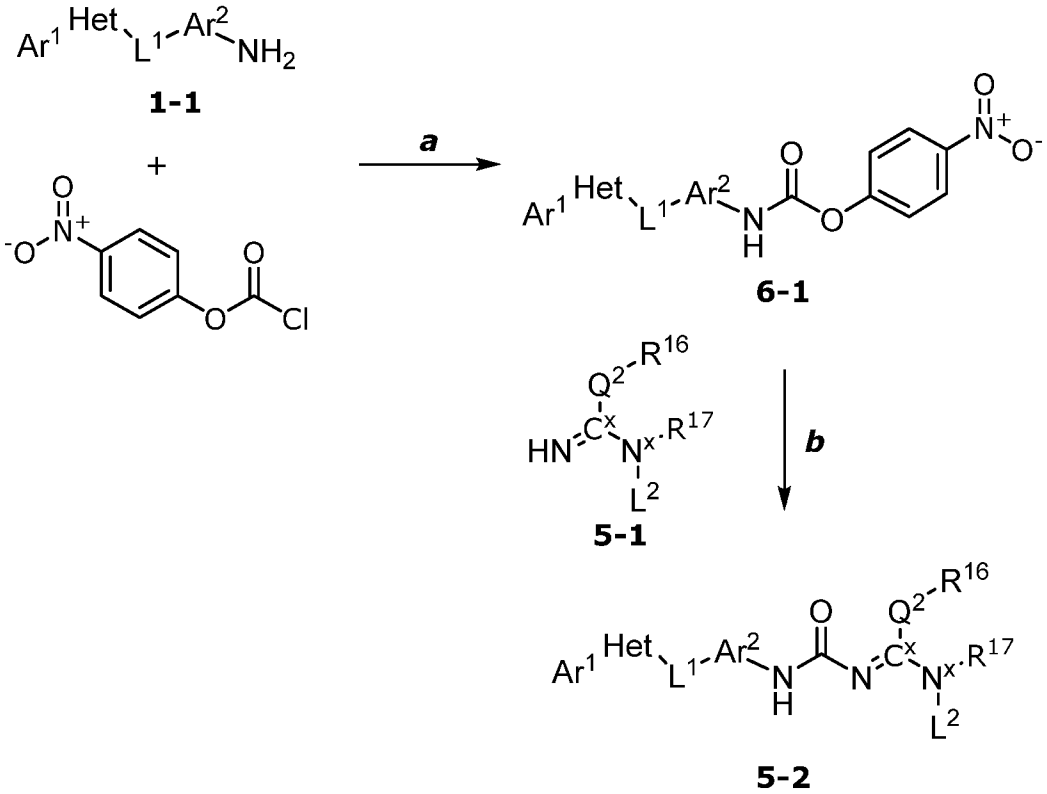
Alternatively, 2-imino-1,3-chalcogenazoheterocycles **5-1** may be reacted with 4-nitrophenyl chloroformate, forming 4-nitrophenyl carbamates **5-2**, wherein $\mathbf{C^x(Q^2)(N^x)}$, $\mathbf{R^{16}}$, $\mathbf{R^{17}}$, and $\mathbf{L^2}$ are as previously disclosed (Scheme 5, step b). This reaction may be conducted with equimolar quantities of 2-imino-1,3-chalcogenazoheterocycles **5-1** and the chloroformate, in a polar aprotic solvent, such as tetrahydrofuran, dioxane, or acetonitrile, in the presence of from about 0.1 equivalents to about 2 equivalents of an inorganic base, such as cesium carbonate or potassium carbonate, preferably at about room temperature. 4-Nitrophenyl carbamates **5-2** may be isolated by filtration and

concentration of the filtrate, or 4-nitrophenyl carbamates **5-2** may be used directly (Scheme 5, step c). Treatment of 4-nitrophenyl carbamates **5-2** with amines **1-1** may generate cyclic thiobiurets **5-2**. Step c may also be conducted in the presence of an inorganic base, such as cesium carbonate or potassium carbonate, from about 0.1 equivalents to about 2 equivalents, preferably about 1 equivalents to about 1.2 equivalents, at temperatures from about 0 °C to about 100 °C, preferably about room temperature. Cyclic biurets **5-2**, wherein $\mathbf{L^1}$ contains an olefin, may be reduced by treatment with hydrogen in the presence of a transition metal catalyst, such as palladium on carbon or platinum(IV) oxide.

Scheme 5

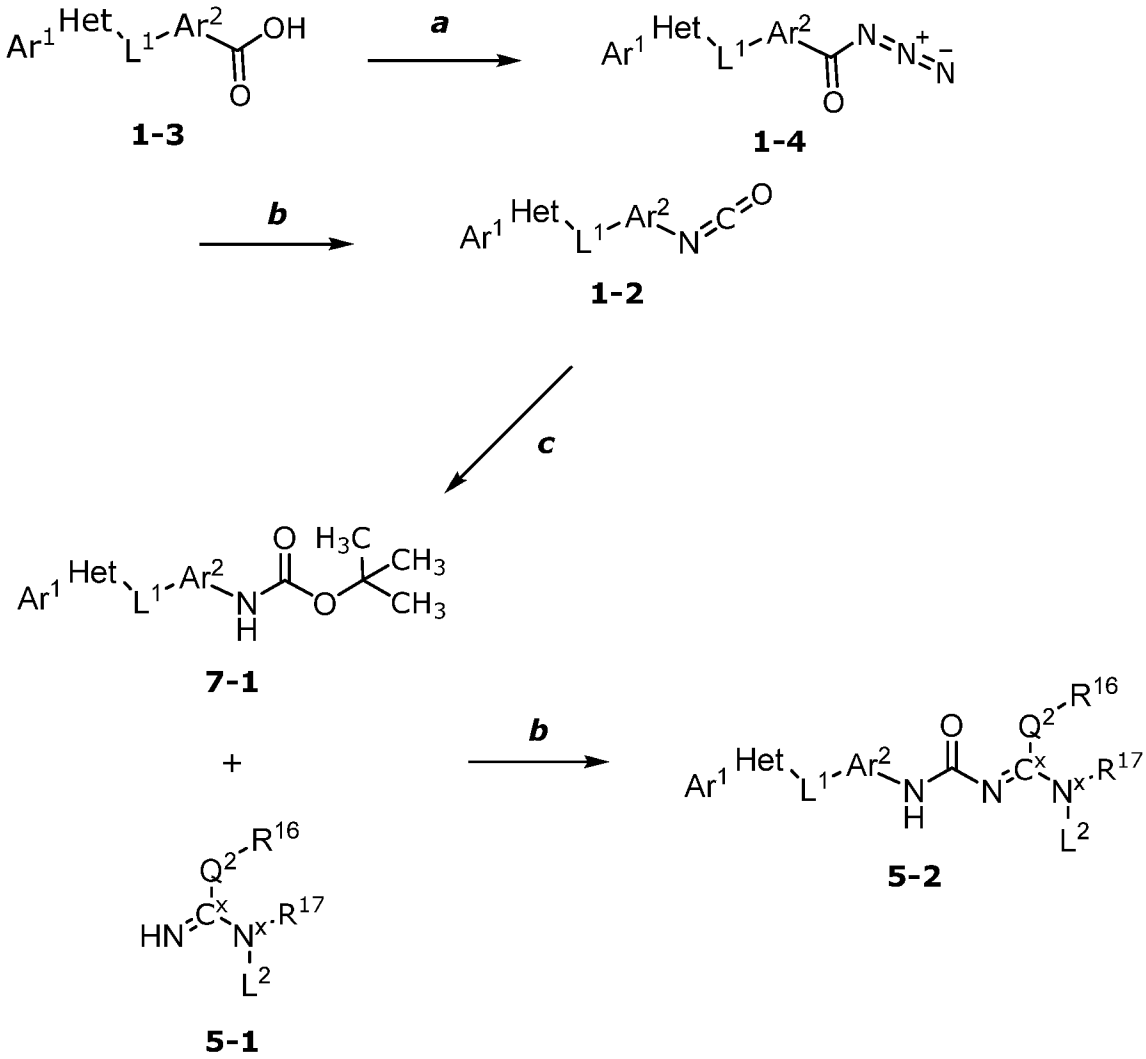


Scheme 6



An alternative method for preparing cyclic biurets is described in Scheme 6. Amines **1-1** may be reacted with 4-nitrophenyl chloroformate, forming 4-nitrophenyl carbamates **6-1**, wherein **Ar^1**, **Het**, **L^1**, and **Ar^2** are as previously disclosed (Scheme 6, step a). This reaction may be conducted with equimolar quantities of amines **1-1** and the chloroformate, in a polar aprotic solvent, such as tetrahydrofuran, dioxane, or acetonitrile, in the presence of from about 0.1 equivalents to about 2 equivalents of an inorganic base, such as cesium carbonate or potassium carbonate, preferably at about room temperature. 4-Nitrophenyl carbamates **6-1** may be isolated by filtration and concentration of the filtrate, or 4-nitrophenyl carbamates **6-1** may be used directly (Scheme 6, step b). Treatment of 4-nitrophenyl carbamates **6-1** with 2-imino-1,3-chalcogenazoheterocycles **5-1** may generate cyclic thiobiurets **5-2**. This reaction may be conducted with equimolar quantities of nitrophenyl carbamates **6-1** and 2-imino-1,3-chalcogenazoheterocycles **5-1**, in a polar aprotic solvent, acetonitrile, in the presence of from about 0.1 equivalents to about 2 equivalents of an inorganic base, such as cesium carbonate or potassium carbonate, and about 2 equivalents of an organic base, such as *N*,*N*-diisopropylethylamine, preferably at about room temperature.

Scheme 7



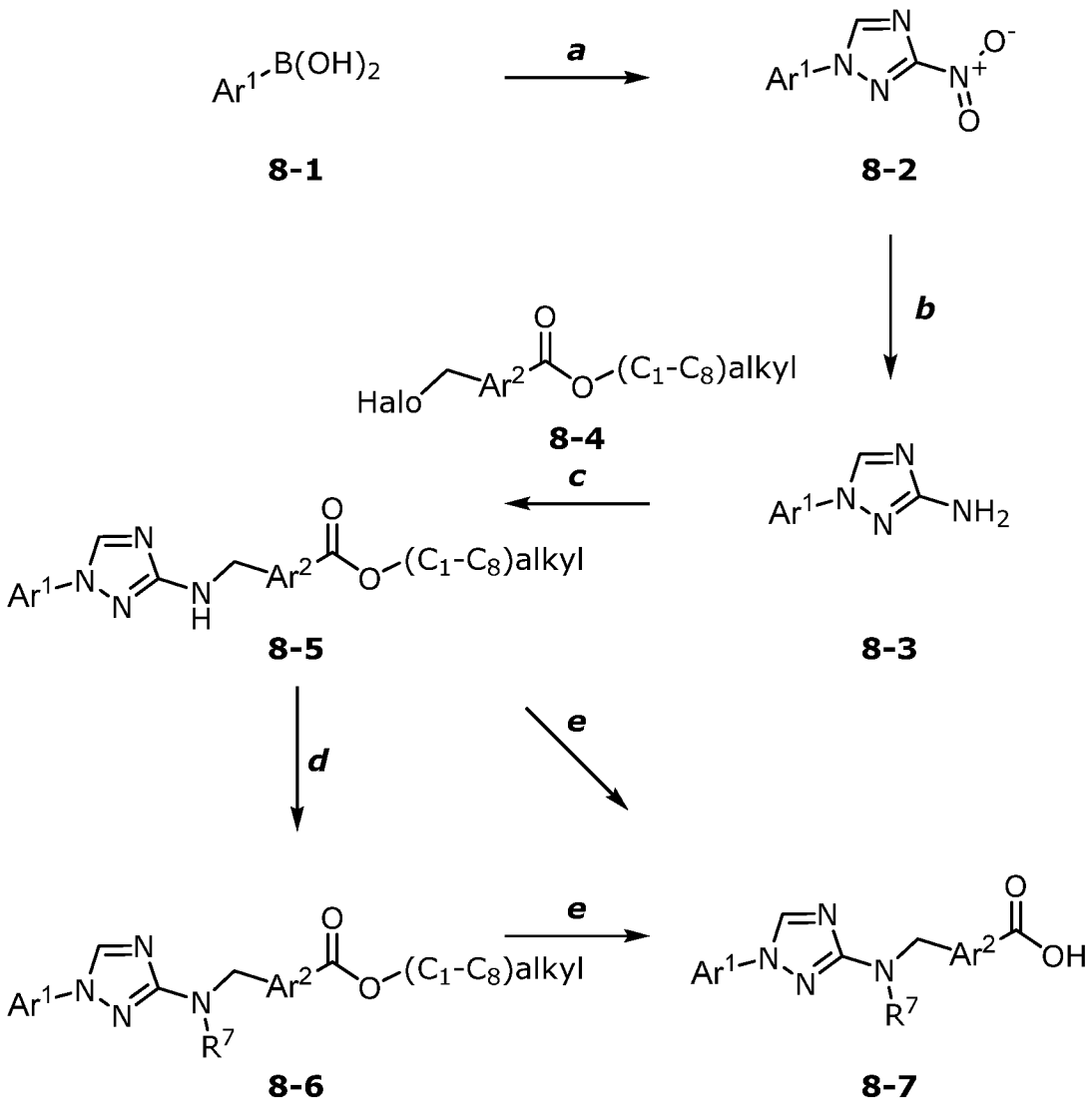
An additional method for preparing cyclic biurets is described in Scheme 7. *tert*-Butyl carbamates **7-1**, wherein **Ar^1**, **Het**, **L^1**, and **Ar^2** are as previously disclosed, may be prepared from the corresponding carboxylic acids **1-3** by *in situ* generation of the isocyanates **1-2** via the Curtius rearrangement of acyl azides **1-4** and reaction with *tert*-butyl alcohol (Scheme 7, step c). Formation of acyl azides **1-4** may occur by treatment of the acid with diphenylphosphoryl azide in the presence of an amine base such as triethylamine (Scheme 1, step a). Acyl azides **1-4** are then made to undergo a thermally-induced Curtius rearrangement, leading to the corresponding isocyanates **1-2**. Depending on the nature of the particular acyl azide, this rearrangement may occur spontaneously at room temperature, or it may require heating from 40 ^{o}C to about 100 ^{o}C in a solvent, such as toluene, acetonitrile, or an ethereal solvent such as dioxane or tetrahydrofuran. When this reaction is conducted in *tert*-butyl alcohol, the carbamate **7-**

1 may be isolated, but not always fully characterized. Treatment of carbamates **7-1**, wherein **Ar^1**, **Het**, **L^1**, and **Ar^2** are as previously disclosed, with 2-imino-1,3-chalcogenazoheterocycles **5-1** may generate cyclic thiobiurets **5-2**. This reaction may be conducted in an aprotic solvent such as toluene, at temperatures from about 80 °C to about 140 °C in a sealed tube (Scheme 7, step b). Cyclic biurets **5-2**, wherein **L^1** contains an olefin, may be reduced by treatment with hydrogen in the presence of a transition metal catalyst, such as palladium on carbon or platinum(IV) oxide.

PREPARATION OF CARBOXYLIC ACIDS

Methods for preparation of carboxylic acids **8-7**, wherein **Ar^1**, **R^7**, and **Ar^2** are as previously disclosed, required for preparation of molecules of Formula One are described in Schemes 8 and 9. Boronic acids **8-1**, wherein **Ar^1** is as previously disclosed, may be treated with substituted triazoles, in the presence of a copper catalyst such as copper(II) acetate, and a base such as pyridine, in a solvent such as dichloromethane, at temperatures from about 15 °C to about 30 °C, to form nitro triazoles **8-2**, wherein **Ar^1** is as previously disclosed (Scheme 8, step a). Nitro triazoles **8-2** may be reduced by treatment with hydrogen in the presence of a transition metal catalyst, such as palladium on carbon or platinum(IV) oxide to form amines **8-3**, wherein **Ar^1** is as previously disclosed (Scheme 8, step b). Amines **8-3** may be treated with aldehydes **8-4**, wherein **Ar^2** is as previously disclosed, in the presence of a reducing agent, such as sodium borohydride, at temperatures from about 50 °C to about 90 °C, to form esters **8-5**, wherein **Ar^1** and **Ar^2** are as previously disclosed (Scheme 8, step c). Esters **8-5** may be treated with an alkyl halide, such as iodomethane, in the presence of a base, such as sodium hydride, a polar aprotic solvent, such as *N*,*N*-dimethylformamide, at temperatures from about -10 °C to about 30 °C to form amines **8-6**, wherein **Ar^1**, **R^7**, and **Ar^2** are as previously disclosed (Scheme 8, step d). Esters **8-5** and **8-6** may be treated with a metal hydroxide such as potassium hydroxide, sodium hydroxide, or lithium hydroxide, in a solvent such as tetrahydrofuran, methanol, water, or mixtures thereof, to form carboxylic acids **8-7** (Scheme 8, step e).

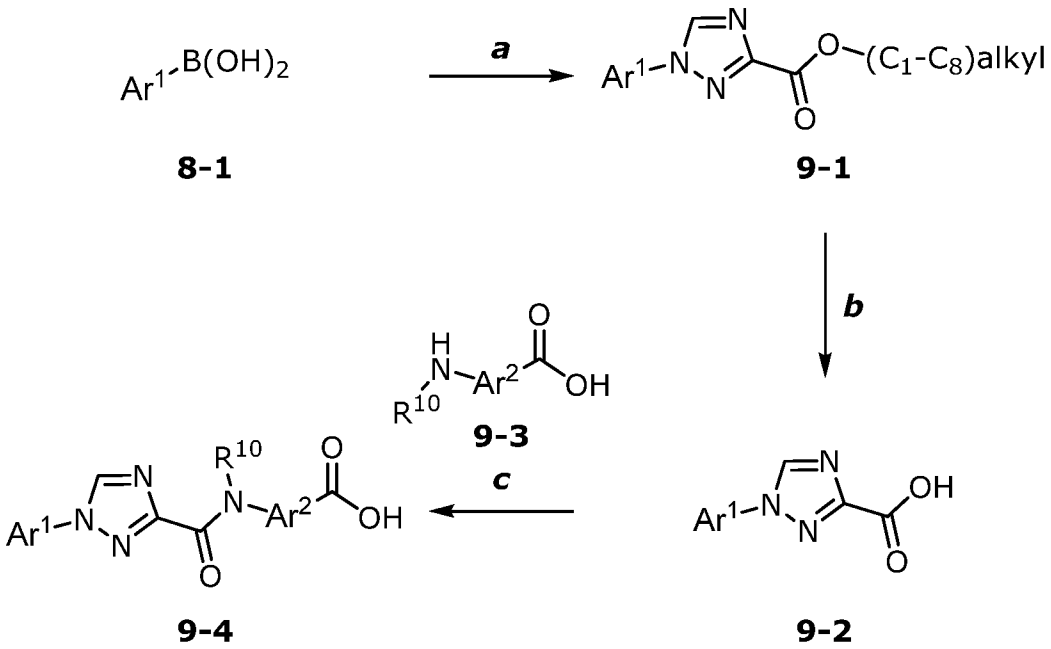
Scheme 8



Boronic acids **8-1** may be treated with substituted triazoles, in the presence of a copper catalyst such as copper(II) acetate, and a base such as pyridine, in a solvent such as dichloromethane, at temperatures from about 15 °C to about 30 °C, to form esters **9-1**, wherein **Ar^1** is as previously disclosed (Scheme 9, step a). Esters **9-1** may be treated with a metal hydroxide such as potassium hydroxide, sodium hydroxide, or lithium hydroxide, in a solvent such as tetrahydrofuran, methanol, water, or mixtures thereof, to form carboxylic acids **9-2**, wherein **Ar^1** is as previously disclosed (Scheme 9, step b). Carboxylic acids **9-2** may be treated with oxalyl chloride in the presence of *N*,*N*-dimethylformamide, in a polar solvent such as dichloromethane, tetrahydrofuran, or mixtures thereof, to form an acid chloride which may in turn be treated with anilines **9-**

3, wherein $\mathbf{R^{10}}$ and $\mathbf{Ar^2}$ are as previously disclosed, in the presence of a base such as trimethylamine to form carboxylic acids **9-4**, wherein $\mathbf{Ar^2}$, $\mathbf{R^{10}}$, and $\mathbf{Ar^2}$ are as previously disclosed (Scheme 9, step c).

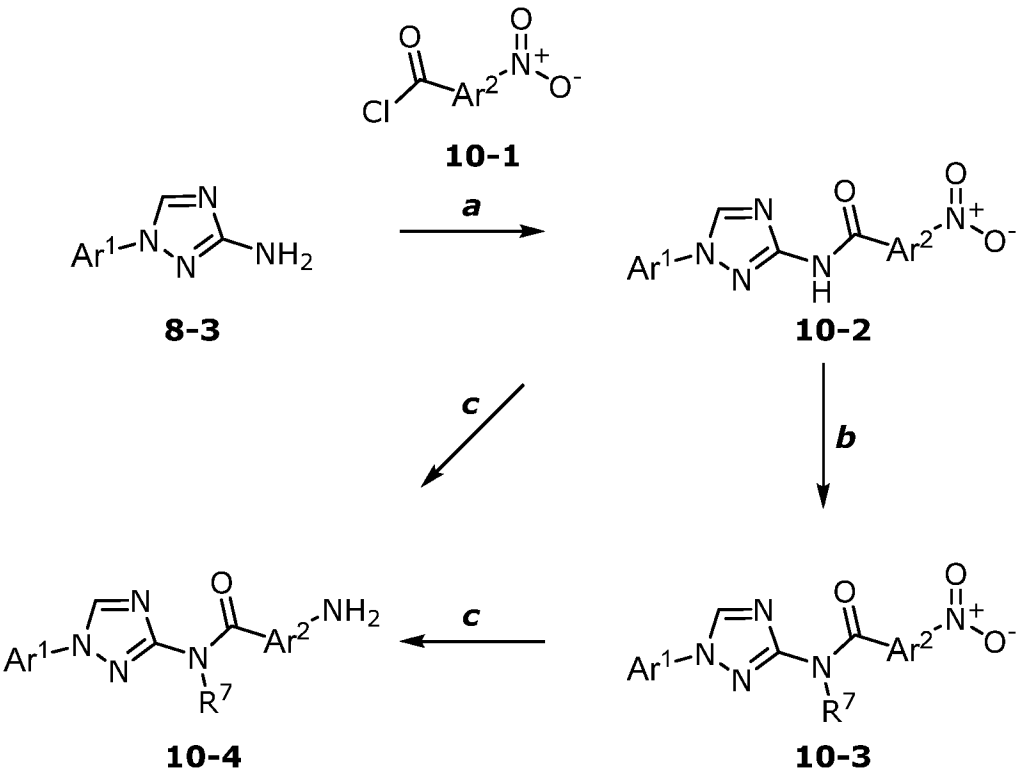
Scheme 9



PREPARATION OF AMINES

Methods for preparation of amines **10-4**, wherein $\mathbf{Ar^1}$, $\mathbf{R^7}$, and $\mathbf{Ar^2}$ are as previously disclosed, required for preparation of molecules of Formula One are described in Scheme 10. Amines **8-3** may be treated with substituted acid chlorides **10-1**, wherein $\mathbf{Ar^2}$ is as previously disclosed, in the presence of a base such as pyridine, in a solvent such as dichloromethane, at temperatures from about -10 °C to about 30 °C, to form nitro amides **10-2**, wherein $\mathbf{Ar^1}$ and $\mathbf{Ar^2}$ are as previously disclosed (Scheme 10, step a). Nitro amides **10-2** may be treated with an alkyl halide, such as iodomethane, in the presence of a base, such as potassium carbonate, a polar aprotic solvent, such as *N*,*N*-dimethylformamide, at temperatures from about -10 °C to about 30 °C to form nitro amides **10-3**, wherein $\mathbf{Ar^1}$, $\mathbf{R^7}$, and $\mathbf{Ar^2}$ are as previously disclosed (Scheme 10, step b). Nitro amides **10-2** and **10-3** may be reduced by treatment with hydrogen in the presence of a transition metal catalyst, such as palladium on carbon or platinum(IV) oxide to form amines **10-4** (Scheme 10, step c).

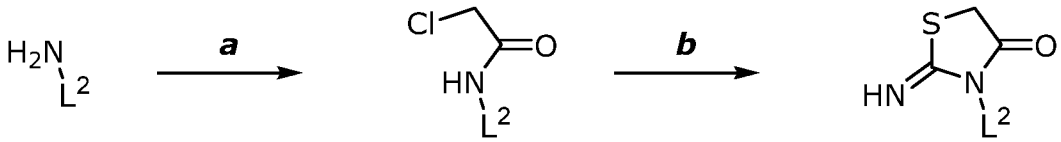
Scheme 10



PREPARATION OF 2-IMINO-1,3-CHALCOGENAZOHETEROCYCLES

Methods for preparation of the 2-imino-1,3-chalcogenazoheterocycles required for preparation of molecules of Formula One are described in Scheme 11. Anilines **11-1**, wherein $\mathbf{L^2}$ is as previously disclosed, may be treated with chloroacetyl chloride in the presence of a base, such as sodium bicarbonate, in a polar aprotic solvent, such as ethyl acetate, at temperatures from about -10 °C to about 30 °C, to form amides **11-2**, wherein $\mathbf{L^2}$ is as previously disclosed (Scheme 11, step a). Treatment of amides **11-2** with potassium thiocyanate, in the presence of a base, such as cesium carbonate, in a polar solvent, such as acetone, at temperatures from about 50 °C to about 75 °C, may form 2-imino-1,3-chalcogenazoheterocycles **11-3**, wherein $\mathbf{L^2}$ is as previously disclosed (Scheme 11, step b).

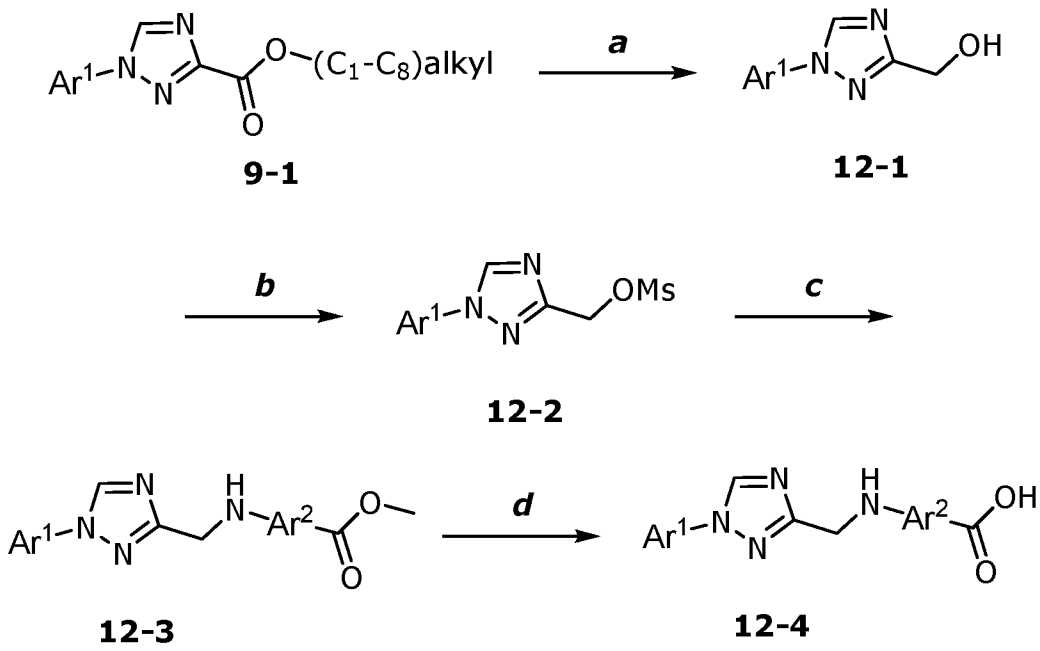
Scheme 11



11-1 **11-2** **11-3**

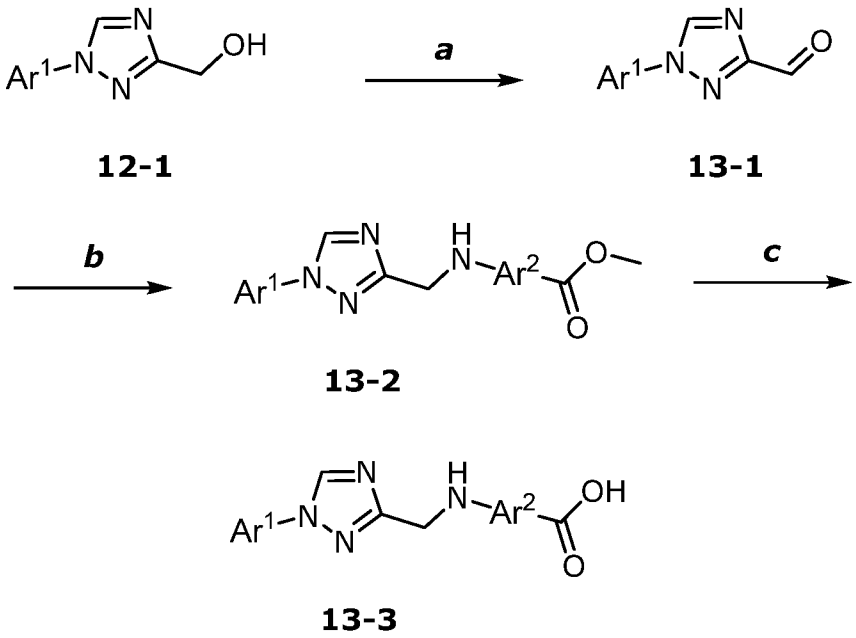
Methods for preparation of carboxylic acids **12-4**, wherein $\mathbf{Ar^1}$ and $\mathbf{Ar^2}$ are as previously disclosed, required for preparation of molecules of Formula One are described in Scheme 12. Esters **9-1** wherein $\mathbf{Ar^1}$ is as previously disclosed may be reacted with a reducing agent such as lithium aluminum hydride in an ethereal solvent such as tetrahydrofuran at a termperature of about 0 °C to room termperature to provide alcohols **12-1** (Scheme 12, step a). RAlcohol **12-1** wherein $\mathbf{Ar^1}$ is as previously disclosed may be treated with methylsulfonyl chloride in an inert solvent such as dichloromethane at a temperature from 0 °C to room temperature to generate the corresponding mesylates **12-2** (Scheme 12, step b). Displacement of the mesylate with an amine wherein $\mathbf{Ar^2}$ is as previously disclosed in the presence of a base such as potassium carbonate and in a polar aprotic solvent such as acetonitrile at a temperature of 60 to 100 °C to provide esters **12-3** (Scheme 12, step c). Esters **12-3** wherein $\mathbf{Ar^1}$ and $\mathbf{Ar^2}$ are as previously disclosed may be treated with a metal hydroxide such as potassium hydroxide, sodium hydroxide, or lithium hydroxide, in a solvent such as tetrahydrofuran, methanol, water, or mixtures thereof, to form carboxylic acids **12-4**, wherein $\mathbf{Ar^1}$ and $\mathbf{Ar^2}$ are as previously disclosed (Scheme 12, step d).

Scheme 12



Methods for preparation of carboxylic acids **13-3**, wherein **Ar^1** is as previously disclosed and **Ar^2** is pyridinyl, required for preparation of molecules of Formula One are described in Scheme 13. Alcohols **12-1** wherein **Ar^1** is as previously disclosed may be treated with an oxidation reagent such as Dess-Martin periodinane in an inert solvent such as dichloromethane at a temperature from 0 °C to room temperature to generate the corresponding aldehydes **13-1** (Scheme 12, step a). Reductive amination of the aldehydes **13-1** wherein **Ar^1** is as previously disclosed with an amine wherein **Ar^2** is pyridinyl in the presence of an organic acid such as acetic acid and in a polar solvent such as methanol or ethanol at a termperature of 0 °C to room termperature may provide the esters **13-2** (Scheme 12, step b). Esters **13-2** wherein **Ar^1** and **Ar^2** are as previously disclosed may be treated with a metal hydroxide such as potassium hydroxide, sodium hydroxide, or lithium hydroxide, in a solvent such as tetrahydrofuran, methanol, water, or mixtures thereof, to form carboxylic acids **13-3**, wherein **Ar^1** is as previously disclosed and **Ar^2** is pyridinyl (Scheme 13, step c).

Scheme 13

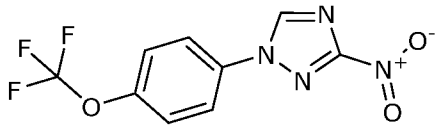


Examples

These examples are for illustration purposes and are not to be construed as limiting this disclosure to only the embodiments disclosed in these examples.

Starting materials, reagents, and solvents that were obtained from commercial sources were used without further purification. Anhydrous solvents were purchased as Sure/Seal™ from Aldrich and were used as received. Melting points were obtained on a Thomas Hoover Unimelt capillary melting point apparatus or an OptiMelt Automated Melting Point System from Stanford Research Systems and are uncorrected. Examples using "room temperature" were conducted in climate controlled laboratories with temperatures ranging from about 20 °C to about 24 °C. Molecules are given their known names, named according to naming programs within ISIS Draw, ChemDraw, or ACD Name Pro. If such programs are unable to name a molecule, such molecule is named using conventional naming rules. ^{1}H NMR spectral data are in ppm (δ) and were recorded at 300, 400, 500, or 600 MHz; ^{13}C NMR spectral data are in ppm (δ) and were recorded at 75, 100, or 150 MHz, and ^{19}F NMR spectral data are in ppm (δ) and were recorded at 376 MHz, unless otherwise stated.

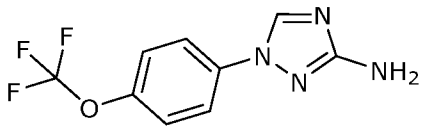
Example 1: Preparation of 3-nitro-1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole (C1)



62

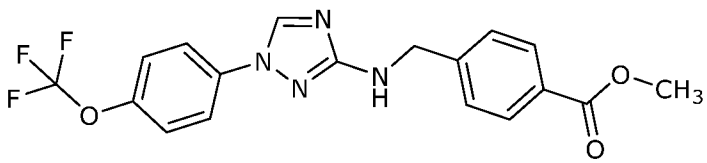
To a 250 mL round bottom flask were added 3-nitro-1*H*-1,2,4-triazole (2.00 g, 17.5 mmol), [4-(trifluoromethoxy)phenyl]boronic acid (3.97 g, 19.3 mmol), molecular sieves (5.00 g), dichloromethane (103 mL), copper(II) acetate (4.78 g, 26.3 mmol), and pyridine (2.84 mL, 35.1 mmol). The reaction mixture was stirred overnight at 30 °C. The solids were removed by filtration, and the organics were washed with water, dried, filtered, and concentrated. Purification by flash column chromatography using ethyl acetate as eluent provided the title compound as a white solid (1.00 g, 21%): mp 121-123 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.61 (s, 1H), 7.82 (m, 2H), 7.45 (dq, *J* = 8.1, 1.0 Hz, 2H); ^{19}F NMR (376 MHz, $CDCl_3$) δ -57.97; ESIMS *m/z* 274 ([M+H]$^+$).

Example 2: Preparation of 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-amine (C2)



To a 50 mL round bottom flask were added 3-nitro-1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole **(C1)** (1.00 g, 3.65 mmol), methanol (14.6 mL), and palladium on carbon (10%, 0.194 g, 0.182 mmol). The flask was sealed, then evacuated and backfilled with hydrogen (balloon, 3x). The reaction mixture was stirred under hydrogen for 3 hours. The reaction mixture was filtered through Celite® and washed with methanol. The resultant solid was dried in a vacuum oven overnight. The title compound was isolated as an off-white solid (0.8900 g, 100%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.19 (s, 1H), 7.62 (m, 2H), 7.32 (m, 2H), 4.28 (s, 2H); ^{19}F NMR (376 MHz, $CDCl_3$) δ -58.08; ESIMS *m/z* 244 ([M+H]$^+$).

Example 3: Preparation of methyl 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate (C3)

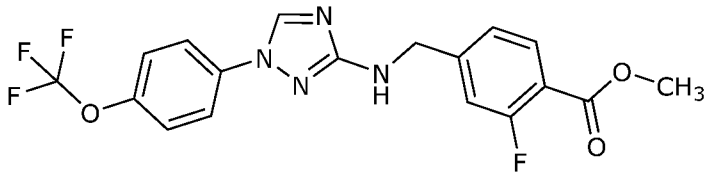


To a reaction vial were added 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-amine **(C2)** (0.200 g, 0.819 mmol), methyl 4-formylbenzoate (0.134 g, 0.819 mmol), ethanol (1.6 mL, 0.5 M), and molecular sieves. The reaction mixture was heated to 78 °C overnight. Additional methyl 4-formyl benzoate (0.134 g, 0.819 mmol)

was added, and the reaction mixture was heated at 78 °C. The reaction mixture was cooled to room temperature, and sodium borohydride (0.0310 g, 0.819 mmol) was added. The reaction mixture was heated to 50 °C for 40 minutes. The reaction mixture was concentrated, and the crude residue was dissolved in ethyl acetate and filtered through Celite®. The filtrate was washed with aqueous sodium bicarbonate and brine, dried, filtered, and concentrated. Purification by flash column chromatography using ethyl acetate/hexanes provided the title compound (0.321 g, 99%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.18 (d, *J* = 6.1 Hz, 1H), 8.08 - 7.98 (m, 3H), 7.65 - 7.58 (m, 2H), 7.52 - 7.40 (m, 3H), 7.31 (dd, *J* = 8.1, 5.2 Hz, 2H), 4.81 - 4.67 (m, 3H), 4.62 (d, *J* = 6.3 Hz, 1H), 4.37 (qd, *J* = 7.1, 4.2 Hz, 3H), 1.86 (t, *J* = 6.0 Hz, 1H), 1.39 (td, *J* = 7.1, 4.8 Hz, 5H); ^{19}F NMR (376 MHz, CDCl3) δ -58.10; ESIMS *m/z* 393 ([M+H]$^+$).

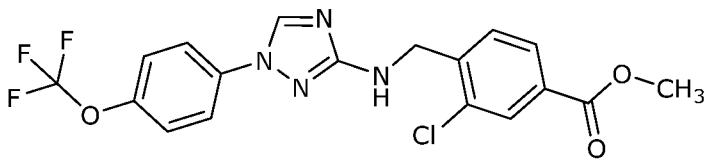
The following compounds were prepared in like manner to the procedure outlined in ***Example 3:***

Methyl 2-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate (C4)



Prepared from 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-amine **(C2)** and isolated as an off-white solid (52%): mp 126–128 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.90 (d, *J* = 4.0 Hz, 1H), 7.91 (d, *J* = 8.4 Hz, 1H) 7.85 - 7.76 (m, 2H), 7.50 (t, *J* = 7.8 Hz, 3H), 7.40 - 7.23 (m, 1H), 7.14 - 6.99 (m, 1H), 4.47 (br d, *J* = 6.4 Hz, 2H), 3.83 (s, 3H); ^{19}F NMR (282 MHz, DMSO-d_6) δ -57.07, -110.75; ESIMS *m/z* 411 ([M+H]$^+$).

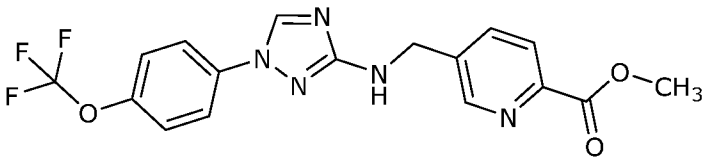
Methyl 3-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate (C5)



Prepared from 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-amine **(C2)** and isolated as a pale-yellow solid (58%): mp 125–127 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.92 (s, 1H), 7.95 - 7.84 (m, 2H), 7.84 - 7.76 (m, 2H), 7.61 (d, *J* = 8.3 Hz, 1H), 7.49

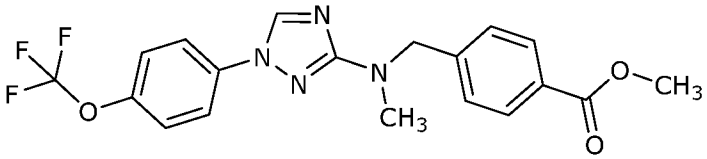
(d, *J* = 8.3 Hz, 2H), 7.12 (t, *J* = 6.1 Hz, 1H), 4.53 (d, *J* = 6.4 Hz, 2H), 3.85 (s, 3H); ^{19}F NMR (282 MHz, DMSO-d_6) δ -57.07, -110.75; ESIMS *m/z* 427 ([M+H]$^+$).

Methyl 5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)picolinate (C6)



Prepared from 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-amine **(C2)** and isolated as an off-white solid (56%): mp 145–147 °C; ^{1}H NMR (300 MHz, DMSO-d_6) δ 8.92 (s, 1H), 8.72 (s, 1H), 8.02 (d, *J* = 8.3 Hz, 1H), 7.95 (dd, *J* = 2.0, 9.0 Hz, 1H), 7.82 (d, *J* = 10.0 Hz, 2H), 7.50 (d, *J* = 9.3 Hz, 2H), 7.15 (t, *J* = 6.3 Hz, 1H), 4.48 (d, *J* = 7.0 Hz, 2H), 3.85 (s, 3H); ^{19}F NMR (282 MHz, DMSO-d_6) δ -57.04; ESIMS *m/z* 394 ([M+H]$^+$).

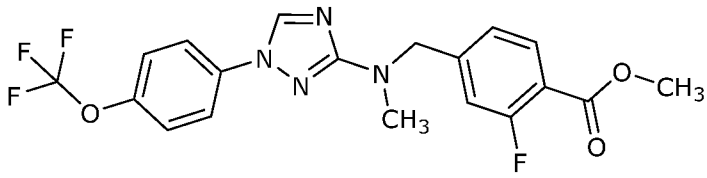
Example 4: Preparation of methyl 4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate (C7)



To a stirred mixture of methyl 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate **(C3)** (1.80 g, 4.58 mmol) in dry *N*,*N*-dimethylformamide (20 mL) at 0 °C was added sodium hydride (95%, 0.329 g, 13.7 mmol) under an inert atmosphere. The reaction mixture was stirred at 0 °C for 15 minutes, then iodomethane (0.172 mL, 2.77 mmol) was added dropwise via syringe. The resulting reaction mixture was stirred at 0 °C for 30 minutes. The reaction mixture was quenched with saturated ammonium chloride (5 mL) and extracted with diethyl ether (3 x 25 mL). The combined organic layers were washed with ice cold water and brine, dried over anhydrous sodium sulphate, filtered, and concentrated. Purification by flash column chromatography provided the title compound as an off-white solid (0.900 g, 48%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.21 (s, 1H), 8.05 (d, *J* = 5.4 Hz, 2H), 7.69 – 7.60 (m, 2H), 7.38 (d, *J* = 8.10 Hz, 2H), 7.31 (d, *J* = 8.4 Hz, 2H), 4.74 (s, 2H), 3.90 (s, 3H), 3.05 (s, 3H); ESIMS *m/z* 408 ([M+H]$^+$).

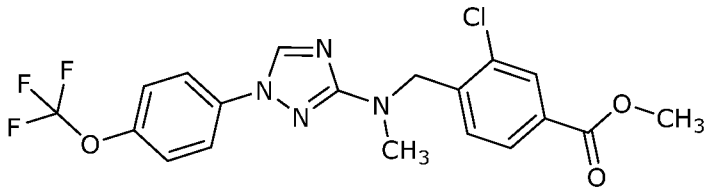
The following compounds were prepared in like manner to the procedure outlined in ***Example 4:***

Methyl 2-fluoro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate (C8)



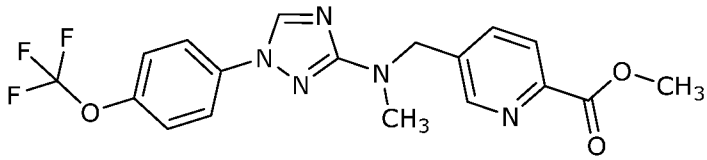
Prepared from methyl 2-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate **(C4)** and isolated as an off-white solid (49%): ESIMS *m/z* 425 ($[M+H]^+$).

Methyl 3-chloro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate (C9)



Prepared from methyl 3-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate **(C5)** and isolated as an off-white solid (45%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.21 (s, 1H), 8.05 (s, 1H), 7.87 (dd, *J* = 2.0, 8.4 Hz, 1H), 7.64 (dd, *J* = 2.4, 6.0 Hz, 2H), 7.37 (d, *J* = 8.4 Hz, 1H), 7.30 (d, *J* = 8.4 Hz, 2H), 4.83 (s, 2H), 3.91 (s, 3H), 3.14 (s, 3H); ESIMS *m/z* 441 ($[M+H]^+$).

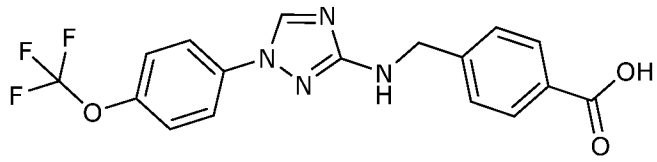
Methyl 5-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)picolinate (C10)



Prepared from methyl 5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)picolinate **(C6)** and isolated as an off-white solid (35%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.72 (s, 1H), 8.22 (s, 1H), 8.10 (d, *J* = 7.6, 1H), 7.81 (dd, *J* = 2.0, 8.0

Hz, 1H), 7.67 – 7.60 (m, 2H), 7.31 (d, *J* = 8.4 Hz, 2H), 4.76 (s, 2H), 3.98 (d, *J* = 11.2 Hz, 3H), 3.08 (s, 3H); ESIMS *m/z* 408 ([M+H]$^+$).

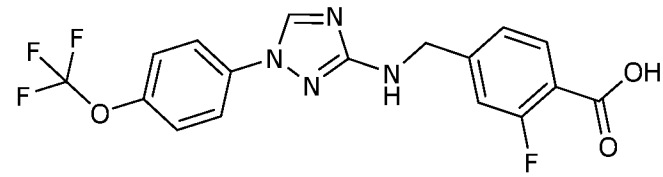
Example 5: Preparation of 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid (C11)



Methyl 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate **(C3)** (0.321 g, 0.818 mmol) and lithium hydroxide (0.184 g, 2.46 mmol) were dissolved in tetrahydrofuran (2.18 mL), methanol (2.18 mL), and water (1.09 mL). The reaction mixture was stirred at room temperature overnight. The reaction mixture was concentrated, diluted with water, and acidified with hydrochloric acid (2 N). The solid was filtered and dried in a vacuum oven. The title compound was isolated as a white solid (0.157 g, 50%): ^{1}H NMR (400 MHz, DMSO-d_6) δ 8.90 (s, 1H), 7.94 - 7.84 (m, 2H), 7.84 - 7.74 (m, 2H), 7.56 - 7.41 (m, 4H), 5.75 (s, 1H), 4.45 (d, *J* = 6.3 Hz, 2H); ^{19}F NMR (376 MHz, DMSO-d_6) δ -57.04; ESIMS *m/z* 379 ([M+H]$^+$).

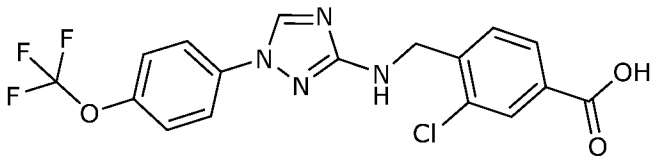
*The following compounds were prepared in like manner to the procedure outlined in **Example 5:***

2-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid (C12)



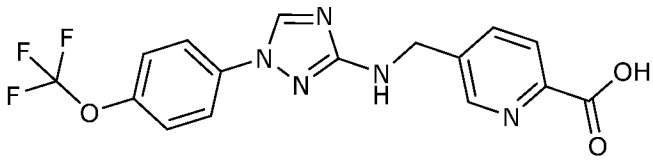
Prepared from methyl 2-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate **(C4)** and isolated as an off-white solid (89%): ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.9 (s, 1H), 8.92 (s, 1H), 7.85 – 7.79 (m, 3H), 7.49 (d, *J* = 8.8 Hz, 2H), 7.27 (t, *J* = 8.4 Hz, 2H), 4.55 (s, 3H); ESIMS *m/z* 397 ([M+H]$^+$).

3-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid (C13)



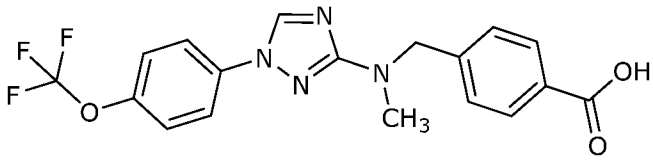
Prepared from methyl 3-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate **(C5)** and isolated as an off-white solid (0.700 g, 92%): ^{1}H NMR (300 MHz, $CDCl_3$) δ 12.9 (s, 1H), 8.22 (s, 1H), 8.08 (s, 1H), 7.93 (d, *J* = 9.0 Hz, 1H), 7.64 – 7.60 (m, 3H), 7.31 (d, *J* = 9.3 Hz, 2H), 5.18 (s, 1H), 4.71 (d, *J* = 5.1 Hz, 2H); ESIMS *m/z* 413 ($[M+H]^+$).

5-(((1-(4-(Trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)picolinic acid (C14)



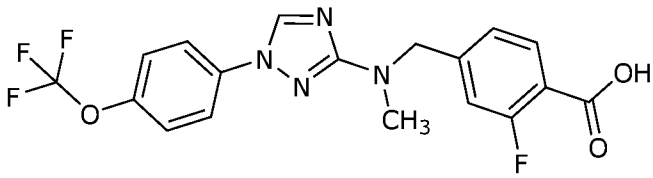
Prepared from methyl 5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)picolinate **(C6)** and isolated as an off-white solid (0.850 g, 92%): ^{1}H NMR (300 MHz, $CDCl_3$) δ 12.9 (s, 1H), 8.91 (s, 1H), 8.70 (d, *J* = 1.5 Hz, 1H), 8.04 – 7.90 (m, 2H), 7.82 (d, *J* = 6.3 Hz, 2H), 7.49 (d, *J* = 9.0 Hz, 2H), 7.11 (t, *J* = 6.6 Hz, 1H), 4.52 (s, 2H); ESIMS *m/z* 380 ($[M+H]^+$).

4-((Methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid (C15)



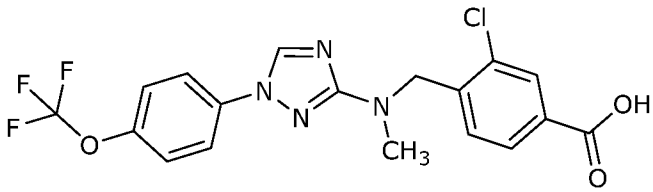
Prepared from methyl 4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate **(C7)** and isolated as an off-white solid (89%): ESIMS *m/z* 393 ($[M+H]^+$).

2-Fluoro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid (C16)



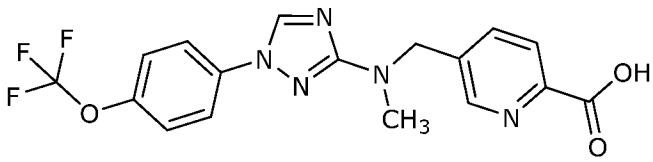
Prepared from methyl 2-fluoro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate **(C8)** and isolated as an off-white solid (91% crude). The compound was used directly for the next reaction.

3-Chloro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid (C17)



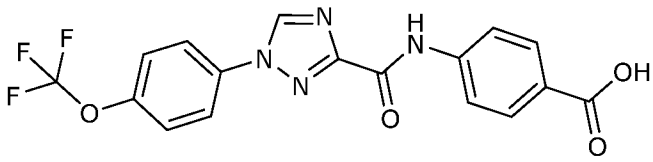
Prepared from methyl 3-chloro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoate **(C9)** and isolated as an off-white solid (92%): ESIMS *m/z* 427 ([M+H]$^+$).

5-((Methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)picolinic acid (C18)



Prepared from methyl 5-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)picolinate **(C10)** and isolated as an off-white solid (0.080 g, 41%): ^{1}H NMR (400 MHz, DMSO-d_6) δ 13.20 (s, 1H), 9.01 (s, 1H), 8.66 (s, 1H), 8.01 (d, *J* = 8.4 Hz, 1H), 7.95 – 7.84 (m, 3H), 7.51 (d, *J* = 8.4 Hz, 2H), 4.73 (s, 2H), 3.01 (s, 3H); ESIMS *m/z* 394 ([M+H]$^+$).

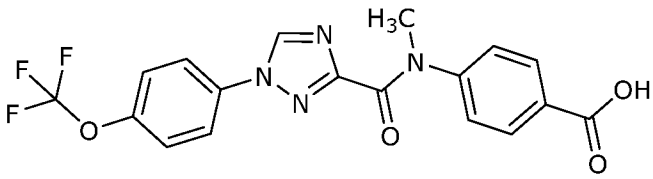
Example 6: Preparation of 4-(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxamido)benzoic acid (C19)



To a dry round-bottomed flask (100 mL) under nitrogen charged with 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxylic acid **(C28)** (0.700 g, 2.56 mmol) and oxalyl chloride (0.673 mL, 7.69 mmol) in dry dichloromethane (22 mL) and tetrahydrofuran (2.8 mL) were added 4-aminobenzoic acid (0.932 g, 7.69 mmol) and *N*,*N*-dimethylformamide (0.198 µL, 2.56 µmol). The reaction mixture was stirred at 23 °C for 48 hours. The reaction mixture was acidified with hydrochloric acid (1 N). The solids were collected via filtration and dried in a vacuum oven. The title compound was isolated as a yellow solid (0.880 g, 79%): ^{1}H NMR (400 MHz, DMSO-d_6) δ 10.84 (s, 1H), 9.57 (s, 1H), 8.31 (s, 1H), 8.16 - 8.09 (m, 2H), 8.03 - 7.97 (m, 2H), 7.97 - 7.91 (m, 2H), 7.65 (d, J = 8.7 Hz, 2H); ^{13}C NMR (126 MHz, DMSO-d_6) δ 167.34, 157.77, 148.22, 144.60, 144.58, 142.76, 135.80, 130.68, 126.51, 123.09, 122.46, 122.44, 120.31.

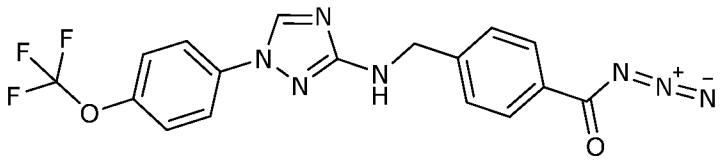
The following compound was prepared in like manner to the procedure outlined in ***Example 6:***

4-(*N*-Methyl-1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxamido)benzoic acid (C20)



Prepared from 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxylic acid **(C28)** and 4-(methylamino)benzoic acid and isolated as a white solid (0.544 g, 66%): mp 190-194 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.37 (s, 1H), 8.07 - 8.01 (m, 2H), 7.60 - 7.53 (m, 2H), 7.35 - 7.27 (m, 4H), 3.59 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 169.98, 160.98, 158.40, 140.81, 134.75, 131.21, 126.48, 122.36, 121.40, 77.33, 77.21, 77.01, 76.69; ESIMS *m/z* 407 ([M+H]$^+$).

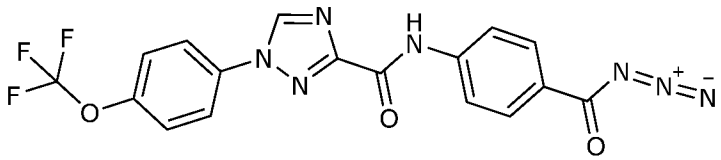
Example 7: Preparation of 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoyl azide (C21)



To a stirred solution of 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C11)** (0.400 g, 1.05 mmol) in tetrahydrofuran (15 mL) at 0 °C were added diphenylphosphoryl azide (0.340 g, 1.27 mmol) and triethylamine (0.160 g, 1.58 mmol). The reaction mixture was stirred and allowed to warm to room temperature over 4 hours. The reaction mixture was concentrated. The residue was diluted with water, and the solid compound was filtered and dried. The title compound was obtained as an off-white solid (0.400 g, 93%). The crude compound was used directly in the next step without further purification.

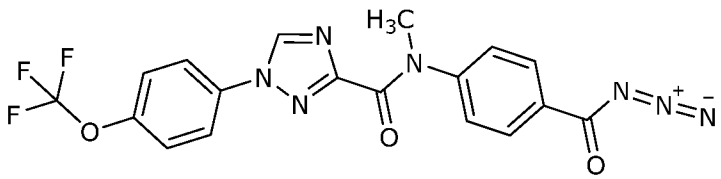
The following compounds were prepared in like manner to the procedure outlined in ***Example 7:***

4-(1-(4-(Trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxamido)benzoyl azide (C22)



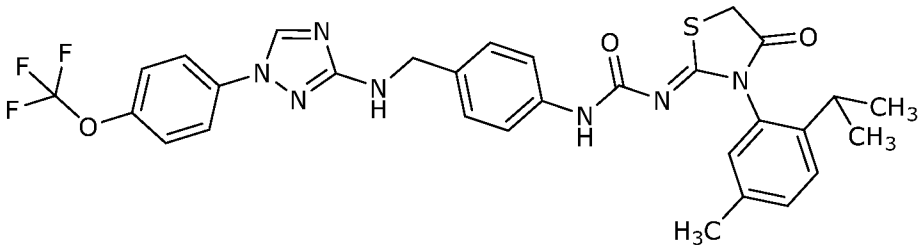
Prepared from 4-(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxamido)benzoic acid **(C19)** and isolated as an off-white solid (0.079 g, 32%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.17 (s, 1H), 8.62 (s, 1H), 8.11 - 8.04 (m, 2H), 7.89 - 7.80 (m, 4H), 7.45 - 7.38 (m, 2H); ^{19}F NMR (376 MHz, $CDCl_3$) δ -57.98.

4-(*N*-Methyl-1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxamido)benzoyl azide (C23)



Prepared from 4-(*N*-methyl-1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxamido)benzoic acid **(C20)** and isolated as a colorless solid (0.189 g, 76%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.37 (s, 1H), 7.98 (dq, *J* = 9.1, 2.3 Hz, 2H), 7.61 - 7.54 (m, 2H), 7.36 - 7.30 (m, 2H), 7.30 - 7.24 (m, 2H), 3.58 (s, 3H); ^{19}F NMR (376 MHz, $CDCl_3$) δ -58.04.

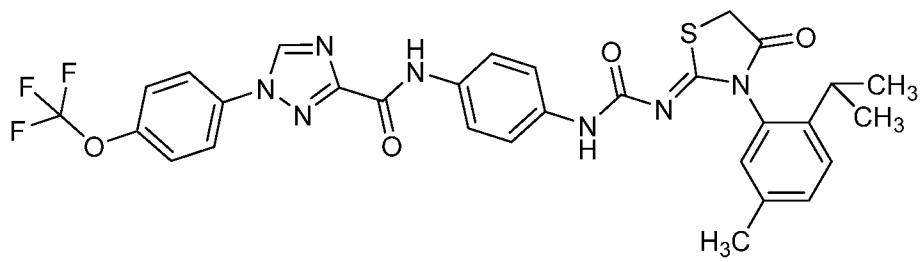
Example 8: Preparation of (*Z*)-1-(3-(2-isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)-3-(4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)urea (F2)



4-(((1-(4-(Trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoyl azide **(C21)** (0.020 mg, 0.050 mmol) in acetonitrile (0.99 mL) was heated at 80 °C for 2 hours. The reaction mixture was cooled to room temperature, and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one (0.012 g, 0.050 mmol) was added. The reaction mixture was stirred at room temperature for 10 minutes. The reaction mixture was diluted with ethyl acetate and loaded onto silica gel. Purification by flash column chromatography using 0-100% ethyl acetate/B, where B is dichloromethane–hexanes (1:1), as eluent, provided the title compound as a white solid (0.015 g, 48%).

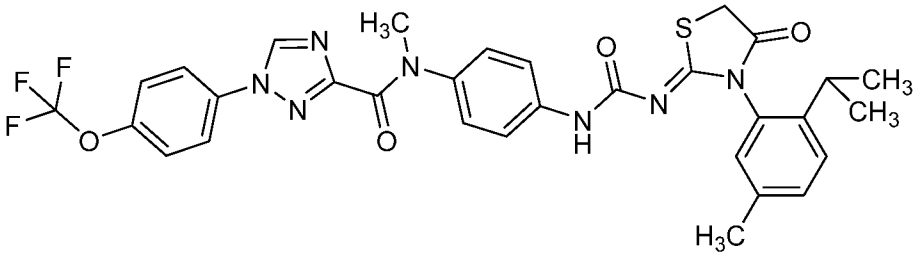
*The following compounds were prepared in like manner to the procedure outlined in **Example 8:***

(*Z*)-*N*-(4-(3-(3-(2-Isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)ureido)phenyl)-1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxamide (F26)



Prepared from 4-(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxamido)benzoyl azide **(C22)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as a yellow solid (0.075 g, 59%).

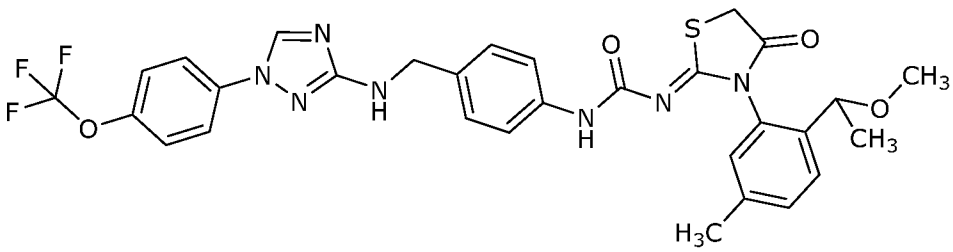
(*Z*)-*N*-(4-(3-(3-(2-Isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)ureido)phenyl)-*N*-methyl-1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxamide (F27)



Prepared from 4-(*N*-methyl-1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxamido)benzoyl azide **(C23)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as a yellow solid (0.095 g, 32%).

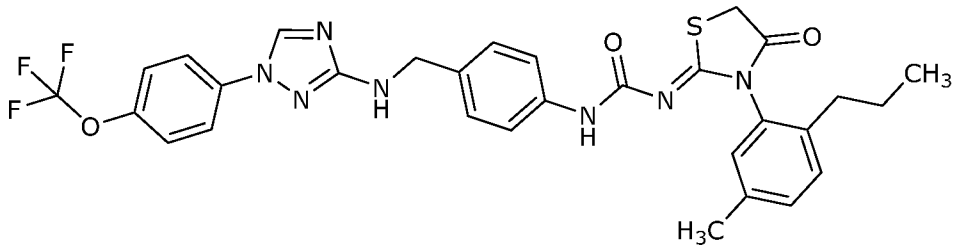
*The following compounds were prepared in like manner to the combined procedures outlined in **Examples 7 and 8:***

(*Z*)-1-(3-(2-(1-Methoxyethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)-3-(4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)urea (F1)



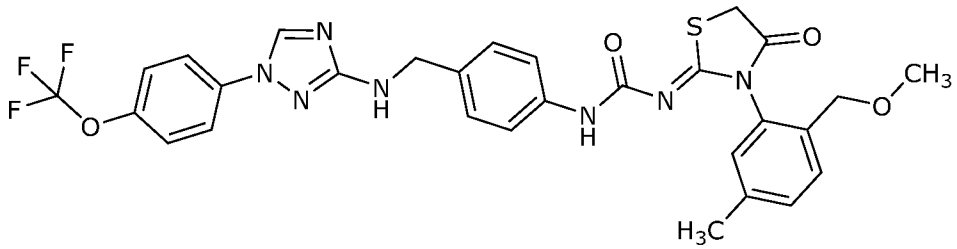
Prepared from 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C11)** and 2-imino-3-(2-(1-methoxyethyl)-5-methylphenyl)thiazolidin-4-one **(C38)** and isolated as an off-white solid (0.025 g, 36%).

(*Z*)-1-(3-(5-Methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)-3-(4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)urea (F3)



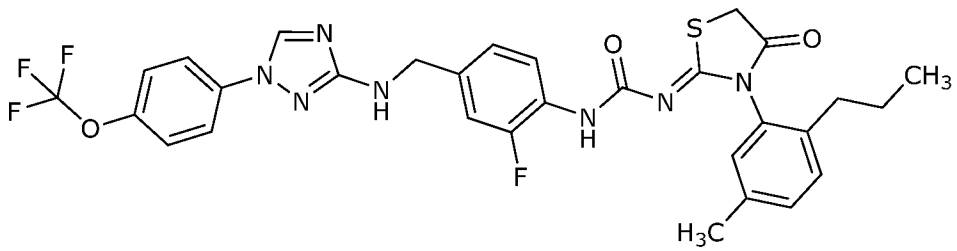
Prepared from 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C11)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as a pale yellow solid (0.105 g, 63%).

(*Z*)-1-(3-(2-(Methoxymethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)-3-(4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)urea (F4)



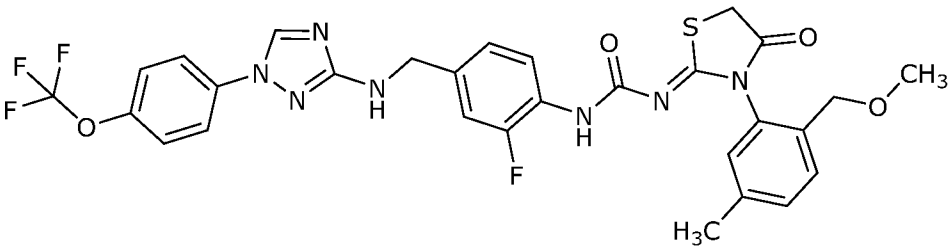
Prepared from 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C11)** and 2-imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one **(C39)** and isolated as an off-white solid (0.060 g, 36%).

(*Z*)-1-(2-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)-3-(3-(5-methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)urea (F5)



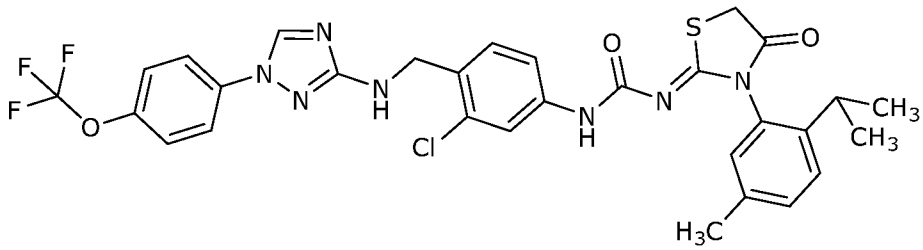
Prepared from 2-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C12)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as an off-white solid (0.053 g, 32%).

(*Z*)-1-(2-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)-3-(3-(2-(methoxymethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F6)



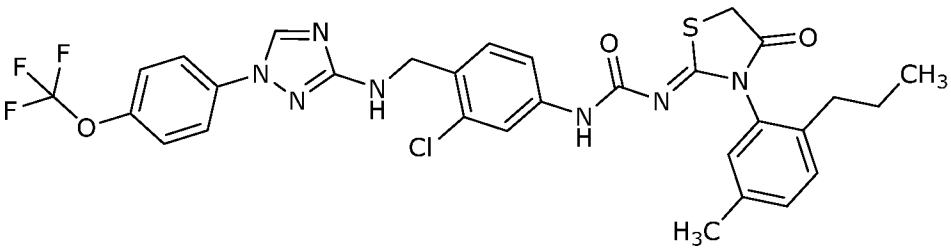
Prepared from 2-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C12)** and 2-imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one **(C39)** and isolated as an off-white solid (0.011 g, 10%).

(*Z*)-1-(3-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)-3-(3-(2-isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F7)



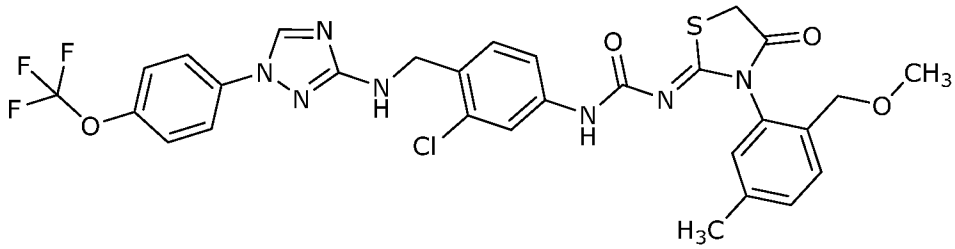
Prepared from 3-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C13)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as a pale-yellow solid (0.090 g, 52%).

(*Z*)-1-(3-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)-3-(3-(5-methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)urea (F8)



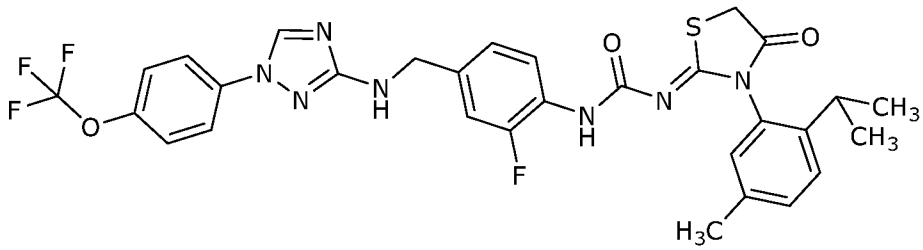
Prepared from 3-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C13)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as a pale-yellow solid (0.070 g, 45%).

(*Z*)-1-(3-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)-3-(3-(2-(methoxymethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F9)



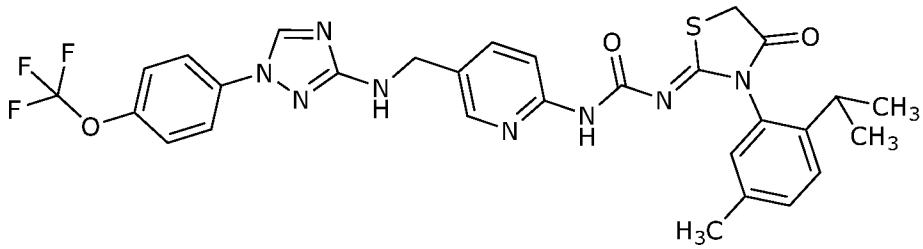
Prepared from 3-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C13)** and 2-imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one **(C39)** and isolated as an off-white solid (0.160 g, 65%).

(*Z*)-1-(2-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)-3-(3-(2-isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F10)



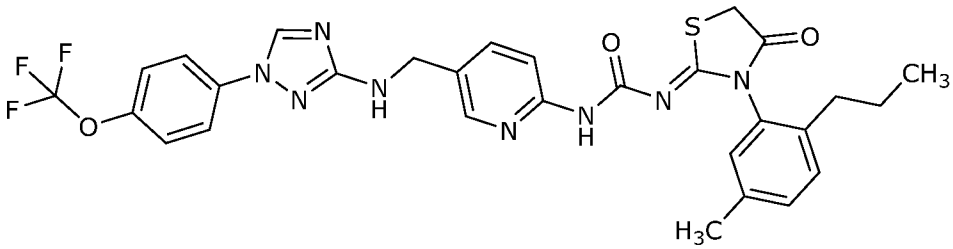
Prepared from 2-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C12)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as an off-white solid (0.019 g, 11%).

(*Z*)-1-(3-(2-Isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)-3-(5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)pyridin-2-yl)urea (F11)



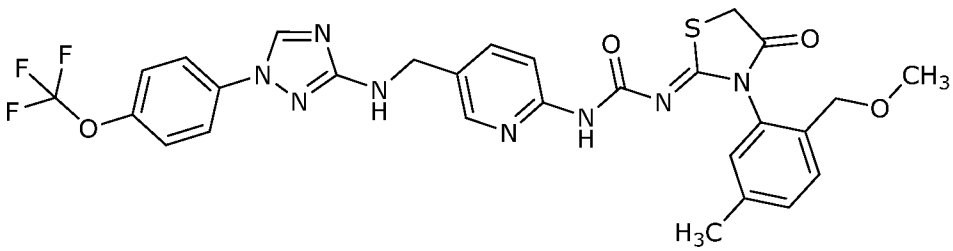
Prepared from 5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)picolinic acid **(C14)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as an off-white solid (0.097 g, 59%).

(*Z*)-1-(3-(5-Methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)-3-(5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)pyridin-2-yl)urea (F12)



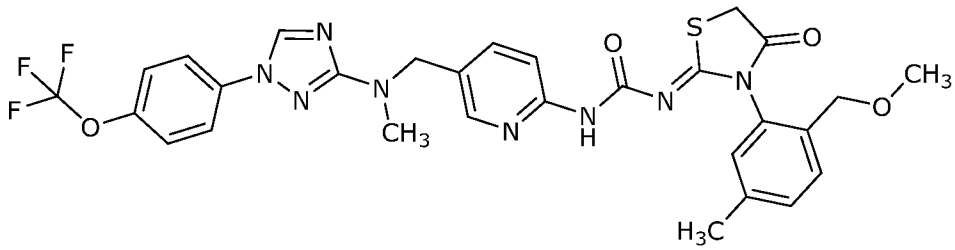
Prepared from 5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)picolinic acid **(C14)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as an off-white solid (0.050 g, 59%).

(*Z*)-1-(3-(2-(Methoxymethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)-3-(5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)pyridin-2-yl)urea (F13)



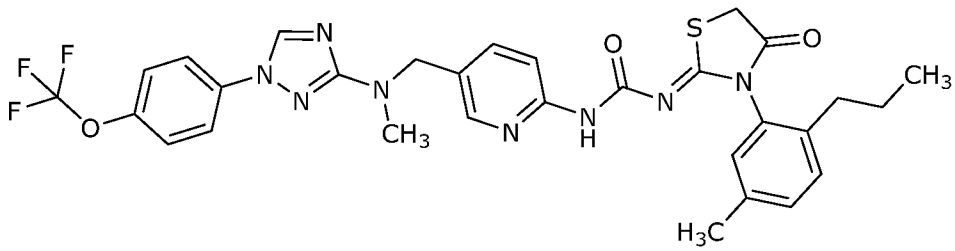
Prepared from 5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)picolinic acid **(C14)** and 2-imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one **(C39)** and isolated as an off-white solid (0.050 g, 59%).

(*Z*)-1-(3-(2-(Methoxymethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)-3-(5-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)pyridin-2-yl)urea (F14)



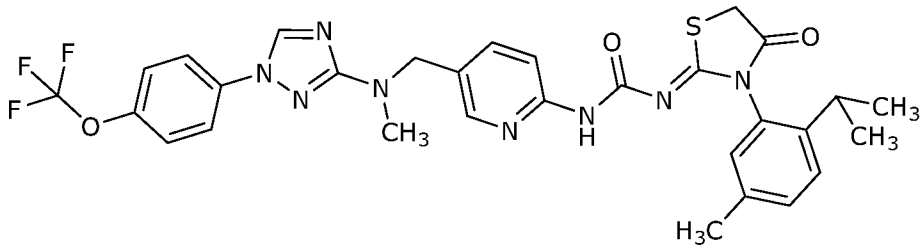
Prepared from 5-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)picolinic acid **(C18)** and 2-imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one **(C39)** and isolated as a pale-yellow solid (0.038 g, 25%).

(*Z*)-1-(5-((Methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)pyridin-2-yl)-3-(3-(5-methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)urea (F15)



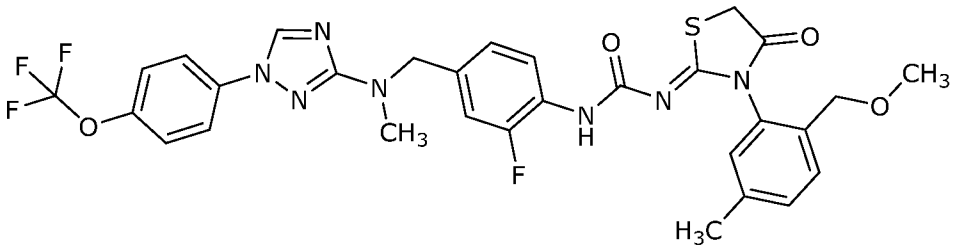
Prepared from 5-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)picolinic acid **(C18)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as a pale-yellow solid (0.020 g, 32%).

(*Z*)-1-(3-(2-Isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)-3-(5-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)pyridin-2-yl)urea (F16)



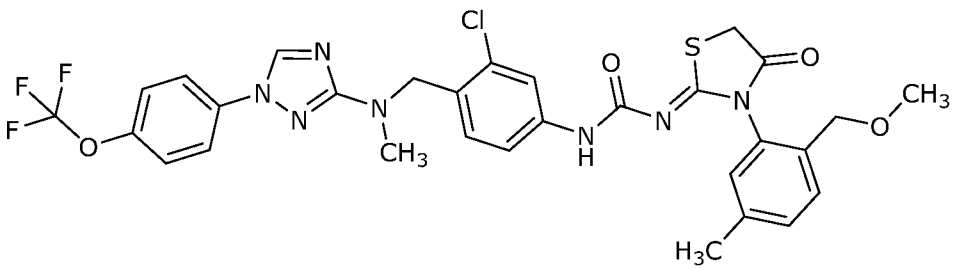
Prepared from 5-((methyl(1-(4-(trifluoromethoxy)phenyl)-1H-1,2,4-triazol-3-yl)amino)methyl)picolinic acid **(C18)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as a pale-yellow solid (0.075 g, 25%).

(*Z*)-1-(2-Fluoro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)-3-(3-(2-(methoxymethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F17)



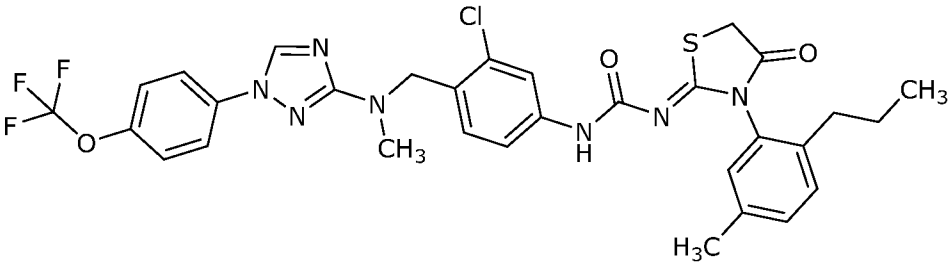
Prepared from 2-fluoro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C16)** and 2-imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one **(C39)** and isolated as a pale-yellow solid (0.060 g, 64%).

(*Z*)-1-(3-Chloro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)-3-(3-(2-(methoxymethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F18)



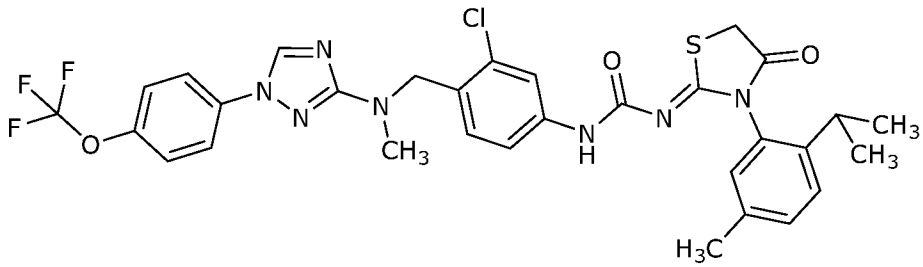
Prepared from 3-chloro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C17)** and 2-imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one **(C39)** and isolated as an off-white solid (0.2 g, 62%).

(*Z*)-1-(3-Chloro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)-3-(3-(5-methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)urea (F19)



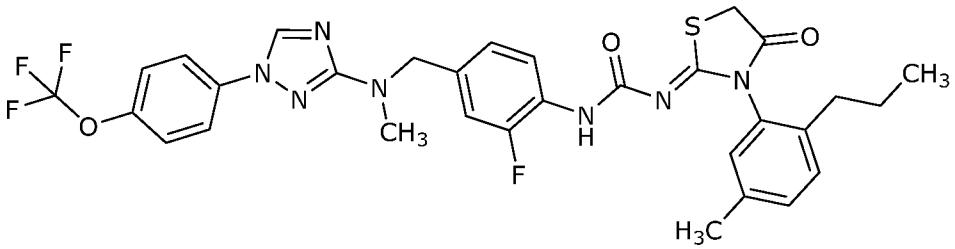
Prepared from 3-chloro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C17)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as a pale-yellow solid (0.09 g, 37%).

(*Z*)-1-(3-Chloro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)-3-(3-(2-isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F20)



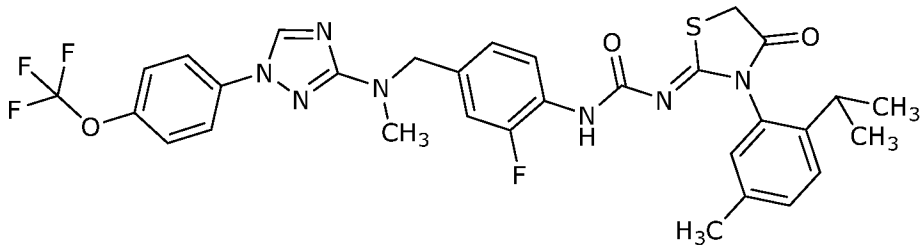
Prepared from 3-chloro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C17)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as a pale-yellow solid (0.120 g, 46%).

(*Z*)-1-(2-Fluoro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)-3-(3-(5-methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)urea (F21)



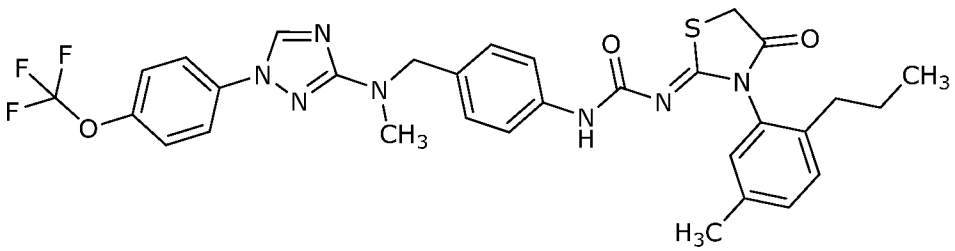
Prepared from 2-fluoro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C16)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as an off-white solid (0.019 g, 30%).

(*Z*)-1-(2-Fluoro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)-3-(3-(2-isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F22)



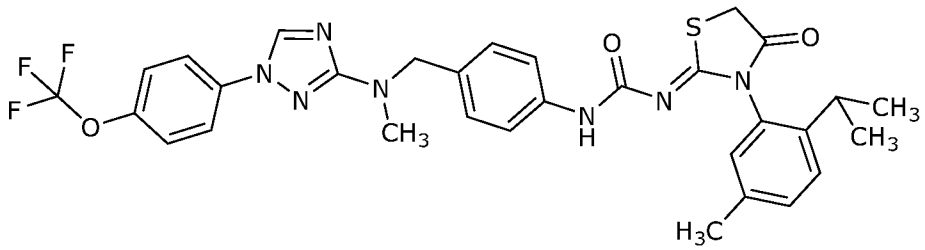
Prepared from 2-fluoro-4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C16)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as an off-white solid (0.054 g, 58%).

(*Z*)-1-(4-((Methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)-3-(3-(5-methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)urea (F23)



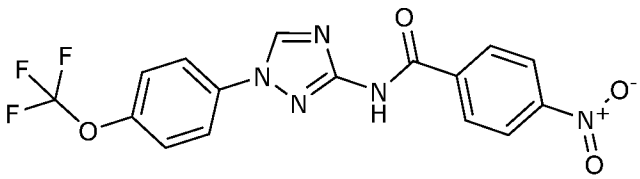
Prepared from 4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C15)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as an off-white solid (0.060 g, 45%).

(*Z*)-1-(3-(2-Isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)-3-(4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)phenyl)urea (F24)



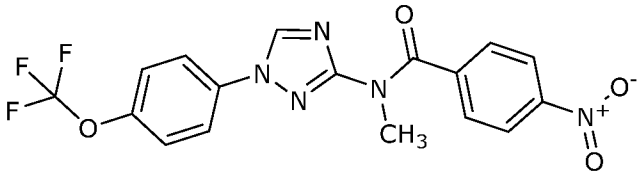
Prepared from 4-((methyl(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)amino)methyl)benzoic acid **(C15)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as a pale-yellow solid (0.070 g, 45%).

Example 9: Preparation of 4-nitro-*N*-(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)benzamide (C24)



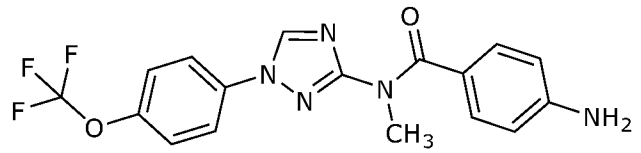
To 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-amine **(C2)** (1.00 g, 4.10 mmol) in dichloromethane (20.5 mL) was added pyridine (0.994 mL, 12.3 mmol). The reaction mixture was cooled to 0 °C, then 4-nitro-benzoylchloride (0.836 g, 4.50 mmol) in dichloromethane was added dropwise. The solution was stirred at 0 °C for 2 hours. The reaction mixture was diluted with dichloromethane and washed with hydrochloric acid (2 N). The layers were separated, and the aqueous phase was further washed with dichloromethane (3x). The combined organic layers were concentrated. Purification by flash column chromatography using dichloromethane/methanol as eluent provided the title compound as a white solid (1.43 g, 88%): mp 197-199 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.88 (s, 1H), 8.38 (m, 3H), 8.14 (m, 2H), 7.75 (m, 2H), 7.38 (m, 2H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 162.45, 156.95, 150.15, 140.27, 138.93, 135.02, 128.72, 124.10, 122.39, 121.40, 60.41, 21.06, 14.21; ESIMS *m/z* 394 ($[M+H]^+$).

Example 10: Preparation of *N*-methyl-4-nitro-*N*-(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)benzamide (C25)



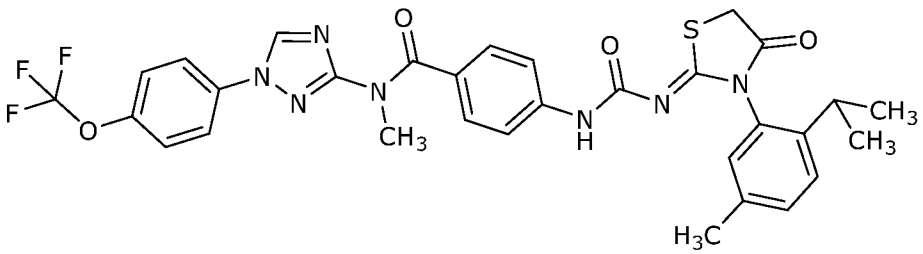
To 4-nitro-*N*-(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)benzamide **(C24)** (0.300 g, 0.763 mmol) in *N*,*N*-dimethylformamide (3.8 mL) in a reaction vial under nitrogen was added potassium carbonate (0.105 g, 0.763 mmol). The reaction mixture was stirred 15 minutes and cooled to 0 °C. Iodomethane (0.0477 mL, 0.763 mmol) was added. The reaction mixture was allowed to warm to room temperature overnight. The reaction mixture was quenched with aqueous ammonium chloride and extracted with ethyl acetate. The organic layers were washed with brine and concentrated. Purification by flash column chromatography using ethyl acetate/hexanes as eluent provided the title compound as a yellow solid (0.193 g, 62%): mp 122-124 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.28 (s, 1H), 8.21 - 8.09 (m, 2H), 7.68 - 7.56 (m, 2H), 7.52 - 7.46 (m, 2H), 7.32 (dq, *J* = 9.0, 0.9 Hz, 2H), 3.62 (s, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 168.64, 161.84, 148.52, 142.25, 140.58, 140.55, 134.69, 128.92, 128.90, 123.30, 123.27, 122.49, 121.34, 120.78, 119.28, 35.82, 35.77; ^{19}F NMR (471 MHz, $CDCl_3$) δ -58.06; ESIMS *m/z* 408 ($[M+H]^+$).

Example 11: Preparation of 4-amino-*N*-methyl-*N*-(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)benzamide (C26)



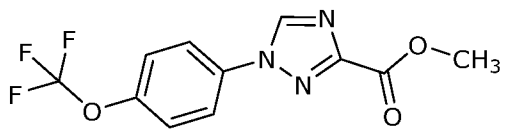
N-Methyl-4-nitro-*N*-(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)benzamide **(C25)** (0.193 g, 0.474 mmol) and palladium on carbon (0.0700 g, 0.0660 mmol) were added to a 25 mL reaction vial. Ethyl acetate (4.7 mL) was added, and the vial was sealed. The vial was evacuated, then backfilled with hydrogen (balloon, 3x). The reaction mixture was stirred under hydrogen by balloon for 2 hours. The reaction mixture was filtered through Celite® and concentrated. Purification by flash column chromatography using 0-100% ethyl acetate/B, where B is 1:1 dichloromethane/hexanes as eluent provided the title compound as a white solid (0.135 g, 75%): mp 167-169 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.30 (s, 1H), 7.60 - 7.50 (m, 2H), 7.36 - 7.28 (m, 4H), 6.57 - 6.43 (m, 2H), 3.84 (s, 2H), 3.54 (s, 3H); ^{19}F NMR (376 MHz, $CDCl_3$) δ -58.06; ESIMS *m/z* 378 ($[M+H]^+$).

Example 12: Preparation of (*Z*)-4-(3-(3-(2-isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)ureido)-*N*-methyl-*N*-(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)benzamide (F25)



To 4-amino-*N*-methyl-*N*-(1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)benzamide **(C26)** (0.0680 g, 0.180 mmol) in acetonitrile (4 mL) was added 4-nitrophenyl carbonochloridate (0.0363 g, 0.180 mmol) in acetonitrile (0.3 mL). The reaction mixture was stirred at room temperature for 30 minutes. Cesium carbonate (0.0587 g, 0.180 mmol), 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one (0.0448 g, 0.180 mmol), and *N,N*-diethylisopropylamine (0.0630 mL, 0.360 mmol) were added, and the reaction mixture was stirred at room temperature. The reaction mixture was diluted with ethyl acetate and washed with brine. The brine was extracted with ethyl acetate. The organic layers were dried over sodium sulfate, filtered, and concentrated. Purification by reverse phase column chromatography using 0-100% acetonitrile/water as eluent provided the title compound as an off-white solid (0.0880 g, 74%).

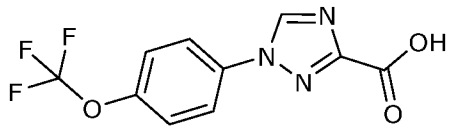
Example 13: Preparation of methyl 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxylate (C27)



To a reaction flask were added methyl 1*H*-1,2,4-triazole-3-carboxylate (5.00 g, 39.3 mmol), (4-(trifluoromethoxy)phenyl)boronic acid (8.10 g, 39.3 mmol), and copper(II) acetate (7.15 g, 39.3 mmol). The flask was sealed, and evacuated/backfilled with nitrogen (3x). Dichloromethane (157 mL) was added, followed by pyridine (4.77 mL, 59.0 mmol). The reaction mixture was allowed to stir at room temperature overnight. Water was added, and the reaction mixture was filtered through Celite®. The filtrate was transferred to a separatory funnel, and the layers were separated. The organic layers were further washed with water (3x), combined, dried over sodium sulfate, filtered, and concentrated. The crude product was triturated with a small amount

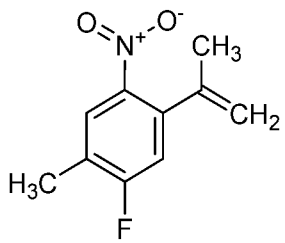
of ethyl acetate/hexanes and filtered. The title compound was obtained as a white solid (2.17 g, 19%): mp 156-158 °C; ^{1}H NMR (300 MHz, $CDCl_3$) δ 8.65 (s, 1H), 7.86 - 7.75 (m, 2H), 7.48 - 7.32 (m, 2H), 4.06 (s, 3H); ^{19}F NMR (471 MHz, CDCl3) δ -58.00; ^{13}C NMR (126 MHz, $CDCl_3$) δ 159.89, 149.29, 134.81, 122.44, 122.07, 121.35, 119.29, 53.06; EIMS *m/z* 288 ([M]$^+$).

Example 14: Preparation of 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxylic acid (C28)



To a round-bottomed flask were added methyl 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxylate **(C27)** (1.00 g, 3.48 mmol), water (8.70 mL), and tetrahydrofuran (26.1 mL). Lithium hydroxide·hydrate (0.438 g, 10.5 mmol) was added, and the reaction mixture was stirred at 23 °C overnight. The reaction mixture was acidified to afford the title compound as a white solid (0.928 g, 93%): ^{1}H NMR (400 MHz, DMSO-d_6) δ 13.62 (s, 1H), 9.45 (s, 1H), 8.16 - 7.92 (m, 2H), 7.64 (dt, *J* = 7.8, 1.2 Hz, 2H).

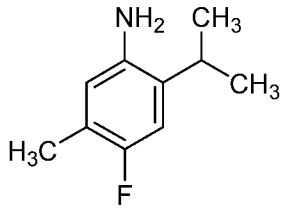
Example 15: Preparation of 1-fluoro-2-methyl-4-nitro-5-(prop-1-en-2-yl)benzene (C29)



To a reaction vial were added 1-chloro-5-fluoro-4-methyl-2-nitrobenzene (1.50 g, 7.91 mmol), 4,4,5,5-tetramethyl-2-(prop-1-en-2-yl)-1,3,2-dioxaborolane (1.79 mL, 9.50 mmol), bis(triphenylphosphine)palladium(II) dichloride (0.444 g, 0.633 mmol), and sodium carbonate (1.01 g, 9.50 mmol). Water (2.85 mL) and dioxane (11.4 mL) were added. The vial was capped and heated at 140 °C for 30 minutes in a Biotage Initiator® microwave reactor, with external IR-sensor temperature monitoring from the side of the vessel. The reaction mixture was cooled to room temperature, diluted with ethyl acetate, and washed with water. The aqueous layer was further extracted with ethyl acetate (3x). The combined organic layers were dried over magnesium sulfate, filtered, and

concentrated. Purification by flash column chromatography eluting with 0-40% ethyl acetate/hexanes provided the title compound as a yellow liquid (1.42 g, 88%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.81 (dd, *J* = 7.0, 0.9 Hz, 1H), 6.95 (d, *J* = 9.4 Hz, 1H), 5.17 (t, *J* = 1.5 Hz, 1H), 4.97 - 4.86 (m, 1H), 2.33 (dd, *J* = 2.0, 0.8 Hz, 3H), 2.06 (dd, *J* = 1.6, 0.9 Hz, 3H); ^{19}F NMR (376 MHz, $CDCl_3$) δ -108.66; EIMS *m/z* 195 ([M]$^+$).

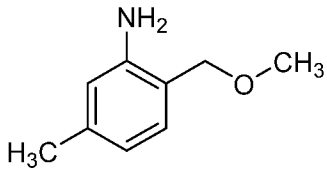
Example 16: Preparation of 4-fluoro-2-isopropyl-5-methylaniline (C30)



To a reaction flask was added 1-fluoro-2-methyl-4-nitro-5-(prop-1-en-2-yl)benzene **(C29)** (1.41 g, 7.22 mmol) in ethyl acetate (29 mL) and palladium on carbon (10 weight%, 0.770 g, 0.720 mmol). The flask was evacuated, then backfilled with hydrogen (balloon) (3x). The reaction mixture was stirred under hydrogen by balloon overnight. The reaction mixture was filtered through Celite® and concentrated to afford the title compound as a yellow liquid (1.10 g, 90%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.79 (d, *J* = 11.1 Hz, 1H), 6.49 (d, *J* = 7.0 Hz, 1H), 3.39 (s, 2H), 2.91 - 2.80 (m, 1H), 2.17 (d, *J* = 2.0 Hz, 3H), 1.22 (d, *J* = 6.8 Hz, 6H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 138.55, 122.03, 118.40, 118.35, 111.97, 111.73, 27.63, 22.29, 14.16; EIMS *m/z* 167 ([M]$^+$).

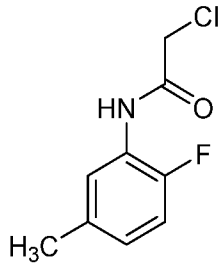
*The following compounds were prepared in like manner to the procedure outlined in **Example 16**:*

2-(Methoxymethyl)-5-methylaniline (C31)



Prepared from 1-(methoxymethyl)-4-methyl-2-nitrobenzene **(C46)** and isolated as an orange oil (1.6 g, 100%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.94 (d, *J* = 7.3 Hz, 1H), 6.56 - 6.49 (m, 2H), 4.44 (s, 2H), 4.11 (s, 2H), 3.32 (s, 3H), 2.26 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 146.16, 139.28, 130.09, 119.27, 118.70, 116.44, 73.46, 57.26, 21.25; EIMS *m/z* 151 ([M]$^+$).

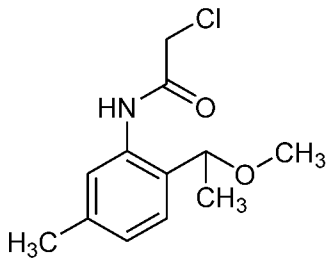
Example 17: Preparation of 2-chloro-*N*-(2-fluoro-5-methylphenyl)acetamide (C32)



To a reaction flask were added 2-fluoro-5-methylaniline (3.00 g, 24.0 mmol) and ethyl acetate (24.0 mL). The reaction mixture was cooled to 0 °C. Sodium bicarbonate (4.03 g, 47.9 mmol) was added, followed by dropwise addition of chloroacetyl chloride (2.30 mL, 28.8 mmol) over 4 minutes. The reaction mixture was allowed to stir at 0 °C for 10 minutes, then twas allowed to warm to room temperature and was further stirred for 90 minutes. Water (15 mL) was added to the reaction mixture, and the phases were separated. The organic layers were washed with brine (20 mL), dried over magnesium sulfate, filtered, and concentrated to afford the title compound (4.83 g, 100%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.47 (s, 1H), 8.08 (dd, *J* = 7.5, 2.1 Hz, 1H), 7.00 (dd, *J* = 10.7, 8.4 Hz, 1H), 6.90 (dddd, *J* = 8.3, 5.0, 2.2, 0.8 Hz, 1H), 4.21 (s, 2H), 2.34 (d, *J* = 0.9 Hz, 3H); ^{19}F NMR (376 MHz, $CDCl_3$) δ -135.59; ^{13}C NMR (126 MHz, $CDCl_3$) δ 163.83, 151.92, 150.00, 134.42, 125.79, 121.94, 114.64, 42.92, 21.08; ESIMS *m/z* 201 ([M+H]$^{+}$).

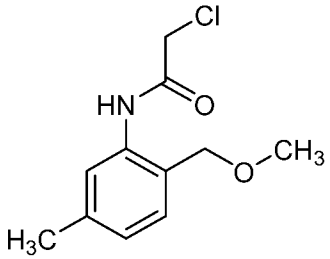
The following compounds were prepared in like manner to the procedure outlined in ***Example 17****:*

2-Chloro-*N*-(2-(1-methoxyethyl)-5-methylphenyl)acetamide (C33)



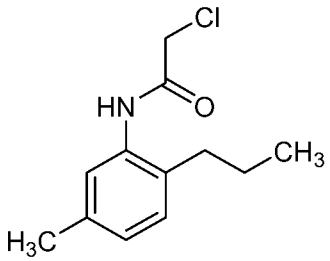
Prepared from 2-(1-methoxyethyl)-5-methylaniline **(C45)** and isolated as a yellow oil (2.19 g, 71%): ^{1}H NMR (300 MHz, $CDCl_3$) δ 10.16 (s, 1H), 8.17 (s, 1H), 7.02 (d, *J* = 7.7 Hz, 1H), 6.99 - 6.85 (m, 1H), 4.45 (q, *J* = 6.7 Hz, 1H), 4.20 (dd, *J* = 2.6, 1.1 Hz, 2H), 3.34 (d, *J* = 1.1 Hz, 3H), 2.37 (d, *J* = 1.0 Hz, 3H), 1.52 (dd, *J* = 6.9, 1.0 Hz, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 164.22, 138.56, 135.55, 128.26, 127.41, 125.20, 122.16, 80.90, 77.31, 77.05, 76.80, 56.25, 43.10, 21.37, 20.95.

2-Chloro-*N*-(2-(methoxymethyl)-5-methylphenyl)acetamide (C34)



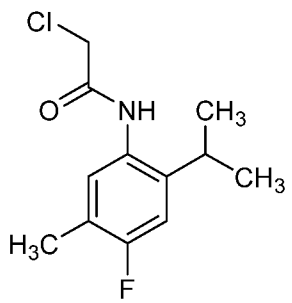
Prepared from 2-(methoxymethyl)-5-methylaniline **(C31)** and isolated as an orange oil (1.89 g, 77%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.74 (s, 1H), 8.01 - 7.95 (m, 1H), 7.09 (d, *J* = 7.6 Hz, 1H), 6.97 - 6.88 (m, 1H), 4.49 (s, 2H), 4.23 (s, 2H), 3.43 (s, 3H), 2.36 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 164.65, 139.40, 136.56, 129.19, 125.42, 124.08, 122.41, 73.55, 58.01, 43.06, 40.47; EIMS *m/z* 227 ([M]$^+$).

2-Chloro-*N*-(5-methyl-2-propylphenyl)acetamide (C35)



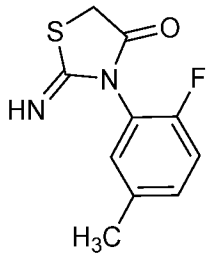
Prepared from 5-methyl-2-propylaniline and isolated as a pink solid (1.86 g, 92%): mp 108-111 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.28 (s, 1H), 7.74 - 7.69 (m, 1H), 7.09 (d, *J* = 7.8 Hz, 1H), 6.98 - 6.94 (m, 1H), 4.24 (s, 2H), 2.55 (dd, *J* = 8.6, 6.8 Hz, 2H), 2.34 (s, 3H), 1.67 - 1.57 (m, 2H), 0.99 (td, *J* = 7.3, 2.9 Hz, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 132.21, 130.32, 129.67, 126.64, 123.34, 43.24, 33.16, 23.23, 13.94; EIMS *m/z* 225 ([M]$^+$).

2-Chloro-*N*-(4-fluoro-2-isopropyl-5-methylphenyl)acetamide (C36)



Prepared from 4-fluoro-2-isopropyl-5-methylaniline **(C30)** and isolated as an orange solid (1.20 g, 85%): mp 126-134 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.13 (s, 1H), 7.50 (d, *J* = 7.4 Hz, 1H), 6.94 (d, *J* = 10.9 Hz, 1H), 4.24 (s, 2H), 3.05 - 2.88 (m, 1H), 2.24 (dd, *J* = 2.0, 0.7 Hz, 3H), 1.24 (d, *J* = 6.8 Hz, 6H); ^{19}F NMR (376 MHz, $CDCl_3$) δ -118.99; EIMS *m/z* 243 ($[M]^+$).

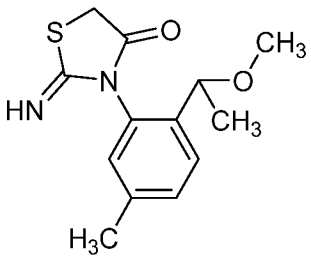
Example 18: Preparation of 3-(2-fluoro-5-methylphenyl)-2-iminothiazolidin-4-one (C37)



To a reaction flask were added 2-chloro-*N*-(2-fluoro-5-methylphenyl)acetamide **(C32)** (2.00 g, 9.92 mmol) and acetone (9.92 mL). Potassium thiocyanate (1.93 g, 19.8 mmol) was added as a solid, and the reaction mixture was heated at 65 °C for 3 hours. The reaction mixture was cooled to room temperature. Cesium carbonate (0.162 g, 0.496 mmol) was added, and the reaction mixture was stirred at room temperature for 45 minutes. The reaction mixture was filtered through Celite®, washed with acetone, and concentrated. Purification by flash column chromatography using 0-60% ethyl acetate/hexanes as eluent provided the title compound as a pale orange solid (1.790 g, 80%): mp 120-122 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.89 (s, 1H), 7.24 (s, 1H), 7.20 - 7.01 (m, 2H), 4.20 - 3.99 (m, 2H), 2.36 (s, 3H); ^{19}F NMR (376 MHz, $CDCl_3$) δ -125.16; ESIMS *m/z* 225 ($[M+H]^+$).

*The following compounds were prepared in like manner to the procedure outlined in **Example 18**:*

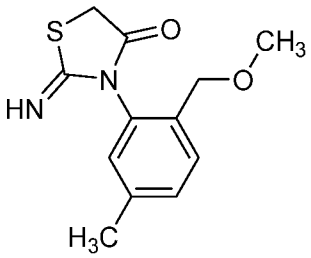
2-Imino-3-(2-(1-methoxyethyl)-5-methylphenyl)thiazolidin-4-one (C38)



Prepared from 2-chloro-*N*-(2-(1-methoxyethyl)-5-methylphenyl)acetamide **(C33)** and isolated as an orange solid (1.80 g, 71%): mp 94-108 °C; ^{1}H NMR (300 MHz, $CDCl_3$)

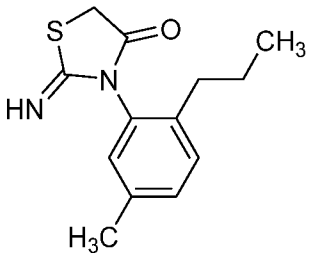
δ 7.51 (d, *J* = 7.9 Hz, 1H), 7.34 (dd, *J* = 8.0, 1.9 Hz, 1H), 7.00 - 6.86 (m, 1H), 4.21 - 4.05 (m, 2H), 3.12 (d, *J* = 1.1 Hz, 2H), 2.38 (s, 3H), 1.42 - 1.31 (m, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 210.86, 170.85, 139.07, 131.65, 129.19, 129.06, 127.13, 77.52, 77.09, 76.67, 74.46, 74.15, 69.51, 56.72, 56.54, 53.81, 31.76, 29.28, 23.35, 20.98.

2-Imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one (C39)



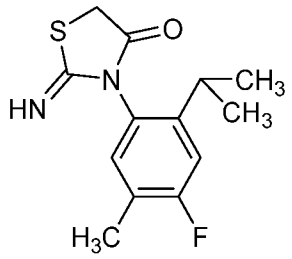
Prepared from 2-chloro-*N*-(2-(methoxymethyl)-5-methylphenyl)acetamide **(C34)** and isolated as an orange solid (0.550 g, 25%): mp 66-71 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.37 (s, 1H), 8.00 (s, 1H), 7.07 (d, *J* = 7.6 Hz, 1H), 6.97 - 6.89 (m, 1H), 4.56 (s, 2H), 3.86 (s, 2H), 3.42 (s, 3H), 2.37 (s, 3H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 162.54, 139.50, 136.62, 129.24, 125.51, 123.55, 122.35, 73.76, 57.85, 37.87, 21.45; EIMS *m/z* 250 ($[M]^+$).

2-Imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one (C40)



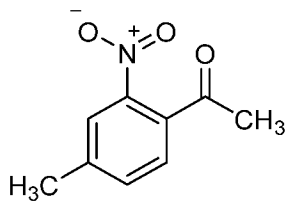
Prepared from 2-chloro-*N*-(5-methyl-2-propylphenyl)acetamide **(C35)** and isolated as a white solid (1.76 g, 84%): mp 120-123 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.67 (s, 1H), 7.17 (d, *J* = 1.7 Hz, 1H), 7.11 (d, *J* = 7.7 Hz, 1H), 7.00 - 6.93 (m, 1H), 4.11 (s, 2H), 2.52 - 2.48 (m, 2H), 2.25 (s, 3H), 1.50 (h, *J* = 7.4 Hz, 2H), 0.88 (t, *J* = 7.3 Hz, 3H); ^{13}C NMR (126 MHz, DMSO-d_6) δ 164.20, 134.56, 134.13, 132.75, 128.76, 126.11, 125.70, 112.19, 36.01, 31.68, 22.32, 19.91, 13.23; EIMS *m/z* 248 ($[M]^+$).

3-(4-Fluoro-2-isopropyl-5-methylphenyl)-2-iminothiazolidin-4-one (C41)



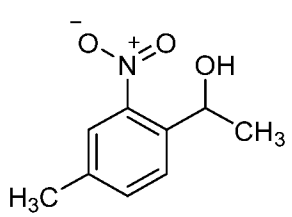
Prepared from 2-chloro-*N*-(4-fluoro-2-isopropyl-5-methylphenyl)acetamide **(C36)** and isolated as a brown oil (1.11 g, 80%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.86 (s, 1H), 7.07 (d, *J* = 10.7 Hz, 1H), 6.93 (d, *J* = 7.3 Hz, 1H), 4.12 - 4.00 (m, 2H), 2.72 - 2.59 (m, 1H), 2.25 (s, 3H), 1.17 (d, *J* = 7.0 Hz, 6H); ^{19}F NMR (376 MHz, $CDCl_3$) δ -114.93; ESIMS *m/z* 267 ([M+H]$^+$).

Example 19: Preparation of 1-(4-methyl-2-nitrophenyl)ethan-1-one (C42)



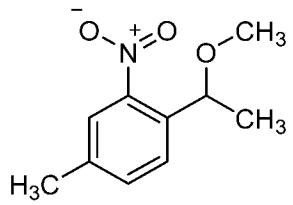
To a reaction flask were added 4-methyl-2-nitro-1-(prop-1-en-2-yl)benzene (11.4 g, 64.3 mmol), dichloromethane (292 mL), and methanol (29.2 mL). The reaction mixture was cooled to -78 °C. Ozone was bubbled into the reaction mixture, and the reaction mixture was stirred at -78 °C for 3 hours. The reaction mixture was flushed with nitrogen. Dimethylsulfide (14.0 mL, 189 mmol) was added, and the reaction mixture was allowed to stir and warm to room temperature overnight. The reaction was concentrated. Purification by flash column chromatography using ethyl acetate/hexanes as eluent provided the title compound as an oil (8.90 g, 70%): ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.85 (dt, *J* = 2.0, 1.0 Hz, 1H), 7.50 (ddt, *J* = 7.8, 1.7, 0.8 Hz, 1H), 7.35 (dd, *J* = 7.7, 0.9 Hz, 1H), 2.57 - 2.51 (m, 3H), 2.49 (q, *J* = 0.9 Hz, 3H).

Example 20: Preparation of 1-(4-methyl-2-nitrophenyl)ethan-1-ol (C43)



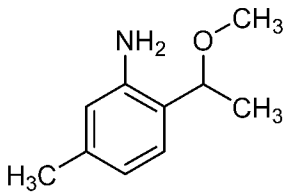
To a reaction flask under an atmosphere of nitrogen were added 1-(4-methyl-2-nitrophenyl)ethan-1-one **(C42)** (8.91 g, 49.7 mmol) and methanol (249 mL). The reaction mixture was cooled to 0 °C. Sodium borohydride (2.26 g, 59.7 mmol) was added, and the reaction mixture was stirred at 0 °C for 1 hour. The reaction mixture was allowed to warm to room temperature overnight. The reaction mixture was acidified with hydrochloric acid (2 N) and was diluted with dichloromethane. The layers were separated, and the aqueous phase was extracted with dichloromethane. The combined organics were dried over sodium sulfate, filtered, and concentrated. Purification by flash column chromatography using ethyl acetate/hexanes as eluent provided the title compound as a green oil (7.10 g, 75%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.73 - 7.66 (m, 2H), 7.45 (dd, *J* = 8.0, 2.1 Hz, 1H), 5.45 - 5.26 (m, 1H), 2.42 (s, 3H), 1.54 (s, 3H).

Example 21: Preparation of 1-(1-methoxyethyl)-4-methyl-2-nitrobenzene (C44)



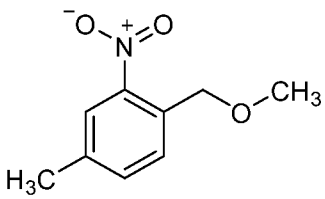
To a dry round-bottomed flask were added 1-(4-methyl-2-nitrophenyl)ethan-1-ol **(C43)** (6.14 g, 33.9 mmol) and tetrahydrofuran (169 mL). The reaction mixture was cooled to 0 °C. Sodium hydride (60% oil immersion, 2.03 g, 50.8 mmol) was added under an atmosphere of nitrogen. The reaction mixture was stirred at 0 °C for 30 minutes, then iodomethane (3.18 mL, 50.8 mmol) was added. The reaction mixture was allowed to warm to room temperature and stirred overnight. The reaction mixture was diluted with saturated aqueous ammonium chloride, and water was added. The layers were separated, and the aqueous phase was extracted with dichloromethane (2x). The combined organic layers were dried over sodium sulfate, filtered, and concentrated. Purification by flash column chromatography using ethyl acetate/hexanes as eluent provided the title compound as a yellow oil (7.10 g, 98%): ^{1}H NMR (400 MHz, $CHCl_3$) δ 7.78 - 7.68 (m, 1H), 7.61 (d, *J* = 8.0 Hz, 1H), 7.45 (ddd, *J* = 8.1, 1.8, 0.9 Hz, 1H), 4.84 (q, *J* = 6.3 Hz, 1H), 3.19 (d, *J* = 0.8 Hz, 3H), 2.43 (s, 3H), 1.50 (dd, *J* = 6.3, 0.8 Hz, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 148.60, 138.44, 136.60, 134.47, 127.44, 124.41, 77.49, 77.23, 76.98, 74.87, 56.82, 23.44, 20.75.

Example 22: Preparation of 2-(1-methoxyethyl)-5-methylaniline (C45)



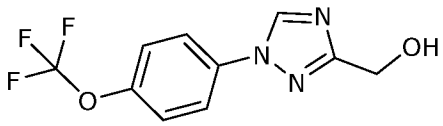
To a reaction flask were added 1-(1-methoxyethyl)-4-methyl-2-nitrobenzene **(C44)** (7.00 g, 35.9 mmol), nickel(II) chloride (4.65 g, 35.9 mmol), and methanol (179 mL). Sodium borohydride (2.94 g, 78.0 mmol) was added to the reaction mixture in 200-500 mg portions every 2-3 minutes under an atmosphere of nitrogen. The reaction was quenched with acetone (6 mL) and was concentrated to approximately 80 mL. The crude mixture was diluted with dichloromethane and washed with water. The layers were separated, and the organics were concentrated. Purification by flash column chromatography using ethyl acetate/hexanes as eluent provided the title compound as an orange oil (2.99 g, 45%): ^{1}H NMR (300 MHz, $CHCl_3$) δ 6.87 (d, *J* = 7.6 Hz, 1H), 6.51 (ddd, *J* = 7.5, 1.7, 0.8 Hz, 1H), 6.47 (d, *J* = 1.6 Hz, 1H), 4.36 (q, *J* = 6.7 Hz, 1H), 4.22 (s, 2H), 3.26 (s, 3H), 2.24 (d, *J* = 0.8 Hz, 3H), 1.56 - 1.46 (m, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 144.87, 128.61, 122.59, 118.56, 116.95, 80.41, 77.31, 77.06, 76.81, 55.93, 21.09, 20.01.

Example 23: Preparation of 1-(methoxymethyl)-4-methyl-2-nitrobenzene (C46)



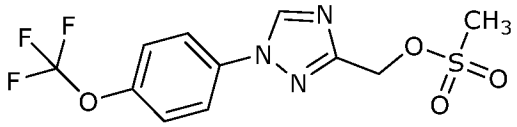
To (4-methyl-2-nitrophenyl)methanol (0.823 g, 4.92 mmol) in tetrahydrofuran (20 mL) at 0 °C was added sodium hydride (60% oil immersion, 0.217 g, 5.42 mmol) in small portions. Gas evolution was immediately observed. The reaction mixture was stirred for 30 minutes, and then iodomethane (0.460 mL, 7.39 mmol) was added. The reaction mixture was slowly warmed to room temperature overnight. The reaction mixture was quenched with methanol, and water and dichloromethane were added. The organic layer was filtered through a phase separator and concentrated to provide the title compound as an orange wax (1.10 g, 100%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.88 (t, *J* = 1.2 Hz, 1H), 7.63 (d, *J* = 7.9 Hz, 1H), 7.49 - 7.41 (m, 1H), 4.80 (s, 2H), 3.48 (s, 3H), 2.43 (s, 3H); ^{13}C NMR (126 MHz, $CDCl_3$) δ 156.37, 138.33, 134.42, 132.03, 128.47, 124.97, 71.07, 58.87, 20.80; EIMS *m/z* 180 ($[M]^+$).

Example 24: Preparation of (1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methanol (C47)



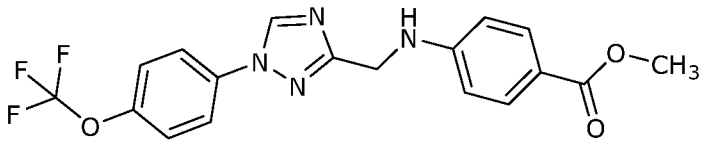
To a stirred solution of methyl 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carboxylate **(C27)** (17.0 g , 59.19 mmol) in tetrahydrofuran (500 mL) at 0 °C was added dropwise a solution of lithium aluminum hydride (2 M in tetrahydrofuran, 30 mL, 59 mmol) (colorless to yellow solution). Upon completion of the addition, the reaction mixture was allowed to warm to and was stirred at room temperature for 2 hours. The reaction mixture was cooled to 0 °C and was quenched carefully with ethyl acetate (200 mL) and water (10 mL). The mixture was filtered through a pad of Celite®, and the Celite® was washed with ethyl acetate. The filtrate was concentrated under reduced pressure, and the residue was diluted with ethyl acetate. The organic layer was washed with water, dried over sodium sulfate, filtered and concentrated under reduced pressure. The crude product was triturated with diethyl ether. The title compound was obtained as a white solid (8.4 g, 55%): mp 160-162 °C; ^{1}H NMR (300 MHz, DMSO-d_6) δ 9.25 (s, 1H), 7.97 (d, J = 10.0 Hz, 2H), 7.58 (d, J = 10.0 Hz, 2H), 5.40 (s, 1H), 4.53 (s, 2H); ESIMS m/z 260.13 ([M+H]$^+$).

Example 25: Preparation of (1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl methanesulfonate (C48)



To a solution of (1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methanol **(C47)** (3.0 g, 11.68 mmol) in dichloromethane (100 mL) were added sequentially triethylamine (3.0 mL, 20.84 mmol) and methanesulfonyl chloride (1.61 mL, 20.84 mmol) dropwise at 0 °C. The reaction mixuture was stirred at 0 °C for 30 minutes and then at room temperature for 2 hours. The reaction mixture was diluted with dichloromethane and washed with water. The organic layer was dried over sodium sulfate, filtered and concentrated under reduced pressure to afford the title compound as a pale yellow oil (3 g, crude), which was used in the next step without further purification: ESIMS m/z 338.15 ([M+H]$^+$).

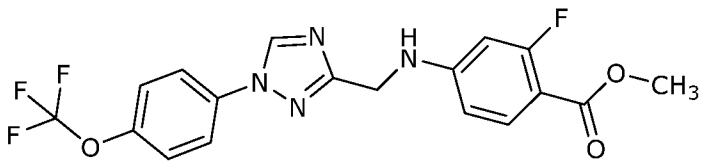
Example 26: Preparation of methyl 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoate (C49)



To a solution of methyl 4-aminobenzoate (1.0 g, 6.62 mmol) in acetonitrile (30 mL) were added potassium carbonate (3.3 g, 9.93 mmol), potassium iodide (0.96 g, 6.62 mmol), and 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl methanesulfonate **(C48)** (2.23 g, 6.62 mmol). The reaction mixture was stirred at 90 °C for 16 hours. The reaction mixture was cooled to room temperature and concentrated under reduced pressure. The residue was taken up in water and extracted with dichloromethane (2 x 50 mL). The organic layer was dried over anhydrous sodium sulfate, filtered and concentrated under reduced pressure. Purification by flash column chromatography (silica gel 100-200 mesh) eluting with 30–45% ethyl acetate/petroleum ether afforded the title compound as an off-white solid (0.9 g, 36%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.49 (s, 1H), 7.89 (d, *J* = 8.8 Hz, 2H), 7.70 (d, *J* = 8.8 Hz, 2H), 7.36 (d, *J* = 8.4 Hz, 2H), 6.72 (d, *J* = 8.8 Hz, 2H), 4.92 (br s, 1H), 4.56 (d, *J* = 6.0 Hz, 2H), 3.90 (s, 3H); ESIMS *m/z* 393.18 ([M+H]$^+$).

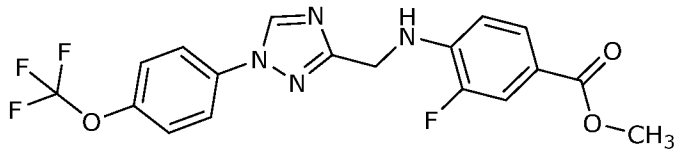
*The following compounds were prepared in like manner to the procedure outlined in **Example 26**:*

Methyl 2-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl) methyl)amino) benzoate (C50)



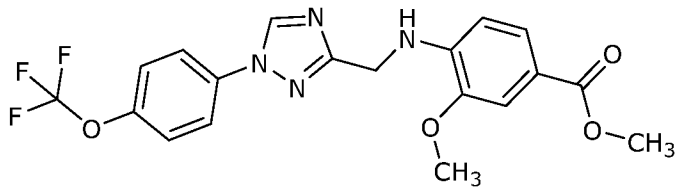
Prepared from 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl methanesulfonate **(C48)** and isolated as an off-white solid (0.92 g, 38%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.49 (s, 1H), 7.81 -7.75 (m, 1H), 7.71 - 7.69 (m, 2H), 7.37 (d, *J* = 8.8 Hz, 2H), 6.50 (dd, *J* = 2.4, 8.8 Hz, 1H), 6.41 (dd, *J* = 2.4, 13.6 Hz, 1H), 5.03 (br s, 1H), 4.53 (d, *J* = 5.6 Hz, 2H), 3.86 (s, 3H); ESIMS *m/z* 411.17 ([M+H]$^+$).

Methyl 3-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoate (C51)



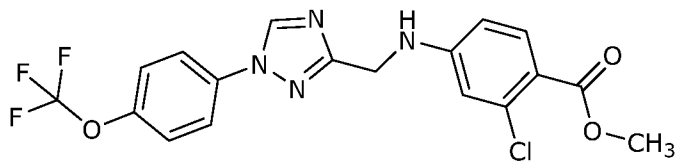
Prepared from 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl methanesulfonate **(C48)** and isolated as an off-white solid (0.9 g, 37%): ^{1}H NMR (300 MHz, $CDCl_3$) δ 8.49 (s, 1H), 7.76 - 7.63 (m, 4H), 7.37 (d, *J* = 8.7 Hz, 2H), 6.87 – 6.75 (m, 1H), 5.14 (br s, 1H), 4.60 (d, *J* = 5.4 Hz, 2H), 3.85 (s, 3H); ESIMS *m/z* 411.08 ($[M+H]^+$).

Methyl 3-methoxy-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl) methyl)amino)benzoate (C52)



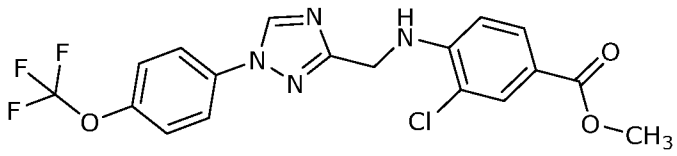
Prepared from 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl methanesulfonate **(C48)** and isolated as an off-white solid (1.0 g, 43%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.48 (s, 1H), 7.71 - 7.68 (m, 2H), 7.64 (dd, *J* = 2.0, 8.4 Hz, 1H), 7.43 (d, *J* = 2.0 Hz, 1H), 7.36 (d, *J* = 8.8 Hz, 2H), 6.72 (d, *J* = 8.4 Hz, 1H), 5.45 (br s, 1H), 4.59 (d, *J* = 5.6 Hz, 2H), 3.91 (s, 3H), 3.85 (s, 3H); ESIMS *m/z* 423.15 ($[M+H]^+$).

Methyl 2-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoate (C53)



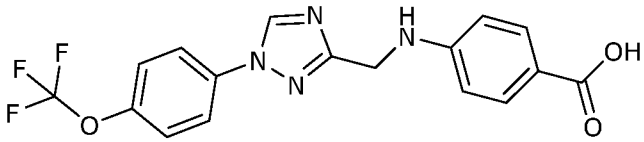
Prepared from 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl methanesulfonate **(C48)** and isolated as an off-white solid (0.8 g, 35%): ^{1}H NMR (300 MHz, $CDCl_3$) δ 8.49 (s, 1H), 7.81 (d, *J* = 8.4 Hz, 1H), 7.71 - 7.67 (m, 2H), 7.37 (d, *J* =8.7 Hz, 2H), 6.77 (d, *J* = 2.4 Hz, 1H), 6.60 (dd, *J* = 2.4, 9.0 Hz, 1H), 4.95 (t, *J* = 5.4 Hz, 1H), 4.54 (d, *J* = 5.7 Hz, 2H), 3.86 (s, 3H); ESIMS *m/z* 427.14 ($[M+H]^+$).

Methyl 3-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoate (C54)



Prepared from 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl methanesulfonate **(C48)** and isolated as an off-white solid (0.85 g, 37%): ^{1}H NMR (300 MHz, $CDCl_3$) δ 8.50 (s, 1H), 7.97 (d, *J* = 1.5 Hz, 1H), 7.86 (d, *J* = 8.4 Hz, 1H), 7.70 (d, *J* = 9.0 Hz, 2H), 7.37 (d, *J* = 9.0 Hz, 2H), 6.83 (d, *J* = 8.4 Hz, 1H), 5.59 (br s, 1H), 4.62 (d, *J* = 5.4 Hz, 2H), 3.86 (s, 3H); ESIMS *m/z* 427.14 ([M+H]$^+$).

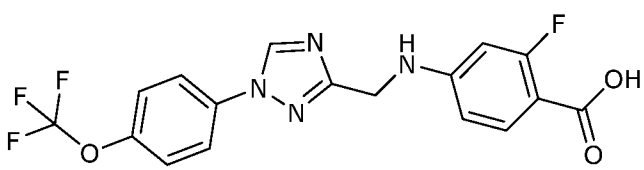
Example 27: Preparation of 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoic acid (C55)



To a solution of methyl 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoate **(C49)** (0.8 g, 2.04 mmol) in a mixture of tetrahydrofuran:methanol:water (2:1:0.5, 35 mL) was added lithium hydroxide monohydrate (0.26 g, 6.12 mmol), and the reaction mixture was stirred at room temperature for 16 hours. The reaction mixture was concentrated under reduced pressure. The residue was taken up in water, acidified with 1 N hydrochloric acid (~ pH 2-3), and the precipitate was vacuum filtered, washed with water, and dried under vacuum. The title compound was isolated as an off-white solid (0.6 g, 78%): mp 200-203 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.02 (br s, 1H), 9.26 (s, 1H), 8.01 - 7.92 (m, 2H), 7.66 (d, *J* = 8.8 Hz, 2H), 7.58 (d, *J* = 8.4 Hz, 2H), 7.07 - 6.98 (m, 1H), 6.70 (d, *J* = 8.8 Hz, 2H), 4.44 (d, *J* = 5.8 Hz, 2H); ESIMS *m/z* 379.18 ([M+H]$^+$).

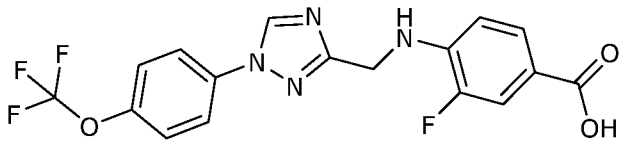
*The following compounds were prepared in like manner to the procedure outlined in **Example 27**:*

2-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoic acid (C56)



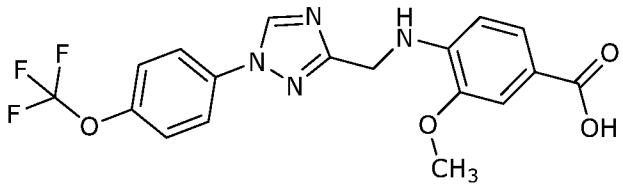
Prepared from methyl 2-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl) methyl)amino) benzoate **(C50)** and isolated as an off-white solid (0.62 g, 80%): mp 336-339 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.26 (s, 1H), 8.01 - 7.88 (m, 2H), 7.62 - 7.47 (m, 3H), 6.92 (br s, 1H), 6.45 (dd, *J* = 2.0, 8.8 Hz, 1H), 6.37 (dd, *J* = 1.7, 13.9 Hz, 1H), 4.40 (d, *J* = 5.9 Hz, 2H); ESIMS *m/z* 397.17 ([M+H]$^+$).

3-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoic acid (C57)



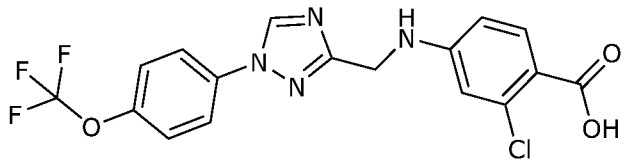
Prepared from methyl 3-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl) methyl)amino) benzoate **(C51)** and isolated as an off-white solid (0.57 g, 74%): mp 197-199 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.38 (br s, 1H), 9.25 (s, 1H), 7.95 (d, *J* = 8.2 Hz, 2H), 7.61 - 7.53 (m, 3H), 7.53 - 7.43 (m, 1H), 6.95 - 6.80 (m, 2H), 4.53 (d, *J* = 6.4 Hz, 2H); ESIMS *m/z* 397.24 ([M+H]$^+$).

3-Methoxy-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoic acid (C58)



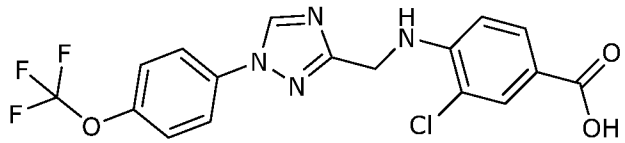
Prepared from methyl 3-methoxy-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl) methyl)amino) benzoate **(C52)** and isolated as an off-white solid (0.6 g, 78%): mp 223-226 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.14 (br s, 1H), 9.25 (s, 1H), 8.04 - 7.86 (m, 2H), 7.58 (d, *J* = 8.8 Hz, 2H), 7.54 - 7.40 (m, 1H), 7.31 (d, *J* = 1.5 Hz, 1H), 6.69 (d, *J* = 8.3 Hz, 1H), 6.25 - 6.19 (m, 1H), 4.51 (d, *J* = 6.4 Hz, 2H), 3.85 (s, 3H); ESIMS *m/z* 409.22 ([M+H]$^+$).

2-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoic acid (C59)



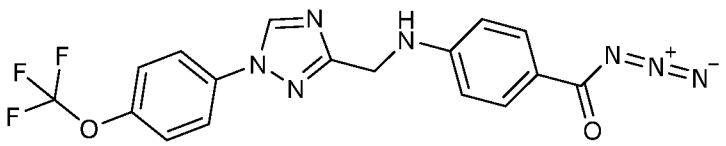
Prepared from methyl 2-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl) methyl)amino) benzoate **(C53)** and isolated as an off-white solid (0.55 g, 71%): mp 226-229 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.35 (br s, 1H), 9.28 (s, 1H), 8.07 - 7.85 (m, 2H), 7.69 (d, *J* = 8.8 Hz, 1H), 7.64 - 7.53 (m, 2H), 7.21 -7.18 (m, 1H), 6.78 (d, *J* = 2.4 Hz, 1H), 6.66 (dd, *J* = 2.4, 8.8 Hz, 1H), 4.45 (d, *J* = 6.4 Hz, 2H); ESIMS *m/z* 413.15 ([M+H]$^+$).

3-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoic acid (C60)



Prepared from methyl 3-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl) methyl)amino) benzoate **(C54)** and isolated as an off-white solid (0.58 g, 75%): mp 268-271 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.35 (br s, 1H), 9.26 (s, 1H), 8.04 - 7.87 (m, *J* = 8.8 Hz, 2H), 7.77 (d, *J* = 2.0 Hz, 1H), 7.73 - 7.64 (m, 1H), 7.64 - 7.52 (m, 2H), 6.88 (d, *J* = 8.3 Hz, 1H), 6.79 - 6.67 (m, 1H), 4.59 (d, *J* = 5.9 Hz, 2H); ESIMS *m/z* 413.15 ([M+H]$^+$).

Example 28: Preparation of 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide (C61)

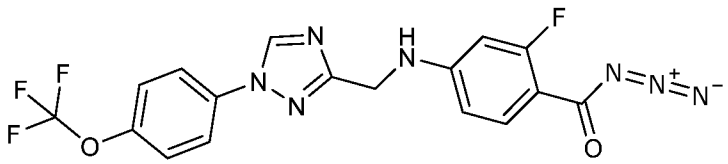


To a solution of 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoic acid **(C55)** (0.5 g, 1.32 mmol) in tetrahydrofuran (15 mL) were added diphenylphosphoryl azide (0.435 g, 1.59 mmol), triethylamine (0.22 g, 1.98 mmol) at 0 °C, and the reaction mixture was stirred at room temperature for 4 hours. The reaction mixture was concentrated under reduced pressure.The residue was diluted with water, and the precipitated solid was filtered and dried under vacuum. The title

compound was isolated as an off-white solid (0.45 g, crude), which was used in the next step without further purification: ESIMS *m/z* 404.24 ([M+H]$^+$).

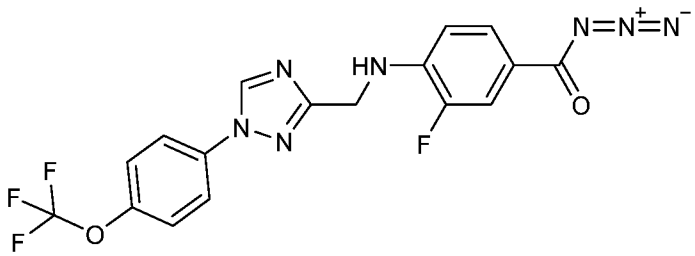
The following compounds were prepared in like manner to the procedure outlined in ***Example 28****:*

2-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide (C62)



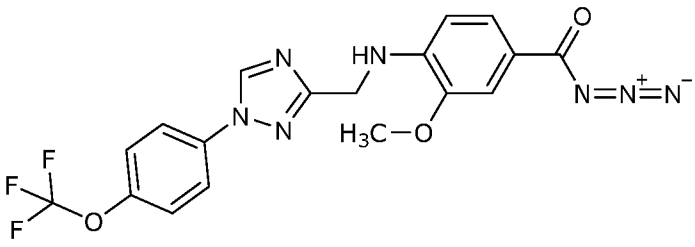
Prepared from 2-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl) methyl)amino)benzoic acid **(C56)** and isolated as an off-white solid (0.48 g, crude): ESIMS *m/z* 422.24 ([M+H])$^+$).

3-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide (C63)



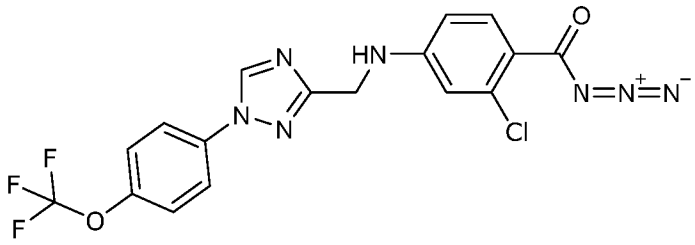
Prepared from 3-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl) methyl)amino)benzoic acid **(C57)** and isolated as an off-white solid (0.41 g, crude): ESIMS *m/z* 422.38 ([M+H]$^+$).

3-Methoxy-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide (C64)



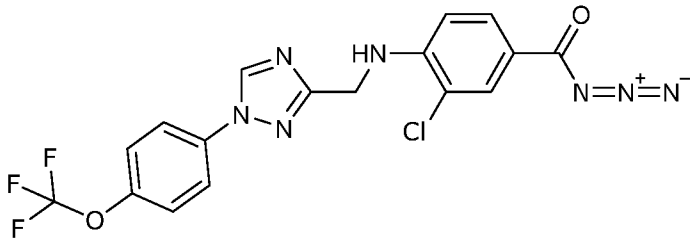
Prepared from 3-methoxy-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl) methyl)amino)benzoic acid **(C58)** and isolated as an off-white solid (0.6 g, crude): ESIMS *m/z* 434.42 ($[M+H]^+$).

2-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide (C65)



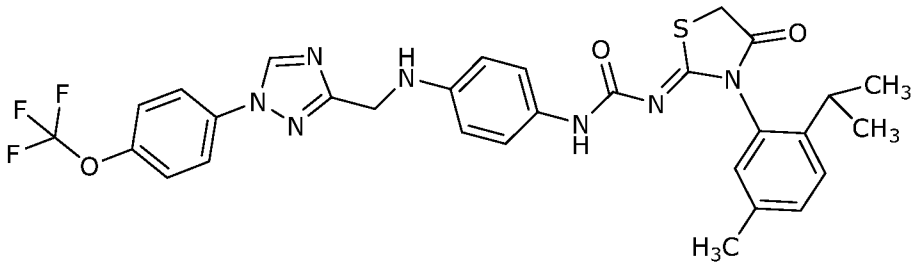
Prepared from 2-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl) methyl)amino)benzoic acid **(C59)** and isolated as an off-white solid (0.55 g, crude): ESIMS *m/z* 438.42 ($[M+H]^+$).

3-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide (C66)



Prepared from 3-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl) methyl)amino)benzoic acid **(C60)** and isolated as an off-white solid (0.37 g, crude): ESIMS *m/z* 438.42 ($[M+H]^+$).

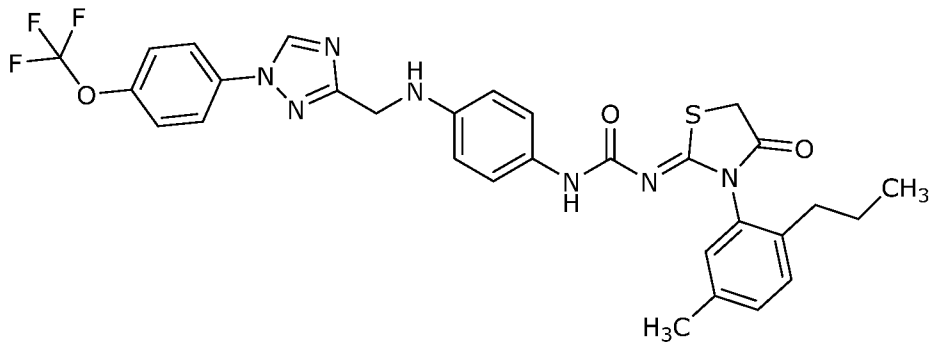
Example 29: Preparation of (*Z*)-1-(3-(2-isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)-3-(4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)urea (F28)



A suspension of 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C61)** (0.15 g, 0.371 mmol) in toluene (5 mL) was stirred at 70 °C for 1 hour. The reaction mixture was cooled to room temperature, 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one (0.184 g, 0.742 mmol) was added, and the reactiuon mixture was stirred at room temperature for 16 hours. The reaction mixture was concentrated under reduced pressure. Purification by flash column chromatography (silica gel 100-200 mesh) eluting with 40 – 60% of ethyl acetate in petroleum ether afforded the title compound as an off-white solid (0.05 g, 22% over three steps from benzoic acid **C55**.

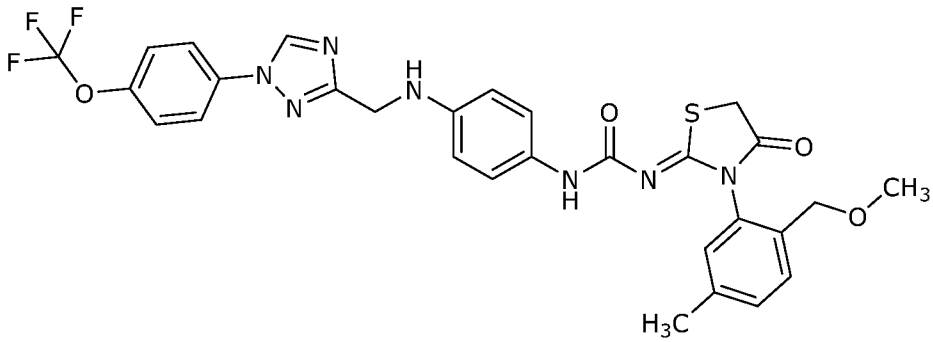
The following compounds were prepared in like manner to the procedure outlined in ***Example 29:***

(*Z*)-1-(3-(5-Methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)-3-(4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)urea (F29)



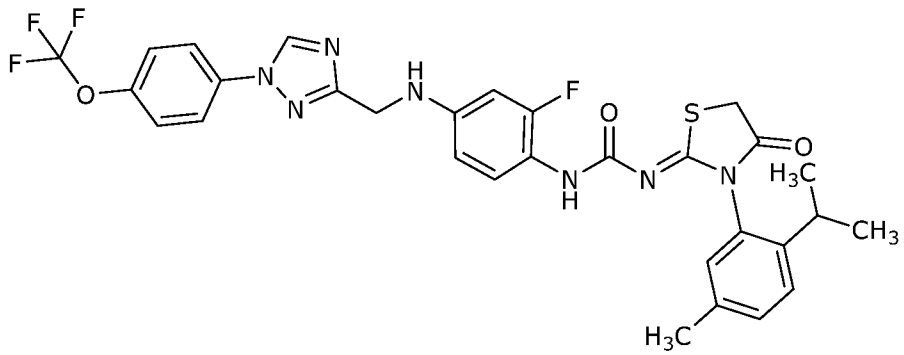
Prepared from 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C61)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as an off-white solid (0.055 g, 24% over three steps from benzoic acid **C55**.

(*Z*)-1-(3-(2-(Methoxymethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)-3-(4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)urea (F30)



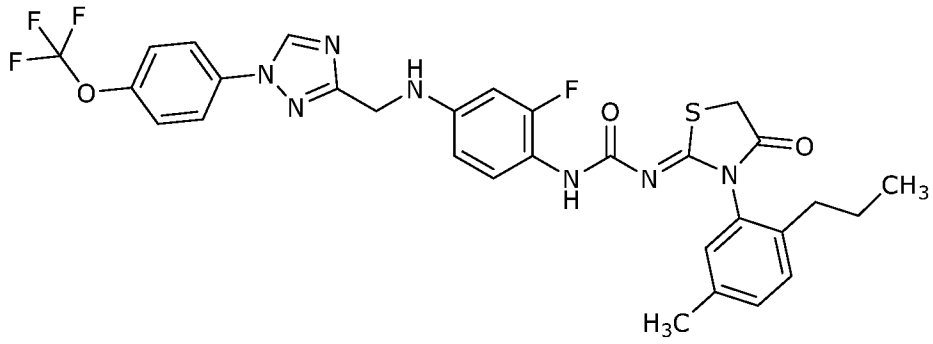
Prepared from 4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C61)** and 2-imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one **(C39)** and isolated as an off-white solid (0.045 g, 20% over three steps from benzoic acid **C55**.

(*Z*)-1-(2-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(2-isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F31)



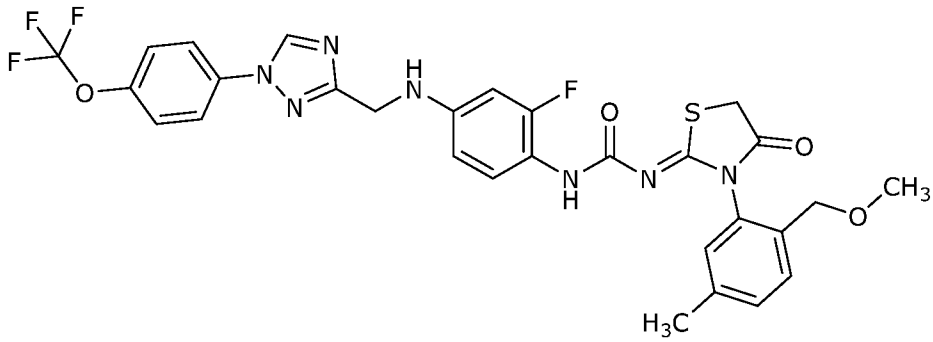
Prepared from 2-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C62)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as an off-white solid (0.03 g, 14% over three steps from benzoic acid **C56**.

(*Z*)-1-(2-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(5-methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)urea (F32)



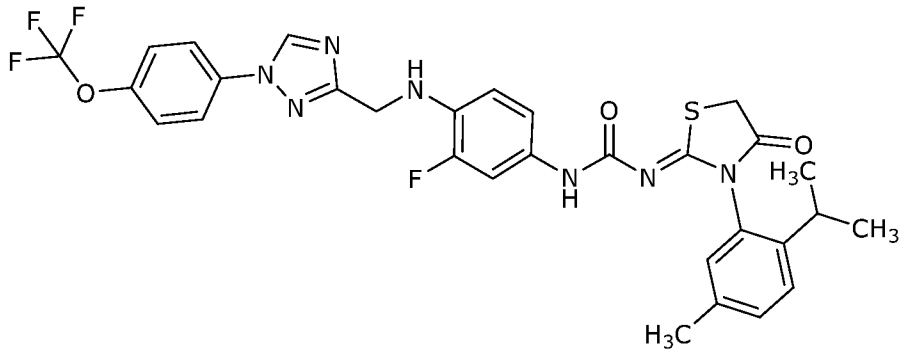
Prepared from 2-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C62)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as an off-white solid (0.035 g, 16% over three steps from benzoic acid **C56**.

(*Z*)-1-(2-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(2-(methoxymethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F33)



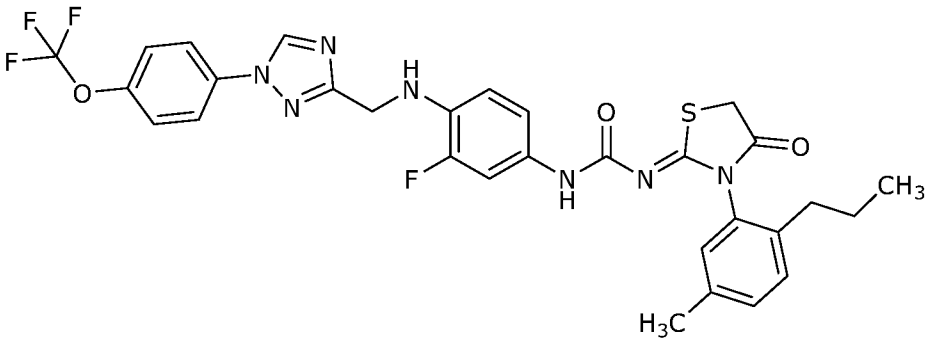
Prepared from 2-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C62)** and 2-imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one **(C39)** and isolated as an off-white solid (0.04 g, 16% over three steps from benzoic acid **C56**.

(*Z*)-1-(3-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(2-isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F34)



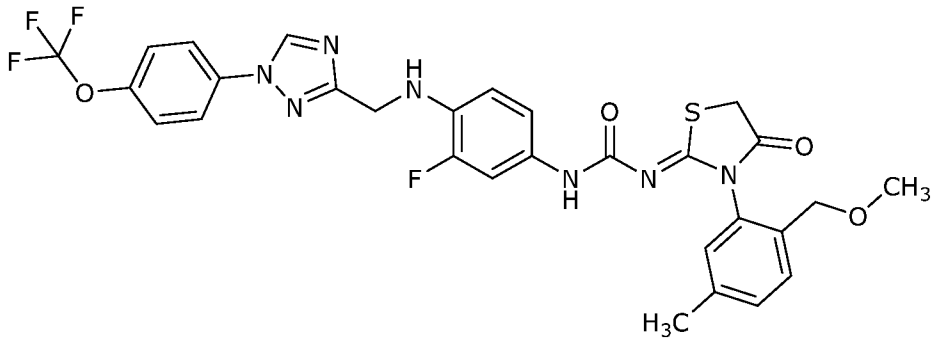
Prepared from 3-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C63)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as an off-white solid (0.07 g, 31% over three steps from benzoic acid **C57**.

(*Z*)-1-(3-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(5-methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)urea (F35)



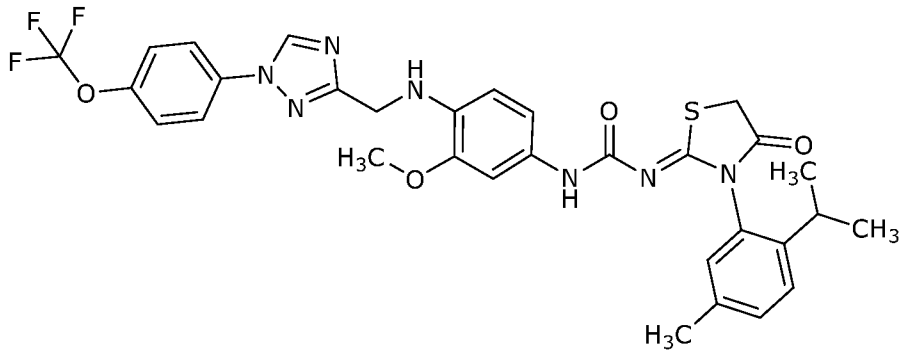
Prepared from 3-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C63)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as an off-white solid (0.05 g, 22% over three steps from benzoic acid **C57**.

(*Z*)-1-(3-Fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(2-(methoxymethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F36)



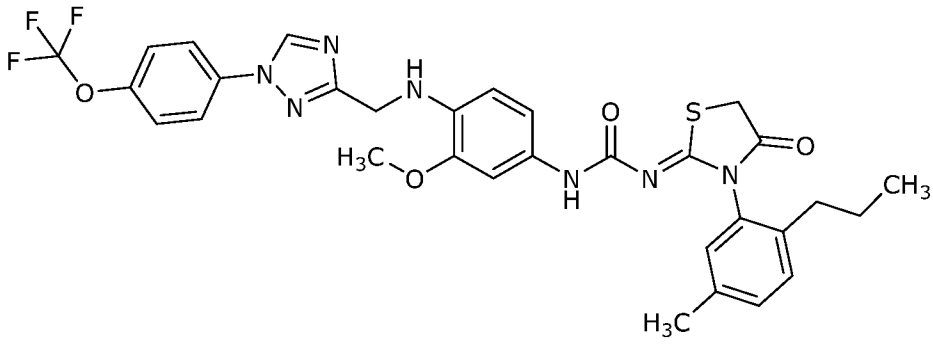
Prepared from 3-fluoro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C63)** and 2-imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one **(C39)** and isolated as an off-white solid (0.045 g, 20% over three steps from benzoic acid **C57**.

(*Z*)-1-(3-(2-Isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)-3-(3-methoxy-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)urea (F37)



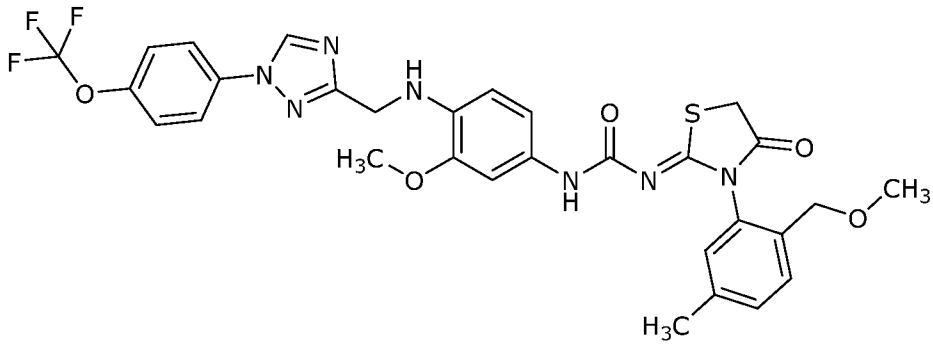
Prepared from 3-methoxy-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C64)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as an off-white solid (0.03 g, 13% over three steps from benzoic acid **C58**.

(*Z*)-1-(3-Methoxy-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(5-methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)urea (F38)



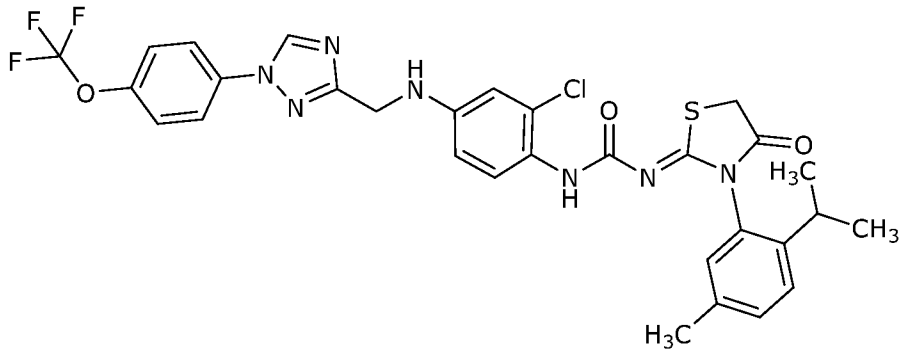
Prepared from 3-methoxy-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C64)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as an off-white solid (0.025 g, 11% over three steps from benzoic acid **C58**.

(*Z*)-1-(3-Methoxy-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(2-(methoxymethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F39)



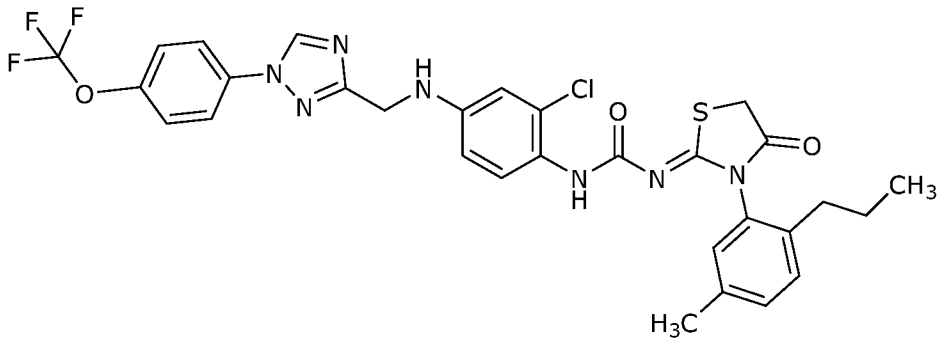
Prepared from 3-methoxy-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C64)** and 2-imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one **(C39)** and isolated as an off-white solid (0.04 g, 17% over three steps from benzoic acid **C58**.

(*Z*)-1-(2-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(2-isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F40)



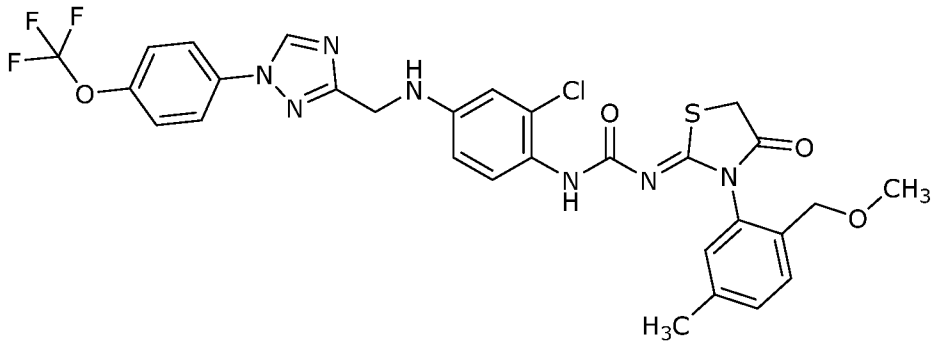
Prepared from 2-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C65)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as an off-white solid (0.045 g, 46% over three steps from benzoic acid **C59**.

(*Z*)-1-(2-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(5-methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)urea (F41)



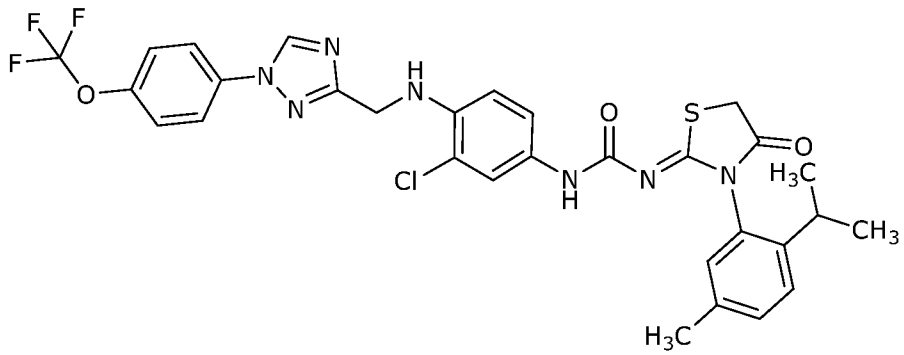
Prepared from 2-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C65)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as an off-white solid (0.045 g, 19% over three steps from benzoic acid **C59**.

(*Z*)-1-(2-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(2-(methoxymethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F42)



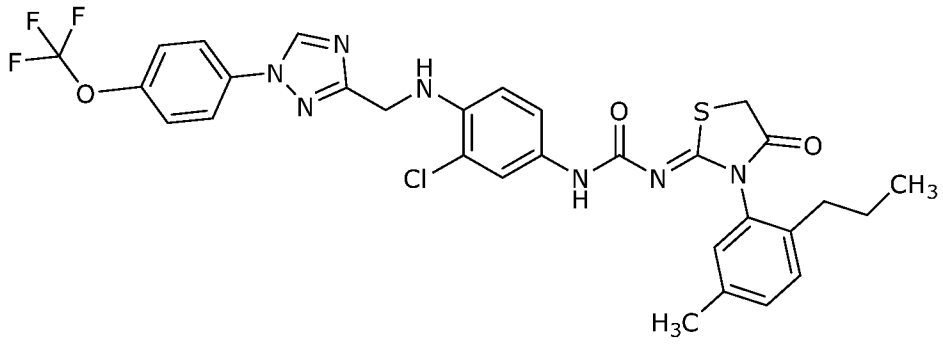
Prepared from 2-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C65)** and 2-imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one **(C39)** and isolated as an off-white solid (0.048 g, 21% over three steps from benzoic acid **C59**.

(*Z*)-1-(3-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(2-isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F43)



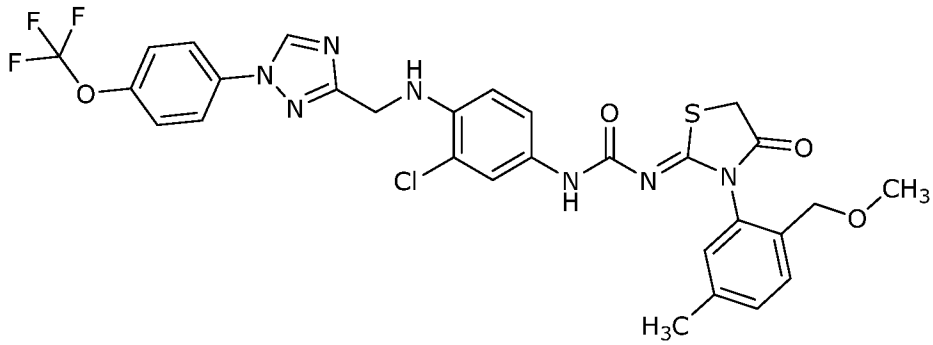
Prepared from 3-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C66)** and 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one and isolated as an off-white solid (0.033 g, 14% over three steps from benzoic acid **C60**.

(*Z*)-1-(3-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(5-methyl-2-propylphenyl)-4-oxothiazolidin-2-ylidene)urea (F44)



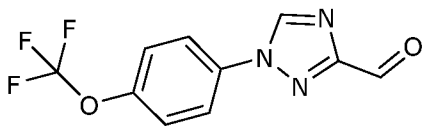
Prepared from 3-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C66)** and 2-imino-3-(5-methyl-2-propylphenyl)thiazolidin-4-one **(C40)** and isolated as an off-white solid (0.031 g, 13% over three steps from benzoic acid **C60**.

(*Z*)-1-(3-Chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)phenyl)-3-(3-(2-(methoxymethyl)-5-methylphenyl)-4-oxothiazolidin-2-ylidene)urea (F45)



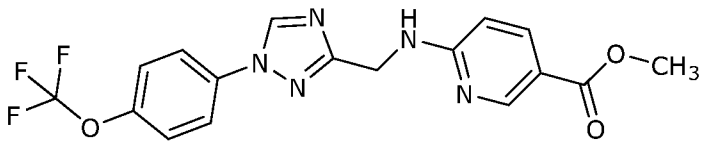
Prepared from 3-chloro-4-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)benzoyl azide **(C66)** and 2-imino-3-(2-(methoxymethyl)-5-methylphenyl)thiazolidin-4-one **(C39)** and isolated as an off-white solid (0.023 g, 10% over three steps from benzoic acid **C60**.

Example 30: Preparation of 1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazole-3-carbaldehyde (C67)



To a solution of (1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methanol **(C47)** (2.0 g, 7.72 mmol) in dichloromethane (30 mL) was added Dess-Martin periodinane (4.92 g, 11.58 mmol) at 0 °C, and the reaction mixuture was stirred at room temperature for 3 hours. The reaction mixture was diluted with dichloromethane (20 mL) and washed with saturated sodium bicarbonate solution (20 mL) and water (10 mL). The organic layer was dried over sodium sulfate, filtered and concentrated under reduced pressure. Purification by flash column chromatography (silica gel 100-200 mesh) eluting with 15 – 20% of ethyl acetate in petroleum ether afforded the title compound as an off-white solid (1.2 g, 61%): ^{1}H NMR (400 MHz, $CDCl_3$) δ 10.11 (s, 1H), 8.68 (s, 1H), 7.81 (d, *J* = 8.8 Hz, 2H), 7.43 (d, *J* = 8.8 Hz, 2H).

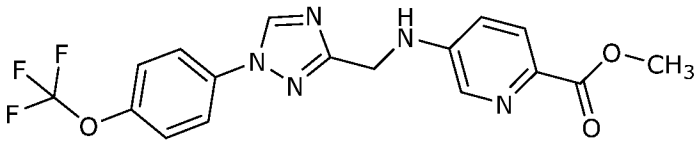
Example 31: Preparation of methyl 6-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)nicotinate (C68)



To a solution of (1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methanol **(C47)** (1.0 g, 3.89 mmol) in methanol (10 mL) was added methyl 6-aminonicotinate (0.71 g, 4.67 mmol). Acetic acid (1.0 mL) was added dropwise at 0 °C, and the reaction mixuture was stirred at room temperature for 16 hours. The reaction mixture was cooled to 0 °C, sodium cyanoborohydride (0.49 g, 7.78 mmol) was added, and the reaction mixuture was stirred at room temperature for 5 hours. The reaction mixture was quenched with cold water and concentrated under reduced pressure. The aqueous layer was extracted with ethyl acetate (2 x 20 mL). The organic extracts were washed with brine, dried over sodium sulfate, filtered and concentrated under reduced pressure. Purification by flash column chromatography (silica gel 100-200 mesh) eluting with 25 – 40% ethyl acetate in petroleum ether afforded the title compound as an off white solid (0.75 g, 49%): mp 194 -196 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.26 (s, 1H), 8.57 (d, *J* = 2.0 Hz, 1H), 7.98 - 7.92 (m, 3H), 7.85 (dd, *J* = 2.4, 8.8 Hz, 1H), 7.57 (d, *J* = 8.4 Hz, 2H), 6.65 (d, *J* = 8.8 Hz, 1H), 4.69 (d, *J* = 5.9 Hz, 2H), 3.76 (s, 3H); ESIMS *m/z* 394.27 ($[M+H]$)$^+$).

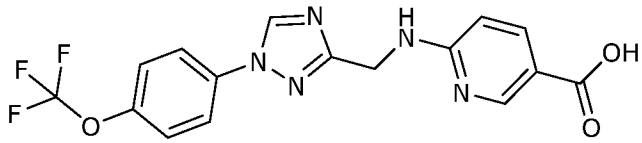
*The following compounds were prepared in like manner to the procedure outlined in **Example 31***:

Methyl 5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)picolinate (C69)



Prepared from (1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methanol **(C47)** and isolated as an off-white solid (0.78 g, 50%): mp 175 - 177 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 9.28 (s, 1H), 8.14 (d, *J* = 2.8 Hz, 1H), 7.99 - 7.94 (m, 2H), 7.81 (d, *J* = 8.4 Hz, 1H), 7.58 (d, *J*= 8.4 Hz, 2H), 7.38 - 7.21 (m, 1H), 7.07 (dd, *J* = 2.8, 8.6 Hz, 1H), 4.51 (d, *J* = 6.0 Hz, 2H), 3.77 (s, 3H); ESIMS *m/z* 394.27 ([M+H]$^+$).

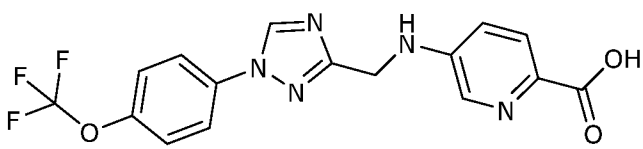
Example 32: Preparation of 6-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)nicotinic acid (C70)



To a solution of methyl 6-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)nicotinate **(C68)** (0.5 g, 1.27 mmol) in a mixture of tetrahydrofuran:methanol:water (2:1:0.5, 15 mL) was added lithium hydroxide monohydrate (0.16 g, 3.82 mmol), and the reaction mixture was stirred at room temperature for 16 hours. The reaction mixture was concentrated under reduced pressure. The residue was taken up in water, acidified with citric acid solution (~ pH 4-5) and the precipitate was vacuum filtered, washed with water, and dried under vacuum. The title compound was isolated as an off-white solid (0.3 g, 63%): mp 223 - 225 °C; ^{1}H NMR (400 MHz, DMSO-d_6) δ 12.30 (br s, 1H), 9.25 (s, 1H), 8.53 (d, *J* = 2.4 Hz, 1H), 8.03 - 7.89 (m, 2H), 7.82 (dd, *J* = 2.2, 8.6 Hz, 1H), 7.57 (d, *J*=8.3 Hz, 2H), 6.61 (d, *J* = 8.8 Hz, 2H), 4.67 (d, *J* = 5.9 Hz, 2H); ESIMS *m/z* 380.27 ([M+H]$^+$).

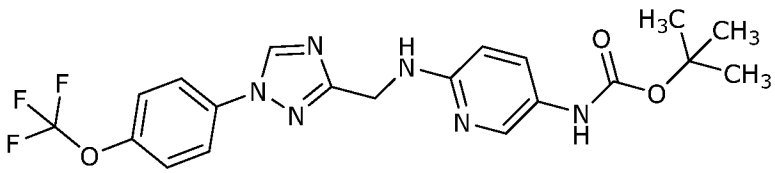
The following compounds were prepared in like manner to the procedure outlined in ***Example 32***:

5-(((1-(4-(Trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)picolinic acid (C71)



Prepared from methyl 5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)picolinate **(C69)** and isolated as an off-white solid (0.32 g, 66%): mp 222 - 224 °C; ^{1}H NMR (400 MHz, DMSO -d_6) δ 12.25 (br s, 1H), 9.28 (s, 1H), 8.12 (d, *J* = 2.4 Hz, 1H), 7.96 (d, *J* = 8.8 Hz, 2H), 7.88 - 7.70 (m, 1H), 7.69 - 7.47 (m, 2H), 7.33 – 7.28 (m, 1H), 7.08 (dd, *J* = 2.8, 8.6 Hz, 1H), 4.51 (d, *J* =5.8 Hz, 2H); ESIMS *m/z* 380.24 ([M+H]$^+$).

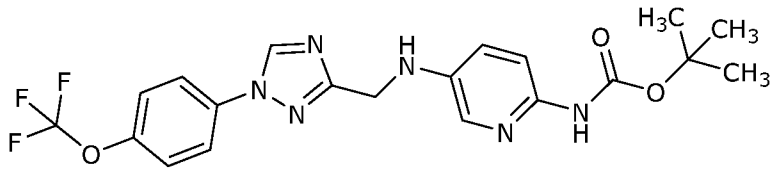
Example 33: Preparation of *tert*-butyl 6-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)pyridin-3-ylcarbamate (C72)



To a solution of 6-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)nicotinic acid **(C70)** (0.2 g, 0.527 mmol) in *tert*-butyl alcohol (10 mL) were added diphenylphosphoryl azide (0.174 g, 0.633 mmol) and triethylamine (0.08 g, 0.79 mmol) at 0 °C, and the reaction mixture was stirred at 70 °C for 5 hours. The reaction mixture was cooled to room temperature and concentrated under reduced pressure. The residue was taken up in water (10 mL) and extracted with ethyl acetate (2 x 10 mL). The organic layer was dried over sodium sulfate, filtered, and concentrated under reduced pressure. The title compound was isolated as a pale yellow solid (0.15 g, 85%), which was used in the next step without further purification: ESIMS *m/z* 450.21 ([M+H]$^+$).

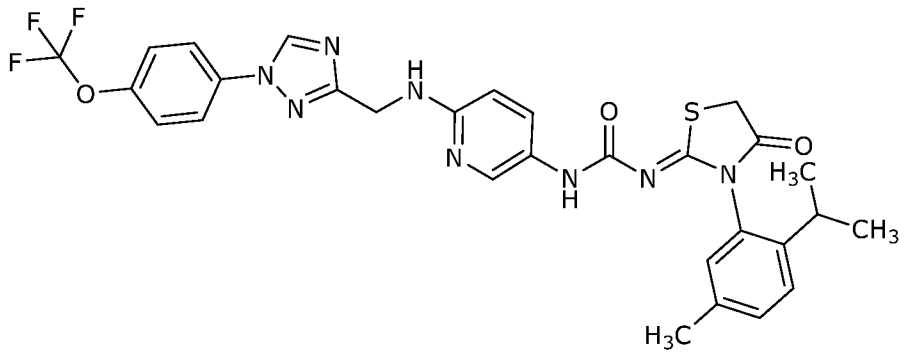
*The following compounds were prepared in like manner to the procedure outlined in **Example 33***:

***tert*-Butyl-5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)pyridin-2-yl)carbamate (C73)**



Prepared from 5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)picolinic acid **(C71)** and isolated as a pale yellow solid (0.170 g, crude): ESIMS *m/z* 450.36 ([M+H]$^+$)

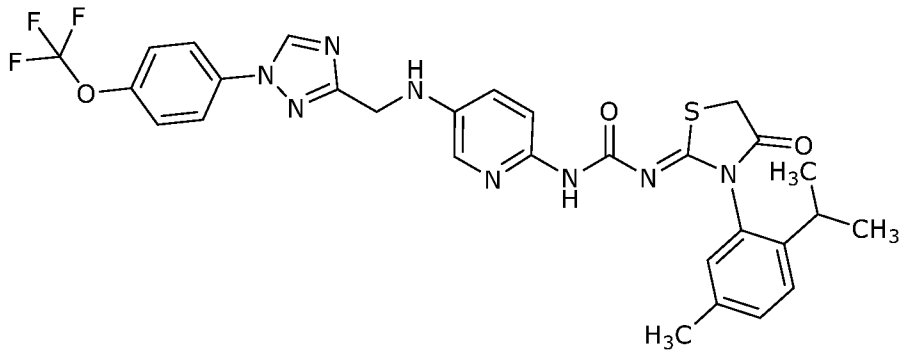
Example 34: Preparation of (*Z*)-1-(3-(2-isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)-3-(6-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)pyridin-3-yl)urea (F46)



To a solution of *tert*-butyl 6-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)pyridin-3-ylcarbamate **(C72)** (0.15 g, 0.33 mmol) in toluene (5 mL) was added 2-imino-3-(2-isopropyl-5-methylphenyl)thiazolidin-4-one (0.165 g, 0.67 mmol) at room temperature, and the reaction mixture was stirred at 100 °C for 48 hours. The reaction mixture was cooled to room temperature and concentrated under reduced pressure. Purification by flash column chromatography (silica gel 100-200 mesh) eluting with 50 – 70% ethyl acetate in petroleum ether afforded the title compound as an off-white solid (0.03 g, 15% over two steps from nicotinic acid **C70**.

*The following compounds were prepared in like manner to the procedure outlined in **Example 34***:

(*Z*)-1-(3-(2-isopropyl-5-methylphenyl)-4-oxothiazolidin-2-ylidene)-3-(5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)pyridin-2-yl)urea (F47)



Prepared from *tert*-butyl-5-(((1-(4-(trifluoromethoxy)phenyl)-1*H*-1,2,4-triazol-3-yl)methyl)amino)pyridin-2-yl)carbamate **(C73)**and 2-imino-3-(2-isopropyl-5-

methylphenyl)thiazolidin-4-one and isolated as an off-white solid (0.025 g, 13% over two steps from picolinic acid **C71**.

It is recognized that some reagents and reaction conditions may not be compatible with certain functionalities that may be present in certain molecules of Formula One or certain molecules used in the preparation of certain molecules of Formula One. In such cases, it may be necessary to employ standard protection and deprotection protocols comprehensively reported in the literature and well known to a person skilled in the art. In addition, in some cases it may be necessary to perform further routine synthetic steps not described herein to complete the synthesis of desired molecules. A person skilled in the art will also recognize that it may be possible to achieve the synthesis of desired molecules by performing some of the steps of the synthetic routes in a different order to that described. A person skilled in the art will also recognize that it may be possible to perform standard functional group interconversions or substitution reactions on desired molecules to introduce or modify substituents.

Biological Assays

The following bioassays against Beet Armyworm (*Spodoptera exigua*), Cabbage Looper (*Trichoplusia ni*), and Yellow Fever Mosquito (*Aedes aegypti*), are included herein due to the damage they inflict. Furthermore, the Beet Armyworm and Cabbage Looper are two good indicator species for a broad range of chewing pests. Additionally, the Green Peach Aphid is a good indicator species for a broad range of sap–feeding pests. The results with these four indicator species along with the Yellow Fever Mosquito show the broad usefulness of the molecules of Formula One in controlling pests in Phyla Arthropoda, Mollusca, and Nematoda (Drewes et al.)

Example A: Bioassays on Beet Armyworm (*Spodoptera exigua*, LAPHEG) ("BAW") and Cabbage Looper (*Trichoplusia ni*, TRIPNI) ("CL")

Beet armyworm is a serious pest of economic concern for alfalfa, asparagus, beets, citrus, corn, cotton, onions, peas, peppers, potatoes, soybeans, sugar beets, sunflowers, tobacco, and tomatoes, among other crops. It is native to Southeast Asia but is now found in Africa, Australia, Japan, North America, and Southern Europe. The larvae may feed in large swarms causing devastating crop losses. It is known to be resistant to several pesticides.

Cabbage looper is a serious pest found throughout the world. It attacks alfalfa, beans, beets, broccoli, Brussel sprouts, cabbage, cantaloupe, cauliflower, celery, collards, cotton, cucumbers, eggplant, kale, lettuce, melons, mustard, parsley, peas, peppers, potatoes, soybeans, spinach, squash, tomatoes, turnips, and watermelons, among other crops. This species is very destructive to plants due to its voracious appetite. The larvae consume three times their weight in food daily. The feeding sites

are marked by large accumulations of sticky, wet, fecal material, which may contribute to higher disease pressure thereby causing secondary problems on the plants in the site. It is known to be resistant to several pesticides.

Consequently, because of the above factors control of these pests is important. Furthermore, molecules that control these pests (BAW and CL), which are known as chewing pests, will be useful in controlling other pests that chew on plants.

Certain molecules disclosed in this document were tested against BAW and CL using procedures described in the following examples. In the reporting of the results, the "**BAW & CL Rating Table**" was used (See Table Section).

Bioassays on BAW

Bioassays on BAW were conducted using a 128–well diet tray assay. One to five second instar BAW larvae were placed in each well (3 mL) of the diet tray that had been previously filled with 1 mL of artificial diet to which 50 μg/cm^2 of the test molecule (dissolved in 50 μL of 90:10 acetone–water mixture) had been applied (to each of eight wells) and then allowed to dry. Trays were covered with a clear self–adhesive cover, vented to allow gas exchange, and held at 25 °C, 14:10 light–dark for five to seven days. Percent mortality was recorded for the larvae in each well; activity in the eight wells was then averaged. The results are indicated in the table entitled "**Table ABC: Biological Results**" (See Table Section).

Bioassays on CL

Bioassays on CL were conducted using a 128–well diet tray assay. One to five second instar CL larvae were placed in each well (3 mL) of the diet tray that had been previously filled with 1 mL of artificial diet to which 50 μg/cm^2 of the test molecule (dissolved in 50 μL of 90:10 acetone–water mixture) had been applied (to each of eight wells) and then allowed to dry. Trays were covered with a clear self–adhesive cover, vented to allow gas exchange, and held at 25 °C, 14:10 light–dark for five to seven days. Percent mortality was recorded for the larvae in each well; activity in the eight wells was then averaged. The results are indicated in the table entitled "**Table ABC: Biological Results**" (See Table Section).

Example B: Bioassays on Yellow Fever Mosquito (*Aedes aegypti*, AEDSAE) ("YFM").

YFM prefers to feed on humans during the daytime and is most frequently found in or near human habitations. YFM is a vector for transmitting several diseases. It is a mosquito that can spread the dengue fever and yellow fever viruses. Yellow fever is the second most dangerous mosquito–borne disease after malaria. Yellow fever is an acute viral hemorrhagic disease and up to 50% of severely affected persons without treatment will die from yellow fever. There are an estimated 200,000 cases of yellow fever, causing 30,000 deaths worldwide each year. Dengue fever is a nasty, viral disease; it is

sometimes called "breakbone fever" or "break–heart fever" because of the intense pain it can produce. Dengue fever kills about 20,000 people annually. Consequently, because of the above factors control of this pest is important. Furthermore, molecules that control this pest (YFM), which is known as a sucking pest, are useful in controlling other pests that cause human and animal suffering.

Certain molecules disclosed in this document were tested against YFM using procedures described in the following paragraph. In the reporting of the results, the "**YFM Rating Table**" was used (See Table Section).

Master plates containing 400 µg of a molecule dissolved in 100 µL of dimethyl sulfoxide (DMSO) (equivalent to a 4000 ppm solution) are used. A master plate of assembled molecules contains 15 µL per well. To this plate, 135 µL of a 90:10 water/acetone mixture is added to each well. A robot (Biomek® NXP Laboratory Automation Workstation) is programmed to dispense 15 µL aspirations from the master plate into an empty 96–well shallow plate ("daughter" plate). There are 6 reps ("daughter" plates) created per master. The created "daughter" plates are then immediately infested with YFM larvae.

The day before plates are to be treated, mosquito eggs are placed in Millipore water containing liver powder to begin hatching (4 g into 400 mL). After the "daughter" plates are created using the robot, they are infested with 220 µL of the liver powder/larval mosquito mixture (about 1 day–old larvae). After plates are infested with mosquito larvae, a non–evaporative lid is used to cover the plate to reduce drying. Plates are held at room temperature for 3 days prior to grading. After 3 days, each well is observed and scored based on mortality. The results are indicated in the table entitled "**Table ABC: Biological Results**" (See Table Section).

Agriculturally acceptable acid addition salts, salt derivatives, solvates, ester derivatives, polymorphs, isotopes, and radionuclides

Molecules of Formula One may be formulated into agriculturally acceptable acid addition salts. By way of a non–limiting example, an amine function can form salts with hydrochloric, hydrobromic, sulfuric, phosphoric, acetic, benzoic, citric, malonic, salicylic, malic, fumaric, oxalic, succinic, tartaric, lactic, gluconic, ascorbic, maleic, aspartic, benzenesulfonic, methanesulfonic, ethanesulfonic, hydroxyl–methanesulfonic, and hydroxyethanesulfonic acids. Additionally, by way of a non–limiting example, an acid function can form salts including those derived from alkali or alkaline earth metals and those derived from ammonia and amines. Examples of preferred cations include sodium, potassium, and magnesium.

Molecules of Formula One may be formulated into salt derivatives. By way of a non–limiting example, a salt derivative may be prepared by contacting a free base with a

sufficient amount of the desired acid to produce a salt. A free base may be regenerated by treating the salt with a suitable dilute aqueous base solution such as dilute aqueous sodium hydroxide, potassium carbonate, ammonia, and sodium bicarbonate. As an example, in many cases, a pesticide, such as 2,4–D, is made more water–soluble by converting it to its dimethylamine salt.

Molecules of Formula One may be formulated into stable complexes with a solvent, such that the complex remains intact after the non–complexed solvent is removed. These complexes are often referred to as "solvates." However, it is particularly desirable to form stable hydrates with water as the solvent.

Molecules of Formula One containing an acid functionality may be made into ester derivatives. These ester derivatives can then be applied in the same manner as the molecules disclosed in this document are applied.

Molecules of Formula One may be made as various crystal polymorphs. Polymorphism is important in the development of agrochemicals since different crystal polymorphs or structures of the same molecule can have vastly different physical properties and biological performances.

Molecules of Formula One may be made with different isotopes. Of particular importance are molecules having ^{2}H (also known as deuterium) or ^{3}H (also known as tritium) in place of ^{1}H. Molecules of Formula One may be made with different radionuclides. Of particular importance are molecules having ^{14}C (also known as radiocarbon). Molecules of Formula One having deuterium, tritium, or ^{14}C may be used in biological studies allowing tracing in chemical and physiological processes and half–life studies, as well as, MoA studies.

Combinations

In another embodiment of this invention, molecules of Formula One may be used in combination (such as, in a compositional mixture, or a simultaneous or sequential application) with one or more active ingredients.

In another embodiment of this invention, molecules of Formula One may be used in combination (such as, in a compositional mixture, or a simultaneous or sequential application) with one or more active ingredients each having a MoA that is the same as, similar to, but more likely – different from, the MoA of the molecules of Formula One.

In another embodiment, molecules of Formula One may be used in combination (such as, in a compositional mixture, or a simultaneous or sequential application) with one or more molecules having acaricidal, algicidal, avicidal, bactericidal, fungicidal, herbicidal, insecticidal, molluscicidal, nematicidal, rodenticidal, and/or virucidal properties.

In another embodiment, the molecules of Formula One may be used in combination (such as, in a compositional mixture, or a simultaneous or sequential application) with one or more molecules that are antifeedants, bird repellents, chemosterilants, herbicide safeners, insect attractants, insect repellents, mammal repellents, mating disrupters, plant activators, plant growth regulators, and/or synergists.

In another embodiment, molecules of Formula One may also be used in combination (such as in a compositional mixture, or a simultaneous or sequential application) with one or more biopesticides.

In another embodiment, in a pesticidal composition combinations of a molecule of Formula One and an active ingredient may be used in a wide variety of weight ratios. For example, in a two-component mixture, the weight ratio of a molecule of Formula One to an active ingredient, the weight ratios in Table B may be used. However, in general, weight ratios less than about 10:1 to about 1:10 are preferred. It is also preferred sometimes to use a three, four, five, six, seven, or more, component mixture comprising a molecule of Formula One and an additional two or more active ingredients.

Weight ratios of a molecule of Formula One to an active ingredient may also be depicted as *X:Y*; wherein *X* is the parts by weight of a molecule of Formula One and *Y* is the parts by weight of active ingredient. The numerical range of the parts by weight for *X* is $0 < X \leq 100$ and the parts by weight for *Y* is $0 < Y \leq 100$ and is shown graphically in TABLE C. By way of non-limiting example, the weight ratio of a molecule of Formula One to an active ingredient may be 20:1.

Ranges of weight ratios of a molecule of Formula One to an active ingredient may be depicted as $X_1:Y_1$ to $X_2:Y_2$, wherein *X* and *Y* are defined as above.

In one embodiment, the range of weight ratios may be $X_1:Y_1$ to $X_2:Y_2$, wherein $X_1 > Y_1$ and $X_2 < Y_2$. By way of non-limiting example, the range of a weight ratio of a molecule of Formula One to an active ingredient may be between 3:1 and 1:3, inclusive of the endpoints.

In another embodiment, the range of weight ratios may be $X_1:Y_1$ to $X_2:Y_2$, wherein $X_1 > Y_1$ and $X_2 > Y_2$. By way of non-limiting example, the range of weight ratio of a molecule of Formula One to an active ingredient may be between 15:1 and 3:1, inclusive of the endpoints.

In another embodiment, the range of weight ratios may be $X_1:Y_1$ to $X_2:Y_2$, wherein $X_1 < Y_1$ and $X_2 < Y_2$. By way of non-limiting example, the range of weight ratios of a molecule of Formula One to an active ingredient may be between about 1:3 and about 1:20, inclusive of the endpoints.

It is envisioned that certain weight ratios of a molecule of Formula One to an active ingredient, as presented in Table B and C, may be synergistic.

Formulations

A pesticide is many times not suitable for application in its pure form. It is usually necessary to add other substances so that the pesticide may be used at the required concentration and in an appropriate form, permitting ease of application, handling, transportation, storage, and maximum pesticide activity. Thus, pesticides are formulated into, for example, baits, concentrated emulsions, dusts, emulsifiable concentrates, fumigants, gels, granules, microencapsulations, seed treatments, suspension concentrates, suspoemulsions, tablets, water soluble liquids, water dispersible granules or dry flowables, wettable powders, and ultra–low volume solutions.

Pesticides are applied most often as aqueous suspensions or emulsions prepared from concentrated formulations of such pesticides. Such water–soluble, water–suspendable, or emulsifiable formulations are either solids, usually known as wettable powders, water dispersible granules, liquids usually known as emulsifiable concentrates, or aqueous suspensions. Wettable powders, which may be compacted to form water dispersible granules, comprise an intimate mixture of the pesticide, a carrier, and surfactants. The concentration of the pesticide is usually from about 10% to about 90% by weight. The carrier is usually selected from among the attapulgite clays, the montmorillonite clays, the diatomaceous earths, or the purified silicates. Effective surfactants, comprising from about 0.5% to about 10% of the wettable powder, are found among sulfonated lignins, condensed naphthalenesulfonates, naphthalenesulfonates, alkylbenzenesulfonates, alkyl sulfates, and non–ionic surfactants such as ethylene oxide adducts of alkyl phenols.

Emulsifiable concentrates of pesticides comprise a convenient concentration of a pesticide, such as from about 50 to about 500 grams per liter of liquid dissolved in a carrier that is either a water miscible solvent or a mixture of water–immiscible organic solvent and emulsifiers. Useful organic solvents include aromatics, especially xylenes and petroleum fractions, especially the high–boiling naphthalenic and olefinic portions of petroleum such as heavy aromatic naphtha. Other organic solvents may also be used, such as the terpenic solvents including rosin derivatives, aliphatic ketones such as cyclohexanone, and complex alcohols such as 2–ethoxyethanol. Suitable emulsifiers for emulsifiable concentrates are selected from conventional anionic and non–ionic surfactants.

Aqueous suspensions comprise suspensions of water–insoluble pesticides dispersed in an aqueous carrier at a concentration in the range from about 5% to about 50% by weight. Suspensions are prepared by finely grinding the pesticide and vigorously mixing it into a carrier comprised of water and surfactants. Ingredients, such as inorganic salts and synthetic or natural gums may, also be added to increase the density

and viscosity of the aqueous carrier. It is often most effective to grind and mix the pesticide at the same time by preparing the aqueous mixture and homogenizing it in an implement such as a sand mill, ball mill, or piston-type homogenizer. The pesticide in suspension might be microencapsulated in plastic polymer.

Oil dispersions (OD) comprise suspensions of organic solvent-insoluble pesticides finely dispersed in a mixture of organic solvent and emulsifiers at a concentration in the range from about 2% to about 50% by weight. One or more pesticide might be dissolved in the organic solvent. Useful organic solvents include aromatics, especially xylenes and petroleum fractions, especially the high-boiling naphthalenic and olefinic portions of petroleum such as heavy aromatic naphtha. Other solvents may include vegetable oils, seed oils, and esters of vegetable and seed oils. Suitable emulsifiers for oil dispersions are selected from conventional anionic and non-ionic surfactants. Thickeners or gelling agents are added in the formulation of oil dispersions to modify the rheology or flow properties of the liquid and to prevent separation and settling of the dispersed particles or droplets.

Pesticides may also be applied as granular compositions that are particularly useful for applications to the soil. Granular compositions usually contain from about 0.5% to about 10% by weight of the pesticide, dispersed in a carrier that comprises clay or a similar substance. Such compositions are usually prepared by dissolving the pesticide in a suitable solvent and applying it to a granular carrier, which has been pre-formed to the appropriate particle size, in the range of from about 0.5 mm to about 3 mm. Such compositions may also be formulated by making a dough or paste of the carrier and molecule, and then crushing and drying to obtain the desired granular particle size. Another form of granules is a water emulsifiable granule (EG). It is a formulation consisting of granules to be applied as a conventional oil-in-water emulsion of the active ingredient(s), either solubilized or diluted in an organic solvent, after disintegration and dissolution in water. Water emulsifiable granules comprise one or several active ingredient(s), either solubilized or diluted in a suitable organic solvent that is (are) absorbed in a water soluble polymeric shell or some other type of soluble or insoluble matrix.

Dusts containing a pesticide are prepared by intimately mixing the pesticide in powdered form with a suitable dusty agricultural carrier, such as kaolin clay, ground volcanic rock, and the like. Dusts can suitably contain from about 1% to about 10% of the pesticide. Dusts may be applied as a seed dressing or as a foliage application with a dust blower machine.

It is equally practical to apply a pesticide in the form of a solution in an appropriate organic solvent, usually petroleum oil, such as the spray oils, which are widely used in agricultural chemistry.

Pesticides can also be applied in the form of an aerosol composition. In such compositions, the pesticide is dissolved or dispersed in a carrier, which is a pressure–generating propellant mixture. The aerosol composition is packaged in a container from which the mixture is dispensed through an atomizing valve.

Pesticide baits are formed when the pesticide is mixed with food or an attractant or both. When the pests eat the bait, they also consume the pesticide. Baits may take the form of granules, gels, flowable powders, liquids, or solids. Baits may be used in pest harborages.

Fumigants are pesticides that have a relatively high vapor pressure and hence can exist as a gas in sufficient concentrations to kill pests in soil or enclosed spaces. The toxicity of the fumigant is proportional to its concentration and the exposure time. They are characterized by a good capacity for diffusion and act by penetrating the pest's respiratory system or being absorbed through the pest's cuticle. Fumigants are applied to control stored product pests under gas proof sheets, in gas sealed rooms or buildings, or in special chambers.

Pesticides may be microencapsulated by suspending the pesticide particles or droplets in plastic polymers of various types. By altering, the chemistry of the polymer or by changing factors in the processing, microcapsules may be formed of various sizes, solubility, wall thicknesses, and degrees of penetrability. These factors govern the speed with which the active ingredient within is released, which in turn, affects the residual performance, speed of action, and odor of the product. The microcapsules might be formulated as suspension concentrates or water dispersible granules.

Oil solution concentrates are made by dissolving pesticide in a solvent that will hold the pesticide in solution. Oil solutions of a pesticide usually provide faster knockdown and kill of pests than other formulations due to the solvents themselves having pesticidal action and the dissolution of the waxy covering of the integument increasing the speed of uptake of the pesticide. Other advantages of oil solutions include better storage stability, better penetration of crevices, and better adhesion to greasy surfaces.

Another embodiment is an oil–in–water emulsion, wherein the emulsion comprises oily globules which are each provided with a lamellar liquid crystal coating and are dispersed in an aqueous phase, wherein each oily globule comprises at least one molecule which is agriculturally active, and is individually coated with a monolamellar or oligolamellar layer comprising: (1) at least one non–ionic lipophilic surface–active agent, (2) at least one non–ionic hydrophilic surface–active agent, and (3) at least one ionic surface–active agent, wherein the globules having a mean particle diameter of less than 800 nanometers.

Other formulation components

Generally, when the molecules disclosed in Formula One are used in a formulation, such formulation can also contain other components. These components include, but are not limited to, (this is a non–exhaustive and non–mutually exclusive list) wetters, spreaders, stickers, penetrants, buffers, sequestering agents, drift reduction agents, compatibility agents, anti–foam agents, cleaning agents, and emulsifiers. A few components are described forthwith.

A wetting agent is a substance that when added to a liquid increases the spreading or penetration power of the liquid by reducing the interfacial tension between the liquid and the surface on which it is spreading. Wetting agents are used for two main functions in agrochemical formulations: during processing and manufacture to increase the rate of wetting of powders in water to make concentrates for soluble liquids or suspension concentrates; and during mixing of a product with water in a spray tank to reduce the wetting time of wettable powders and to improve the penetration of water into water–dispersible granules. Examples of wetting agents used in wettable powder, suspension concentrate, and water–dispersible granule formulations are: sodium lauryl sulfate, sodium dioctyl sulfosuccinate, alkyl phenol ethoxylates, and aliphatic alcohol ethoxylates.

A dispersing agent is a substance that adsorbs onto the surface of particles, helps to preserve the state of dispersion of the particles, and prevents them from reaggregating. Dispersing agents are added to agrochemical formulations to facilitate dispersion and suspension during manufacture, and to ensure the particles redisperse into water in a spray tank. They are widely used in wettable powders, suspension concentrates, and water–dispersible granules. Surfactants that are used as dispersing agents have the ability to adsorb strongly onto a particle surface and provide a charged or steric barrier to reaggregation of particles. The most commonly used surfactants are anionic, non–ionic, or mixtures of the two types. For wettable powder formulations, the most common dispersing agents are sodium lignosulfonates. For suspension concentrates, very good adsorption and stabilization are obtained using polyelectrolytes, such as sodium–naphthalene–sulfonate–formaldehyde–condensates. Tristyrylphenol ethoxylate phosphate esters are also used. Non–ionics such as alkylarylethylene oxide condensates and EO–PO block copolymers are sometimes combined with anionics as dispersing agents for suspension concentrates. In recent years, new types of very high molecular weight polymeric surfactants have been developed as dispersing agents. These have very long hydrophobic 'backbones' and a large number of ethylene oxide chains forming the 'teeth' of a 'comb' surfactant. These high molecular weight polymers can give very good long–term stability to suspension concentrates because the hydrophobic backbones have many anchoring points onto the particle surfaces.

Examples of dispersing agents used in agrochemical formulations are: sodium lignosulfonates, sodium naphthalene sulfonate formaldehyde condensates, tristyrylphenol–ethoxylate–phosphate–esters, aliphatic alcohol ethoxylates, alkyl ethoxylates, EO–PO block copolymers, and graft copolymers.

An emulsifying agent is a substance that stabilizes a suspension of droplets of one liquid phase in another liquid phase. Without the emulsifying agent, the two liquids would separate into two immiscible liquid phases. The most commonly used emulsifier blends contain an alkylphenol or an aliphatic alcohol with twelve or more ethylene oxide units and the oil–soluble calcium salt of dodecylbenzenesulfonic acid. A range of hydrophile–lipophile balance ("HLB") values from about 8 to about 18 will normally provide good stable emulsions. Emulsion stability can sometimes be improved by the addition of a small amount of an EO–PO block copolymer surfactant.

A solubilizing agent is a surfactant that will form micelles in water at concentrations above the critical micelle concentration. The micelles are then able to dissolve or solubilize water–insoluble materials inside the hydrophobic part of the micelle. The types of surfactants usually used for solubilization are non–ionics, sorbitan monooleates, sorbitan monooleate ethoxylates, and methyl oleate esters.

Surfactants are sometimes used, either alone or with other additives such as mineral or vegetable oils as adjuvants to spray–tank mixes to improve the biological performance of the pesticide on the target. The types of surfactants used for bioenhancement depend generally on the nature and mode of action of the pesticide. However, they are often non–ionics such as: alkyl ethoxylates, linear aliphatic alcohol ethoxylates, and aliphatic amine ethoxylates.

A carrier or diluent in an agricultural formulation is a material added to the pesticide to give a product of the required strength. Carriers are usually materials with high absorptive capacities, while diluents are usually materials with low absorptive capacities. Carriers and diluents are used in the formulation of dusts, wettable powders, granules, and water–dispersible granules.

Organic solvents are used mainly in the formulation of emulsifiable concentrates, oil–in–water emulsions, suspoemulsions, oil dispersions, and ultra–low volume formulations, and to a lesser extent, granular formulations. Sometimes mixtures of solvents are used. The first main groups of solvents are aliphatic paraffinic oils such as kerosene or refined paraffins. The second main group (and the most common) comprises the aromatic solvents such as xylene and higher molecular weight fractions of C9 and C10 aromatic solvents. Chlorinated hydrocarbons are useful as cosolvents to prevent crystallization of pesticides when the formulation is emulsified into water. Alcohols are sometimes used as cosolvents to increase solvent power. Other solvents may include vegetable oils, seed oils, and esters of vegetable and seed oils.

Thickeners or gelling agents are used mainly in the formulation of suspension concentrates, oil dispersions, emulsions and suspoemulsions to modify the rheology or flow properties of the liquid and to prevent separation and settling of the dispersed particles or droplets. Thickening, gelling, and anti–settling agents generally fall into two categories, namely water–insoluble particulates and water–soluble polymers. It is possible to produce suspension concentrate and oil dispersion formulations using clays and silicas. Examples of these types of materials, include, but are not limited to, montmorillonite, bentonite, magnesium aluminum silicate, and attapulgite. Water–soluble polysaccharides in water based suspension concentrates have been used as thickening–gelling agents for many years. The types of polysaccharides most commonly used are natural extracts of seeds and seaweeds or are synthetic derivatives of cellulose. Examples of these types of materials include, but are not limited to, guar gum, locust bean gum, carrageenam, alginates, methyl cellulose, sodium carboxymethyl cellulose (SCMC), and hydroxyethyl cellulose (HEC). Other types of anti–settling agents are based on modified starches, polyacrylates, polyvinyl alcohol, and polyethylene oxide. Another good anti–settling agent is xanthan gum.

Microorganisms can cause spoilage of formulated products. Therefore, preservation agents are used to eliminate or reduce their effect. Examples of such agents include, but are not limited to: propionic acid and its sodium salt, sorbic acid and its sodium or potassium salts, benzoic acid and its sodium salt, *p*–hydroxybenzoic acid sodium salt, methyl *p*–hydroxybenzoate, and 1,2–benzisothiazolin–3–one (BIT).

The presence of surfactants often causes water–based formulations to foam during mixing operations in production and in application through a spray tank. In order to reduce the tendency to foam, anti–foam agents are often added either during the production stage or before filling into bottles. Generally, there are two types of anti–foam agents, namely silicones and non–silicones. Silicones are usually aqueous emulsions of dimethyl polysiloxane, while the non–silicone anti–foam agents are water–insoluble oils, such as octanol and nonanol, or silica. In both cases, the function of the anti–foam agent is to displace the surfactant from the air–water interface.

"Green" agents (*e.g.*, adjuvants, surfactants, solvents) can reduce the overall environmental footprint of crop protection formulations. Green agents are biodegradable and generally derived from natural and/or sustainable sources, *e.g.* plant and animal sources. Specific examples are: vegetable oils, seed oils, and esters thereof, also alkoxylated alkyl polyglucosides.

Applications

Molecules of Formula One may be applied to any locus. Particular loci to apply such molecules include loci where alfalfa, almonds, apples, barley, beans, canola, corn,

cotton, crucifers, flowers, fodder species (Rye Grass, Sudan Grass, Tall Fescue, Kentucky Blue Grass, and Clover), fruits, lettuce, oats, oil seed crops, oranges, peanuts, pears, peppers, potatoes, rice, sorghum, soybeans, strawberries, sugarcane, sugarbeets, sunflowers, tobacco, tomatoes, wheat (for example, Hard Red Winter Wheat, Soft Red Winter Wheat, White Winter Wheat, Hard Red Spring Wheat, and Durum Spring Wheat), and other valuable crops are growing or the seeds thereof are going to be planted.

Molecules of Formula One may also be applied where plants, such as crops, are growing and where there are low levels (even no actual presence) of pests that can commercially damage such plants. Applying such molecules in such locus is to benefit the plants being grown in such locus. Such benefits, may include, but are not limited to: helping the plant grow a better root system; helping the plant better withstand stressful growing conditions; improving the health of a plant; improving the yield of a plant *(e.g.* increased biomass and/or increased content of valuable ingredients); improving the vigor of a plant (*e.g*. improved plant growth and/or greener leaves); improving the quality of a plant (*e.g.* improved content or composition of certain ingredients); and improving the tolerance to abiotic and/or biotic stress of the plant.

Molecules of Formula One may be applied with ammonium sulfate when growing various plants as this may provide additional benefits.

Molecules of Formula One may be applied on, in, or around plants genetically modified to express specialized traits, such as *Bacillus thuringiensis* (for example, Cry1Ab, Cry1Ac, Cry1Fa, Cry1A.105, Cry2Ab, Vip3A, mCry3A, Cry3Ab, Cry3Bb, Cry34Ab1/Cry35Ab1), other insecticidal toxins, or those expressing herbicide tolerance, or those with "stacked" foreign genes expressing insecticidal toxins, herbicide tolerance, nutrition–enhancement, or any other beneficial traits.

Molecules of Formula One may be applied to the foliar and/or fruiting portions of plants to control pests. Either such molecules will come in direct contact with the pest, or the pest will consume such molecules when eating the plant or while extracting sap or other nutrients from the plant.

Molecules of Formula One may also be applied to the soil, and when applied in this manner, root and stem feeding pests may be controlled. The roots may absorb such molecules thereby taking it up into the foliar portions of the plant to control above ground chewing and sap feeding pests.

Systemic movement of pesticides in plants may be utilized to control pests on one portion of the plant by applying (for example by spraying a locus) a molecule of Formula One to a different portion of the plant. For example, control of foliar–feeding insects may be achieved by drip irrigation or furrow application, by treating the soil with for example pre– or post–planting soil drench, or by treating the seeds of a plant before planting.

Molecules of Formula One may be used with baits. Generally, with baits, the baits are placed in the ground where, for example, termites can come into contact with, and/or be attracted to, the bait. Baits can also be applied to a surface of a building, (horizontal, vertical, or slant surface) where, for example, ants, termites, cockroaches, and flies, can come into contact with, and/or be attracted to, the bait.

Molecules of Formula One may be encapsulated inside, or placed on the surface of a capsule. The size of the capsules can range from nanometer size (about 100–900 nanometers in diameter) to micrometer size (about 10–900 microns in diameter).

Molecules of Formula One may be applied to eggs of pests. Because of the unique ability of the eggs of some pests to resist certain pesticides, repeated applications of such molecules may be desirable to control newly emerged larvae.

Molecules of Formula One may be applied as seed treatments. Seed treatments may be applied to all types of seeds, including those from which plants genetically modified to express specialized traits will germinate. Representative examples include those expressing proteins toxic to invertebrate pests, such as *Bacillus thuringiensis* or other insecticidal toxins, those expressing herbicide tolerance, such as "Roundup Ready" seed, or those with "stacked" foreign genes expressing insecticidal toxins, herbicide tolerance, nutrition–enhancement, drought tolerance, or any other beneficial traits. Furthermore, such seed treatments with molecules of Formula One may further enhance the ability of a plant to withstand stressful growing conditions better. This results in a healthier, more vigorous plant, which can lead to higher yields at harvest time. Generally, about 1 gram of such molecules to about 500 grams per 100,000 seeds is expected to provide good benefits, amounts from about 10 grams to about 100 grams per 100,000 seeds is expected to provide better benefits, and amounts from about 25 grams to about 75 grams per 100,000 seeds is expected to provide even better benefits. Molecules of Formula One may be applied with one or more active ingredients in a soil amendment.

Molecules of Formula One may be used for controlling endoparasites and ectoparasites in the veterinary medicine sector or in the field of non–human–animal keeping. Such molecules may be applied by oral administration in the form of, for example, tablets, capsules, drinks, granules, by dermal application in the form of, for example, dipping, spraying, pouring on, spotting on, and dusting, and by parenteral administration in the form of, for example, an injection.

Molecules of Formula One may also be employed advantageously in livestock keeping, for example, cattle, chickens, geese, goats, pigs, sheep, and turkeys. They may also be employed advantageously in pets such as, horses, dogs, and cats. Particular pests to control would be flies, fleas, and ticks that are bothersome to such animals.

Suitable formulations are administered orally to the animals with the drinking water or feed. The dosages and formulations that are suitable depend on the species.

Molecules of Formula One may also be used for controlling parasitic worms, especially of the intestine, in the animals listed above.

Molecules of Formula One may also be employed in therapeutic methods for human health care. Such methods include, but are limited to, oral administration in the form of, for example, tablets, capsules, drinks, granules, and by dermal application.

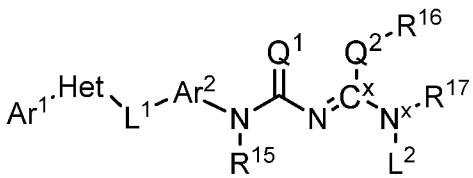
Molecules of Formula One may also be applied to invasive pests. Pests around the world have been migrating to new environments (for such pest) and thereafter becoming a new invasive species in such new environment. Such molecules may also be used on such new invasive species to control them in such new environments.

Before a pesticide may be used or sold commercially, such pesticide undergoes lengthy evaluation processes by various governmental authorities (local, regional, state, national, and international). Voluminous data requirements are specified by regulatory authorities and must be addressed through data generation and submission by the product registrant or by a third party on the product registrant's behalf, often using a computer with a connection to the World Wide Web. These governmental authorities then review such data and if a determination of safety is concluded, provide the potential user or seller with product registration approval. Thereafter, in that locality where the product registration is granted and supported, such user or seller may use or sell such pesticide.

Molecules according to Formula One may be tested to determine its efficacy against pests. Additionally, a molecule of Formula One may be mixed with another active ingredient to form a pesticidal composition, and then that composition is tested to determine if it is synergistic using conventional testing procedures. Furthermore, mode of action studies may be conducted to determine if said molecule has a different mode of action than other pesticides. Thereafter, such acquired data may be disseminated, such as by the internet, to third parties.

Consequently, in light of the above and the Tables in the Table Section, the following additional details (D) are provided.

1D. A molecule having the following formula



Formula One

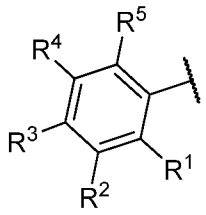
wherein:

(A) **Ar^1** is selected from the group consisting of furanyl, phenyl, pyridazinyl, pyridyl, pyrimidinyl, or thienyl,

wherein each furanyl, phenyl, pyridazinyl, pyridyl, pyrimidinyl, and thienyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

preferably, **Ar^1** is **(1a)**



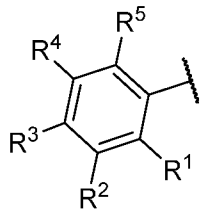
(1a),

wherein, **R^1**, **R^2**, **R^3**, **R^4**, and **R^5** are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-

C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-S(O)$_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, S(O)$_n$-(C_1-C_4)alkyl, S(O)$_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-S(O)$_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and phenoxy,

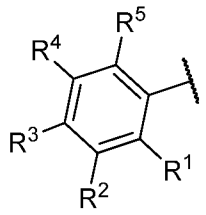
more preferably, **Ar^1** is **(1a)**



(1a),

wherein, **R^1**, **R^2**, **R^3**, **R^4**, and **R^5** are each independently selected from the group consisting of H and (C_1-C_4)haloalkoxy,

even more preferably, **Ar^1** is **(1a)**



(1a),

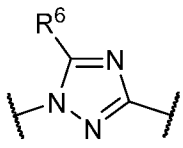
wherein, **R^1**, **R^2**, **R^3**, **R^4**, and **R^5** are each independently selected from the group consisting of H and OCF_3;

(B) **Het** is a 5- or 6-membered, saturated or unsaturated, heterocyclic ring, containing one or more heteroatoms independently selected from nitrogen, sulfur, or oxygen, and where **Ar^1** and **L^1** are not ortho to each other, but may be meta or para, such as, for a five-membered ring they are 1,3, and for a 6-membered ring they are either 1,3 or 1,4,

wherein each heterocyclic ring may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

preferably, **Het** is **(1b)**



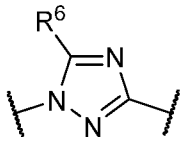
(1b),

wherein, $\mathbf{R^6}$ may be optionally substituted with a substituent selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-

C_6)alkenyl, (C_2-C_6)alkynyl, $S(O)_n$-(C_1-C_4)alkyl, $S(O)_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$S(O)_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and phenoxy,

more preferably, **Het** is **(1b)**



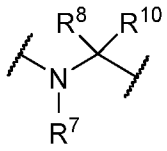
(1b),

wherein, $\mathbf{R^6}$ is H;

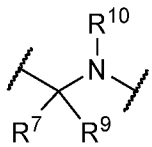
(C) $\mathbf{L^1}$ is selected from the group consisting of $N(R^x)$-(C_1-C_4)alkyl, $N(R^x)$-(C_3-C_8)cycloalkyl, $N(R^x)$-(C_2-C_6)alkenyl, $N(R^x)$-(C_2-C_6)alkynyl, $N(R^x)$-$S(O)_n$-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$N(R^x)$-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$N(R^x)$-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$N(R^x)$, (C_3-C_8)cycloalkyl-$N(R^x)$, (C_2-C_6)alkynyl-$N(R^x)$, (C_1-C_4)alkyl-$S(O)_n$-$N(R^x)$, C(O)-$N(R^x)$, C(S)-$N(R^x)$, $N(R^x)$-C(O), $N(R^x)$-C(S), C(O)-$N(R^x)$-(C_1-C_4)alkyl, C(S)-$N(R^x)$-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$N(R^x)$-C(O), and (C_1-C_4)alkyl-$N(R^x)$-C(S),

wherein each alkyl, cycloalkyl, alkenyl, and alkynyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, and (C_2-C_6)alkynyl,

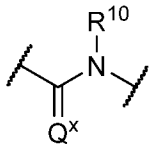
preferably, $\mathbf{L^1}$ is selected from the group consisting of



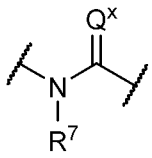
(1c),



(1d),



(1e), and



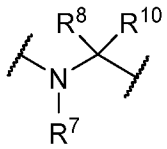
(1f),

wherein:

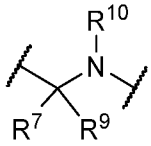
(1) $\mathbf{Q^x}$ is selected from the group consisting of O and S, and

(2) $\mathbf{R^7}$, $\mathbf{R^8}$, $\mathbf{R^9}$, and $\mathbf{R^{10}}$ are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_3\text{-}C_8)$cycloalkyl, $(C_1\text{-}C_4)$alkoxy, $(C_1\text{-}C_4)$haloalkoxy, $(C_2\text{-}C_6)$alkenyl, and $(C_2\text{-}C_6)$alkynyl,

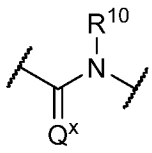
more preferably, $\mathbf{L^1}$ is selected from the group consisting of



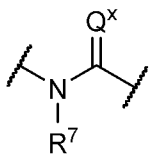
(1c),



(1d),



(1e), and



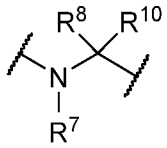
(1f),

wherein:

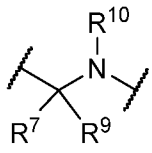
(1) $\mathbf{Q^x}$ is O, and

(2) R^7, R^8, R^9, and R^{10} are each independently selected from the group consisting of H and $(C_1\text{-}C_4)$alkyl,

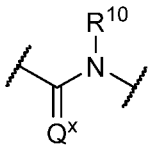
even more preferably, L^1 is selected from the group consisting of



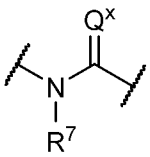
(1c),



(1d),



(1e), and



(1f),

wherein:

(1) Q^x is O, and

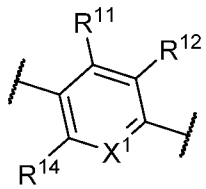
(2) R^7, R^8, R^9, and R^{10} are each independently selected from the group consisting of H and CH_3;

(D) Ar^2 is selected from the group consisting of furanyl, phenyl, pyridazinyl, pyridyl, pyrimidinyl, or thienyl,

wherein each furanyl, phenyl, pyridazinyl, pyridyl, pyrimidinyl, and thienyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_3\text{-}C_8)$cycloalkyl, $(C_1\text{-}C_4)$alkoxy, $(C_1\text{-}C_4)$haloalkoxy, $(C_2\text{-}C_6)$alkenyl, $(C_2\text{-}C_6)$alkynyl, $S(O)_n\text{-}(C_1\text{-}C_4)$alkyl, $S(O)_n\text{-}(C_1\text{-}C_4)$haloalkyl, $OSO_2\text{-}(C_1\text{-}C_4)$alkyl, $OSO_2\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)\text{-}NR^xR^y$, $(C_1\text{-}C_4)$alkyl-NR^xR^y, $C(O)\text{-}(C_1\text{-}C_4)$alkyl, $C(O)O\text{-}(C_1\text{-}C_4)$alkyl, $C(O)\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)O\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)\text{-}(C_3\text{-}C_8)$cycloalkyl, $C(O)O\text{-}(C_3\text{-}C_8)$cycloalkyl, $C(O)\text{-}(C_2\text{-}C_6)$alkenyl, $C(O)O\text{-}(C_2\text{-}C_6)$alkenyl, $(C_1\text{-}C_4)$alkyl-$O\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$S(O)_n\text{-}(C_1\text{-}C_4)$alkyl, $C(O)\text{-}(C_1\text{-}C_4)$alkyl-$C(O)O\text{-}(C_1\text{-}C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

preferably, $\mathbf{Ar^2}$ is **(1g)**



(1g),

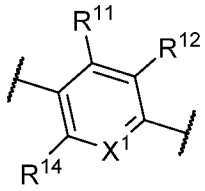
wherein:

(1) $\mathbf{X^1}$ is selected from the group consisting of N and $C\mathbf{R^{13}}$, and

(2) $\mathbf{R^{11}}$, $\mathbf{R^{12}}$, $\mathbf{R^{13}}$, and $\mathbf{R^{14}}$ are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

more preferably, **Ar^2** is **(1g)**



(1g),

wherein:

(1) **X^1** is selected from the group consisting of N and C**R^{13}**, and

(2) **R^{11}**, **R^{12}**, **R^{13}**, and **R^{14}** are each independently selected from the group consisting of H, F, and Cl;

(E) **R^{15}** is selected from the group consisting of H, $(C_1$-$C_4)$alkyl, $(C_3$-$C_8)$cycloalkyl, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-NR^xR^y, C(O)-phenyl, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl,

wherein each alkyl, cycloalkyl, alkenyl, alkynyl, and phenyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

preferably, **R^{15}** is H;

(F) **Q^1** is selected from the group consisting of O and S, preferably **Q^1** is O;

(G) **Q^2** is selected from the group consisting of O and S, preferably **Q^2** is S;

(H) **R^{16}** is selected from the group consisting of **(K)**, H, $(C_1$-$C_4)$alkyl, $(C_3$-$C_8)$cycloalkyl, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, C(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkylphenyl, $(C_1$-$C_4)$alkyl-O-phenyl, C(O)-(Het-1), (Het-1), $(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-N(R^x)$(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-N(R^x)$(C_1$-$C_4)$alkyl(NR^xR^y)-C(O)OH, $(C_1$-$C_4)$alkyl-C(O)-N(R^x)$(C_1$-$C_4)$alkyl-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-N(R^x)$(C_1$-$C_4)$alkyl-N(R^x)-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-C(O)-

$N(R^x)(C_1\text{-}C_4)$alkyl$(N(R^x)\text{-}C(O)O\text{-}(C_1\text{-}C_4)$alkyl$)\text{-}C(O)OH$, $(C_1\text{-}C_4)$alkyl-$C(O)$-(Het-1)-$C(O)O$-$(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)O\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)\text{-}(C_3\text{-}C_8)$cycloalkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)$-(Het-1), $(C_1\text{-}C_4)$alkyl-$OC(O)\text{-}(C_1\text{-}C_4)$alkyl-$N(R^x)\text{-}C(O)O\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-NR^xR^y, $(C_1\text{-}C_4)$alkyl-$S(O)_n$-(Het-1), and $(C_1\text{-}C_4)$alkyl-O-(Het-1),

wherein each alkyl, cycloalkyl, alkenyl, alkynyl, phenyl, and (Het-1) may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_3\text{-}C_8)$cycloalkyl, $(C_1\text{-}C_4)$alkoxy, $(C_2\text{-}C_6)$alkenyl, $(C_2\text{-}C_6)$alkynyl, $S(O)_n\text{-}(C_1\text{-}C_4)$alkyl, $S(O)_n\text{-}(C_1\text{-}C_4)$haloalkyl, $OSO_2\text{-}(C_1\text{-}C_4)$alkyl, $OSO_2\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)H$, $C(O)OH$, $C(O)\text{-}NR^xR^y$, $(C_1\text{-}C_4)$alkyl-NR^xR^y, $C(O)\text{-}(C_1\text{-}C_4)$alkyl, $C(O)O\text{-}(C_1\text{-}C_4)$alkyl, $C(O)\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)O\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)\text{-}(C_3\text{-}C_8)$cycloalkyl, $C(O)O\text{-}(C_3\text{-}C_8)$cycloalkyl, $C(O)\text{-}(C_2\text{-}C_6)$alkenyl, $C(O)O\text{-}(C_2\text{-}C_6)$alkenyl, $(C_1\text{-}C_4)$alkyl-$O\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$S(O)_n\text{-}(C_1\text{-}C_4)$alkyl, $C(O)\text{-}(C_1\text{-}C_4)$alkyl-$C(O)O\text{-}(C_1\text{-}C_4)$alkyl), phenyl, phenoxy, $Si((C_1\text{-}C_4)\text{alkyl})_3$, $S(O)_n\text{-}NR^xR^y$, and (Het-1),

preferably, $\mathbf{R^{16}}$ is **(K)**;

(I) $\mathbf{R^{17}}$ is selected from the group consisting of **(K)**, H, $(C_1\text{-}C_4)$alkyl, $(C_3\text{-}C_8)$cycloalkyl, $(C_2\text{-}C_6)$alkenyl, $(C_2\text{-}C_6)$alkynyl, $C(O)\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$O\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$S(O)_n\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkylphenyl, $(C_1\text{-}C_4)$alkyl-O-phenyl, $C(O)$-(Het-1), (Het-1), $(C_1\text{-}C_4)$alkyl-(Het-1), $(C_1\text{-}C_4)$alkyl-$OC(O)\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)O\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)\text{-}NR^xR^y$, $(C_1\text{-}C_4)$alkyl-$C(O)\text{-}N(R^x)(C_1\text{-}C_4)$alkyl-(Het-1), $(C_1\text{-}C_4)$alkyl-$C(O)$-(Het-1), $(C_1\text{-}C_4)$alkyl-$C(O)\text{-}N(R^x)(C_1\text{-}C_4)$alkyl$(NR^xR^y)\text{-}C(O)OH$, $(C_1\text{-}C_4)$alkyl-$C(O)\text{-}N(R^x)(C_1\text{-}C_4)$alkyl-$NR^xR^y$, $(C_1\text{-}C_4)$alkyl-$C(O)\text{-}N(R^x)(C_1\text{-}C_4)$alkyl-$N(R^x)\text{-}C(O)O\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$C(O)\text{-}N(R^x)(C_1\text{-}C_4)$alkyl$(N(R^x)\text{-}C(O)O\text{-}(C_1\text{-}C_4)$alkyl$)\text{-}C(O)OH$, $(C_1\text{-}C_4)$alkyl-$C(O)$-(Het-1)-$C(O)O$-$(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)O\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)\text{-}(C_3\text{-}C_8)$cycloalkyl, $(C_1\text{-}C_4)$alkyl-$OC(O)$-(Het-1), $(C_1\text{-}C_4)$alkyl-$OC(O)\text{-}(C_1\text{-}C_4)$alkyl-$N(R^x)\text{-}C(O)O\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-NR^xR^y, $(C_1\text{-}C_4)$alkyl-$S(O)_n$-(Het-1), and $(C_1\text{-}C_4)$alkyl-O-(Het-1),

wherein each alkyl, cycloalkyl, alkenyl, alkynyl, phenyl, and (Het-1) may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$haloalkyl, $(C_3\text{-}C_8)$cycloalkyl, $(C_1\text{-}C_4)$alkoxy, $(C_2\text{-}C_6)$alkenyl, $(C_2\text{-}C_6)$alkynyl, $S(O)_n\text{-}(C_1\text{-}C_4)$alkyl, $S(O)_n\text{-}(C_1\text{-}C_4)$haloalkyl, $OSO_2\text{-}(C_1\text{-}C_4)$alkyl, $OSO_2\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)H$, $C(O)OH$, $C(O)\text{-}NR^xR^y$, $(C_1\text{-}C_4)$alkyl-NR^xR^y, $C(O)\text{-}(C_1\text{-}C_4)$alkyl, $C(O)O\text{-}(C_1\text{-}C_4)$alkyl, $C(O)\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)O\text{-}(C_1\text{-}C_4)$haloalkyl, $C(O)\text{-}(C_3\text{-}C_8)$cycloalkyl, $C(O)O\text{-}(C_3\text{-}C_8)$cycloalkyl, $C(O)\text{-}(C_2\text{-}C_6)$alkenyl, $C(O)O\text{-}(C_2\text{-}C_6)$alkenyl, $(C_1\text{-}C_4)$alkyl-$O\text{-}(C_1\text{-}C_4)$alkyl, $(C_1\text{-}C_4)$alkyl-$S(O)_n\text{-}(C_1\text{-}C_4)$alkyl, $C(O)$-

$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, phenoxy, Si$((C_1$-$C_4)$alkyl$)_3$, S(O)$_n$-NR^xR^y, and (Het-1),

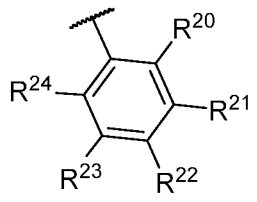
preferably, **R^{17}** is **(K)**;

(J) **L^2** is selected from the group consisting of $(C_3$-$C_8)$cycloalkyl, phenyl, $(C_1$-$C_4)$alkylphenyl, $(C_1$-$C_4)$alkyl-O-phenyl, $(C_2$-$C_6)$alkenyl-O-phenyl, (Het-1), $(C_1$-$C_4)$alkyl-(Het-1), and $(C_1$-$C_4)$alkyl-O-(Het-1),

wherein each alkyl, cycloalkyl, alkenyl, phenyl, and (Het-1) may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, S(O)$_n$-$(C_1$-$C_4)$alkyl, S(O)$_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_1$-$C_4)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, O-$(C_1$-$C_4)$alkyl, S-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, phenoxy, and (Het-1),

wherein each alkyl, cycloalkyl, alkenyl, phenyl, and (Het-1) substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, S(O)$_n$-$(C_1$-$C_4)$alkyl, S(O)$_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_1$-$C_4)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, O-$(C_1$-$C_4)$alkyl, S-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, phenoxy, and (Het-1),

preferably, **L^2** is **(1h)**



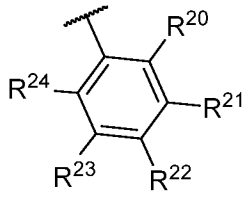
(1h),

wherein, **R^{20}**, **R^{21}**, **R^{22}**, **R^{23}**, and **R^{24}** are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, S(O)$_n$-$(C_1$-$C_4)$alkyl, S(O)$_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_1$-$C_4)$cycloalkyl,

$C(O)$-$(C_2$-$C_6)$alkenyl, $C(O)O$-$(C_2$-$C_6)$alkenyl, O-$(C_1$-$C_4)$alkyl, S-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $C(O)$-$(C_1$-$C_4)$alkyl-$C(O)O$-$(C_1$-$C_4)$alkyl, phenyl, phenoxy, and (Het-1),

wherein each alkyl, cycloalkyl, alkenyl, phenyl, and (Het-1) substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, $C(O)H$, $C(O)$-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, $C(O)$-$(C_1$-$C_4)$alkyl, $C(O)O$-$(C_1$-$C_4)$alkyl, $C(O)$-$(C_1$-$C_4)$haloalkyl, $C(O)O$-$(C_1$-$C_4)$haloalkyl, $C(O)$-$(C_3$-$C_8)$cycloalkyl, $C(O)O$-$(C_1$-$C_4)$cycloalkyl, $C(O)$-$(C_2$-$C_6)$alkenyl, $C(O)O$-$(C_2$-$C_6)$alkenyl, O-$(C_1$-$C_4)$alkyl, S-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $C(O)$-$(C_1$-$C_4)$alkyl-$C(O)O$-$(C_1$-$C_4)$alkyl, phenyl, phenoxy, and (Het-1),

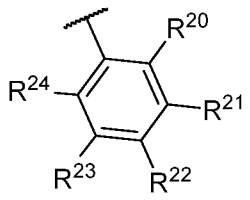
more preferably, $\mathbf{L^2}$ is **(1h)**



(1h),

wherein, $\mathbf{R^{20}}$, $\mathbf{R^{21}}$, $\mathbf{R^{22}}$, $\mathbf{R^{23}}$, and $\mathbf{R^{24}}$ are each independently selected from the group consisting of H, $(C_1$-$C_4)$alkyl, and $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl,

even more preferably, $\mathbf{L^2}$ is **(1h)**



(1h),

wherein, $\mathbf{R^{20}}$, $\mathbf{R^{21}}$, $\mathbf{R^{22}}$, $\mathbf{R^{23}}$, and $\mathbf{R^{24}}$ are each independently selected from the group consisting of H, CH_3 , $CH_2CH_2CH_3$, $CH(CH_3)_2$, CH_2OCH_3, and $CH(CH_3)OCH_3$;

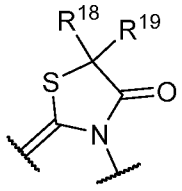
(K) $\mathbf{R^{16}}$ and $\mathbf{R^{17}}$ along with $\mathbf{C^x(Q^2)(N^x)}$, form a 4- to 7-membered saturated or unsaturated, heterocyclic ring, which may further contain one or more heteroatoms selected from the group consisting of nitrogen, sulfur, and oxygen,

wherein each heterocyclic ring may be optionally substituted with one or more substituents independently selected from the group consisting of oxo, $\mathbf{R^{18}}$, and $\mathbf{R^{19}}$,

wherein $\mathbf{R^{18}}$ and $\mathbf{R^{19}}$ are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, thioxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-

C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, $S(O)_n$-(C_1-C_4)alkyl, $S(O)_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)H, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$S(O)_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and (Het-1),

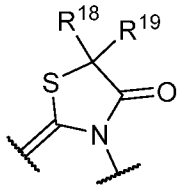
preferably, $\mathbf{R^{16}}$ and $\mathbf{R^{17}}$ along with $\mathbf{C^x(Q^2)(N^x)}$, is **(1i)**



(1i),

wherein, $\mathbf{R^{18}}$ and $\mathbf{R^{19}}$ are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, thioxo, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, $S(O)_n$-(C_1-C_4)alkyl, $S(O)_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)H, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$S(O)_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and (Het-1),

more preferably, $\mathbf{R^{16}}$ and $\mathbf{R^{17}}$ along with $\mathbf{C^x(Q^2)(N^x)}$, is **(1i)**



(1i),

wherein, $\mathbf{R^{18}}$ and $\mathbf{R^{19}}$ are each independently H;

(L) $\mathbf{R^x}$ and $\mathbf{R^y}$ are each independently selected from the group consisting of H, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, $S(O)_n$-(C_1-C_4)alkyl, $S(O)_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)H, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-OC(O)-(C_1-C_4)alkyl, (C_1-C_4)alkyl-OC(O)O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$S(O)_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, and phenyl,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, and phenyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and (Het-1);

(M) **(Het-1)** is a 5- or 6-membered, saturated or unsaturated, heterocyclic ring, containing one or more heteroatoms independently selected from the group consisting of nitrogen, sulfur, or oxygen,

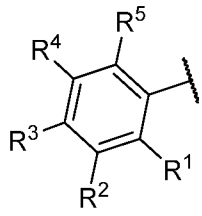
wherein each heterocyclic ring may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(N) **n** are each independently 0, 1, or 2; and N–oxides, agriculturally acceptable acid addition salts, salt derivatives, solvates, ester derivatives, crystal polymorphs, isotopes, resolved stereoisomers, and tautomers, of the molecules of Formula One.

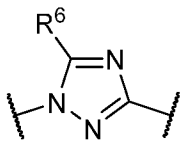
2D. A molecule according to 1D wherein

(A) **Ar^1** is **(1a)**


(1a),

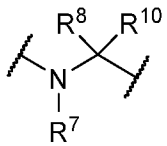
wherein, $\mathbf{R^1}$, $\mathbf{R^2}$, $\mathbf{R^3}$, $\mathbf{R^4}$, and $\mathbf{R^5}$ are each independently selected from the group consisting of H and (C_1-C_4)haloalkoxy;

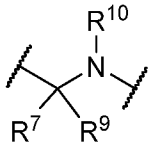
(B) **Het** is **(1b)**

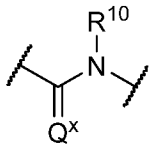

(1b),

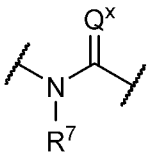
wherein, $\mathbf{R^6}$ is H;

(C) $\mathbf{L^1}$ is selected from the group consisting of


(1c),


(1d),


(1e), and

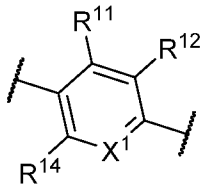

(1f),

wherein:

(1) $\mathbf{Q^x}$ is O, and

(2) $\mathbf{R^7}$, $\mathbf{R^8}$, $\mathbf{R^9}$, and $\mathbf{R^{10}}$ are each independently selected from the group consisting of H and $(C_1\text{-}C_4)$alkyl;

(D) $\mathbf{Ar^2}$ is **(1g)**



(1g),

wherein:

(1) $\mathbf{X^1}$ is selected from the group consisting of N and $C\mathbf{R^{13}}$, and

(2) $\mathbf{R^{11}}$, $\mathbf{R^{12}}$, $\mathbf{R^{13}}$, and $\mathbf{R^{14}}$ are each independently selected from the group consisting of H, F, and Cl;

(E) $\mathbf{R^{15}}$ is H;

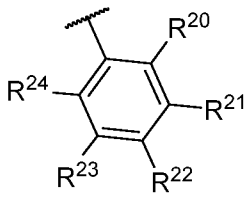
(F) $\mathbf{Q^1}$ is O;

(G) $\mathbf{Q^2}$ is S;

(H) $\mathbf{R^{16}}$ is **(K)**;

(I) $\mathbf{R^{17}}$ is **(K)**;

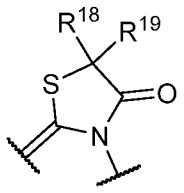
(J) $\mathbf{L^2}$ is **(1h)**



(1h),

wherein, $\mathbf{R^{20}}$, $\mathbf{R^{21}}$, $\mathbf{R^{22}}$, $\mathbf{R^{23}}$, and $\mathbf{R^{24}}$ are each independently selected from the group consisting of H, $(C_1\text{-}C_4)$alkyl, and $(C_1\text{-}C_4)$alkyl-O-$(C_1\text{-}C_4)$alkyl; and

(K) $\mathbf{R^{16}}$ and $\mathbf{R^{17}}$ along with $\mathbf{C^x(Q^2)(N^x)}$, is **(1i)**

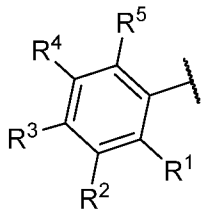


(1i),

wherein, $\mathbf{R^{18}}$ and $\mathbf{R^{19}}$ are each independently H.

3D. A molecule according to any one of 1D or 2D wherein

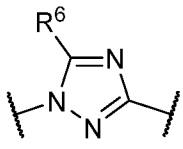
(A) $\mathbf{Ar^1}$ is **(1a)**



(1a),

wherein, $\mathbf{R^1}$, $\mathbf{R^2}$, $\mathbf{R^3}$, $\mathbf{R^4}$, and $\mathbf{R^5}$ are each independently selected from the group consisting of H and OCF_3;

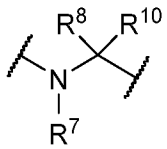
(B) **Het** is **(1b)**



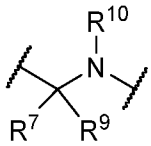
(1b),

wherein, $\mathbf{R^6}$ is H;

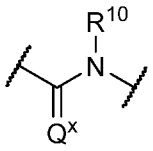
(C) $\mathbf{L^1}$ is selected from the group consisting of



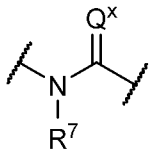
(1c),



(1d),



(1e), and



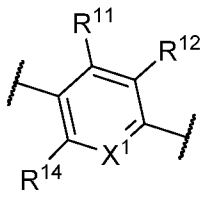
(1f),

wherein:

(1) Q^x is O, and

(2) R^7, R^8, R^9, and R^{10} are each independently selected from the group consisting of H and CH_3;

(D) Ar^2 is **(1g)**



(1g),

wherein:

(1) X^1 is selected from the group consisting of N and CR^{13}, and

(2) R^{11}, R^{12}, R^{13}, and R^{14} are each independently selected from the group consisting of H, F, and Cl;

(E) R^{15} is H;

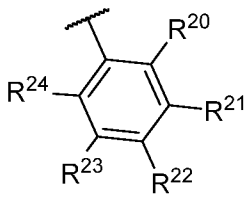
(F) Q^1 is O;

(G) Q^2 is S;

(H) R^{16} is **(K)**;

(I) R^{17} is **(K)**;

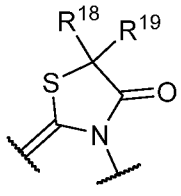
(J) L^2 is **(1h)**



(1h),

wherein, R^{20}, R^{21}, R^{22}, R^{23}, and R^{24} are each independently selected from the group consisting of H, CH_3 , $CH_2CH_2CH_3$, $CH(CH_3)_2$, CH_2OCH_3, and $CH(CH_3)OCH_3$; and

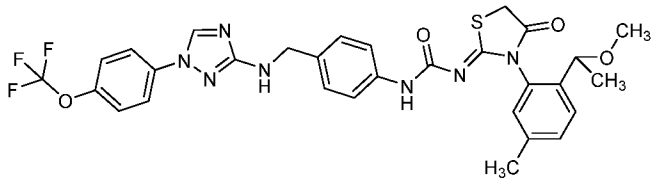
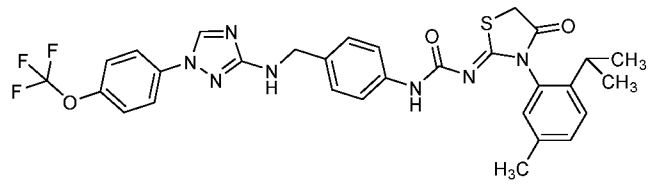
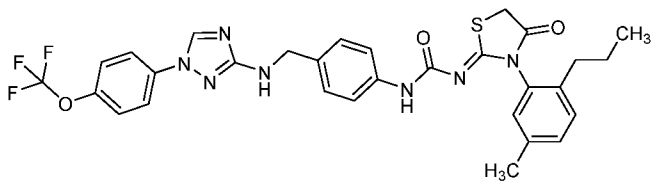
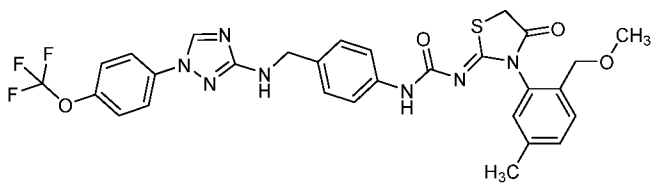
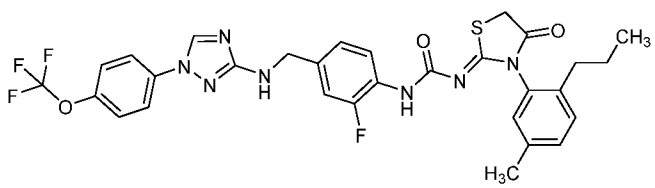
(K) R^{16} and R^{17} along with $C^x(Q^2)(N^x)$, is **(1i)**

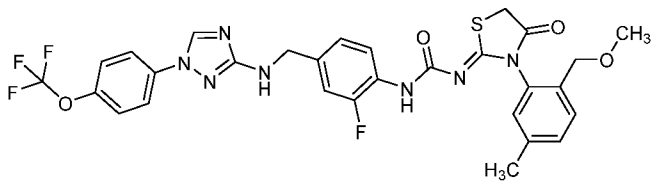
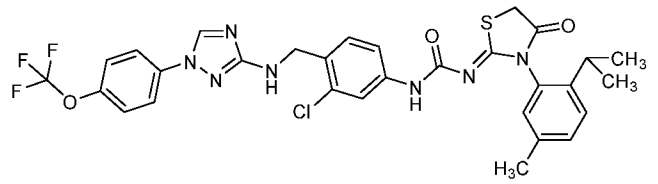
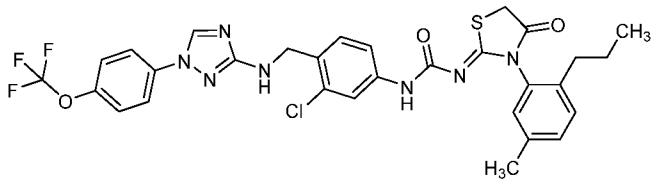
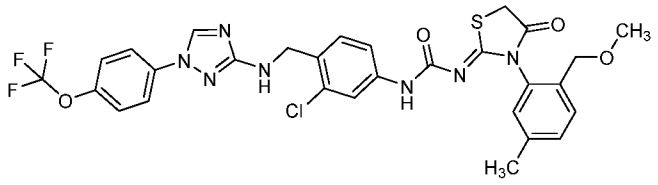
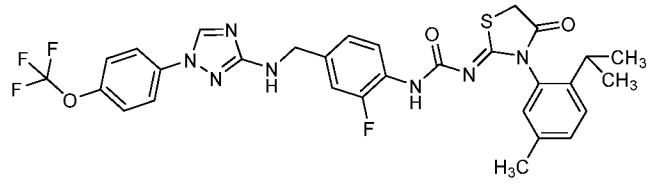
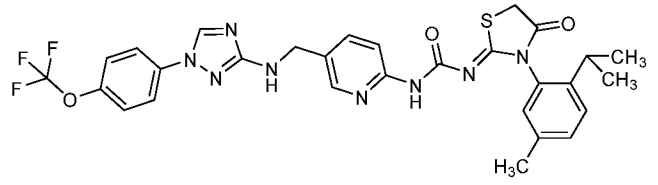
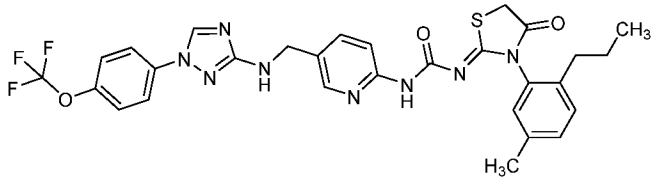
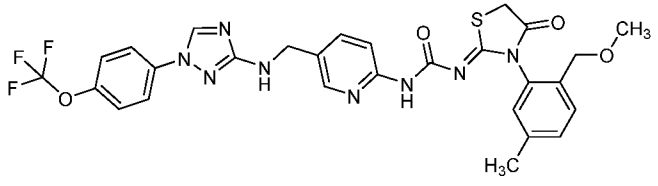


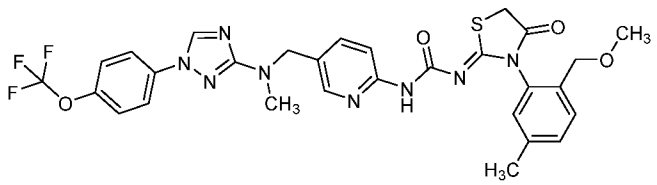
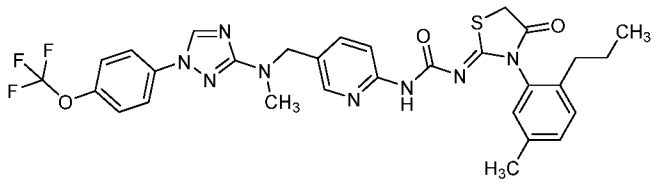
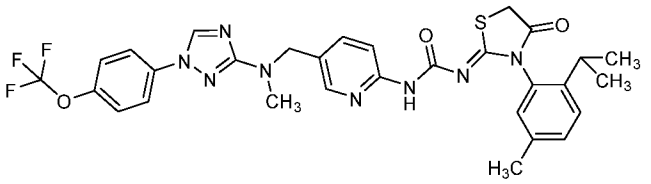
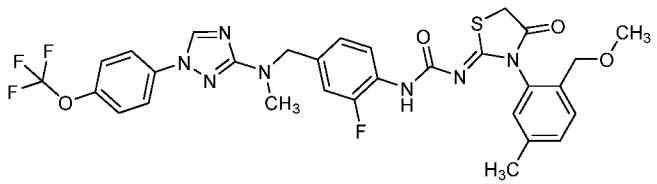
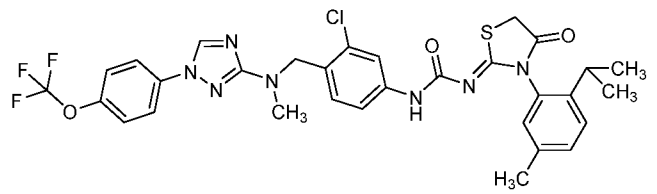
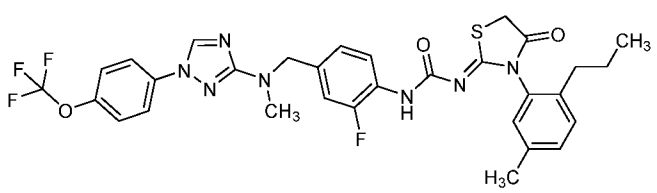
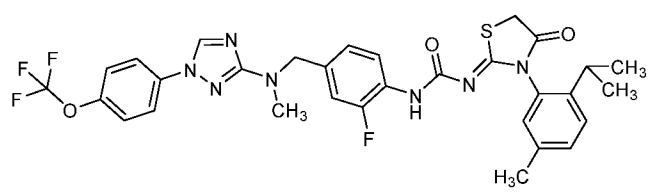
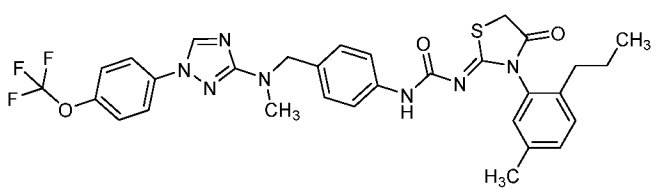
(1i),

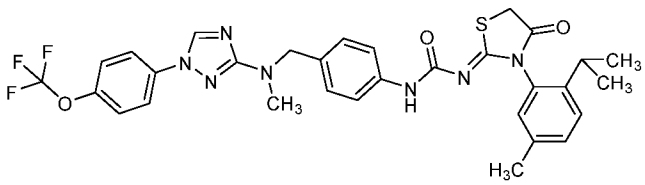
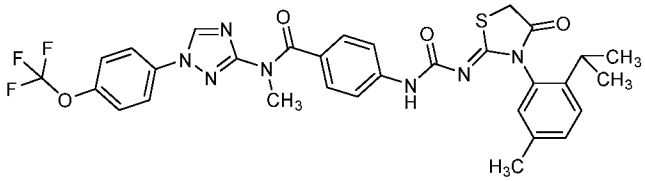
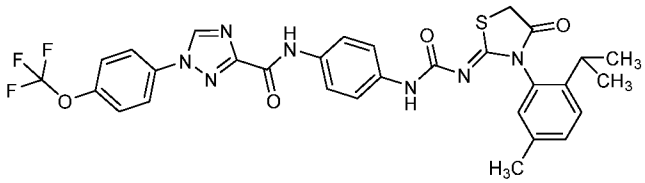
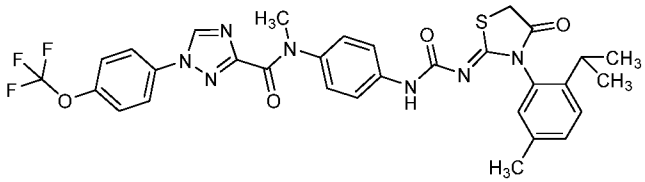
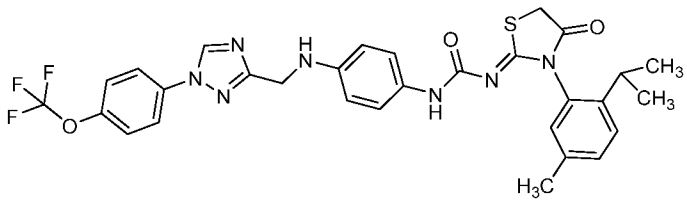
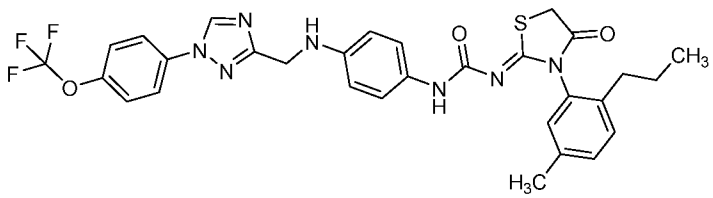
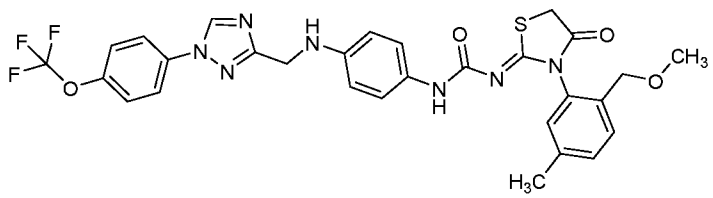
wherein, $\mathbf{R^{18}}$ and $\mathbf{R^{19}}$ are each independently H.

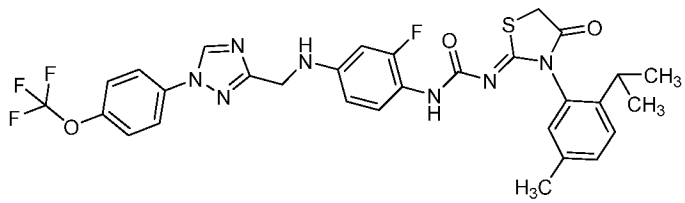
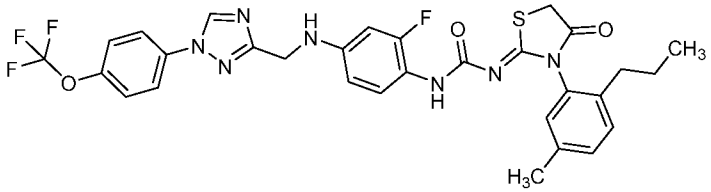
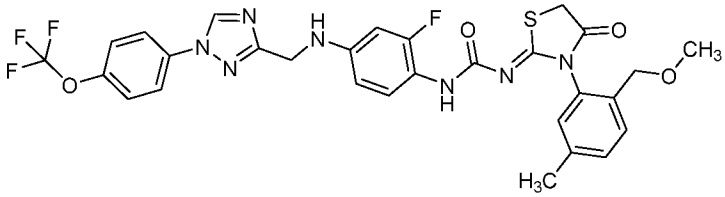
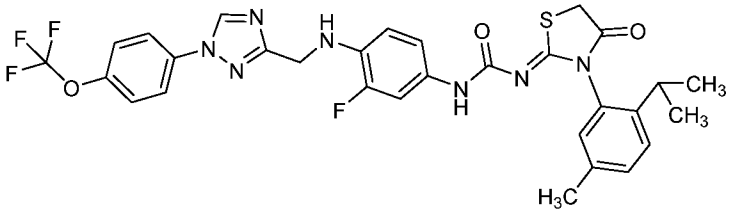
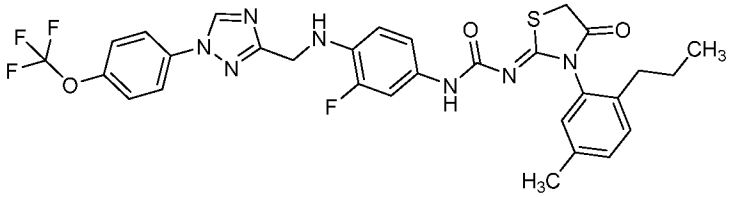
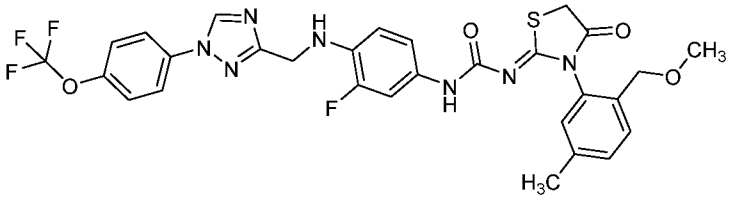
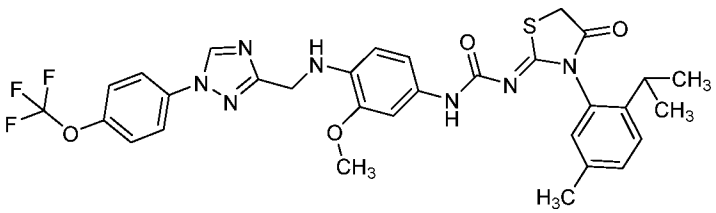
4D. A molecule according to any one of 1D, 2D, or 3D wherein said molecule is

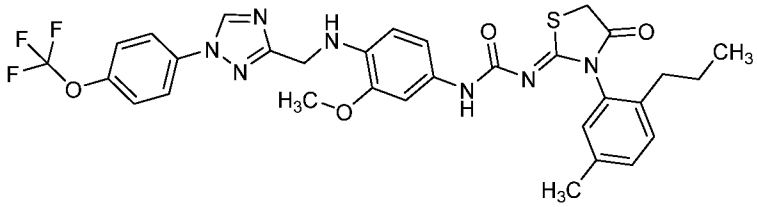
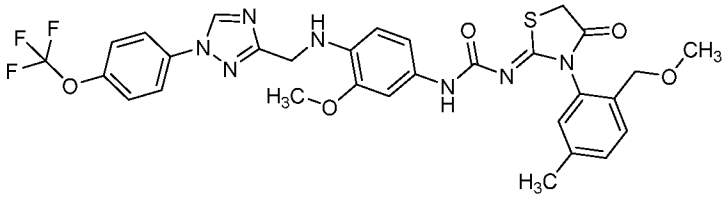
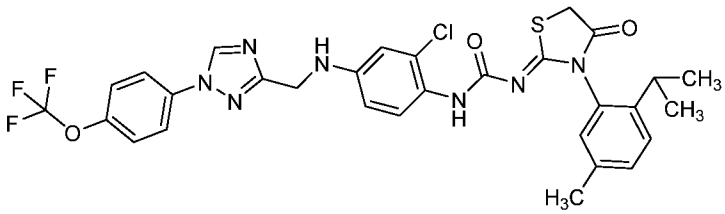
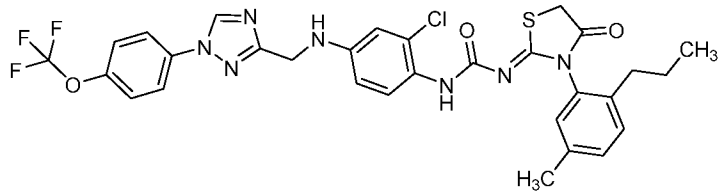
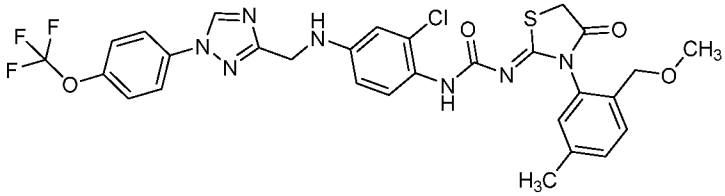
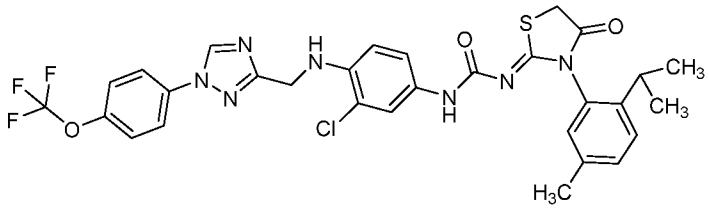
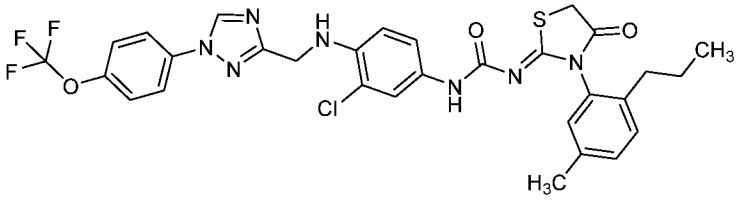
No.	Structure
F1	
F2	
F3	
F4	
F5	

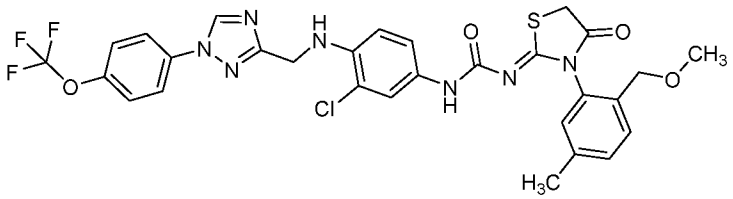
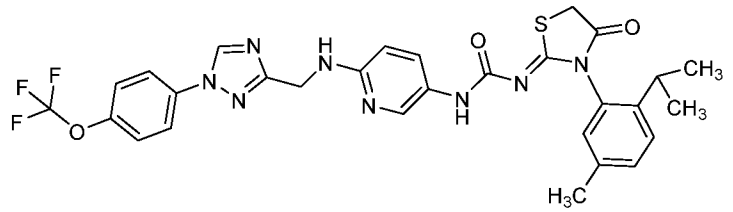
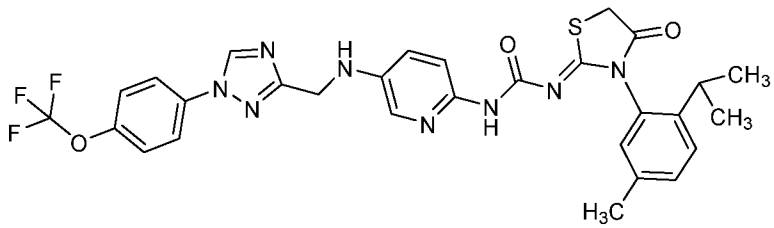
F6	
F7	
F8	
F9	
F10	
F11	
F12	
F13	

F14	
F15	
F16	
F17	
F20	
F21	
F22	
F23	

F24	
F25	
F26	
F27	
F28	
F29	
F30	

F31	
F32	
F33	
F34	
F35	
F36	
F37	

F38	
F39	
F40	
F41	
F42	
F43	
F44	

F45	
F46	
F47	

5D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient.

6D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient selected from acaricides, algicides, antifeedants, avicides, bactericides, bird repellents, chemosterilants, fungicides, herbicide safeners, herbicides, insect attractants, insect repellents, insecticides, mammal repellents, mating disrupters, molluscicides, nematicides, plant activators, plant growth regulators, rodenticides, synergists, and virucides.

7D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient selected from **AIGA**.

8D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising **AI–1**.

9D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising **AI–2**.

10D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising **Lotilaner**.

11D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising a molecule selected from **Table A**.

12D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient selected from **AIGA–2**.

13D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising chlorpyrifos.

14D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising hexaflumuron.

15D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising methoxyfenozide.

16D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising noviflumuron.

17D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising spinetoram.

18D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising spinosad.

19D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising sulfoxaflor.

20D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient selected from **AIGA-2**.

21D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising acequinocyl.

22D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising acetamiprid.

23D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising acetoprole.

24D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising avermectin.

25D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising azinphos–methyl.

26D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising bifenazate.

27D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising bifenthrin.

28D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising carbaryl.

29D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising carbofuran.

30D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising chlorfenapyr.

31D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising chlorfluazuron.

32D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising chromafenozide.

33D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising clothianidin.

34D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising cyfluthrin.

35D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising cypermethrin.

36D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising deltamethrin.

37D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising diafenthiuron.

38D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising emamectin benzoate.

39D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising endosulfan.

40D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising esfenvalerate.

41D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising ethiprole.

42D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising etoxazole.

43D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising fipronil.

44D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising flonicamid.

45D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising fluacrypyrim.

46D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising *gamma*–cyhalothrin.

47D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising halofenozide.

48D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising indoxacarb.

49D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising *lambda*–cyhalothrin.

50D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising lufenuron.

51D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising malathion.

52D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising methomyl.

53D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising novaluron.

54D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising permethrin.

55D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising pyridalyl.

56D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising pyrimidifen.

57D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising spirodiclofen.

58D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising tebufenozide.

59D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising thiacloprid.

60D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising thiamethoxam.

61D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising thiodicarb.

62D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising tolfenpyrad.

63D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising *zeta*–cypermethrin.

64D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising a biopesticide.

65D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Acetylcholinesterase (AChE) inhibitors**.

66D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **GABA–gated chloride channel antagonists.**

67D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Sodium channel modulators.**

68D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Nicotinic acetylcholine receptor (nAChR) agonists**.

69D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Nicotinic acetylcholine receptor (nAChR) allosteric activators**.

70D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Chloride channel activators**.

71D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Juvenile hormone mimics.**

72D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Miscellaneous nonspecific (multi–site) inhibitors**.

73D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Modulators of Chordotonal Organs**.

74D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Mite growth inhibitors**.

75D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Microbial disruptors of insect midgut membranes**.

76D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Inhibitors of mitochondrial ATP synthase**.

77D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Uncouplers of oxidative phosphorylation via disruption of the proton gradient**.

78D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Nicotinic acetylcholine receptor (nAChR) channel blockers**.

79D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Inhibitors of chitin biosynthesis, type 0**.

80D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Inhibitors of chitin biosynthesis, type 1**.

81D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Moulting disruptor, Dipteran**.

82D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Ecdysone receptor agonists**.

83D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Octopamine receptor agonists**.

84D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Mitochondrial complex III electron transport inhibitors**.

85D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Mitochondrial complex I electron transport inhibitors**.

86D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Voltage–dependent sodium channel blockers**.

87D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Inhibitors of acetyl CoA carboxylase**.

88D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Mitochondrial complex IV electron transport inhibitors**.

89D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Mitochondrial complex II electron transport inhibitors**.

90D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Ryanodine receptor modulators**.

91D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, further comprising an active ingredient from **Group UN**.

92D. A pesticidal composition according to any one of 5D through and including 91D wherein the weight ratio of the molecule according to Formula One to the active ingredient is 100:1 to 1:100.

93D. A pesticidal composition according to any one of 5D through and including 91D wherein the weight ratio of the molecule according to Formula One to the active ingredient is 50:1 to 1:50.

94D. A pesticidal composition according to any one of 5D through and including 91D wherein the weight ratio of the molecule according to Formula One to the active ingredient is 20:1 to 1:20.

95D. A pesticidal composition according to any one of 5D through and including 91D wherein the weight ratio of the molecule according to Formula One to the active ingredient is 10:1 to 1:10.

96D. A pesticidal composition according to any one of 5D th4ough and including 91D wherein the weight ratio of the molecule according to Formula One to the active ingredient is 5:1 to 1:5.

97D. A pesticidal composition according to any one of 5D through and including 91D wherein the weight ratio of the molecule according to Formula One to the active ingredient is 3:1 to 1:3.

98D. A pesticidal composition according to any one of 5D through and including 91D wherein the weight ratio of the molecule according to Formula One to the active ingredient is 2:1 to 1:2.

99D. A pesticidal composition according to any one of 5D through and including 91D wherein the weight ratio of the molecule according to Formula One to the active ingredient is 1:1.

100D. A pesticidal composition according to any of 5D through and including 91D wherein the weight ratio of the molecule of Formula One to the active ingredient is *X:Y*; wherein *X* is the parts by weight of the molecule of Formula One and *Y* is the parts by weight of the active ingredient; further wherein the numerical range of the parts by weight for *X* is $0 < X \leq 100$ and the parts by weight for *Y* is $0 < Y \leq 100$; and further wherein *X* and *Y* are selected from Table C.

101D. A pesticidal composition according to 100D wherein a range of weight ratios of the molecule of Formula One to the active ingredient is X_1:Y_1 to X_2:Y_2; further wherein $X_1 > Y_1$ and $X_2 < Y_2$.

102D. A pesticidal composition according to 100D wherein a range of weight ratios of a molecule of Formula One to an active ingredient is X_1:Y_1 to X_2:Y_2; further wherein $X_1 > Y_1$ and $X_2 > Y_2$.

103D. A pesticidal composition according to 100D wherein a range of weight ratios of a molecule of Formula One to an active ingredient is X_1:Y_1 to X_2:Y_2; further wherein $X_1 < Y_1$ and $X_2 < Y_2$.

104D. A pesticidal composition according to any of 5D through and including 103D, wherein said pesticidal composition further comprises ammonium sulfate.

105D. A pesticidal composition according to any one of 5D through and including 104D wherein said pesticidal composition is synergistic.

106D. A process to produce a pesticidal composition, said process comprising mixing a molecule according to any one of 1D, 2D, 3D, or 4D, with one or more active ingredients.

107D. A process of testing the pesticidal composition according to 106D to determine if it is synergistic.

108D. A pesticidal composition comprising a molecule according to any one of 1D, 2D, 3D, or 4D, and a seed.

109D. A molecule according to any one of 1D, 2D, 3D, or 4D, wherein said molecule is in the form of agriculturally acceptable acid addition salt.

110D. A molecule according to any one of 1D, 2D, 3D, or 4D, wherein said molecule is in the form of a salt derivative.

111D. A molecule according to any one of 1D, 2D, 3D, or 4D, wherein said molecule is in the form of solvate.

112D. A molecule according to any one of 1D, 2D, 3D, or 4D, wherein said molecule is in the form of an ester derivative.

113D. A molecule according to any one of 1D, 2D, 3D, or 4D, wherein said molecule is in the form of a crystal polymorph.

114D. A molecule according to any one of 1D, 2D, 3D, or 4D, wherein said molecule has deuterium, tritium, radiocarbon, or a combination thereof.

115D. A molecule according to any one of 1D, 2D, 3D, or 4D, wherein said molecule is in the form of one or more stereoisomers.

116D. A molecule according to any one of 1D, 2D, 3D, or 4D, wherein said molecule is in the form of a resolved stereoisomer.

117D. A process to control a pest said process comprising applying to a locus, a pesticidally effective amount of a molecule according to any one of 1D, 2D, 3D, or 4D.

118D. A process to control a pest said process comprising applying to a locus, a pesticidally effective amount of a pesticidal composition according to any one of 5D through and including 106D.

119D. A process according to 117D or 118D wherein said pest is selected from ants, aphids, bed bugs, beetles, bristletails, caterpillars, cockroaches, crickets, earwigs, fleas, flies, grasshoppers, grubs, leafhoppers, lice, locusts, maggots, mites, nematodes, planthoppers, psyllids, sawflies, scales, silverfish, slugs, snails, spiders, springtails, stink bugs, symphylans, termites, thrips, ticks, wasps, whiteflies, and wireworms.

120D. A process according to 117D or 118D wherein said pest is selected from **Subphyla Chelicerata, Myriapoda, or Hexapoda**.

121D. A process according to 117D or 118D wherein said pest is selected from **Class of Arachnida, Symphyla, or Insecta**.

122D. A process according to 117D or 118D wherein said pest is selected from **Order Anoplura**.

123D. A process according to 117D or 118D wherein said pest is selected from **Order Coleoptera**.

124D. A process according to 117D or 118D wherein said pest is selected from **Order Dermaptera**.

125D. A process according to 117D or 118D wherein said pest is selected from **Order Blattaria**.

126D. A process according to 117D or 118D wherein said pest is selected from **Order Diptera**.

127D. A process according to 117D or 118D wherein said pest is selected from **Order Hemiptera**.

128D. A process according to 117D or 118D wherein said pest is selected from **Order Hymenoptera**.

129D. A process according to 117D or 118D wherein said pest is selected from **Order Isoptera**.

130D. A process according to 117D or 118D wherein said pest is selected from **Order Lepidoptera.**

131D. A process according to 117D or 118D wherein said pest is selected from **Order Mallophaga**.

132D. A process according to 117D or 118D wherein said pest is selected from **Order Orthoptera**.

133D. A process according to 117D or 118D wherein said pest is selected from **Order Psocoptera**.

134D. A process according to 117D or 118D wherein said pest is selected from **Order Siphonaptera**.

135D. A process according to 117D or 118D wherein said pest is selected from **Order Thysanoptera**.

136D. A process according to 117D or 118D wherein said pest is selected from **Order Thysanura**.

137D. A process according to 117D or 118D wherein said pest is selected from **Order Acarina**.

138D. A process according to 117D or 118D wherein said pest is selected from **Order Araneae**.

139D. A process according to 117D or 118D wherein said pest is selected from **Class Symphyla**.

140D. A process according to 117D or 118D wherein said pest is selected from **Subclass Collembola**.

141D. A process according to 117D or 118D wherein said pest is selected from **Phylum Nematoda**.

142D. A process according to 117D or 118D wherein said pest is selected from **Phylum Mollusca**.

143D. A process according to 117D or 118D wherein said pest is a sap–feeding pest.

144D. A process according to 143D wherein said pest is selected from aphids, leafhoppers, moths, scales, thrips, psyllids, mealybugs, stinkbugs, and whiteflies.

145D. A process according to 143D wherein said pest is selected from Orders Anoplura and Hemiptera.

146D. A process according to 143D wherein said pest is selected from *Aulacaspis* spp., *Aphrophora* spp., *Aphis* spp., *Bemisia* spp., *Coccus* spp., *Euschistus* spp., *Lygus* spp., *Macrosiphum* spp., *Nezara* spp., and *Rhopalosiphum* spp.

147D. A process according to 117D or 118D wherein said pest is a chewing pest.

148D. A process according to 147D wherein said pest is selected from caterpillars, beetles, grasshoppers, and locusts.

149D. A process according to 147D wherein said pest is selected from Coleoptera and Lepidoptera.

150D. A process according to 148D wherein said pest is selected from *Anthonomus* spp., *Cerotoma* spp., *Chaetocnema* spp., *Colaspis* spp., *Cyclocephala* spp., *Diabrotica* spp., *Hypera* spp., *Phyllophaga* spp., *Phyllotreta* spp., *Sphenophorus* spp., *Sitophilus* spp.

151D. A process according to 117D or 118D wherein said locus is where alfalfa, almonds, apples, barley, beans, canola, corn, cotton, crucifers, lettuce, oats, oranges, pears, peppers, potatoes, rice, sorghum, soybeans, strawberries, sugarcane, sugar beets, sunflowers, tobacco, tomatoes, wheat, and other valuable crops are growing or the seeds thereof are planted.

152D. A process according to 117D or 118D wherein said locus is where plants genetically modified to express specialized traits are planted.

153D. A process according to 117D or 118D wherein said applying is done to the foliar and/or fruiting portions of plants.

154D. A process according to 117D or 118D wherein said applying is done to the soil.

155D. A process according to 117D or 118D wherein said applying is done by drip irrigation, furrow application, or pre– or post–planting soil drench.

TABLES

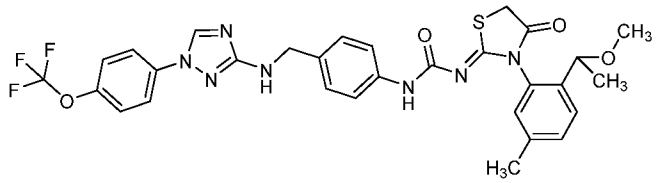
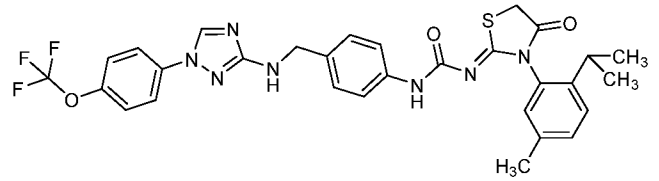
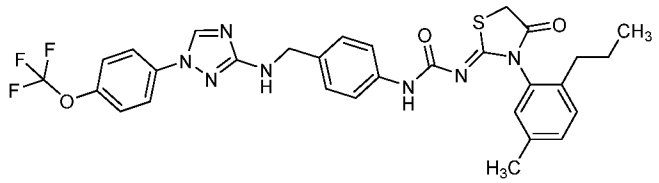
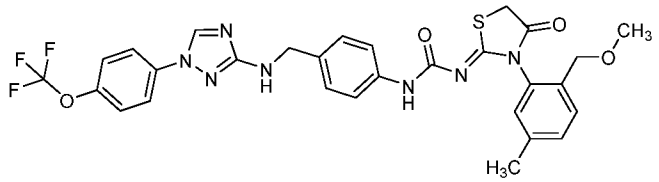
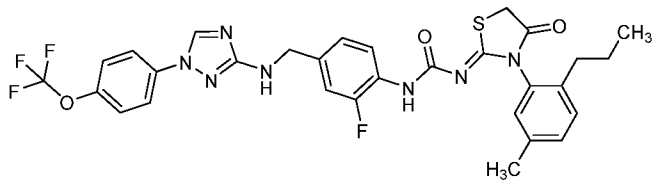
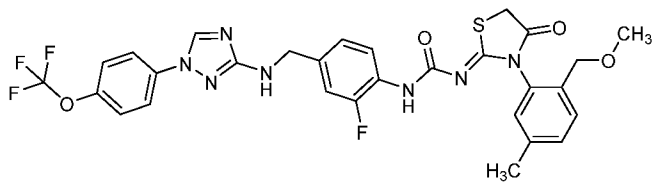
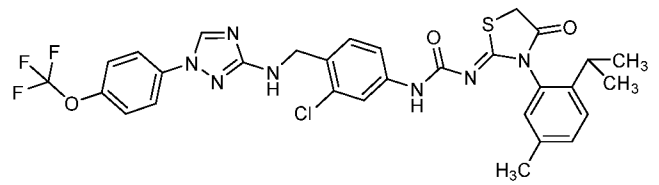
TABLE B

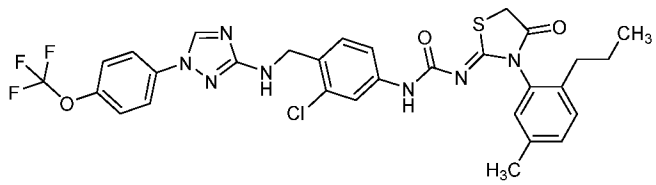
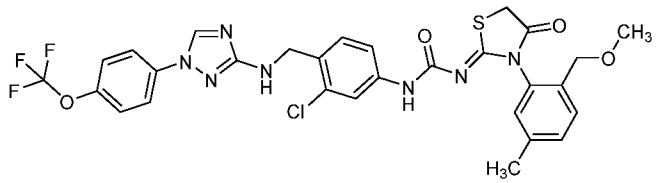
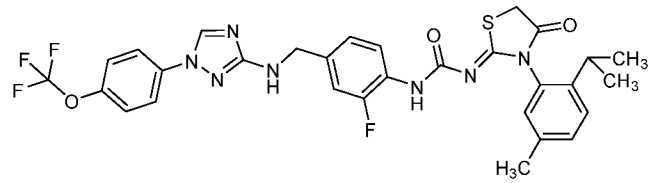
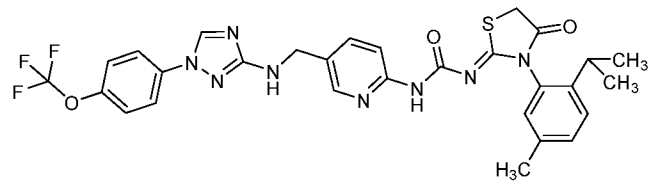
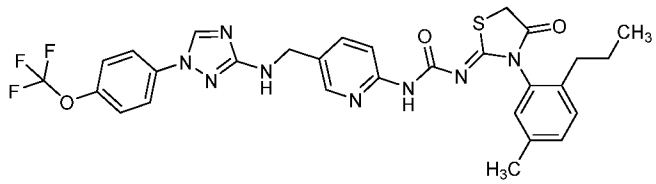
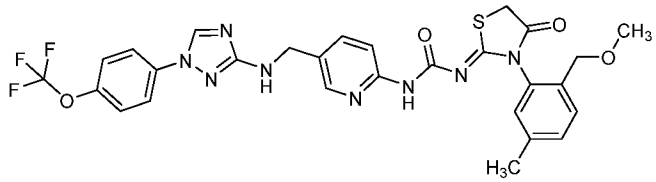
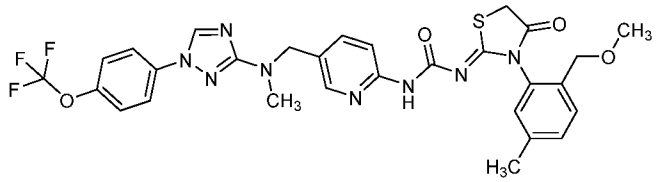
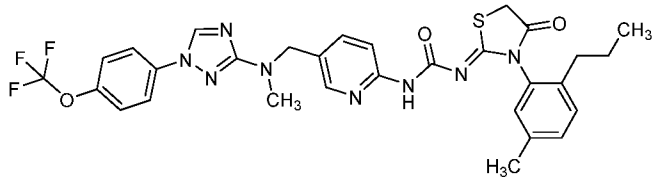
Weight Ratios **Molecule of the Formula One : active ingredient**
100:1 to 1:100
50:1 to 1:50
20:1 to 1:20
10:1 to 1:10
5:1 to 1:5
3:1 to 1:3
2:1 to 1:2
1:1

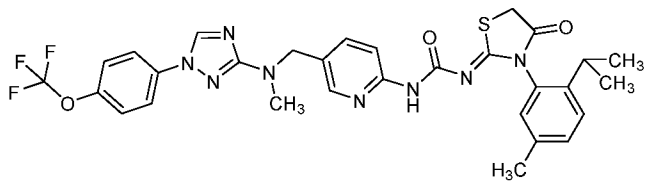
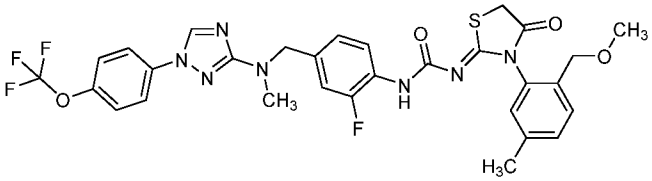
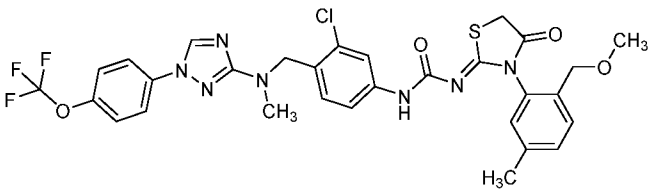
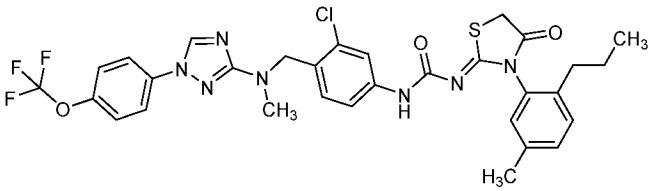
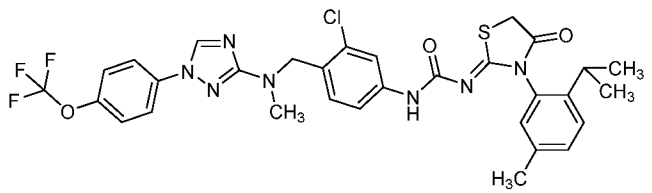
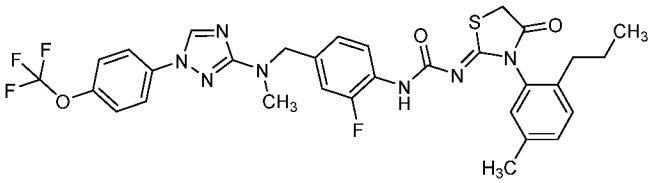
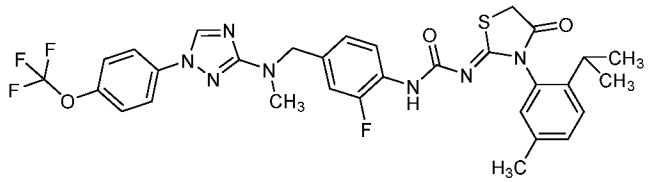
TABLE C

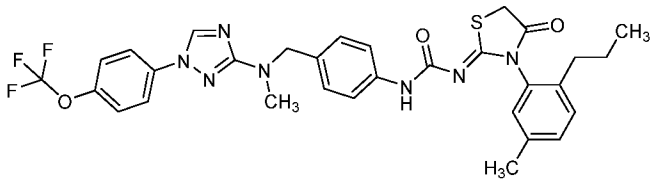
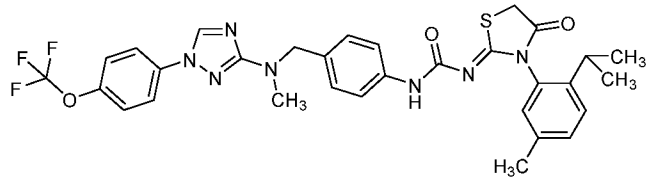
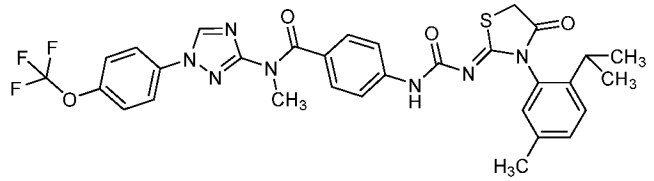
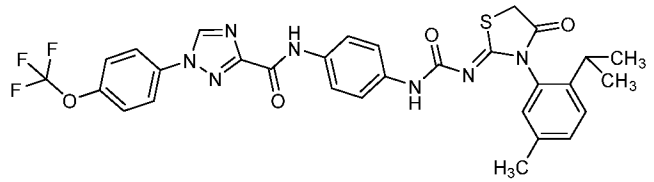
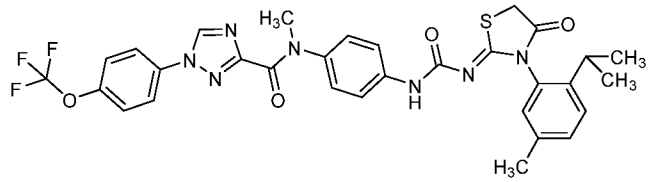
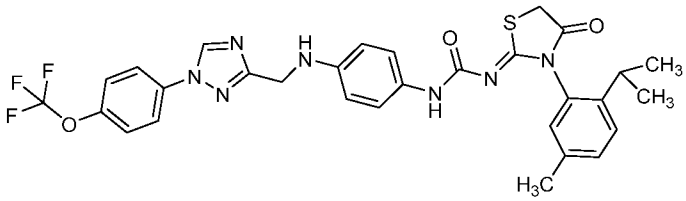
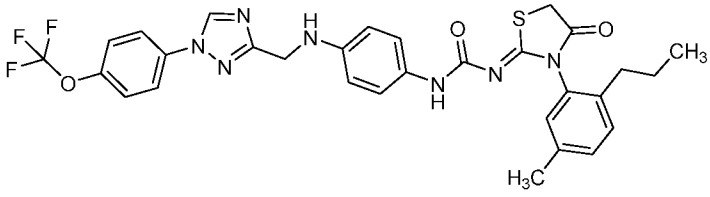
active ingredient (*Y*) *Parts by weight*										
	100	*X,Y*		*X,Y*			*X,Y*			
	50	*X,Y*	*X,Y*	*X,Y*			*X,Y*	*X,Y*		
	20	*X,Y*		*X,Y*	*X,Y*		*X,Y*		*X,Y*	
	15	*X,Y*	*X,Y*					*X,Y*	*X,Y*	*X,Y*
	10	*X,Y*		*X,Y*						
	5	*X,Y*	*X,Y*	*X,Y*				*X,Y*		
	3	*X,Y*	*X,Y*		*X,Y*	*X,Y*		*X,Y*	*X,Y*	*X,Y*
	2	*X,Y*		*X,Y*	*X,Y*		*X,Y*		*X,Y*	
	1	*X,Y*	*X,Y*	*X,Y*	*X,Y*	*X,Y*	*X,Y*	*X,Y*	*X,Y*	*X,Y*
		1	2	3	5	10	15	20	50	100
	molecule of Formula One (*X*) *Parts by weight*									

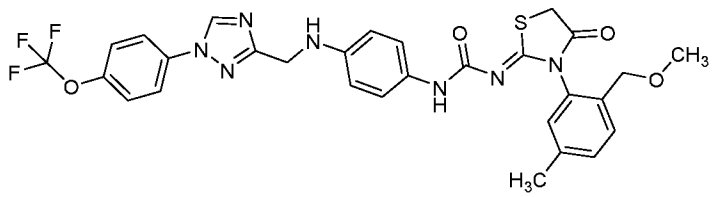
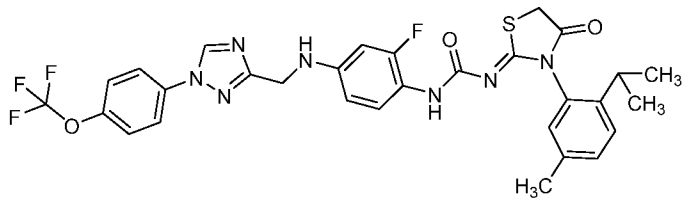
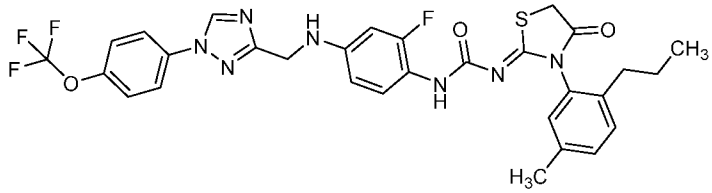
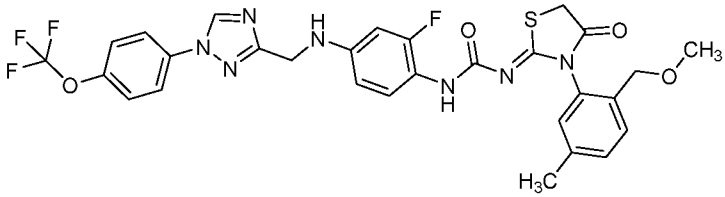
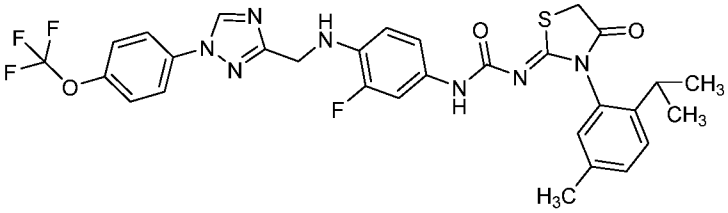
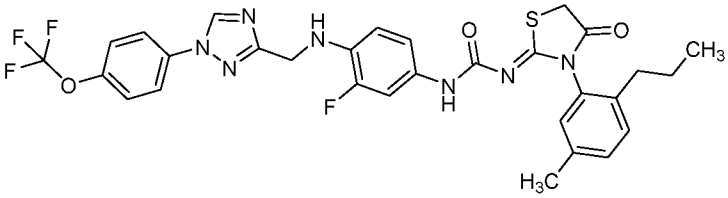
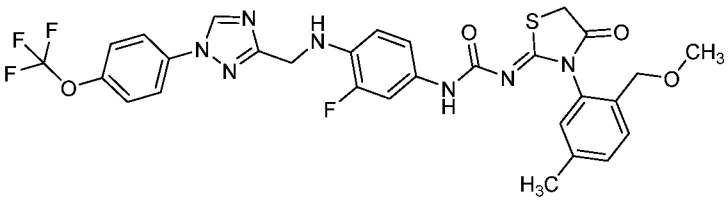
Table 2. Structure and preparation method for F Series molecules

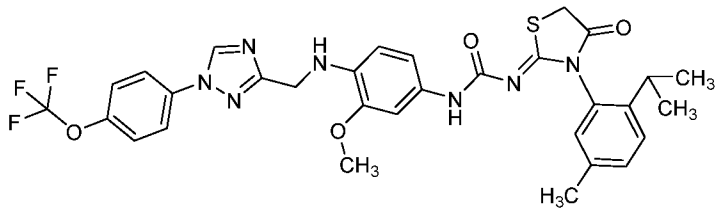
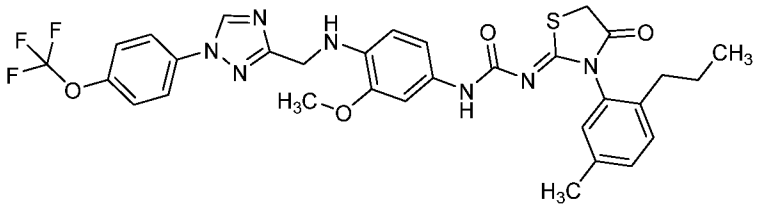
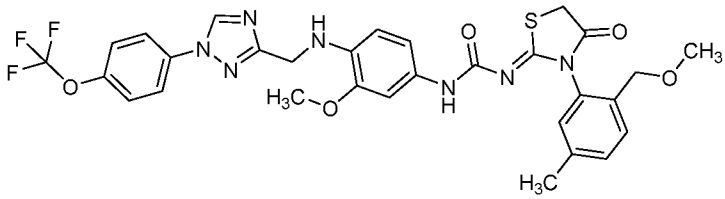
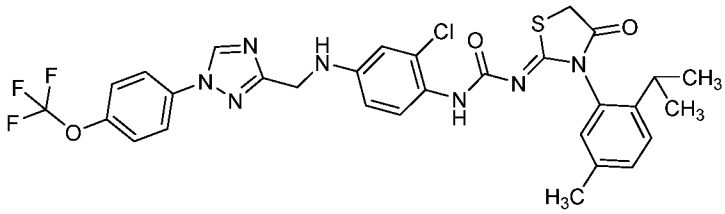
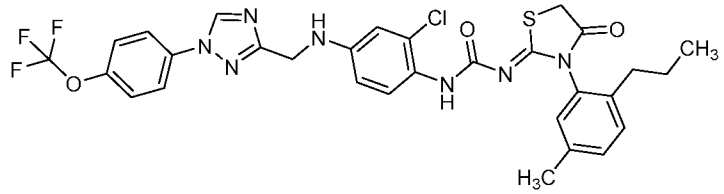
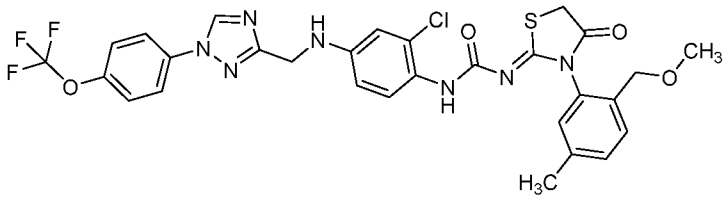
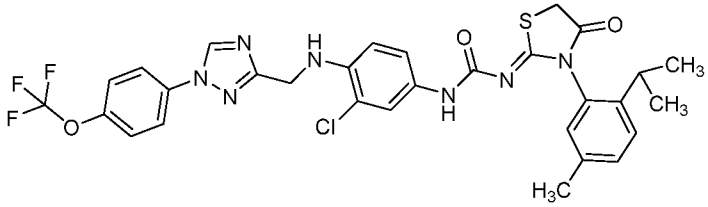
No.	Structure	Prep.*
F1		7 and 8
F2		8
F3		7 and 8
F4		7 and 8
F5		7 and 8
F6		7 and 8
F7		7 and 8

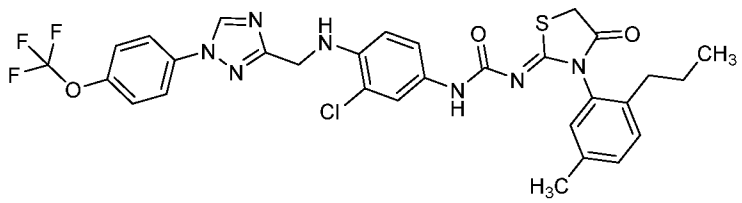
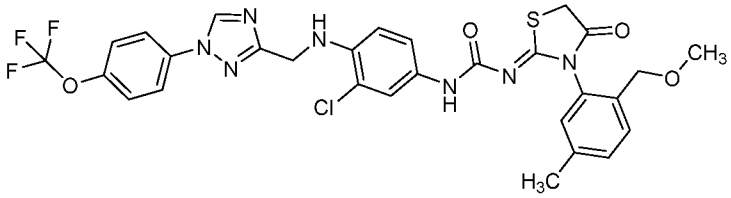
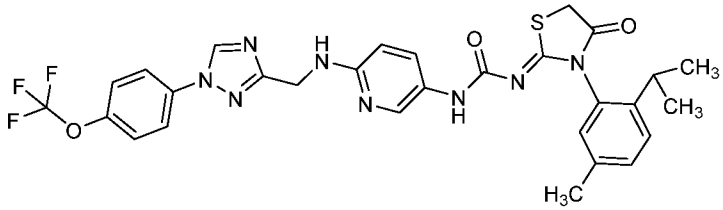
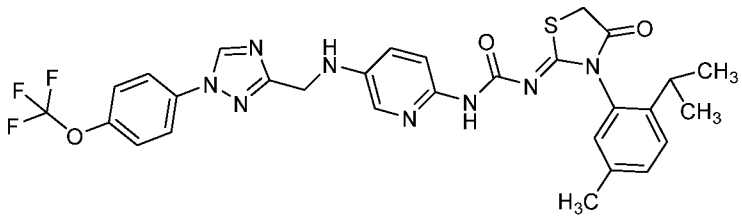
F8		7 and 8
F9		7 and 8
F10		7 and 8
F11		7 and 8
F12		7 and 8
F13		7 and 8
F14		7 and 8
F15		7 and 8

F16		7 and 8
F17		7 and 8
F18		7 and 8
F19		7 and 8
F20		7 and 8
F21		7 and 8
F22		7 and 8

F23		7 and 8
F24		7 and 8
F25		12
F26		8
F27		8
F28		29
F29		29

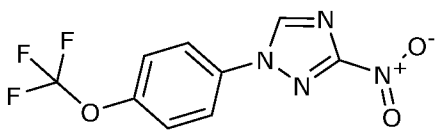
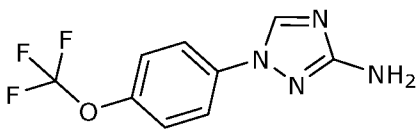
F30		29
F31		29
F32		29
F33		29
F34		29
F35		29
F36		29

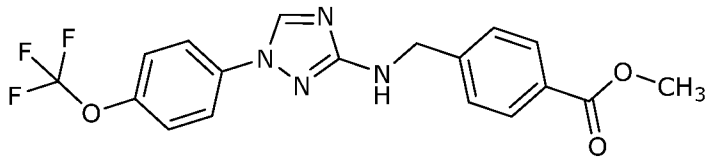
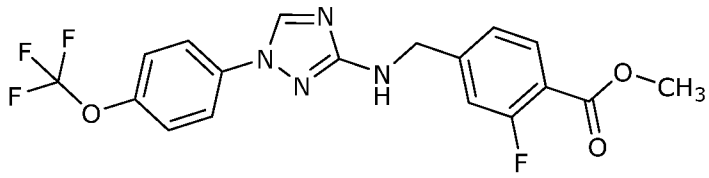
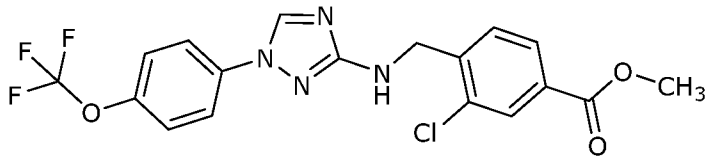
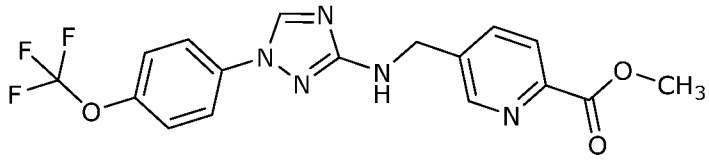
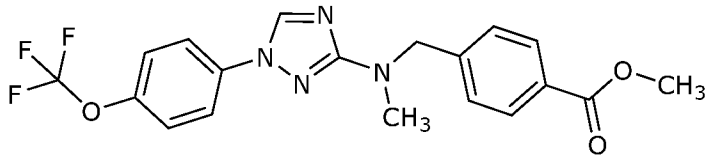
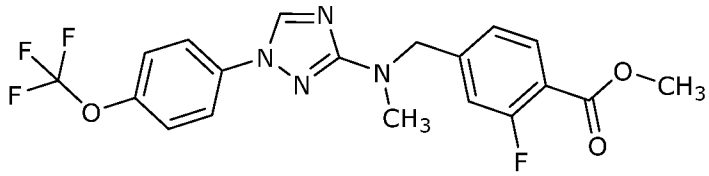
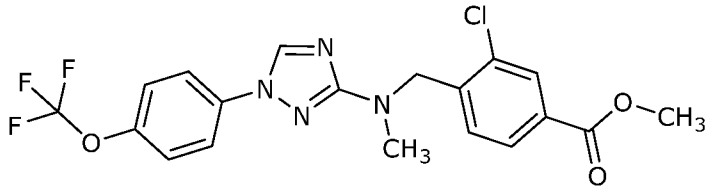
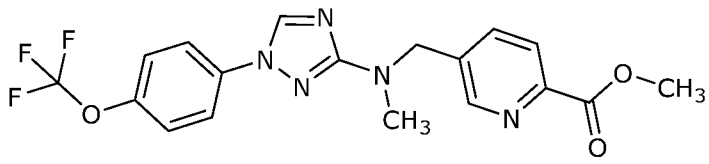
F37		29
F38		29
F39		29
F40		29
F41		29
F42		29
F43		29

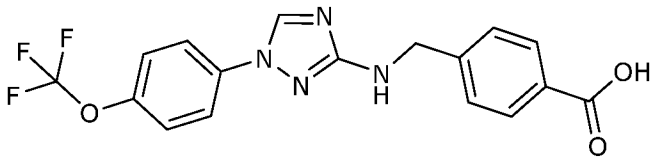
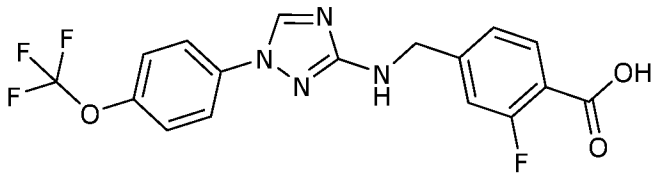
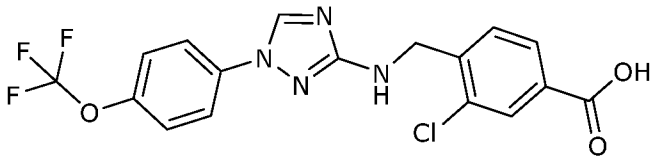
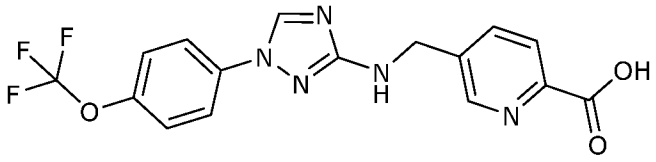
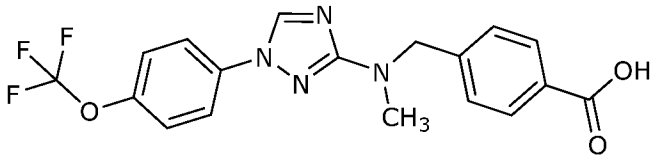
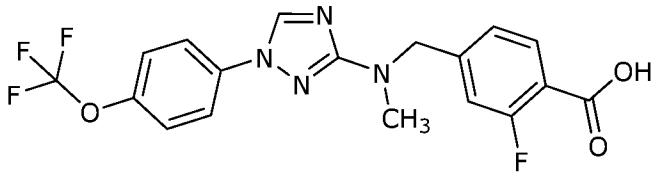
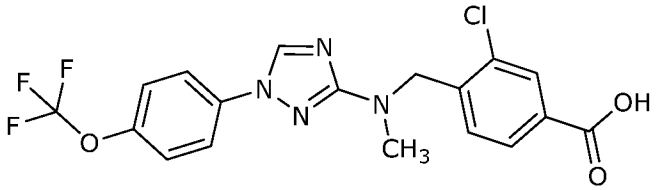
F44		29
F45		29
F46		34
F47		34

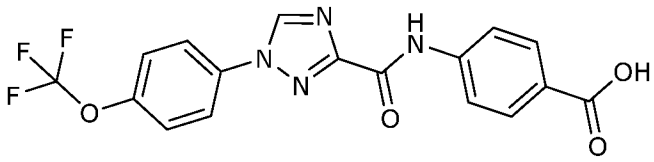
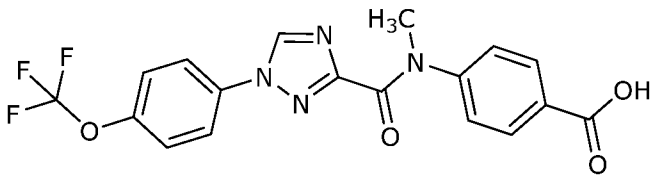
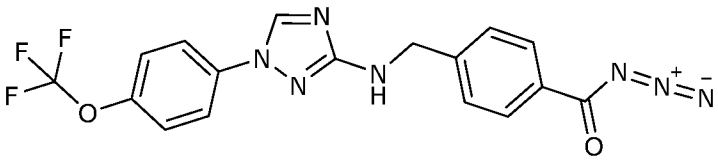
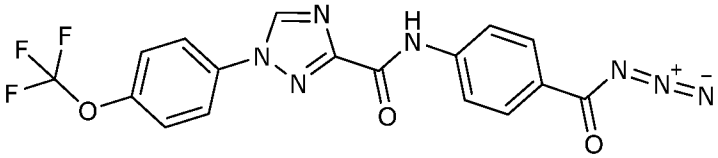
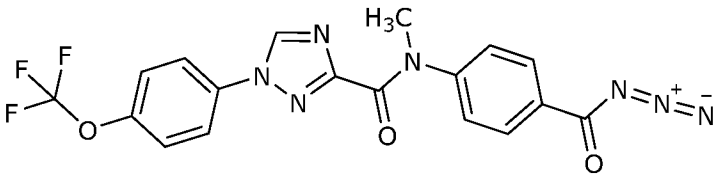
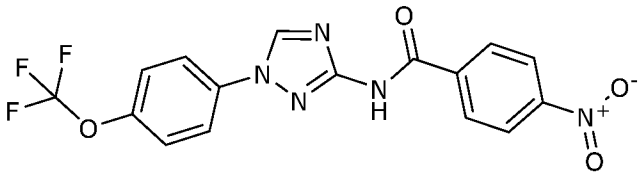
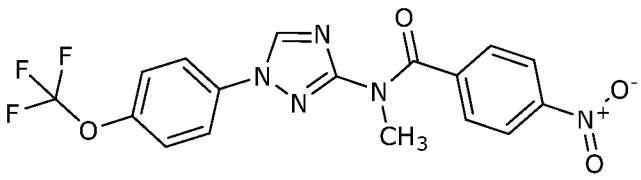
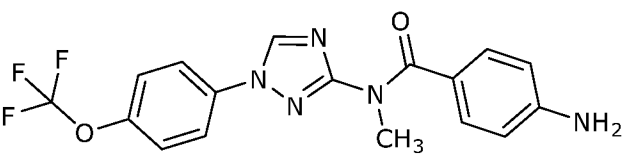
***prepared according to example number**

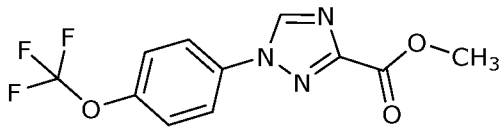
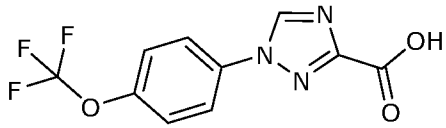
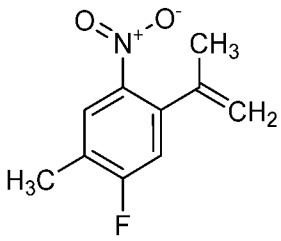
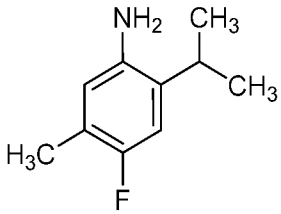
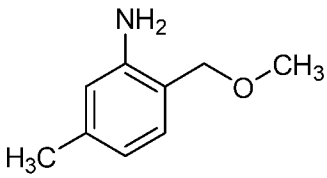
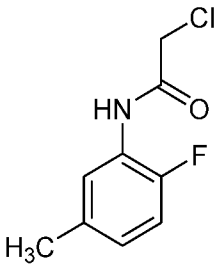
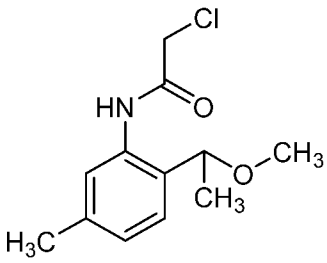
Table 3. Structure and preparation method for C series molecules

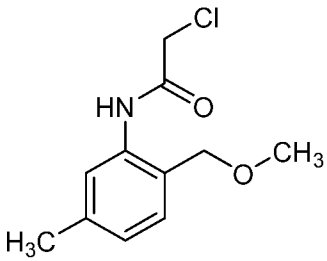
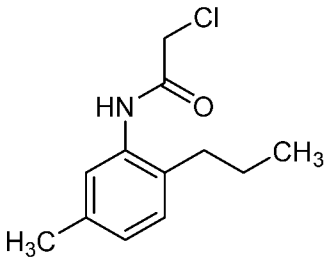
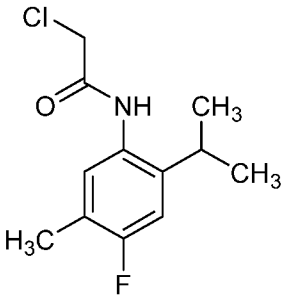
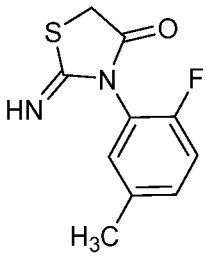
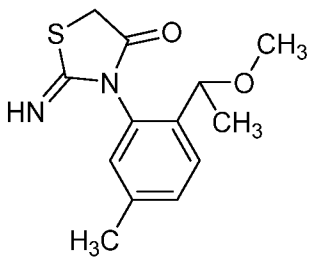
No.	Structure	Prep*
C1		**1**
C2		**2**

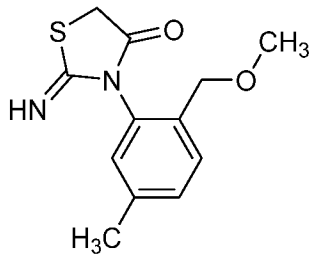
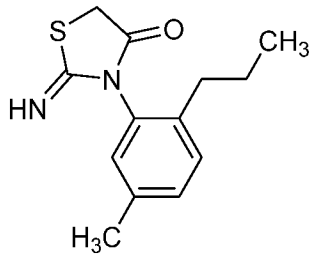
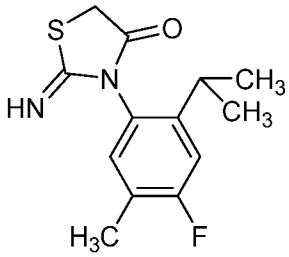
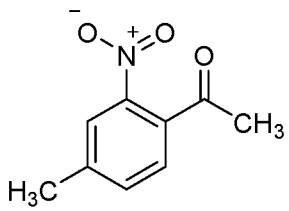
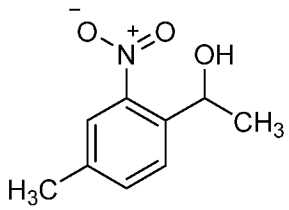
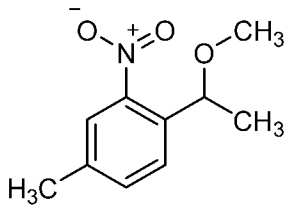
C3		3
C4		3
C5		3
C6		3
C7		4
C8		4
C9		4
C10		4

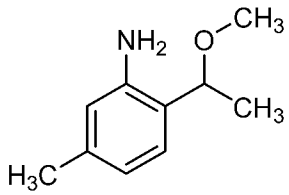
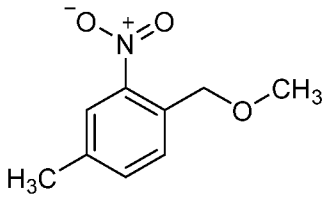
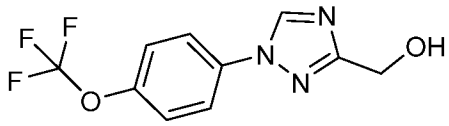
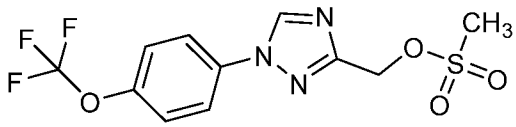
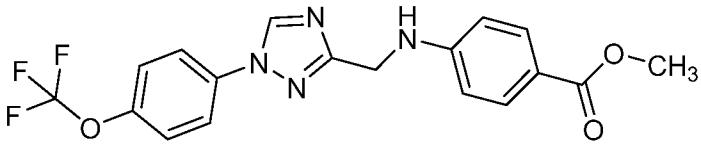
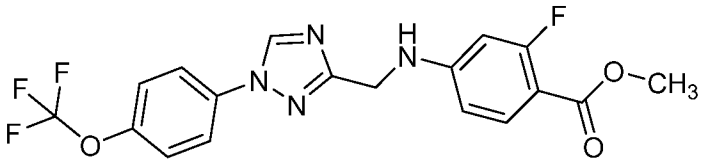
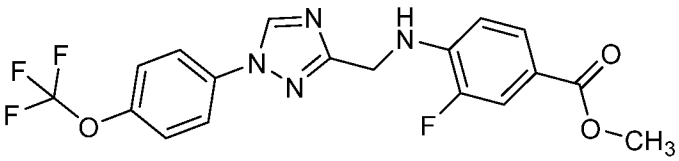
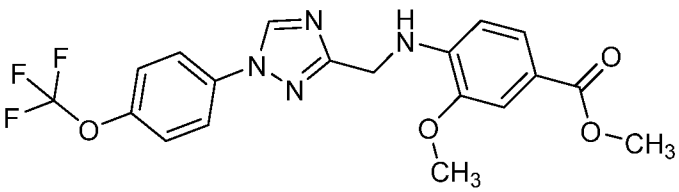
C11		**5**
C12		**5**
C13		**5**
C14		**5**
C15		**5**
C16		**5**
C17		**5**
C18		**5**

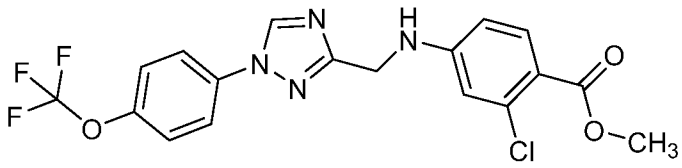
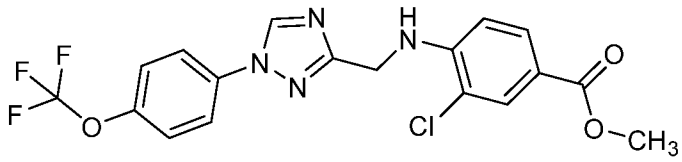
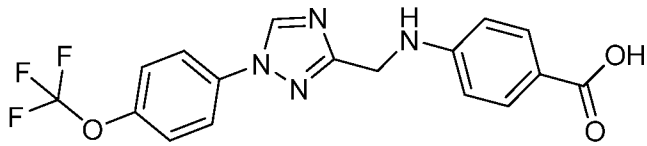
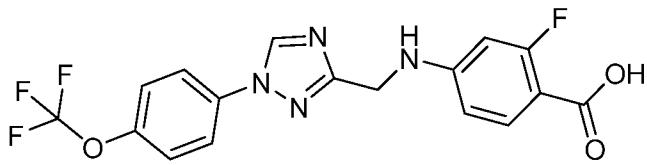
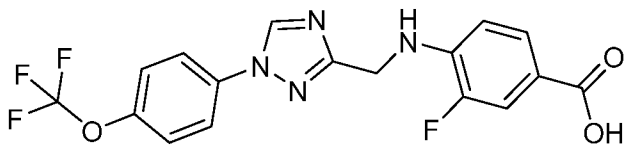
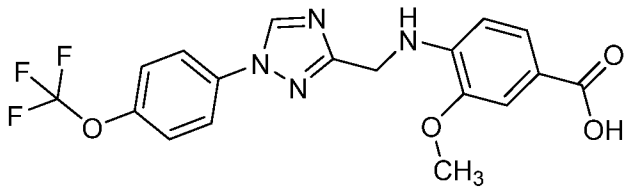
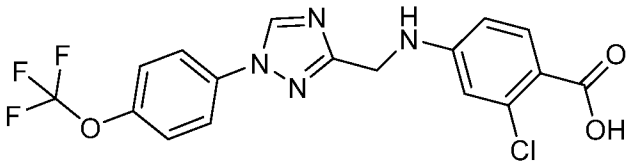
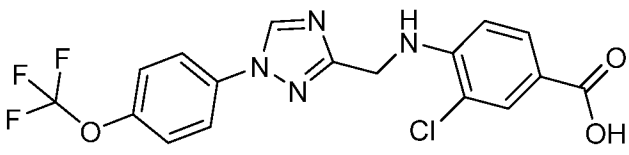
C19		**6**
C20		**6**
C21		**7**
C22		**7**
C23		**7**
C24		**9**
C25		**10**
C26		**11**

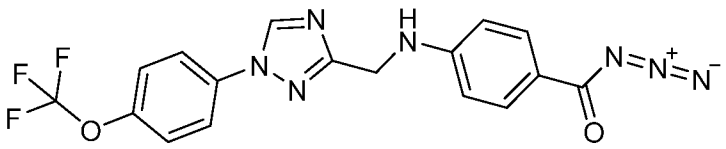
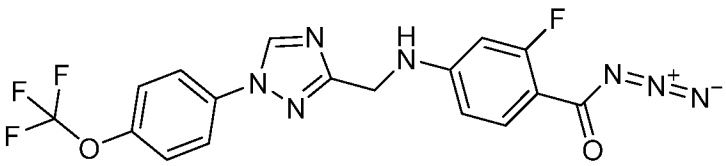
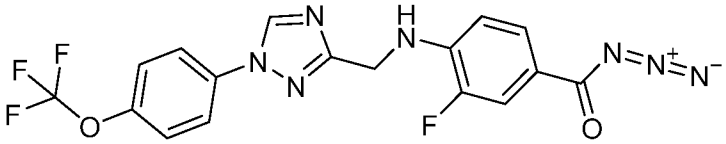
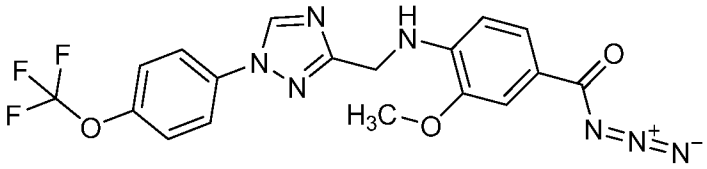
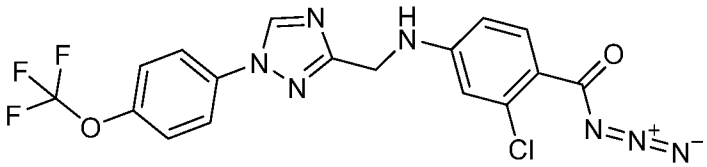
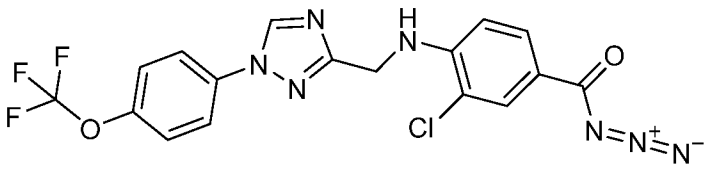
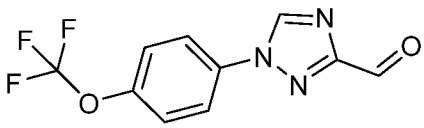
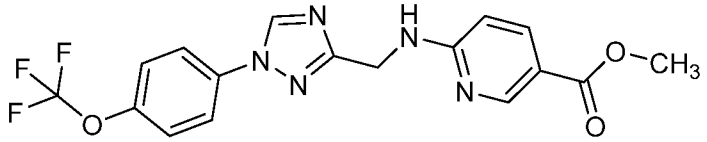
C27		**13**
C28		**14**
C29		**15**
C30		**16**
C31		**16**
C32		**17**
C33		**17**

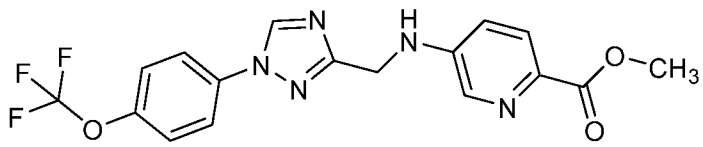
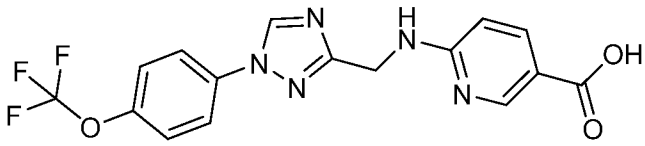
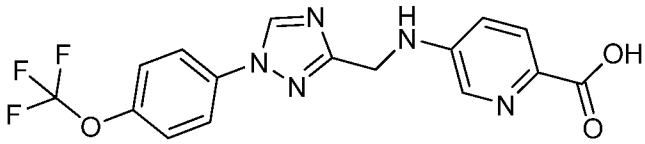
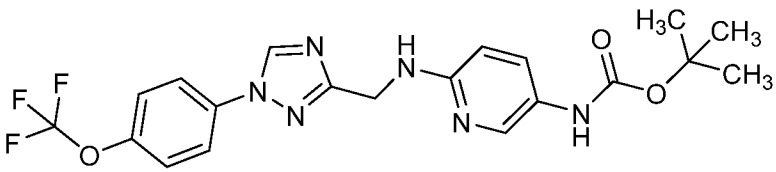
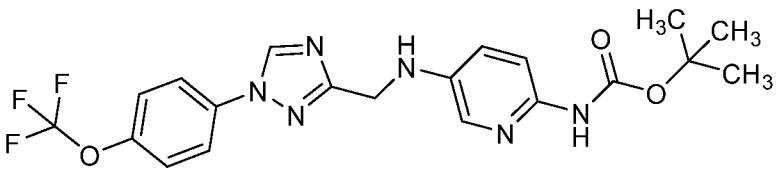
C34		**17**
C35		**17**
C36		**17**
C37		**18**
C38		**18**

C39		**18**
C40		**18**
C41		**18**
C42		**19**
C43		**20**
C44		**21**

C45		**22**
C46		**23**
C47		**24**
C48		**25**
C49		**26**
C50		**26**
C51		**26**
C52		**26**

C53		**26**
C54		**26**
C55		**27**
C56		**27**
C57		**27**
C58		**27**
C59		**27**
C60		**27**

C61		28
C62		28
C63		28
C64		28
C65		28
C66		28
C67		30
C68		31

C69		**31**
C70		**32**
C71		**32**
C72		**33**
C73		**33**

***prepared according to example number**

BAW & CL Rating Table	
% Control (or Mortality)	Rating
50–100	A
More than 0 – Less than 50	B
Not Tested	C
No activity noticed in this bioassay	D

YFM Rating Table	
% Control (or Mortality)	Rating
80–100	A
More than 0 – Less than 80	B
Not Tested	C
No activity noticed in this bioassay	D

Table ABC: Biological Results

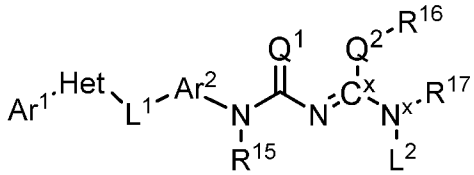
No.	Species		
	BAW	**CL**	**YFM**
F1	A	A	C
F2	C	C	C
F3	A	A	A
F4	A	A	C
F5	A	A	A
F6	C	C	C
F7	A	A	C
F8	A	A	C
F9	A	A	C

F10	C	C	C
F11	A	A	C
F12	A	A	C
F13	A	A	C
F14	A	A	C
F15	C	C	C
F16	A	A	C
F17	A	A	C
F18	B	B	C
F19	D	D	C
F20	B	A	C
F21	C	C	C
F22	A	A	C
F23	A	A	C
F24	A	A	C
F25	A	A	C
F26	A	A	C
F27	A	A	C
F28	A	A	C
F29	A	A	C
F30	A	A	C
F31	A	A	C
F32	A	A	C
F33	A	A	C
F34	A	A	C
F35	A	A	C

F36	A	A	C
F37	A	A	C
F38	A	A	C
F39	A	A	C
F40	A	A	C
F41	A	A	C
F42	A	A	C
F43	A	A	C
F44	A	A	C
F45	C	C	C
F46	A	A	C
F47	A	A	C

Claims

1. A molecule having the following formula



Formula One

wherein:

(A) **Ar^1** is selected from the group consisting of furanyl, phenyl, pyridazinyl, pyridyl, pyrimidinyl, or thienyl,

wherein each furanyl, phenyl, pyridazinyl, pyridyl, pyrimidinyl, and thienyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(B) **Het** is a 5- or 6-membered, saturated or unsaturated, heterocyclic ring, containing one or more heteroatoms independently selected from nitrogen, sulfur, or oxygen, and where **Ar^1** and **L^1** are not ortho to each other, but may be meta or para, such as, for a five-membered ring they are 1,3, and for a 6-membered ring they are either 1,3 or 1,4,

wherein each heterocyclic ring may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-

C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, $S(O)_n$-(C_1-C_4)alkyl, $S(O)_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$S(O)_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, $S(O)_n$-(C_1-C_4)alkyl, $S(O)_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$S(O)_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and phenoxy;

(C) $\mathbf{L^1}$ is selected from the group consisting of $N(R^x)$-(C_1-C_4)alkyl, $N(R^x)$-(C_3-C_8)cycloalkyl, $N(R^x)$-(C_2-C_6)alkenyl, $N(R^x)$-(C_2-C_6)alkynyl, $N(R^x)$-$S(O)_n$-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$N(R^x)$-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$N(R^x)$-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$N(R^x)$, (C_3-C_8)cycloalkyl-$N(R^x)$, (C_2-C_6)alkynyl-$N(R^x)$, (C_1-C_4)alkyl-$S(O)_n$-$N(R^x)$, C(O)-$N(R^x)$, C(S)-$N(R^x)$, $N(R^x)$-C(O), $N(R^x)$-C(S), C(O)-$N(R^x)$-(C_1-C_4)alkyl, C(S)-$N(R^x)$-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$N(R^x)$-C(O), and (C_1-C_4)alkyl-$N(R^x)$-C(S),

wherein each alkyl, cycloalkyl, alkenyl, and alkynyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, and (C_2-C_6)alkynyl;

(D) $\mathbf{Ar^2}$ is selected from the group consisting of furanyl, phenyl, pyridazinyl, pyridyl, pyrimidinyl, or thienyl,

wherein each furanyl, phenyl, pyridazinyl, pyridyl, pyrimidinyl, and thienyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, $S(O)_n$-(C_1-C_4)alkyl, $S(O)_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$S(O)_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(E) $\mathbf{R^{15}}$ is selected from the group consisting of H, $(C_1$-$C_4)$alkyl, $(C_3$-$C_8)$cycloalkyl, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-NR^xR^y, C(O)-phenyl, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl,

wherein each alkyl, cycloalkyl, alkenyl, alkynyl, and phenyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(F) $\mathbf{Q^1}$ is selected from the group consisting of O and S;

(G) $\mathbf{Q^2}$ is selected from the group consisting of O and S;

(H) $\mathbf{R^{16}}$ is selected from the group consisting of **(K)**, H, $(C_1$-$C_4)$alkyl, $(C_3$-$C_8)$cycloalkyl, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, C(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkylphenyl, $(C_1$-$C_4)$alkyl-O-phenyl, C(O)-(Het-1), (Het-1), $(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl(NR^xR^y)-C(O)OH, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-$N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl$(N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl)-C(O)OH, $(C_1$-$C_4)$alkyl-C(O)-(Het-1)-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkyl-OC(O)-(Het-1), $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-

C_4)alkyl-N(R^x)-C(O)O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-NR^xR^y, (C_1-C_4)alkyl-S(O)$_n$-(Het-1), and (C_1-C_4)alkyl-O-(Het-1),

wherein each alkyl, cycloalkyl, alkenyl, alkynyl, phenyl, and (Het-1) may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, S(O)$_n$-(C_1-C_4)alkyl, S(O)$_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)H, C(O)OH, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-S(O)$_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl), phenyl, phenoxy, Si((C_1-C_4)alkyl)$_3$, S(O)$_n$-NR^xR^y, and (Het-1);

(I) $\mathbf{R^{17}}$ is selected from the group consisting of **(K)**, H, (C_1-C_4)alkyl, (C_3-C_8)cycloalkyl, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, C(O)-(C_1-C_4)alkyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-S(O)$_n$-(C_1-C_4)alkyl, (C_1-C_4)alkylphenyl, (C_1-C_4)alkyl-O-phenyl, C(O)-(Het-1), (Het-1), (C_1-C_4)alkyl-(Het-1), (C_1-C_4)alkyl-OC(O)-(C_1-C_4)alkyl, (C_1-C_4)alkyl-OC(O)-(C_1-C_4)alkyl, (C_1-C_4)alkyl-OC(O)O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-OC(O)-NR^xR^y, (C_1-C_4)alkyl-C(O)-N(R^x)(C_1-C_4)alkyl-(Het-1), (C_1-C_4)alkyl-C(O)-(Het-1), (C_1-C_4)alkyl-C(O)-N(R^x)(C_1-C_4)alkyl(NR^xR^y)-C(O)OH, (C_1-C_4)alkyl-C(O)-N(R^x)(C_1-C_4)alkyl-NR^xR^y, (C_1-C_4)alkyl-C(O)-N(R^x)(C_1-C_4)alkyl-N(R^x)-C(O)O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-C(O)-N(R^x)(C_1-C_4)alkyl(N(R^x)-C(O)O-(C_1-C_4)alkyl)-C(O)OH, (C_1-C_4)alkyl-C(O)-(Het-1)-C(O)O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-OC(O)O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-OC(O)-(C_1-C_4)alkyl, (C_1-C_4)alkyl-OC(O)-(C_3-C_8)cycloalkyl, (C_1-C_4)alkyl-OC(O)-(Het-1), (C_1-C_4)alkyl-OC(O)-(C_1-C_4)alkyl-N(R^x)-C(O)O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-NR^xR^y, (C_1-C_4)alkyl-S(O)$_n$-(Het-1), and (C_1-C_4)alkyl-O-(Het-1),

wherein each alkyl, cycloalkyl, alkenyl, alkynyl, phenyl, and (Het-1) may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, S(O)$_n$-(C_1-C_4)alkyl, S(O)$_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)H, C(O)OH, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-S(O)$_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, phenoxy, Si((C_1-C_4)alkyl)$_3$, S(O)$_n$-NR^xR^y, and (Het-1);

(J) $\mathbf{L^2}$ is selected from the group consisting of (C_3-C_8)cycloalkyl, phenyl, (C_1-C_4)alkylphenyl, (C_1-C_4)alkyl-O-phenyl, (C_2-C_6)alkenyl-O-phenyl, (Het-1), (C_1-C_4)alkyl-(Het-1), and (C_1-C_4)alkyl-O-(Het-1),

wherein each alkyl, cycloalkyl, alkenyl, phenyl, and (Het-1) may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_1$-$C_4)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, O-$(C_1$-$C_4)$alkyl, S-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, phenoxy, and (Het-1),

wherein each alkyl, cycloalkyl, alkenyl, phenyl, and (Het-1) substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_1$-$C_4)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, O-$(C_1$-$C_4)$alkyl, S-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, phenoxy, and (Het-1);

(K) $\mathbf{R^{16}}$ and $\mathbf{R^{17}}$ along with $\mathbf{C^x(Q^2)(N^x)}$, form a 4- to 7-membered saturated or unsaturated, heterocyclic ring, which may further contain one or more heteroatoms selected from the group consisting of nitrogen, sulfur, and oxygen,

wherein each heterocyclic ring may be optionally substituted with one or more substituents independently selected from the group consisting of oxo, $\mathbf{R^{18}}$, and $\mathbf{R^{19}}$,

wherein $\mathbf{R^{18}}$ and $\mathbf{R^{19}}$ are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, thioxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and (Het-1);

(L) $\mathbf{R^x}$ and $\mathbf{R^y}$ are each independently selected from the group consisting of H, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-

$OC(O)$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$OC(O)O$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $C(O)$-$(C_1$-$C_4)$alkyl-$C(O)O$-$(C_1$-$C_4)$alkyl, and phenyl,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, and phenyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, $C(O)H$, $C(O)$-$(C_1$-$C_4)$alkyl, $C(O)O$-$(C_1$-$C_4)$alkyl, $C(O)$-$(C_1$-$C_4)$haloalkyl, $C(O)O$-$(C_1$-$C_4)$haloalkyl, $C(O)$-$(C_3$-$C_8)$cycloalkyl, $C(O)O$-$(C_3$-$C_8)$cycloalkyl, $C(O)$-$(C_2$-$C_6)$alkenyl, $C(O)O$-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $C(O)$-$(C_1$-$C_4)$alkyl-$C(O)O$-$(C_1$-$C_4)$alkyl, phenyl, and (Het-1);

(M) **(Het-1)** is a 5- or 6-membered, saturated or unsaturated, heterocyclic ring, containing one or more heteroatoms independently selected from the group consisting of nitrogen, sulfur, or oxygen,

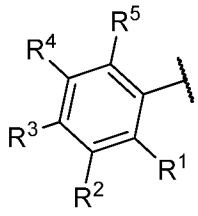
wherein each heterocyclic ring may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, $C(O)$-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, $C(O)$-$(C_1$-$C_4)$alkyl, $C(O)O$-$(C_1$-$C_4)$alkyl, $C(O)$-$(C_1$-$C_4)$haloalkyl, $C(O)O$-$(C_1$-$C_4)$haloalkyl, $C(O)$-$(C_3$-$C_8)$cycloalkyl, $C(O)O$-$(C_3$-$C_8)$cycloalkyl, $C(O)$-$(C_2$-$C_6)$alkenyl, $C(O)O$-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $C(O)$-$(C_1$-$C_4)$alkyl-$C(O)O$-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, $C(O)$-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, $C(O)$-$(C_1$-$C_4)$alkyl, $C(O)O$-$(C_1$-$C_4)$alkyl, $C(O)$-$(C_1$-$C_4)$haloalkyl, $C(O)O$-$(C_1$-$C_4)$haloalkyl, $C(O)$-$(C_3$-$C_8)$cycloalkyl, $C(O)O$-$(C_3$-$C_8)$cycloalkyl, $C(O)$-$(C_2$-$C_6)$alkenyl, $C(O)O$-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $C(O)$-$(C_1$-$C_4)$alkyl-$C(O)O$-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(N) **n** are each independently 0, 1, or 2; and N–oxides, agriculturally acceptable acid addition salts, salt derivatives, solvates, ester derivatives, crystal polymorphs, isotopes, resolved stereoisomers, and tautomers, of the molecules of Formula One.

2. A molecule according to 1 wherein:

(A) **Ar^1** is **(1a)**

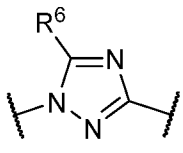


(1a),

wherein, **R^1**, **R^2**, **R^3**, **R^4**, and **R^5** are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(B) **Het** is **(1b)**



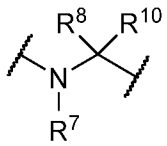
(1b),

wherein, **R^6** is a substituent selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-

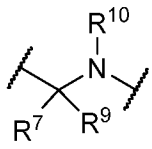
C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-S(O)$_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, S(O)$_n$-(C_1-C_4)alkyl, S(O)$_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-S(O)$_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and phenoxy;

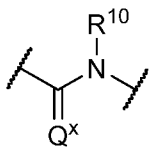
(C) $\mathbf{L^1}$ is selected from the group consisting of



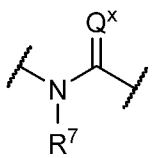
(1c),



(1d),



(1e), and



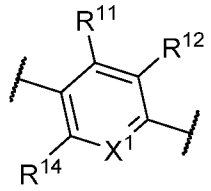
(1f),

wherein:

(1) $\mathbf{Q^x}$ is selected from the group consisting of O and S, and

(2) R^7, R^8, R^9, and R^{10} are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, and $(C_2$-$C_6)$alkynyl;

(D) Ar^2 is **(1g)**



(1g),

wherein:

(1) X^1 is selected from the group consisting of N and CR^{13}, and

(2) R^{11}, R^{12}, R^{13}, and R^{14} are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(E) R^{15} is selected from the group consisting of H, $(C_1$-$C_4)$alkyl, $(C_3$-$C_8)$cycloalkyl, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl,

wherein each alkyl, cycloalkyl, alkenyl, and alkynyl may be optionally substituted with one or more substituents independently selected from the group

consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy;

(F) Q^1 is selected from the group consisting of O and S;

(G) Q^2 is selected from the group consisting of O and S;

(H) R^{16} is selected from the group consisting of **(K)**, H, $(C_1$-$C_4)$alkyl, $(C_3$-$C_8)$cycloalkyl, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, C(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkylphenyl, $(C_1$-$C_4)$alkyl-O-phenyl, C(O)-(Het-1), (Het-1), $(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl(NR^xR^y)-C(O)OH, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-$N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl$(N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl$)$-C(O)OH, $(C_1$-$C_4)$alkyl-C(O)-(Het-1)-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkyl-OC(O)-(Het-1), $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl-$N(R^x)$-C(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-NR^xR^y, $(C_1$-$C_4)$alkyl-$S(O)_n$-(Het-1), and $(C_1$-$C_4)$alkyl-O-(Het-1),

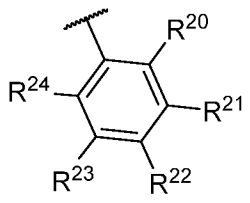
wherein each alkyl, cycloalkyl, alkenyl, alkynyl, phenyl, and (Het-1) may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)H, C(O)OH, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl), phenyl, phenoxy, $Si((C_1$-$C_4)$alkyl$)_3$, $S(O)_n$-NR^xR^y, and (Het-1);

(I) R^{17} is selected from the group consisting of **(K)**, H, $(C_1$-$C_4)$alkyl, $(C_3$-$C_8)$cycloalkyl, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, C(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkylphenyl, $(C_1$-$C_4)$alkyl-O-phenyl, C(O)-(Het-1), (Het-1), $(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-OC(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-C(O)-$N(R^x)(C_1$-$C_4)$alkyl-(Het-1), $(C_1$-$C_4)$alkyl-C(O)-(Het-1), $(C_1$-

C_4)alkyl-C(O)-N(R^x)(C_1-C_4)alkyl(NR^xR^y)-C(O)OH, (C_1-C_4)alkyl-C(O)-N(R^x)(C_1-C_4)alkyl-NR^xR^y, (C_1-C_4)alkyl-C(O)-N(R^x)(C_1-C_4)alkyl-N(R^x)-C(O)O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-C(O)-N(R^x)(C_1-C_4)alkyl(N(R^x)-C(O)O-(C_1-C_4)alkyl)-C(O)OH, (C_1-C_4)alkyl-C(O)-(Het-1)-C(O)O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-OC(O)O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-OC(O)-(C_1-C_4)alkyl, (C_1-C_4)alkyl-OC(O)-(C_3-C_8)cycloalkyl, (C_1-C_4)alkyl-OC(O)-(Het-1), (C_1-C_4)alkyl-OC(O)-(C_1-C_4)alkyl-N(R^x)-C(O)O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-NR^xR^y, (C_1-C_4)alkyl-S(O)$_n$-(Het-1), and (C_1-C_4)alkyl-O-(Het-1),

wherein each alkyl, cycloalkyl, alkenyl, alkynyl, phenyl, and (Het-1) may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, S(O)$_n$-(C_1-C_4)alkyl, S(O)$_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)H, C(O)OH, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-S(O)$_n$-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, phenoxy, Si((C_1-C_4)alkyl)$_3$, S(O)$_n$-NR^xR^y, and (Het-1);

(J) L^2 is **(1h)**



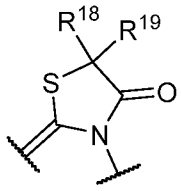
(1h),

wherein, $\mathbf{R^{20}}$, $\mathbf{R^{21}}$, $\mathbf{R^{22}}$, $\mathbf{R^{23}}$, and $\mathbf{R^{24}}$ are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, S(O)$_n$-(C_1-C_4)alkyl, S(O)$_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl, C(O)H, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_1-C_4)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, O-(C_1-C_4)alkyl, S-(C_1-C_4)alkyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, phenoxy, and (Het-1),

wherein each alkyl, cycloalkyl, alkenyl, phenyl, and (Het-1) substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, NR^xR^y, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, S(O)$_n$-(C_1-C_4)alkyl, S(O)$_n$-(C_1-C_4)haloalkyl, OSO_2-(C_1-C_4)alkyl, OSO_2-(C_1-C_4)haloalkyl,

C(O)H, C(O)-NR^xR^y, (C_1-C_4)alkyl-NR^xR^y, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_1-C_4)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, O-(C_1-C_4)alkyl, S-(C_1-C_4)alkyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, phenoxy, and (Het-1);

(K) $\mathbf{R^{16}}$ and $\mathbf{R^{17}}$ along with $\mathbf{C^x(Q^2)(N^x)}$, is **(1i)**



(1i),

wherein, $\mathbf{R^{18}}$ and $\mathbf{R^{19}}$ are each independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, thioxo, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, $S(O)_n-(C_1-C_4)$alkyl, $S(O)_n-(C_1-C_4)$haloalkyl, $OSO_2-(C_1-C_4)$alkyl, $OSO_2-(C_1-C_4)$haloalkyl, C(O)H, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$S(O)_n-(C_1-C_4)$alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and (Het-1);

(L) $\mathbf{R^x}$ and $\mathbf{R^y}$ are each independently selected from the group consisting of H, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, $S(O)_n-(C_1-C_4)$alkyl, $S(O)_n-(C_1-C_4)$haloalkyl, $OSO_2-(C_1-C_4)$alkyl, $OSO_2-(C_1-C_4)$haloalkyl, C(O)H, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$S(O)_n-(C_1-C_4)$alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, and phenyl,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, and phenyl may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, (C_1-C_4)alkyl, (C_1-C_4)haloalkyl, (C_3-C_8)cycloalkyl, (C_1-C_4)alkoxy, (C_1-C_4)haloalkoxy, (C_2-C_6)alkenyl, (C_2-C_6)alkynyl, $S(O)_n-(C_1-C_4)$alkyl, $S(O)_n-(C_1-C_4)$haloalkyl, $OSO_2-(C_1-C_4)$alkyl, $OSO_2-(C_1-C_4)$haloalkyl, C(O)H, C(O)-(C_1-C_4)alkyl, C(O)O-(C_1-C_4)alkyl, C(O)-(C_1-C_4)haloalkyl, C(O)O-(C_1-C_4)haloalkyl, C(O)-(C_3-C_8)cycloalkyl, C(O)O-(C_3-C_8)cycloalkyl, C(O)-(C_2-C_6)alkenyl, C(O)O-(C_2-C_6)alkenyl, (C_1-C_4)alkyl-O-(C_1-C_4)alkyl, (C_1-C_4)alkyl-$S(O)_n-(C_1-C_4)$alkyl, C(O)-(C_1-C_4)alkyl-C(O)O-(C_1-C_4)alkyl, phenyl, and (Het-1);

(M) **(Het-1)** is a 5- or 6-membered, saturated or unsaturated, heterocyclic ring, containing one or more heteroatoms independently selected from the group consisting of nitrogen, sulfur, or oxygen,

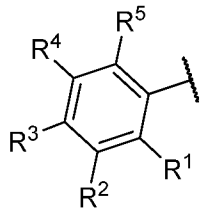
wherein each heterocyclic ring may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, oxo, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy,

wherein each alkyl, haloalkyl, cycloalkyl, alkoxy, haloalkoxy, alkenyl, alkynyl, phenyl, and phenoxy substituent may be optionally substituted with one or more substituents independently selected from the group consisting of H, F, Cl, Br, I, CN, NO_2, $(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$haloalkyl, $(C_3$-$C_8)$cycloalkyl, $(C_1$-$C_4)$alkoxy, $(C_1$-$C_4)$haloalkoxy, $(C_2$-$C_6)$alkenyl, $(C_2$-$C_6)$alkynyl, $S(O)_n$-$(C_1$-$C_4)$alkyl, $S(O)_n$-$(C_1$-$C_4)$haloalkyl, OSO_2-$(C_1$-$C_4)$alkyl, OSO_2-$(C_1$-$C_4)$haloalkyl, C(O)-NR^xR^y, $(C_1$-$C_4)$alkyl-NR^xR^y, C(O)-$(C_1$-$C_4)$alkyl, C(O)O-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$haloalkyl, C(O)O-$(C_1$-$C_4)$haloalkyl, C(O)-$(C_3$-$C_8)$cycloalkyl, C(O)O-$(C_3$-$C_8)$cycloalkyl, C(O)-$(C_2$-$C_6)$alkenyl, C(O)O-$(C_2$-$C_6)$alkenyl, $(C_1$-$C_4)$alkyl-O-$(C_1$-$C_4)$alkyl, $(C_1$-$C_4)$alkyl-$S(O)_n$-$(C_1$-$C_4)$alkyl, C(O)-$(C_1$-$C_4)$alkyl-C(O)O-$(C_1$-$C_4)$alkyl, phenyl, and phenoxy; and

(N) **n** are each independently 0, 1, or 2.

3. A molecule according to 1 wherein:

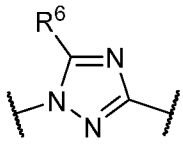
(A) $\mathbf{Ar^1}$ is **(1a)**



(1a),

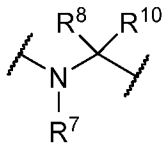
wherein, $\mathbf{R^1}$, $\mathbf{R^2}$, $\mathbf{R^3}$, $\mathbf{R^4}$, and $\mathbf{R^5}$ are each independently selected from the group consisting of H and $(C_1$-$C_4)$haloalkoxy;

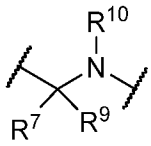
(B) **Het** is **(1b)**

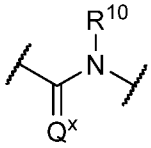

(1b),

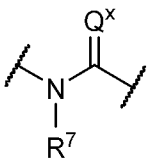
wherein, $\mathbf{R^6}$ is H;

(C) $\mathbf{L^1}$ is selected from the group consisting of


(1c),


(1d),


(1e), and

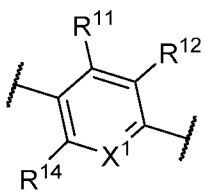

(1f),

wherein:

(1) $\mathbf{Q^x}$ is O, and

(2) $\mathbf{R^7}$, $\mathbf{R^8}$, $\mathbf{R^9}$, and $\mathbf{R^{10}}$ are each independently selected from the group consisting of H and (C_1-C_4)alkyl;

(D) $\mathbf{Ar^2}$ is **(1g)**


(1g),

wherein:

(1) X^1 is selected from the group consisting of N and CR^{13}, and

(2) R^{11}, R^{12}, R^{13}, and R^{14} are each independently selected from the group consisting of H, F, and Cl;

(E) R^{15} is H;

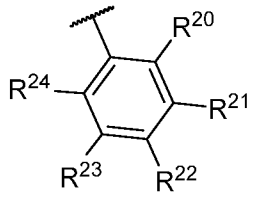
(F) Q^1 is O;

(G) Q^2 is S;

(H) R^{16} is **(K)**;

(I) R^{17} is **(K)**;

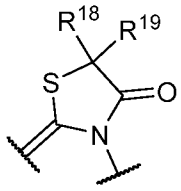
(J) L^2 is **(1h)**



(1h),

wherein, R^{20}, R^{21}, R^{22}, R^{23}, and R^{24} are each independently selected from the group consisting of H, $(C_1\text{-}C_4)$alkyl, and $(C_1\text{-}C_4)$alkyl-O-$(C_1\text{-}C_4)$alkyl; and

(K) R^{16} and R^{17} along with $C^x(Q^2)(N^x)$, is **(1i)**

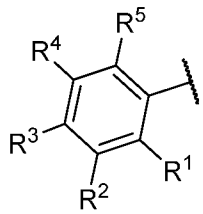


(1i),

wherein, R^{18} and R^{19} are each independently H.

4. A molecule according to 1 wherein:

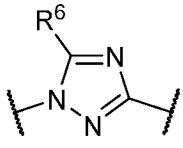
(A) Ar^1 is **(1a)**



(1a),

wherein, $\mathbf{R^1}$, $\mathbf{R^2}$, $\mathbf{R^3}$, $\mathbf{R^4}$, and $\mathbf{R^5}$ are each independently selected from the group consisting of H and OCF_3;

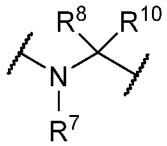
(B) **Het** is **(1b)**



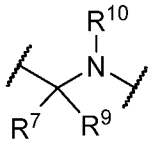
(1b),

wherein, $\mathbf{R^6}$ is H;

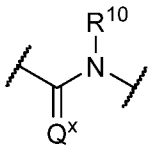
(C) $\mathbf{L^1}$ is selected from the group consisting of



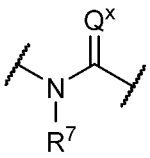
(1c),



(1d),



(1e), and



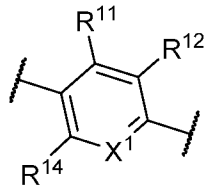
(1f),

wherein:

(1) $\mathbf{Q^x}$ is O, and

(2) $\mathbf{R^7}$, $\mathbf{R^8}$, $\mathbf{R^9}$, and $\mathbf{R^{10}}$ are each independently selected from the group consisting of H and CH_3;

(D) $\mathbf{Ar^2}$ is **(1g)**



(1g),

wherein:

(1) X^1 is selected from the group consisting of N and CR^{13}, and

(2) R^{11}, R^{12}, R^{13}, and R^{14} are each independently selected from the group consisting of H, F, and Cl;

(E) R^{15} is H;

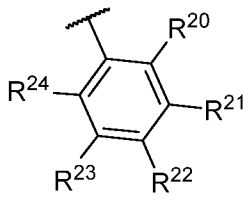
(F) Q^1 is O;

(G) Q^2 is S;

(H) R^{16} is **(K)**;

(I) R^{17} is **(K)**;

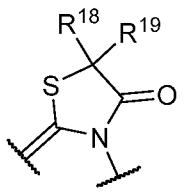
(J) L^2 is **(1h)**



(1h),

wherein, R^{20}, R^{21}, R^{22}, R^{23}, and R^{24} are each independently selected from the group consisting of H, CH_3, $CH_2CH_2CH_3$, $CH(CH_3)_2$, CH_2OCH_3, and $CH(CH_3)OCH_3$; and

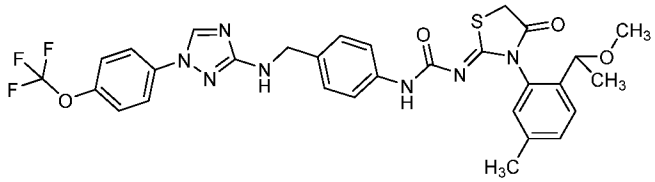
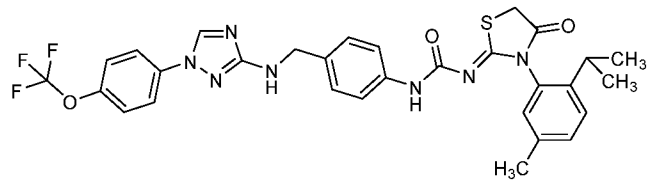
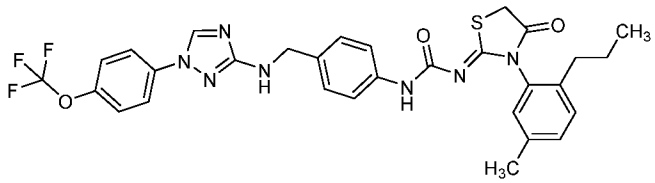
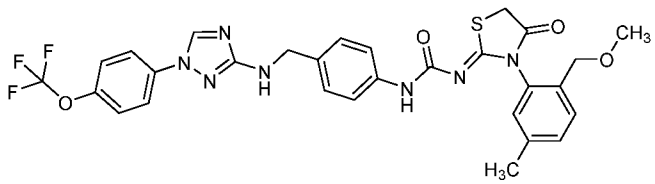
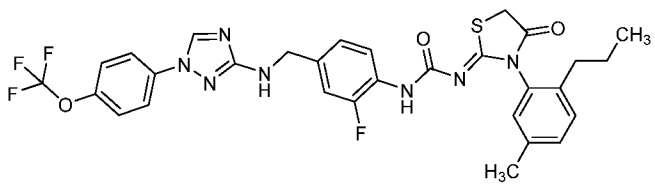
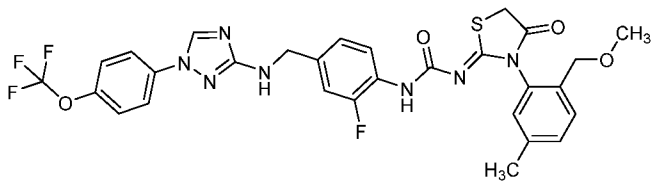
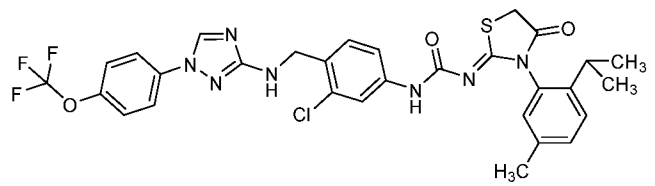
(K) R^{16} and R^{17} along with $C^x(Q^2)(N^x)$, is **(1i)**

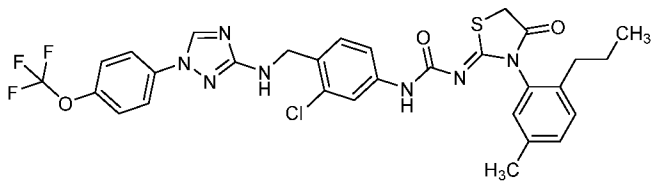
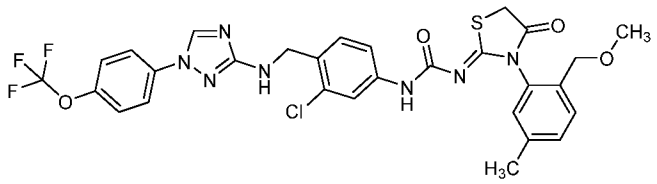
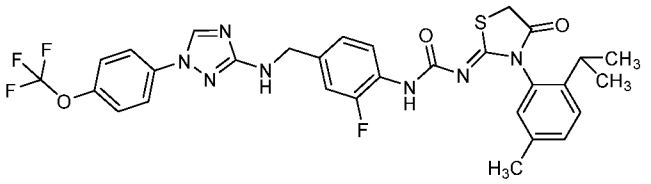
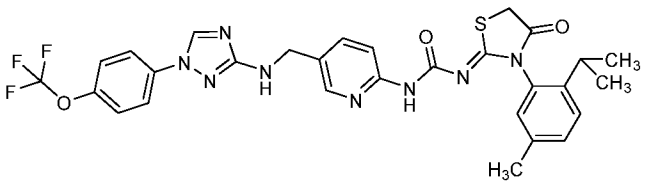
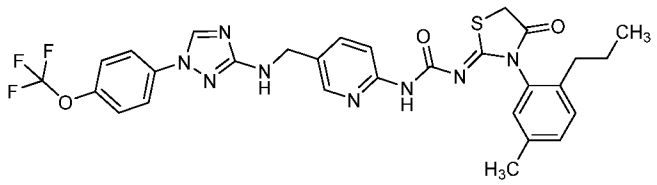
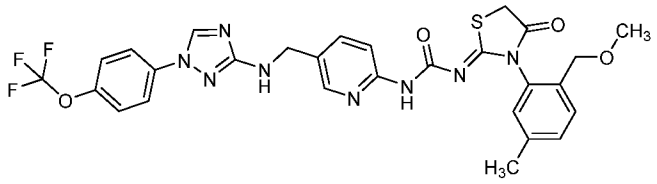
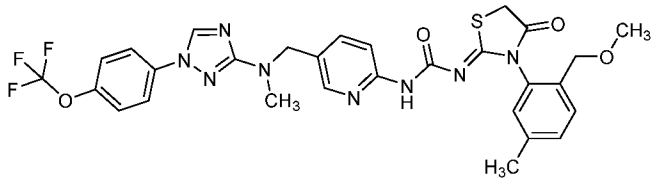
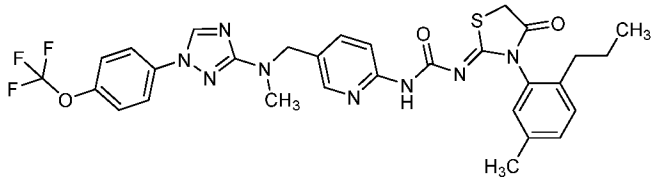


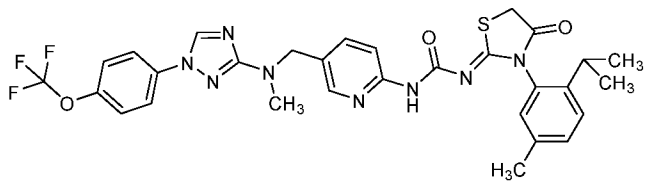
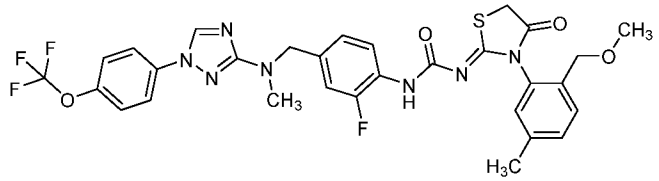
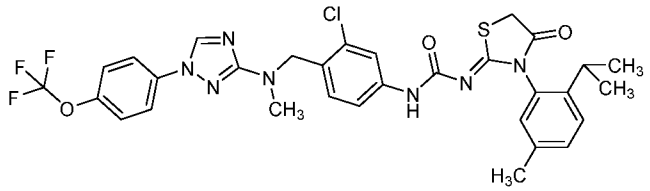
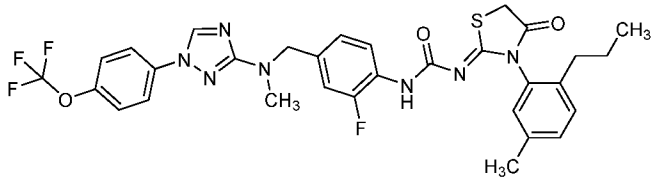
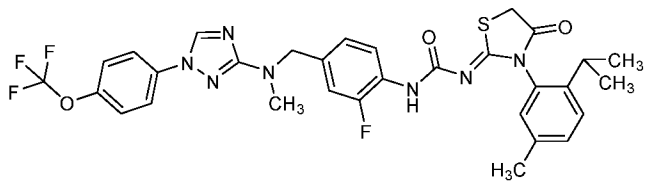
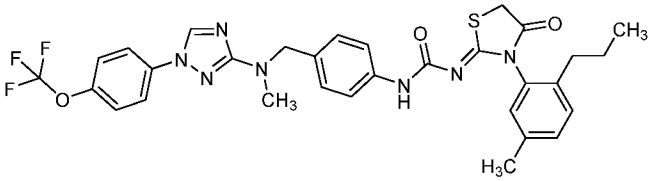
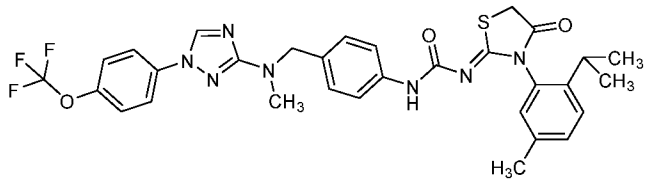
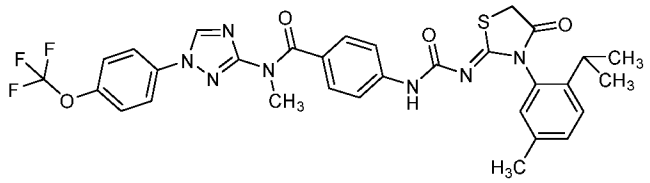
(1i),

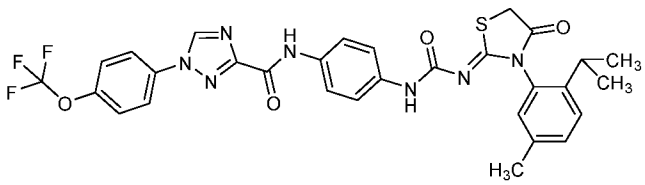
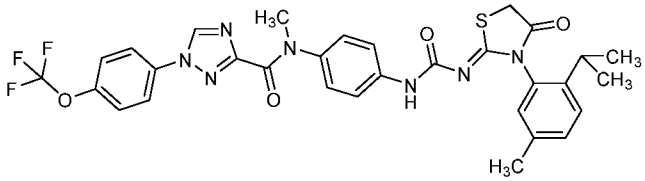
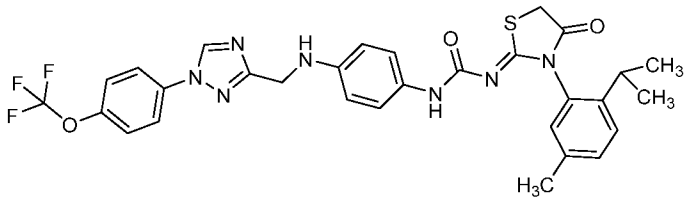
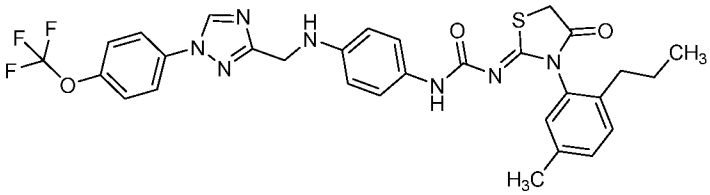
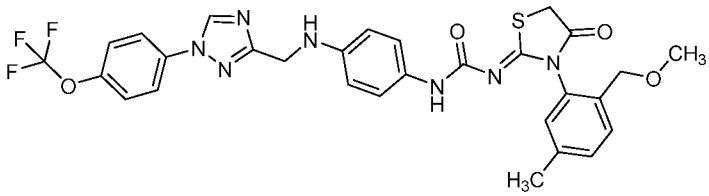
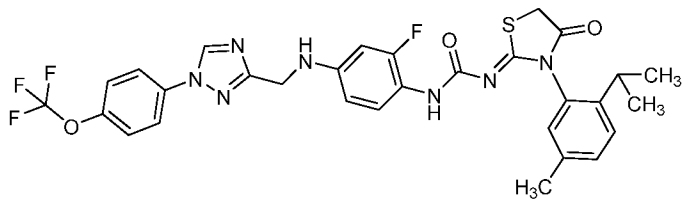
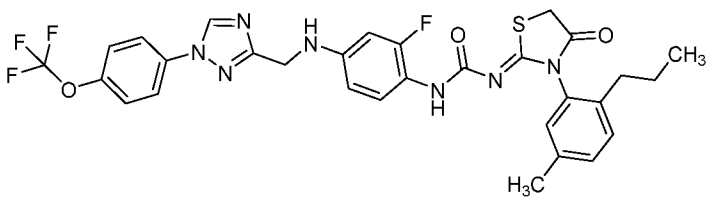
wherein, R^{18} and R^{19} are each independently H.

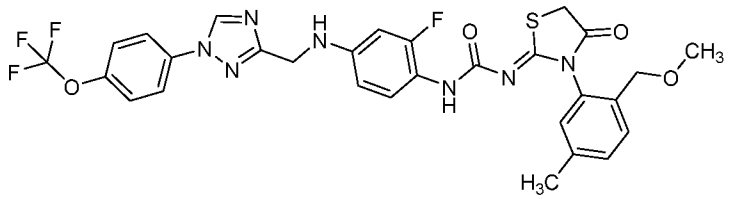
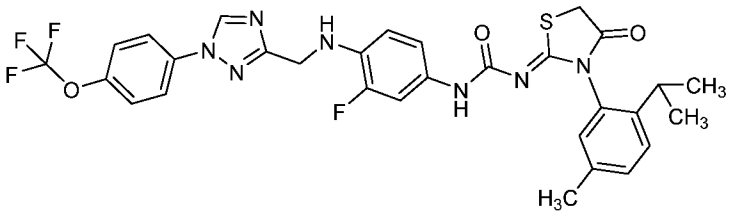
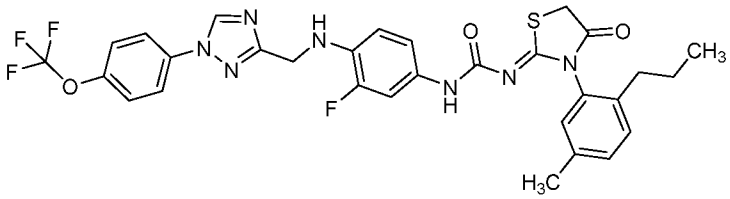
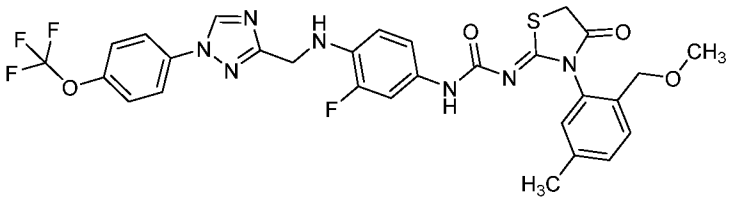
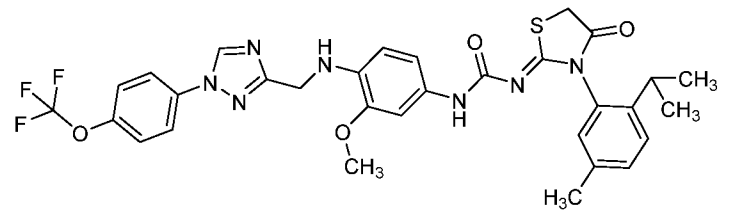
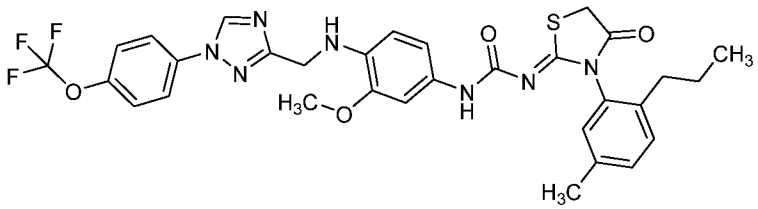
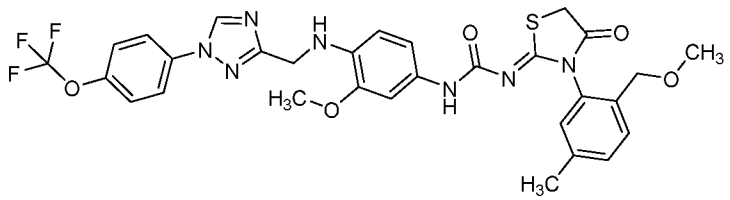
5. A molecule according to 1 wherein said molecule is

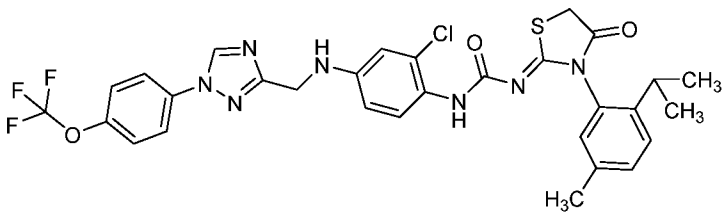
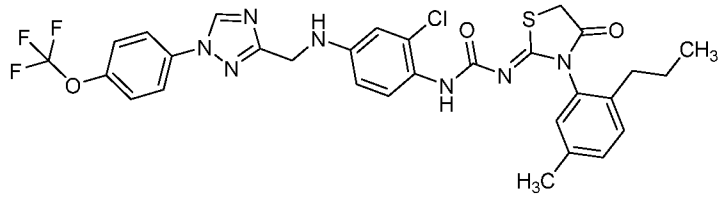
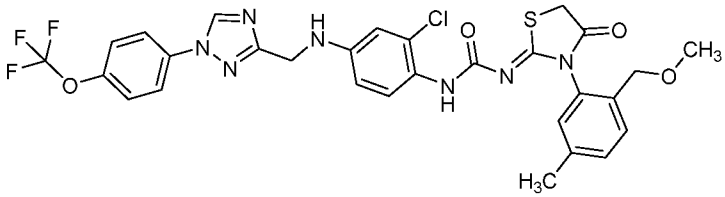
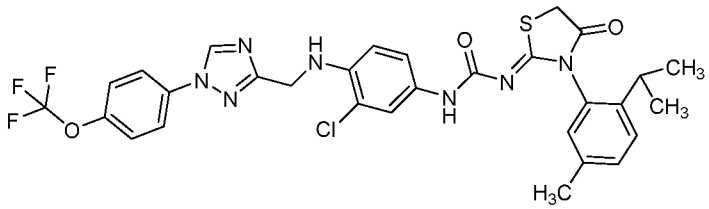
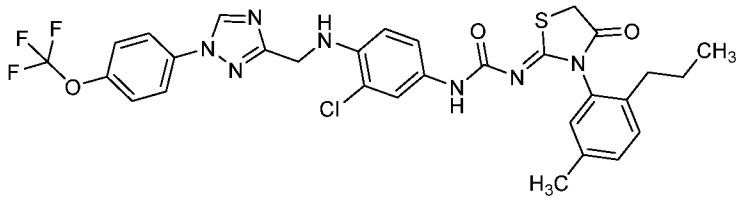
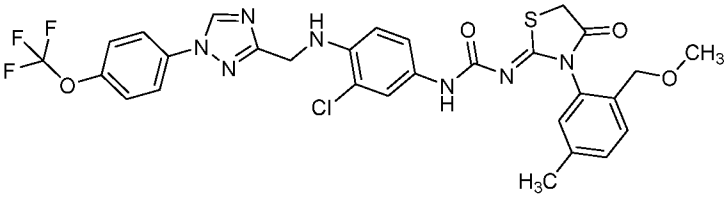
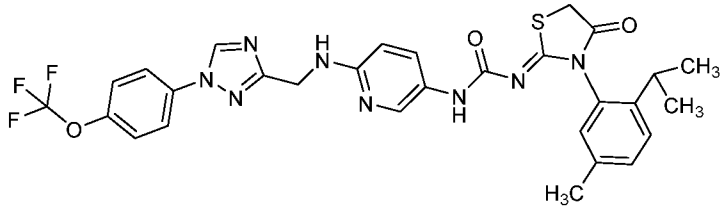
No.	Structure
F1	
F2	
F3	
F4	
F5	
F6	
F7	

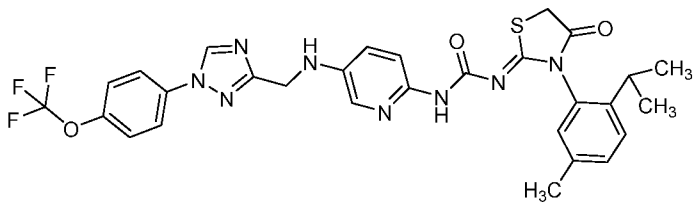
F8	
F9	
F10	
F11	
F12	
F13	
F14	
F15	

F16	
F17	
F20	
F21	
F22	
F23	
F24	
F25	

F26	
F27	
F28	
F29	
F30	
F31	
F32	

F33	
F34	
F35	
F36	
F37	
F38	
F39	

F40	
F41	
F42	
F43	
F44	
F45	
F46	

F47	

.

6. A pesticidal composition comprising a molecule according to any one of claims 1, 2, 3, 4, or 5 further comprising an active ingredient.

7. A process to control a pest said process comprising applying to a locus, a pesticidally effective amount of a molecule according to any one of claims 1, 2, 3, 4, or 5.

8. A process to control a pest said process comprising applying to a locus, a pesticidally effective amount of a pesticidal composition according to claim 6.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/048633

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - C07C 275/26; A01N 43/48; A01N 43/72; A01N 47/42; A01N 53/00; C07D 307/34 (2016.01)
CPC - C07C 275/26; A01N 43/48; A01N 43/72; A01N 47/42; A01N 53/00; C07D 307/34 (2016.11)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC - A01N 43/48; A01N 43/72; A01N 47/42; A01N 53/00; C07C 275/26; C07D 307/34
CPC - A01N 43/48; A01N 43/72; A01N 47/42; A01N 53/00; C07C 275/26; C07D 307/34

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 548/185; 548/196; 548/400; IPC - A01N 43/48; A01N 43/72; A01N 47/42; A01N 53/00; C07C 275/26; C07D 307/34;
CPC - A01N 43/48; A01N 43/72; A01N 47/42; A01N 53/00; C07C 275/26; C07D 307/34 (keyword delimited)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Orbit, Google Patents, Google, PubChem, SureChem, STN
Search terms used: pesticidal, furanyl, pyrrolidine, urea , carbamide, cyclopropyl

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2014/0274688 A1 (DOW AGROSCIENCES LLC) 18 September 2014 (18.09.2014) entire document	1, 6-8
A	US 2015/0225391 A1 (DOW AGROSCIENCES LLC) 13 August 2015 (13.08.2015) entire document	1, 6-8
A	US 2010/0093690 A1 (BRUCE et al) 15 April 2010 (15.04.2010) entire document	1, 6-8
A	US 2012/0053216 A1 (CREEMER et al) 01 March 2012 (01.03.2012) entire document	1, 6-8

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
01 December 2016	28 DEC 2016
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450 Facsimile No. 571-273-8300	Authorized officer Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/048633

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Extra Sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1, 6-8

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/048633

Continued from Box No. III Observations where unity of invention is lacking

Claims 1 and 6-8 have been analyzed subject to the restriction that the claims read on a molecule having the following formula: Formula One, wherein: Ar1 is furanyl, which is unsubstituted; Het is a 5-membered saturated heterocyclic ring containing one heteroatom independently selected from nitrogen, where Ar1 and L1 are meta to each other such that for the five-membered ring they are 1,3, where the Ar1 is attached at the 1-position and L1 is attached at the 3-position; L1 is N(Rx)-(C1)alkyl; Ar2 is furanyl, which is unsubstituted; R15 is H; Q1 is O; Q2 is O; R16 is selected from (K); R17 is selected from (K); L2 is C3 cycloalkyl, which is unsubstituted; wherein (K) is R16 and R17 along with Cx(Q2)(Nx) form a 4-memberd saturated heterocyclic ring containing one nitrogen atom; Rx is H; pesticidal compositions comprising the molecules; and processes to control a pest.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees need to be paid.

Group I+: claims 1-8 are drawn to molecules having the formula one, pesticidal compositions comprising the molecules, and processes to control a pest.

The first invention of Group I+ is restricted based on the proviso where Ar1 and L1 are not ortho to each other; and is restricted to a molecule having the following formula: Formula One, wherein: Ar1 is furanyl, which is unsubstituted; Het is a 5-membered saturated heterocyclic ring containing one heteroatom independently selected from nitrogen, where Ar1 and L1 are meta to each other such that for the five-membered ring they are 1,3, where the Ar1 is attached at the 1-position and L1 is attached at the 3-position; L1 is N(Rx)-(C1) alkyl; Ar2 is furanyl, which is unsubstituted; R15 is H; Q1 is O; Q2 is O; R16 is selected from (K); R17 is selected from (K); L2 is C3 cycloalkyl, which is unsubstituted; wherein (K) is R16 and R17 along with Cx(Q2)(Nx) form a 4-memberd saturated heterocyclic ring containing one nitrogen atom; Rx is H; pesticidal compositions comprising the molecules; and processes to control a pest. It is believed that claims 1 and 6-8 read on this first named invention and thus these claims will be searched without fee to the extent that they read on the above embodiment.

Applicant is invited to elect additional formula(e) for each additional compound to be searched in a specific combination by paying an additional fee for each set of election. Each additional elected formula(e) requires the selection of a single definition for each compound variable. An exemplary election would be a molecule having the following formula: Formula One, wherein: Ar1 is pyridyl, which is unsubstituted, where the pyridyl is attached at the 1-postion; Het is a 6-membered saturated heterocyclic ring containing one heteroatom independently selected from nitrogen, where Ar1 and L1 are meta to each other such that for the six-membered ring they are 1,3, where the Ar1 is attached at the 1-position and L1 is attached at the 3-position; L1 is N(Rx)-(C4)alkyl; Ar2 is phenyl, which is unsubstituted; R15 is C8 cycloalkyl; Q1 is S; Q2 is O; R16 is C4 alkyl, which is unsubstituted; R17 is C4 alkyl, which is unsubstituted; L2 is C4 cycloalkyl, which is unsubstituted; Rx is H; pesticidal compositions comprising the molecules; and processes to control a pest. Additional formula(e) will be searched upon the payment of additional fees. Applicants must specify the claims that read on any additional elected inventions. Applicants must further indicate, if applicable, the claims which read on the first named invention if different than what was indicated above for this group. Failure to clearly identify how any paid additional invention fees are to be applied to the "+" group(s) will result in only the first claimed invention to be searched/examined.

The inventions listed in Groups I+ do not relate to a single general inventive concept under PCT Rule 13.1, because under PCT Rule 13.2 they lack the same or corresponding special technical features for the following reasons:

The Groups I+ formulae do not share a significant structural element requiring the selection of alternatives for the compound variables Ar1, Het, L1, Ar2, R15, Q1, Q2, L2, R16, and R17.

The Groups I+ share the technical features of a molecule having the core structure of Formula One; a pesticidal composition comprising a molecule further comprising an active ingredient; a process to control a pest said process comprising applying to a locus, a pesticidally effective amount of a molecule; and a process to control a pest said process comprising applying to a locus, a pesticidally effective amount of a pesticidal composition. However, these shared technical features do not represent a contribution over the prior art.

Specifically, US 2014/0274688 A1 to Dow Agrosciences LLC teaches of a molecule having the core structure of Formula One (Claim 12, Compound F2;...see shown structure...; Paras. [0262] through [0267]); a pesticidal composition (Abstract; Para. [0762]) comprising a molecule (Abstract; Para. [0762]) further comprising an active ingredient (Abstract; Para. [0762]); a process to control a pest said process comprising applying to a locus (Claim 25; Paras. [0820] and [0821]), a pesticidally effective amount of a molecule (Claim 25; Paras. [0820] and [0821]); and a process to control a pest (Claim 25; Paras. [0820] and [0821]) said process comprising applying to a locus, a pesticidally effective amount of a pesticidal composition (Claim 25; Paras. [0820] and [0821]; Para. [0842]).

The inventions listed in Groups I+ therefore lack unity under Rule 13 because they do not share a same or corresponding special technical feature.