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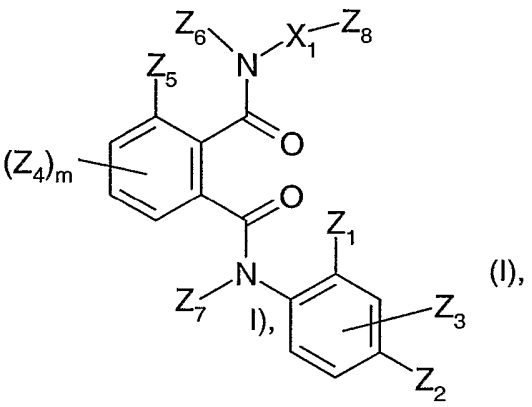
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(54) Title: PHTHALAMIDE DERIVATIVES FOR USE AS INSECTICIDES



(57) Abstract: Compounds of formula (I), wherein the substituents are as defined in claim (1), and the agrochemically acceptable salts and all stereoisomers and tautomeric forms of the compounds of formula (I) can be used as agrochemical active ingredients and can be prepared in a manner known per se.

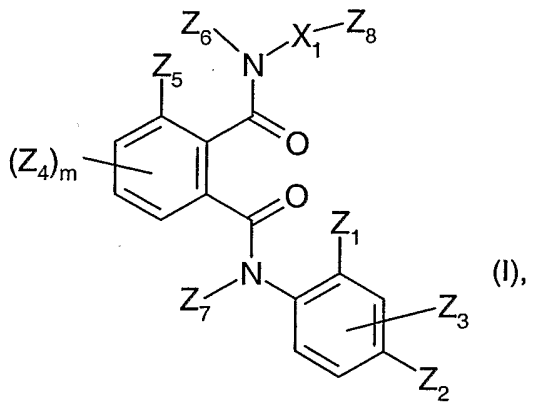
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PHTHALAMIDE DERIVATIVES FOR USE AS INSECTICIDES

The present invention relates to phthalamide derivatives, to processes for their preparation, to compositions comprising those compounds, and to their use for controlling insects or representatives of the order Acarina.

Phthalamide derivatives with insecticidal properties are known and described, for example, in EP-A-1006107, EP-A-1241159, WO 02/0947695 and EP-A-1215200.

There have now been found novel phthalamide derivatives with pesticidal properties. The present invention accordingly relates to compounds of formula I



(I),

wherein

X_1 is a chemical bond or is a C_1-C_4-alkylene chain;

each of Z_1 and Z_3, which may be the same or different, represents hydrogen, halogen, nitro, cyano, C_1-C_8alkyl, C_1-C_8haloalkyl, C_2-C_8alkenyl, C_2-C_8haloalkenyl, C_2-C_8alkynyl, C_2-C_8haloalkynyl, C_3-C_6cycloalkyl, C_3-C_6halocycloalkyl, C_1-C_8alkoxy, C_1-C_8haloalkoxy, C_1-C_8alkylthio, C_1-C_8haloalkylthio, C_1-C_8alkylsulfinyl, C_1-C_8haloalkylsulfinyl, C_1-C_8alkylsulfonyl, C_1-C_8haloalkylsulfonyl, C_1-C_6alkylamino, di-(C_1-C_6alkyl)amino, whose C_1-C_6alkyl groups may be the same or different;

Z_2 represents C_1-C_6haloalkoxy or a group $-C(R_1R_2)-R_3$;

R_1 is halogen;

R_2 is halogen or C_1-C_6-haloalkyl;

R_3 is halogen or C_1-C_6-haloalkyl;

each of Z_4 and Z_5, which may be the same or different, represents halogen, cyano, C_1-C_8alkyl, C_1-C_8haloalkyl, C_1-C_8alkoxy, C_1-C_8haloalkoxy, C_1-C_8alkylthio, C_1-C_8haloalkylthio, C_1-

C_8alkylsulfinyl, C_1-C_8haloalkylsulfinyl, C_1-C_8alkylsulfonyl, C_1-C_8haloalkylsulfonyl; -N($R_{13}R_{14}$), -N(R_{15})-C(O)-OR_{16} or -N(R_{17})-C(O)-R_{18};

R_{13}, R_{14}, R_{15}, R_{16}, R_{17} and R_{18} independently of one another are C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_3-C_6cycloalkyl(C_1-C_4)alkyl, C_1-C_6alkoxy(C_1-C_4)alkyl, C_1-C_6 alkylthio(C_1-C_4) alkyl, cyano(C_1-C_6)alkyl, phenyl(C_1-C_4) alkyl which may be mono-, di- or trisubstituted by R_{19}, C_3-C_8cycloalkyl, C_3-C_8halocycloalkyl, C_3-C_6alkenyl, C_3-C_6haloalkenyl, C_3-C_6alkinyl or phenyl which may be mono-, di- or trisubstituted by R_{19};

R_{19} represents halogen, cyano, nitro, C_1-C_6alkyl, C_1-C_6haloalkyl, C_3-C_6cycloalkyl, C_3-C_6halocycloalkyl, C_2-C_6alkenyl, C_2-C_6haloalkenyl, C_2-C_6alkinyl, C_2-C_6haloalkinyl, C_1-C_6alkoxy, C_1-C_6haloalkoxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, C_1-C_6alkylamino, di(C_1-C_6 alkyl)amino, C_1-C_6alkoxycarbonyl, C_1-C_6haloalkoxycarbonyl, or phenyl which may be substituted by halogen;

m is 0, 1 or 2;

Z_8 represents C_3-C_6cyanocycloalkyl, C_3-C_6nitrocycloalkyl, C_3-C_6cyanocycloalkenyl or C_3-C_6nitrocycloalkenyl; or

Z_8 represents C_3-C_6cycloalkyl, C_3-C_6cyanocycloalkyl, C_3-C_6nitrocycloalkyl, C_3-C_6halocyloalkyl, C_3-C_6cycloalkenyl, C_3-C_6cyanocycloalkenyl, C_3-C_6nitrocycloalkenyl or C_3-C_6halocyloalkenyl, which are

a) mono-, di- or trisubstituted by substituents selected from C_1-C_8alkyl, C_2-C_8-alkenyl, C_2-C_8alkynyl and silyl(C_1-C_4-alkyl)$_3$; where said substituents for their part may be substituted by cyano, nitro, halogen, C_1-C_6alkylaminosulfonyl, di-(C_1-C_6alkylamino)sulfonyl, or by a three- to ten-membered, monocyclic or fused bicyclic ring system, which may be aromatic, partially saturated or fully saturated and may contain from 1 to 4 hetero atoms selected from nitrogen, oxygen, sulfur, C(O) and C(=NR_9), and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may contain not more than two oxygen atoms, not more than two sulfur atoms, not more than two C(O) groups and not more than one C(=NR_9) group, and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may itself be mono- or poly-substituted by C_1-C_6alkyl, C_1-C_6haloalkyl, C_2-C_6alkenyl, C_2-C_6haloalkenyl, C_2-C_6alkynyl, C_2-C_6haloalkynyl, C_1-C_6alkoxy, C_1-C_6haloalkoxy, C_3-C_6alkenyloxy, C_3-C_6alkynyloxy, mercapto, amino, hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)-

amino, halogen, cyano, nitro and/or phenyl, it being possible for the phenyl group in turn to be substituted by hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano or nitro, and the substituents at the nitrogen atom in the heterocyclic ring being other than halogen, and two oxygen atoms not being located next to one another;

R_9 is hydrogen, hydroxy, C_1-C_6alkyl, C_1-C_6haloalkyl, C_1-C_6alkoxy, C_1-C_6alkylcarbonyl, C_1-C_6alkoxycarbonyl or C_1-C_6alkylsulfonyl; or which are

b) mono-, di- or trisubstituted by a three- to ten-membered, monocyclic or fused bicyclic ring system, which may be aromatic, partially saturated or fully saturated and may contain from 1 to 4 hetero atoms selected from nitrogen, oxygen, sulfur, C(O) and C(=NR_{10}), and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may contain not more than two oxygen atoms, not more than two sulfur atoms, not more than two C(O) groups and not more than one C(=NR_{10}) group, and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may itself be mono- or poly-substituted by C_1-C_6alkyl, C_1-C_6haloalkyl, C_2-C_6alkenyl, C_2-C_6haloalkenyl, C_2-C_6alkynyl, C_2-C_6haloalkynyl, C_1-C_6alkoxy, C_1-C_6haloalkoxy, C_3-C_6alkenyloxy, C_3-C_6alkynyloxy, mercapto, amino, hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano, nitro and/or phenyl, it being possible for the phenyl group in turn to be substituted by hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano or nitro, and the substituents at the nitrogen atom in the heterocyclic ring being other than halogen, and two oxygen atoms not being located next to one another;

R_{10} is hydrogen, hydroxy, C_1-C_6alkyl, C_1-C_6haloalkyl, C_1-C_6alkoxy, C_1-C_6alkylcarbonyl, C_1-C_6alkoxycarbonyl or C_1-C_6alkylsulfonyl; or

Z_8 represents a seven- to twelve-membered monocarbocyclic, bridged or fused bicarbocyclic ring system, which is saturated or partially saturated, where

c) said seven- to twelve-membered monocarbocyclic, bridged or fused bicarbocyclic ring system for its part may be mono-, di- or trisubstituted by substituents selected from C_1-C_8alkyl, C_2-C_8-alkenyl, C_2-C_8alkynyl and silyl(C_1-C_4-alkyl)$_3$; where said substituents for their part may be substituted by cyano, nitro, halogen, C_1-C_6alkylaminosulfonyl, di-(C_1-C_6alkylamino)sulfonyl, or by a three- to ten-membered, monocyclic or fused bicyclic ring system, which may be aromatic, partially saturated or fully saturated and may contain from 1 to 4 hetero atoms selected from nitrogen, oxygen, sulfur, C(O) and C(=NR_{11}), and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may contain not more than two oxygen atoms, not more than two sulfur atoms, not more than two C(O) groups and not more than one C(=NR_{11}) group, and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may itself be mono- or poly-substituted by C_1-C_6alkyl, C_1-C_6haloalkyl, C_2-C_6alkenyl, C_2-C_6haloalkenyl, C_2-C_6alkynyl, C_2-C_6haloalkynyl, C_1-C_6alkoxy, C_1-C_6haloalkoxy, C_3-C_6alkenyloxy, C_3-C_6alkynyloxy, mercapto, amino, hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano, nitro and/or phenyl, it being possible for the phenyl group in turn to be substituted by hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano or nitro, and the substituents at the nitrogen atom in the heterocyclic ring being other than halogen, and two oxygen atoms not being located next to one another;

R_{11} is hydrogen, hydroxy, C_1-C_6alkyl, C_1-C_6haloalkyl, C_1-C_6alkoxy, C_1-C_6alkylcarbonyl, C_1-C_6alkoxycarbonyl or C_1-C_6alkylsulfonyl; or

d) said seven- to twelve-membered monocarbocyclic, bridged or fused bicarbocyclic ring system for its part may be substituted by a three- to ten-membered, monocyclic or fused bicyclic ring system, which may be aromatic, partially saturated or fully saturated and may contain from 1 to 4 hetero atoms selected from nitrogen, oxygen, sulfur, C(O) and C(=NR_{12}),

and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may contain not more than two oxygen atoms, not more than two sulfur atoms, not more than two C(O) groups and not more than one C(=NR_{12}) group, and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may itself be mono- or poly-substituted by C_1-C_6alkyl, C_1-C_6haloalkyl, C_2-C_6alkenyl, C_2-C_6haloalkenyl, C_2-C_6alkynyl, C_2-C_6haloalkynyl, C_1-C_6alkoxy, C_1-C_6haloalkoxy, C_3-C_6alkenyloxy, C_3-C_6alkynyloxy, mercapto, amino, hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano, nitro and/or phenyl, it being possible for the phenyl group in turn to be substituted by hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano or nitro, and the substituents at the nitrogen atom in the heterocyclic ring being other than halogen, and two oxygen atoms not being located next to one another;

R_{12} is hydrogen, hydroxy, C_1-C_6alkyl, C_1-C_6haloalkyl, C_1-C_6alkoxy, C_1-C_6alkylcarbonyl, C_1-C_6alkoxycarbonyl or C_1-C_6alkylsulfonyl;

Z_6 is hydrogen or C_1-C_8alkyl; and

Z_7 is hydrogen, C_1-C_8alkyl, C_2-C_8alkenyl or C_2-C_8alkynyl; and agronomically acceptable salts/isomers/enantiomers/tautomers of those compounds.

Compounds I which have at least one basic centre can form, for example, acid addition salts, for example with strong inorganic acids such as mineral acids, for example perchloric acid, sulfuric acid, nitric acid, nitrose acid, a phosphorus acid or a hydrohalic acid, with strong organic carboxylic acids, such as C_1-C_4alkanecarboxylic acids which are unsubstituted or substituted, for example by halogen, for example acetic acid, such as saturated or unsaturated dicarboxylic acids, for example oxalic acid, malonic acid, succinic acid, maleic acid, fumaric acid or phthalic acid, such as hydroxycarboxylic acids, for example ascorbic acid, lactic acid, malic acid, tartaric acid or citric acid, or such as benzoic acid, or with organic sulfonic acids, such as C_1-C_4alkane- or arylsulfonic acids which are unsubstituted or

substituted, for example by halogen, for example methane- or p-toluenesulfonic acid. Compounds I which have at least one acidic group can form, for example, salts with bases, for example mineral salts such as alkali metal or alkaline earth metal salts, for example sodium, potassium or magnesium salts, or salts with ammonia or an organic amine, such as morpholine, piperidine, pyrrolidine, a mono-, di- or tri-lower-alkylamine, for example ethyl-, diethyl-, triethyl- or dimethylpropylamine, or a mono-, di- or trihydroxy-lower-alkylamine, for example mono-, di- or triethanolamine. Where appropriate, the corresponding internal salts can furthermore be formed. Preferred within the scope of the invention are agrochemically advantageous salts; however, the invention also encompasses salts which have disadvantage for agrochemical use, for example salts which are toxic to bees or fish, and which are employed, for example, for the isolation or purification of free compounds I or agrochemically utilizable salts thereof. Owing to the close relationship between the compounds I in free form and in the form of their salts, for the purposes of the invention the free compounds I or their salts hereinabove and hereinbelow are respectively to be understood as including, where appropriate, the corresponding salts or the free compounds I. The same applies analogously to tautomers of compounds I and salts thereof. In general, the free form is preferred in each case.

A seven- to twelve-membered monocarbocyclic, bridged or fused bicarbocyclic ring system, which is saturated or partially saturated is preferably cycloheptyl, cyclooctyl, cycloheptenyl, cyclooctenyl, bicyclo[3.2.1]octyl or bicyclo[4.1.0]heptyl.

Z_8 as C_3-C_6cycloalkyl or C_3-C_6cycloalkenyl is cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cylclopropenyl, cyclobutenyl, cyclopentenyl or cyclohexenyl.

The alkyl groups occurring in the definitions of the substituents can be straight-chain or branched and are, for example, methyl, ethyl, n-propyl, isopropyl, n-butyl, sec-butyl, isobutyl, tert-butyl, pentyl, hexyl, heptyl and octyl and their branched isomers. Alkoxy, alkenyl and alkynyl radicals are derived from the alkyl radicals mentioned. The alkenyl and alkynyl groups can be mono- or polyunsaturated.

Halogen is generally fluorine, chlorine, bromine or iodine. This also applies, correspondingly, to halogen in combination with other meanings, such as haloalkyl or halophenyl.

Haloalkyl groups preferably have a chain length of from 1 to 6 carbon atoms. Haloalkyl is, for example, fluoromethyl, difluoromethyl, trifluoromethyl, chloromethyl, dichloromethyl, trichloromethyl, 2,2,2-trifluoroethyl, 2-fluoroethyl, 2-chloroethyl, pentafluoroethyl, 1,1-difluoro-

2,2,2-trichloroethyl, 2,2,3,3-tetrafluoroethyl and 2,2,2-trichloroethyl; preferably trichloromethyl, difluorochloromethyl, difluoromethyl, trifluoromethyl and dichlorofluoromethyl.

Suitable haloalkenyl groups are alkenyl groups which are mono- or polysubstituted by halogen, halogen being fluorine, chlorine, bromine and iodine and in particular fluorine and chlorine, for example 2,2-difluoro-1-methylvinyl, 3-fluoropropenyl, 3-chloropropenyl, 3-bromopropenyl, 2,3,3-trifluoropropenyl, 2,3,3-trichloropropenyl and 4,4,4-trifluorobut-2-en-1-yl. Among the C_3-C_{20}alkenyl groups which are mono-, di- or trisubstituted by halogen, preference is given to those having a chain length of from 3 to 5 carbon atoms.

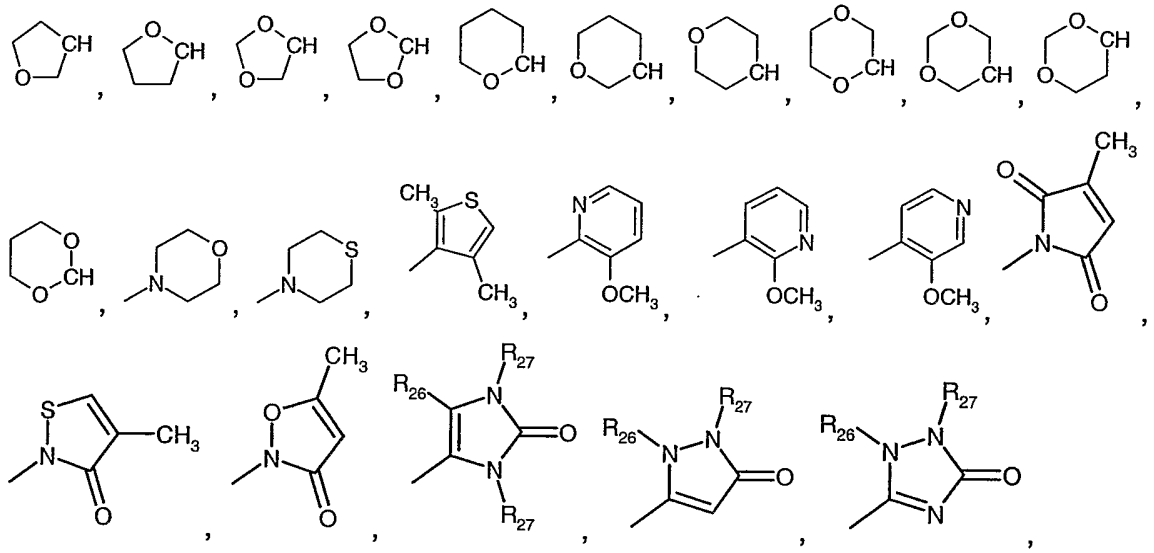
Suitable haloalkynyl groups are, for example, alkynyl groups which are mono- or polysubstituted by halogen, halogen being bromine, iodine and in particular fluorine and chlorine, for example 3-fluoropropynyl, 3-chloropropynyl, 3-bromopropynyl, 3,3,3-trifluoropropynyl and 4,4,4-trifluorobut-2-yn-1-yl. Among the alkynyl groups which are mono- or polysubstituted by halogen, preference is given to those having a chain length of from 3 to 5 carbon atoms.

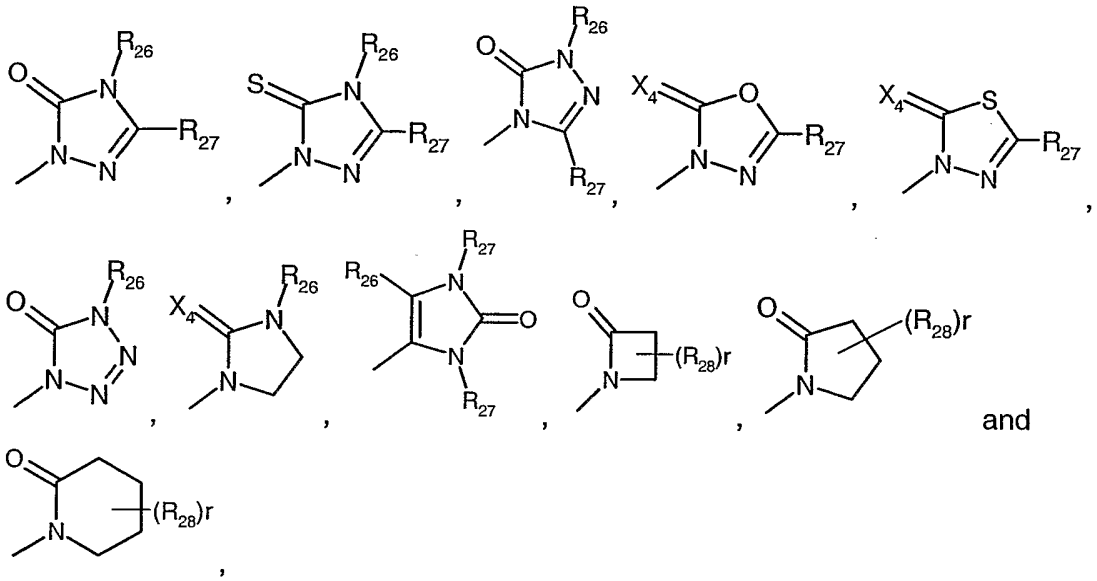
Alkoxy groups preferably have a preferred chain length of from 1 to 6 carbon atoms. Alkoxy is, for example, methoxy, ethoxy, propoxy, i-propoxy, n-butoxy, isobutoxy, sec-butoxy and tert-butoxy and also the isomeric pentyloxy and hexyloxy radicals; preferably methoxy and ethoxy. Alkylcarbonyl is preferably acetyl or propionyl. Alkoxycarbonyl is, for example, methoxycarbonyl, ethoxycarbonyl, propoxycarbonyl, isopropoxycarbonyl, n-butoxycarbonyl, isobutoxycarbonyl, sec-butoxycarbonyl or tert-butoxycarbonyl; preferably methoxycarbonyl or ethoxycarbonyl. Haloalkoxy groups preferably have a chain length of from 1 to 8 carbon atoms. Haloalkoxy is, for example, fluoromethoxy, difluoromethoxy, trifluoromethoxy, 2,2,2-trifluoroethoxy, 1,1,2,2-tetrafluoroethoxy, 2-fluoroethoxy, 2-chloroethoxy, 2,2-difluoroethoxy and 2,2,2-trichloroethoxy; preferably difluoromethoxy, 2-chloroethoxy and trifluoromethoxy. Alkylthio groups preferably have a chain length of from 1 to 8 carbon atoms. Alkylthio is, for example, methylthio, ethylthio, propylthio, isopropylthio, n-butylthio, isobutylthio, sec-butylthio or tert-butylthio, preferably methylthio and ethylthio. Alkylsulfinyl is, for example, methylsulfinyl, ethylsulfinyl, propylsulfinyl, isopropylsulfinyl, n-butylsulfinyl, isobutylsulfinyl, sec-butylsulfinyl, tert-butylsulfinyl; preferably methylsulfinyl and ethylsulfinyl.

Alkylsulfonyl is, for example, methylsulfonyl, ethylsulfonyl, propylsulfonyl, isopropylsulfonyl, n-butylsulfonyl, isobutylsulfonyl, sec-butylsulfonyl or tert-butylsulfonyl; preferably methylsulfonyl or ethylsulfonyl. Alkoxyalkoxy groups preferably have a chain length of from 1 to 8 carbon atoms. Examples of alkoxyalkoxy groups are: methoxymethoxy, methoxyethoxy, methoxypropoxy, ethoxymethoxy, ethoxyethoxy, propoxymethoxy or butoxybutoxy. Alkylamino is, for example, methylamino, ethylamino, n-propylamino, isopropylamino or the isomeric butylamines. Dialkylamino is, for example, dimethylamino, methylethylamino, diethylamino, n-propylmethylamino, dibutylamino and diisopropylamino. Preference is given to alkylamino groups having a chain length of from 1 to 4 carbon atoms. Alkoxyalkyl groups preferably have a chain length of 1 to 6 carbon atoms. Alkoxyalkyl is, for example, methoxymethyl, methoxyethyl, ethoxymethyl, ethoxyethyl, n-propoxymethyl, n-propoxyethyl, isopropoxymethyl or isopropoxyethyl. Alkylthioalkyl groups preferably have from 1 to 8 carbon atoms. Alkylthioalkyl is, for example, methylthiomethyl, methylthioethyl, ethylthiomethyl, ethylthioethyl, n-propylthiomethyl, n-propylthioethyl, isopropylthiomethyl, isopropylthioethyl, butylthiomethyl, butylthioethyl or butylthiobutyl. The cycloalkyl groups preferably have from 3 to 8 ring carbon atoms, for example cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, cycloheptyl and cyclooctyl. Phenyl, also as part of a substituent such as phenoxy, benzyl, benzyloxy, benzoyl, phenylthio, phenylalkyl, phenoxyalkyl, may be substituted. In this case, the substituents can be in ortho, meta and/or para position. The preferred substituent positions are the ortho and para positions to the ring attachment point.

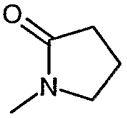
According to the present invention, a three- to ten-membered, monocyclic or fused bicyclic ring system which may be aromatic, partially saturated or fully saturated is, for example, selected from the group consisting of cylclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, where said cycloalkylgroups for their part may be preferably unsubstituted or substituted by C_1-C_6alkyl or halogen, or is phenyl, naphthyl or the following heterocyclic groups: pyrrolyl; pyridyl; pyrazolyl; pyrimidyl; pyrazinyl; imidazolyl; thiadiazolyl; quinazolinyl; furyl; oxadiazolyl; indolizinyl; pyranyl; isobenzofuranyl; thienyl; naphthyridinyl; (1-methyl-1H-pyrazol-3-yl)-; (1-ethyl-1H-pyrazol-3-yl)-; (1-propyl-1H-pyrazol-3-yl)-; (1H-pyrazol-3-yl)-; (1,5-dimethyl-1H-pyrazol-3-yl)-; (4-chloro-1-methyl-1H-pyrazol-3-yl)-; (1H-pyrazol-1-yl)-; (3-methyl-1H-pyrazol-1-yl)-; (3,5-dimethyl-1H-pyrazol-1-yl)-; (3-isoxazolyl)-; (5-methyl-3-isoxazolyl)-; (3-methyl-5-isoxazolyl)-; (5-isoxazolyl)-; (1H-pyrrol-2-yl)-; (1-methyl-1H-pyrrol-2-yl)-; (1H-pyrrol-1-yl)-; (1-methyl-1H-pyrrol-3-yl)-; (2-furanyl)-; (5-methyl-2-furanyl)-; (3-furanyl)-; (5-methyl-2-thienyl)-; (2-thienyl)-; (3-thienyl)-; (1-methyl-1H-imidazol-2-yl)-; (1H-imidazol-2-yl)-; (1-methyl-1H-

imidazol-4-yl)-; (1- methyl-1H-imidazol-5-yl)-; (4-methyl-2-oxazolyl)-; (5-methyl-2-oxazolyl)-; (2-oxazolyl)-; (2-methyl-5-oxazolyl)-; (2-methyl-4-oxazolyl)-; (4-methyl-2-thiazolyl)-; (5-methyl-2-thiazolyl)-; (2-thiazolyl)-; (2-methyl-5-thiazolyl)-; (2-methyl-4-thiazolyl)-; (3-methyl-4-isothiazolyl)-; (3-methyl-5-isothiazolyl)-; (5-methyl-3-isothiazolyl)-; (1-methyl-1H-1,2,3-triazol-4-yl)-; (2-methyl-2H-1,2,3-triazol-4-yl)-; (4-methyl-2H-1,2,3-triazol-2-yl)-; (1-methyl-1H-1,2,4-triazol-3-yl)-; (1,5-dimethyl-1H-1,2,4-triazol-3-yl)-; (3-methyl-1H-1,2,4-triazol-1-yl)-; (5-methyl-1H-1,2,4-triazol-1-yl)-; (4,5-dimethyl-4H-1,2,4-triazol-3-yl)-; (4-methyl-4H-1,2,4-triazol-3-yl)-; (4H-1,2,4-triazol-4-yl)-; (5-methyl-1,2,3-oxadiazol-4-yl)-; (1,2,3-oxadiazol-4-yl)-; (3-methyl-1,2,4-oxadiazol-5-yl)-; (5-methyl-1,2,4-oxadiazol-3-yl)-; (4-methyl-3-furazanyl)-; (3-furazanyl)-; (5-methyl-1,2,4-oxadiazol-2-yl)-; (5-methyl-1,2,3-thiadiazol-4-yl)-; (1,2,3-thiadiazol-4-yl)-; (3-methyl-1,2,4-thiadiazol-5-yl)-; (5-methyl-1,2,4-thiadiazol-3-yl)-; (4-methyl-1,2,5-thiadiazol-3-yl)-; (5-methyl-1,3,4-thiadiazol-2-yl)-; (1-methyl-1H-tetrazol-5-yl)-; (1H-tetrazol-5-yl)-; (5-methyl-1H-tetrazol-1-yl)-; (2-methyl-2H-tetrazol-5-yl)-; (2-ethyl-2H-tetrazol-5-yl)-; (5-methyl-2H-tetrazol-2-yl)-; (2H-tetrazol-2-yl)-; (2-pyridyl)-; (6-methyl-2-pyridyl)-; (4-pyridyl)-; (3-pyridyl)-; (6-methyl-3-pyridazinyl)-; (5-methyl-3-pyridazinyl)-; (3-pyridazinyl)-; (4,6-dimethyl-2-pyrimidinyl)-; (4-methyl-2-pyrimidinyl)-; (2-pyrimidinyl)-; (2-methyl-4-pyrimidinyl)-; (2-chloro-4-pyrimidinyl)-; (2,6-dimethyl-4-pyrimidinyl)-; (4-pyrimidinyl)-; (2-methyl-5-pyrimidinyl)-; (6-methyl-2-pyrazinyl)-; (2-pyrazinyl)-; (4,6-dimethyl-1,3,5-triazin-2-yl)-; (4,6-dichloro-1,3,5-triazin-2-yl)-; (1,3,5-triazin-2-yl)-; (4-methyl-1,3,5-triazin-2-yl)-; (3-methyl-1,2,4-triazin-5-yl)-; (3-methyl-1,2,4-triazin-6-yl)-;





wherein each R_{26} is methyl, each R_{27} and each R_{28} are independently hydrogen, C_1-C_3alkyl, C_1-C_3alkoxy, C_1-C_3alkylthio or trifluoromethyl, X_4 is oxygen or sulfur and r = 1, 2, 3 or 4.

Where no free valency is indicated in those definitions, for example as in , the linkage site is located at the carbon atom labelled "CH" or in a case such as, for example,  at the bonding site indicated at the bottom left.

Preference is given to compounds of formula I wherein Z_6 and/or Z_7 is hydrogen.

Compounds of formula I are also preferred wherein m is 0.

Special mention should be made of compounds of formula I wherein Z_2 is a group $-C(R_1R_2)-R_3$, wherein R_1 is fluorine, R_2 is C_1-C_6fluoroalkyl, preferably fluoromethyl, most preferably trifluoromethyl and R_3 is C_1-C_6fluoroalkyl, preferably fluoromethyl, most preferably trifluoromethyl.

In a further preferred group of compounds of formula I R_3 and R_2 are fluorine.
An outstanding group of compounds of formula I comprises those compounds wherein Z_1 is hydrogen, halogen or C_1-C_4alkyl and Z_3 is hydrogen.

A further outstanding group of compounds of formula I comprises those compounds wherein Z_1 is hydrogen, methyl or chlorine, Z_2 is $-C(CF_3)_2-F$, Z_3 is hydrogen, Z_4 is hydrogen, Z_5 is chlorine, iodine or nitro, Z_6 is hydrogen, Z_7 is hydrogen, X_1 is a chemical bond and Z_8 is cyclopropyl which is mono- or di-substituted by C_1-C_6alkyl, thienyl, furyl, phenyl, or by phenyl which itself is substituted by C_1-C_3-alkyl, C_1-C_6haloalkyl and/or halogen, or by pyridyl, which itself may be substituted by halogen or methyl, or by C_3-C_6cycloalkyl, C_2-C_6alkenyl, bicyclohexyl, bicyclohexyl substituted by C_1-C_3alkyl, or by bicycloheptyl or bicycloheptyl substituted by C_1-C_3alkyl.

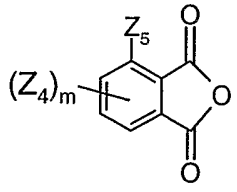
Preferred compounds of formula I are those wherein Z_5 is halogen, preferably iodine or chlorine.

Especially interesting compounds of formula I are those wherein Z_8 is cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl, each of which is mono-, di- or trisubstituted by methyl, ethyl, n-propyl, i-propyl or n-buthyl; or by C_1-C_6alkyl substituted by cyano, nitro or halogen; or is mono-, di- or trisubstituted by phenyl, or by phenyl which itself is substituted by C_1-C_3-alkyl, C_1-C_6haloalkyl and/or halogen, or by pyridyl, which itself may be substituted by halogen or methyl, or by furyl, thienyl, C_3-C_6cycloalkyl, C_2-C_6alkenyl, bicyclohexyl, bicyclohexyl substituted by C_1-C_3alkyl, or by bicycloheptyl or bicycloheptyl substituted by C_1-C_3alkyl.

In further preferred compounds Z_8 is cyclopropyl mono- or disubstituted by methyl or ethyl.

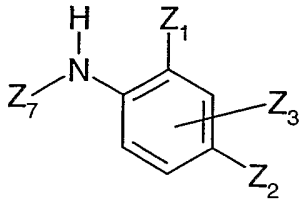
The process according to the invention for preparing compounds of the formula I is carried out analogously to known processes, for example those described in EP-A-1006107, EP-A-1241159, WO 02/0947695 and EP-A-1215200.

Compounds of formula I, wherein Z_7 is hydrogen, can be prepared, for example, by reacting a compound of formula II



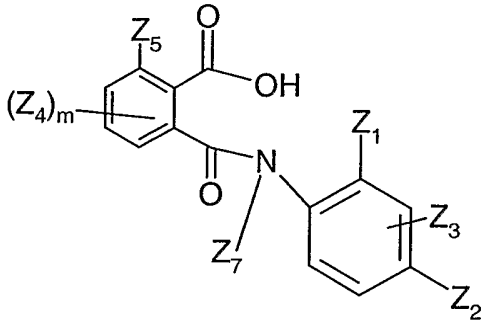
(II),

wherein Z_4, m and Z_5 are defined as in formula I, with a compound of formula III



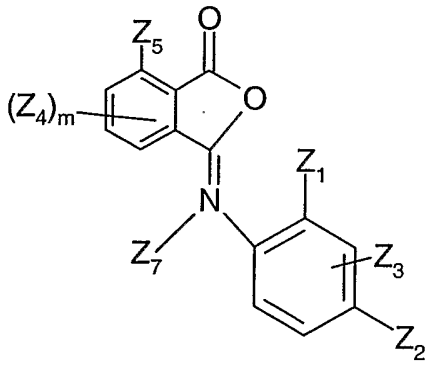
(III),

wherein Z_1, Z_2, and Z_3 are defined as in formula I and Z_7 is hydrogen, in the presence of inert solvents and if appropriate, in the presence of a base, to a compound of formula IV



(IV),

wherein Z_1, Z_2, and Z_3 are defined as in formula I and Z_7 is hydrogen, which is converted with a condensing agent to a compound of formula V



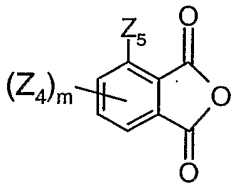
(V),

wherein Z_1, Z_2, Z_3, Z_4, and m are defined as in formula I and Z_7 is hydrogen , which is reacted in the presence of an inert solvent with a compound of formula VI

$$H\text{-}N(Z_6)\text{-}X_1\text{-}Z_8 \quad (VI),$$

wherein Z_6, X_1 and Z_8 are as defined in formula I, to the compounds of formula I. Compounds of formula I, wherein Z_7 is different from hydrogen, can be prepared by condensation of a compound of formula IV, wherein Z_7 is different from hydrogen with a compound of formula VI in the presence of an inert solvent. Analogous reactions are described, e.g. on pages 9 to 17 of EP-A-1006107. Isoimides such as 7-iodo-3-[(Z)-2-methyl-4-(1,2,2,2-tetrafluoro-1-trifluoromethyl-ethyl)-phenylimino]-3H-isobenzofuran-1-one can be prepared according to EP 1006107, example 3-2.

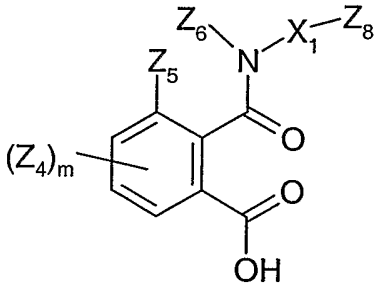
Compounds of formula I, wherein Z_6 is hydrogen, can also be prepared according to EP-A-1006107 by reacting a phthalic anhydride derivative of formula II


(II),

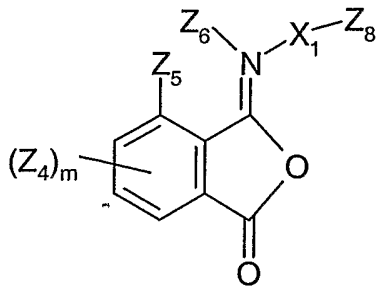
wherein Z_4, m and Z_5 are defined as in formula I, in the presence of an inert solvent with a compound of formula VIa

$$H\text{-}N(Z_6)\text{-}X_1\text{-}Z_8 \quad \text{(VIa)},$$

wherein X_1 and Z_8 are as defined in formula I and Z_6 is hydrogen , to a compound of formula VII

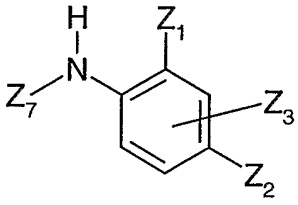

(VII),

wherein Z_4, m, Z_5, X_1 and Z_8 are as defined in formula I and Z_6 is hydrogen, which is converted with a condensing agent to a compound of formula VIII



(VIII),

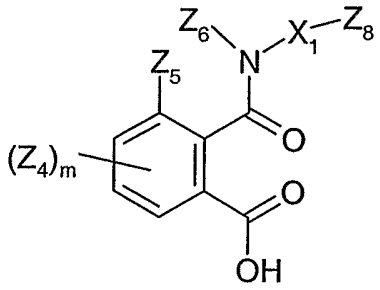
wherein Z_4, m, Z_5, X_1 and Z_8 are as defined in formula I and Z_6 is hydrogen, which is reacted with a compound of formula IIIa



(IIIa),

wherein Z_1, Z_2, Z_3 and Z_7 are defined as in formula I, in the presence of inert solvents to a compound of formula I. Compounds of formula I, wherein Z_6 is different from hydrogen, can be prepared by condensation of a compound of formula VII, wherein Z_6 is different from hydrogen with a compound of formula VI in the presence of an inert solvent.

The compounds of formula VII



(VII),

wherein Z_4, m, Z_5, Z_6, X_1 and Z_8 are as defined in formula I, are novel and therefore likewise form part of the subject matter of the present invention.

Substituted cyclic amines can be prepared in many ways as described for example in Saul Patai "The Chemistry of the Amino Group" Wiley Interscience, London 1968.

Cyclopropyl amines can be prepared in many ways as described for example in E-Vilsmaier, Aminocyclopropanes, Chapter 22 in "The Chemistry of the Cyclopropyl Group" Ed. Z Rapoport, John Wiley 1987. London p 1341.

The reactions described hereinabove and hereinbelow are carried out in a manner known per se, for example in the absence or, normally, in the presence of a suitable solvent or diluent or of a mixture of these, the process being carried out, as required, with cooling, at room temperature or with heating, for example in a temperature range of from approximately -80°C to the boiling point of the reaction mixture, preferably from approximately -20°C to approximately +150°C, and, if required, in a sealed vessel, under reduced, normal or elevated pressure, in an inert gas atmosphere and/or under anhydrous conditions. Especially advantageous reaction conditions can be seen from the examples.

Examples of such solvents or diluents which may be mentioned are: aromatic, aliphatic and alicyclic hydrocarbons and halohydrocarbons such as benzene, toluene, xylene, mesitylene, tetralin, chlorobenzene, dichlorobenzene, bromobenzene, petroleum ether, hexane, cyclohexane, dichloromethane, trichloromethane, tetrachloromethane, dichloroethane, trichloroethene or tetrachloroethene; esters such as ethyl acetate; ethers such as diethyl ether, dipropyl ether, diisopropyl ether, dibutyl ether, tert-butyl methyl ether, ethyleneglycol monomethyl ether, ethylene glycol monoethyl ether, ethylene glycol dimethyl ether, dimethoxydiethyl ether, tetrahydrofuran or dioxane; ketones, such as acetone, methyl ethyl ketone or methyl isobutyl ketone; alcohols, such as methanol, ethanol, propanol, isopropanol, butanol, ethylene glycol or glycerol; amides such as N,N-dimethylformamide, N,N-diethylformamide, N,N-dimethylacetamide, N-methylpyrrolidone or hexamethylphosphoric triamide; nitriles, such as acetonitrile or propionitrile; and sulfoxides, such as dimethyl sulfoxide.

Unless otherwise specified, the starting materials mentioned hereinabove and hereinbelow, which are used for the preparation of the compounds I or, where appropriate, the tautomers thereof, in each case in free form or in salt form, are known or can be prepared by methods known per se, for example in accordance with the information given below.

A compound I can be converted in a manner known per se into another compound I by replacing one or more substituents of the starting compound I in the customary manner by (an)other substituent(s) according to the invention.

Depending on the choice of the reaction conditions and starting materials which are suitable in each case, it is possible, for example, in one reaction step only to replace one substituent by another substituent according to the invention, or a plurality of substituents can be replaced by other substituents according to the invention in the same reaction step.

Salts of compounds I can be prepared in a manner known per se. Thus, for example, acid addition salts of compounds I are obtained by treatment with a suitable acid or a suitable ion exchanger reagent and salts with bases are obtained by treatment with a suitable base or with a suitable ion exchanger reagent.

Salts of compounds I can be converted in the customary manner into the free compounds I, acid addition salts, for example, by treatment with a suitable basic compound or with a suitable ion exchanger reagent and salts with bases, for example, by treatment with a suitable acid or with a suitable ion exchanger reagent.

Salts of compounds I can be converted in a manner known per se into other salts of compounds I, acid addition salts, for example, into other acid addition salts, for example by treatment of a salt of inorganic acid such as hydrochloride with a suitable metal salt such as a sodium, barium or silver salt, of an acid, for example with silver acetate, in a suitable solvent in which an inorganic salt which forms, for example silver chloride, is insoluble and thus precipitates from the reaction mixture.

Depending on the procedure or the reaction conditions, the compounds I, which have salt-forming properties can be obtained in free form or in the form of salts.

The compounds I and, where appropriate, the tautomers thereof, in each case in free form or in salt form, can be present in the form of one of the isomers which are possible or as a mixture of these, for example in the form of pure isomers, such as antipodes and/or diastereomers, or as isomer mixtures, such as enantiomer mixtures, for example racemates, diastereomer mixtures or racemate mixtures, depending on the number, absolute and

relative configuration of asymmetric carbon atoms which occur in the molecule and/or depending on the configuration of non-aromatic double bonds which occur in the molecule; the invention relates to the pure isomers and also to all isomer mixtures which are possible and is to be understood in each case in this sense hereinabove and hereinbelow, even when stereochemical details are not mentioned specifically in each case.

Diastereomer mixtures or racemate mixtures of compounds I, in free form or in salt form, which can be obtained depending on which starting materials and procedures have been chosen can be separated in a known manner into the pure diasteromers or racemates on the basis of the physicochemical differences of the components, for example by fractional crystallization, distillation and/or chromatography.

Enantiomer mixtures, such as racemates, which can be obtained in a similar manner can be resolved into the optical antipodes by known methods, for example by recrystallization from an optically active solvent, by chromatography on chiral adsorbents, for example high-performance liquid chromatography (HPLC) on acetyl celulose, with the aid of suitable microorganisms, by cleavage with specific, immobilized enzymes, via the formation of inclusion compounds, for example using chiral crown ethers, where only one enantiomer is complexed, or by conversion into diastereomeric salts, for example by reacting a basic end-product racemate with an optically active acid, such as a carboxylic acid, for example camphor, tartaric or malic acid, or sulfonic acid, for example camphorsulfonic acid, and separating the diastereomer mixture which can be obtained in this manner, for example by fractional crystallization based on their differing solubilities, to give the diastereomers, from which the desired enantiomer can be set free by the action of suitable agents, for example basic agents.

Pure diastereomers or enantiomers can be obtained according to the invention not only by separating suitable isomer mixtures, but also by generally known methods of diastereoselective or enantioselective synthesis, for example by carrying out the process according to the invention with starting materials of a suitable stereochemistry.

It is advantageous to isolate or synthesize in each case the biologically more effective isomer, for example enantiomer or diastereomer, or isomer mixture, for example enantiomer mixture or diastereomer mixture, if the individual components have a different biological activity.

The compounds I and, where appropriate, the tautomers thereof, in each case in free form or in salt form, can, if appropriate, also be obtained in the form of hydrates and/or include other solvents, for example those which may have been used for the crystallization of compounds which are present in solid form.

The invention relates to all those embodiments of the process by which, starting from a compound obtainable at any level of the process as starting material or intermediate, all or some of the missing steps are carried out or a starting material is used in the form of a derivative and/or salt and/or racemates or antipodes thereof or, in particular, is formed under the reaction conditions.

Those starting materials and intermediates, in each case in free form or in salt form, which lead to the compounds I or salts thereof which have been described at the outset as being particularly valuable are preferably used in the process of the present invention.

The compounds I according to the invention are preventively and/or curatively valuable active ingredients in the field of pest control, even at low rates of application, which have a very favorable biocidal spectrum and are well tolerated by warm-blooded species, fish and plants. The active ingredients according to the invention act against all or individual developmental stages of normally sensitive, but also resistant, animal pests, such as insects or representatives of the order Acarina. The insecticidal or acaricidal activity of the active ingredients according to the invention can manifest itself directly, i. e. in destruction of the pests, which takes place either immediately or only after some time has elapsed, for example during ecdysis, or indirectly, for example in a reduced oviposition and/or hatching rate, a good activity corresponding to a destruction rate (mortality) of at least 50 to 60%.

Examples of the abovementioned animal pests are:
from the order *Acarina*, for example,
Acarus siro, Aceria sheldoni, Aculus schlechtendali, Amblyomma spp., Argas spp., Boophilus spp., Brevipalpus spp., Bryobia praetiosa, Calipitrimerus spp., Chorioptes spp., Dermanyssus gallinae, Eotetranychus carpini, Eriophyes spp., Hyalomma spp., Ixodes spp., Olygonychus pratensis, Ornithodoros spp., Panonychus spp., Phyllocoptruta oleivora, Polypha-

gotarsonemus latus, Psoroptes spp., Rhipicephalus spp., Rhizoglyphus spp., Sarcoptes spp., Tarsonemus spp. and Tetranychus spp.;
from the order *Anoplura*, for example,
Haematopinus spp., Linognathus spp., Pediculus spp., Pemphigus spp. and Phylloxera spp.;
from the order *Coleoptera*, for example,
Agriotes spp., Anthonomus spp., Atomaria linearis, Chaetocnema tibialis, Cosmopolites spp., Curculio spp., Dermestes spp., Diabrotica spp., Epilachna spp., Eremnus spp., Leptinotarsa decemlineata, Lissorhoptrus spp., Melolontha spp., Orycaephilus spp., Otiorhynchus spp., Phlyctinus spp., Popillia spp., Psylliodes spp., Rhizopertha spp., Scarabeidae, Sitophilus spp., Sitotroga spp., Tenebrio spp., Tribolium spp. and Trogoderma spp.;
from the order *Diptera,* for example,
Aedes spp., Antherigona soccata, Bibio hortulanus, Calliphora erythrocephala, Ceratitis spp., Chrysomyia spp., Culex spp., Cuterebra spp., Dacus spp., Drosophila melanogaster, Fannia spp., Gastrophilus spp., Glossina spp., Hypoderma spp., Hyppobosca spp., Liriomyza spp., Lucilia spp., Melanagromyza spp., Musca spp., Oestrus spp., Orseolia spp., Oscinella frit, Pegomyia hyoscyami, Phorbia spp., Rhagoletis pomonella, Sciara spp., Stomoxys spp., Tabanus spp., Tannia spp. and Tipula spp.;

from the order *Heteroptera,* for example,
Cimex spp., Distantiella theobroma, Dysdercus spp., Euchistus spp., Eurygaster spp., Leptocorisa spp., Nezara spp., Piesma spp., Rhodnius spp., Sahlbergella singularis, Scotinophara spp. and Triatoma spp.;
from the order *Homoptera*, for example,
Aleurothrixus floccosus, Aleyrodes brassicae, Aonidiella spp., Aphididae, Aphis spp., Aspidiotus spp., Bemisia tabaci, Ceroplaster spp., Chrysomphalus aonidium, Chrysomphalus dictyospermi, Coccus hesperidum, Empoasca spp., Eriosoma larigerum, Erythroneura spp., Gascardia spp., Laodelphax spp., Lecanium corni, Lepidosaphes spp., Macrosiphus spp., Myzus spp., Nephotettix spp., Nilaparvata spp., Parlatoria spp., Pemphigus spp., Planococcus spp., Pseudaulacaspis spp., Pseudococcus spp., Psylla spp., Pulvinaria aethiopica, Quadraspidiotus spp., Rhopalosiphum spp., Saissetia spp., Scaphoideus spp., Schizaphis spp., Sitobion spp., Trialeurodes vaporariorum, Trioza erytreae and Unaspis citri;
from the order *Hymenoptera*, for example,

Acromyrmex, Atta spp., Cephus spp., Diprion spp., Diprionidae, Gilpinia polytoma, Hoplocampa spp., Lasius spp., Monomorium pharaonis, Neodiprion spp., Solenopsis spp. and Vespa spp.;

from the order *Isoptera*, for example,

Reticulitermes spp.;

from the order *Lepidoptera*, for example,

Acleris spp., Adoxophyes spp., Aegeria spp., Agrotis spp., Alabama argillaceae, Amylois spp., Anticarsia gemmatalis, Archips spp., Argyrotaenia spp., Autographa spp., Busseola fusca, Cadra cautella, Carposina nipponensis, Chilo spp., Choristoneura spp., Clysia ambiguella, Cnaphalocrocis spp., Cnephasia spp., Cochylis spp., Coleophora spp., Crocidolomia binotalis, Cryptophlebia leucotreta, Cydia spp., Diatraea spp., Diparopsis castanea, Earias spp., Ephestia spp., Eucosma spp., Eupoecilia ambiguella, Euproctis spp., Euxoa spp., Grapholita spp., Hedya nubiferana, Heliothis spp., Hellula undalis, Hyphantria cunea, Keiferia lycopersicella, Leucoptera scitella, Lithocollethis spp., Lobesia botrana, Lymantria spp., Lyonetia spp., Malacosoma spp., Mamestra brassicae, Manduca sexta, Operophtera spp., Ostrinia nubilalis, Pammene spp., Pandemis spp., Panolis flammea, Pectinophora gossypiela, Phthorimaea operculella, Pieris rapae, Pieris spp., Plutella xylostella, Prays spp., Scirpophaga spp., Sesamia spp., Sparganothis spp., Spodoptera spp., Synanthedon spp., Thaumetopoea spp., Tortrix spp., Trichoplusia ni and Yponomeuta spp.;

from the order *Mallophaga*, for example,

Damalinea spp. and Trichodectes spp.;

from the order *Orthoptera*, for example,

Blatta spp., Blattella spp., Gryllotalpa spp., Leucophaea maderae, Locusta spp., Periplaneta spp. and Schistocerca spp.;

from the order *Psocoptera*, for example,

Liposcelis spp.;

from the order *Siphonaptera*, for example,

Ceratophyllus spp., Ctenocephalides spp. and Xenopsylla cheopis;

from the order *Thysanoptera*, for example,

Frankliniella spp., Hercinothrips spp., Scirtothrips aurantii, Taeniothrips spp., Thrips palmi and Thrips tabaci; and

from the order *Thysanura*, for example,

Lepisma saccharina.

The active ingredients according to the invention can be used for controlling, i. e. containing or destroying, pests of the abovementioned type which occur in particular on plants, especially on useful plants and ornamentals in agriculture, in horticulture and in forests, or on organs, such as fruits, flowers, foliage, stalks, tubers or roots, of such plants, and in some cases even plant organs which are formed at a later point in time remain protected against these pests.

Suitable target crops are, in particular, cereals, such as wheat, barley, rye, oats, rice, maize or sorghum; beet, such as sugar or fodder beet; fruit, for example pomaceous fruit, stone fruit or soft fruit, such as apples, pears, plums, peaches, almonds, cherries or berries, for example strawberries, raspberries or blackberries; leguminous crops, such as beans, lentils, peas or soya; oil crops, such as oilseed rape, mustard, poppies, olives, sunflowers, coconut, castor, cocoa or ground nuts; cucurbits, such as pumpkins, cucumbers or melons; fibre plants, such as cotton, flax, hemp or jute; citrus fruit, such as oranges, lemons, grapefruit or tangerines; vegetables, such as spinach, lettuce, asparagus, cabbages, carrots, onions, tomatoes, potatoes or bell peppers; Lauraceae, such as avocado, Cinnamonium or camphor; and also tobacco, nuts, coffee, eggplants, sugarcane, tea, pepper, grapevines, hops, the plantain family, latex plants and ornamentals.

The active ingredients according to the invention are especially suitable for controlling Aphis craccivora, Diabrotica balteata, Heliothis virescens, Myzus persicae, Plutella xylostella, Spodoptera littoralis, Mamestra, Cydia pomonella, Empoasca , Leptinotarsa, Chilo supressalis in cotton, vegetable, apples, vineyard, potatos, maize, rice and soya crops.

The term "crops" is to be understood as including also crops that have been rendered tolerant to herbicides like bromoxynil or classes of herbicides (such as, for example, HPPD inhibitors, ALS inhibitors, for example primisulfuron, prosulfuron and trifloxysulfuron, EPSPS (5-enol-pyrovyl-shikimate-3-phosphate-synthase) inhibitors, GS (glutamine synthetase) inhibitors) as a result of conventional methods of breeding or genetic engineering. An example of a crop that has been rendered tolerant to imidazolinones, e.g. imazamox, by conventional methods of breeding (mutagenesis) is Clearfield® summer rape (Canola). Examples of crops that have been rendered tolerant to herbicides or classes of herbicides by genetic engineering methods include glyphosate- and glufosinate-resistant maize varieties

commercially available under the trade names RoundupReady® , Herculex I® and LibertyLink®.

The term "crops" is to be understood as including also crop plants which have been so transformed by the use of recombinant DNA techniques that they are capable of synthesising one or more selectively acting toxins, such as are known, for example, from toxin-producing bacteria, especially those of the genus Bacillus.

Toxins that can be expressed by such transgenic plants include, for example, insecticidal proteins, for example insecticidal proteins from Bacillus cereus or Bacillus popliae; or insecticidal proteins from Bacillus thuringiensis, such as δ-endotoxins, e.g. CryIA(b), CryIA(c), CryIF, CryIF(a2), CryIIA(b), CryIIIA, CryIIIB(b1) or Cry9c, or vegetative insecticidal proteins (VIP), e.g. VIP1, VIP2, VIP3 or VIP3A; or insecticidal proteins of bacteria colonising nematodes, for example Photorhabdus spp. or Xenorhabdus spp., such as Photorhabdus luminescens, Xenorhabdus nematophilus; toxins produced by animals, such as scorpion toxins, arachnid toxins, wasp toxins and other insect-specific neurotoxins; toxins produced by fungi, such as Streptomycetes toxins, plant lectins, such as pea lectins, barley lectins or snowdrop lectins; agglutinins; proteinase inhibitors, such as trypsine inhibitors, serine protease inhibitors, patatin, cystatin, papain inhibitors; ribosome-inactivating proteins (RIP), such as ricin, maize-RIP, abrin, luffin, saporin or bryodin; steroid metabolism enzymes, such as 3-hydroxysteroidoxidase, ecdysteroid-UDP-glycosyl-transferase, cholesterol oxidases, ecdysone inhibitors, HMG-COA-reductase, ion channel blockers, such as blockers of sodium or calcium channels, juvenile hormone esterase, diuretic hormone receptors, stilbene synthase, bibenzyl synthase, chitinases and glucanases.

In the context of the present invention there are to be understood by δ-endotoxins, for example CryIA(b), CryIA(c), CryIF, CryIF(a2), CryIIA(b), CryIIIA, CryIIIB(b1) or Cry9c, or vegetative insecticidal proteins (VIP), for example VIP1, VIP2, VIP3 or VIP3A, expressly also hybrid toxins, truncated toxins and modified toxins. Hybrid toxins are produced recombinantly by a new combination of different domains of those proteins (see, for example, WO 02/15701). Truncated toxins, for example a truncated CryIA(b), are known. In the case of modified toxins, one or more amino acids of the naturally occurring toxin are replaced. In such amino acid replacements, preferably non-naturally present protease recognition

sequences are inserted into the toxin, such as, for example, in the case of CryIIIA055, a cathepsin-D-recognition sequence is inserted into a CryIIIA toxin (see WO 03/018810).

Examples of such toxins or transgenic plants capable of synthesising such toxins are disclosed, for example, in EP-A-0 374 753, WO 93/07278, WO 95/34656, EP-A-0 427 529, EP-A-451 878 and WO 03/052073.

The processes for the preparation of such transgenic plants are generally known to the person skilled in the art and are described, for example, in the publications mentioned above. Cryl-type deoxyribonucleic acids and their preparation are known, for example, from WO 95/34656, EP-A-0 367 474, EP-A-0 401 979 and WO 90/13651.

The toxin contained in the transgenic plants imparts to the plants tolerance to harmful insects. Such insects can occur in any taxonomic group of insects, but are especially commonly found in the beetles (Coleoptera), two-winged insects (Diptera) and butterflies (Lepidoptera).

Transgenic plants containing one or more genes that code for an insecticidal resistance and express one or more toxins are known and some of them are commercially available. Examples of such plants are: YieldGard® (maize variety that expresses a CryIA(b) toxin); YieldGard Rootworm® (maize variety that expresses a CryIIIB(b1) toxin); YieldGard Plus® (maize variety that expresses a CryIA(b) and a CryIIIB(b1) toxin); Starlink® (maize variety that expresses a Cry9(c) toxin); Herculex I® (maize variety that expresses a CryIF(a2) toxin and the enzyme phosphinothricine N-acetyltransferase (PAT) to achieve tolerance to the herbicide glufosinate ammonium); NuCOTN 33B® (cotton variety that expresses a CryIA(c) toxin); Bollgard I® (cotton variety that expresses a CryIA(c) toxin); Bollgard II® (cotton variety that expresses a CryIA(c) and a CryIIA(b) toxin); VIPCOT® (cotton variety that expresses a VIP toxin); NewLeaf® (potato variety that expresses a CryIIIA toxin); Nature-Gard® and Protecta®.

Further examples of such transgenic crops are:

1. **Bt11 Maize** from Syngenta Seeds SAS, Chemin de l'Hobit 27, F-31 790 St. Sauveur, France, registration number C/FR/96/05/10. Genetically modified *Zea mays* which has been rendered resistant to attack by the European corn borer (*Ostrinia nubilalis* and *Sesamia nonagrioides*) by transgenic expression of a truncated CryIA(b) toxin. Bt11 maize also transgenically expresses the enzyme PAT to achieve tolerance to the herbicide glufosinate ammonium.

2. **Bt176 Maize** from Syngenta Seeds SAS, Chemin de l'Hobit 27, F-31 790 St. Sauveur, France, registration number C/FR/96/05/10. Genetically modified *Zea mays* which has been rendered resistant to attack by the European corn borer (*Ostrinia nubilalis* and *Sesamia nonagrioides*) by transgenic expression of a CryIA(b) toxin. Bt176 maize also transgenically expresses the enzyme PAT to achieve tolerance to the herbicide glufosinate ammonium.

3. **MIR604 Maize** from Syngenta Seeds SAS, Chemin de l'Hobit 27, F-31 790 St. Sauveur, France, registration number C/FR/96/05/10. Maize which has been rendered insect-resistant by transgenic expression of a modified CryIIIA toxin. This toxin is Cry3A055 modified by insertion of a cathepsin-D-protease recognition sequence. The preparation of such transgenic maize plants is described in WO 03/018810.

4. **MON 863 Maize** from Monsanto Europe S.A. 270-272 Avenue de Tervuren, B-1150 Brussels, Belgium, registration number C/DE/02/9. MON *863* expresses a CryIIIB(b1) toxin and has resistance to certain Coleoptera insects.

5. **IPC 531 Cotton** from Monsanto Europe S.A. 270-272 Avenue de Tervuren, B-1150 Brussels, Belgium, registration number C/ES/96/02.

6. **1507 Maize** from Pioneer Overseas Corporation, Avenue Tedesco, 7 B-1160 Brussels, Belgium, registration number C/NL/00/10. Genetically modified maize for the expression of the protein Cry1F for achieving resistance to certain Lepidoptera insects and of the PAT protein for achieving tolerance to the herbicide glufosinate ammonium.

7. **NK603 × MON 810 Maize** from Monsanto Europe S.A. 270-272 Avenue de Tervuren, B-1150 Brussels, Belgium, registration number C/GB/02/M3/03. Consists of conventionally bred hybrid maize varieties by crossing the genetically modified varieties NK603 and MON

810. NK603 x MON 810 Maize transgenically expresses the protein CP4 EPSPS, obtained from *Agrobacterium sp.* strain CP4, which imparts tolerance to the herbicide Roundup® (contains glyphosate), and also a CrylA(b) toxin obtained from *Bacillus thuringiensis subsp. kurstaki* which brings about tolerance to certain Lepidoptera, include the European corn borer.

Transgenic crops of insect-resistant plants are also described in BATS (Zentrum für Biosicherheit und Nachhaltigkeit, Zentrum BATS, Clarastrasse 13, 4058 Basel, Switzerland) Report 2003, (http://bats.ch).

The term "crops" is to be understood as including also crop plants which have been so transformed by the use of recombinant DNA techniques that they are capable of synthesising antipathogenic substances having a selective action, such as, for example, the so-called "pathogenesis-related proteins" (PRPs, see e.g. EP-A-0 392 225). Examples of such antipathogenic substances and transgenic plants capable of synthesising such antipathogenic substances are known, for example, from EP-A-0 392 225, WO 95/33818, and EP-A-0 353 191. The methods of producing such transgenic plants are generally known to the person skilled in the art and are described, for example, in the publications mentioned above.

Antipathogenic substances which can be expressed by such transgenic plants include, for example, ion channel blockers, such as blockers for sodium and calcium channels, for example the viral KP1, KP4 or KP6 toxins; stilbene synthases; bibenzyl synthases; chitinases; glucanases; the so-called "pathogenesis-related proteins" (PRPs; see e.g. EP-A-0 392 225); antipathogenic substances produced by microorganisms, for example peptide antibiotics or heterocyclic antibiotics (see e.g. WO 95/33818) or protein or polypeptide factors involved in plant pathogen defence (so-called "plant disease resistance genes", as described in WO 03/000906).

Other indication areas for the active ingredients of the invention are the protection of stored products and stores and of material and, in the hygiene sector, especially the protection of domestic animals and livestock against pests of said type.

The invention therefore also relates to pesticidal compositions such as emulsifiable concentrates, suspension concentrates, directly sprayable or dilutable solutions, spreadable pastes,

dilute emulsions, soluble powders, dispersible powders, wettable powders, dusts, granules or encapsulations in polymeric substances, which comprise - at least - one of the active ingredients according to the invention and which are to be selected to suit the intended aims and the prevailing circumstances.

In these compositions, the active ingredient is employed in pure form, a solid active ingredient for example in a specific particle size, or, preferably, together with - at least - one of the auxiliaries conventionally used in the art of formulation, such as extenders, for example solvents or solid carriers, or such as surface-active compounds (surfactants).

Examples of suitable solvents are: unhydrogenated or partially hydrogenated aromatic hydrocarbons, preferably the fractions C_8 to C_{12} of alkylbenzenes, such as xylene mixtures, alkylated naphthalenes or tetrahydronaphthalene, aliphatic or cycloaliphatic hydrocarbons, such as paraffins or cyclohexane, alcohols such as ethanol, propanol or butanol, glycols and their ethers and esters such as propylene glycol, dipropylene glycol ether, ethylene glycol or ethylene glycol monomethyl ether or ethylene glycol monoethyl ether, ketones, such as cyclohexanone, isophorone or diacetone alcohol, strongly polar solvents, such as N-methylpyrrolid-2-one, dimethyl sulfoxide or N,N-dimethylformamide, water, unepoxidized or epoxidized vegetable oils, such as unexpodized or epoxidized rapeseed, castor, coconut or soya oil, and silicone oils.

Solid carriers which are used for example for dusts and dispersible powders are, as a rule, ground natural minerals such as calcite, talc, kaolin, montmorillonite or attapulgite. To improve the physical properties, it is also possible to add highly disperse silicas or highly disperse absorbtive polymers. Suitable particulate adsorptive carriers for granules are porous types, such as pumice, brick grit, sepiolite or bentonite, and suitable non-sorptive carrier materials are calcite or sand. In addition, a large number of granulated materials of inorganic or organic nature can be used, in particular dolomite or comminuted plant residues.

Suitable surface-active compounds are, depending on the type of the active ingredient to be formulated, non-ionic, cationic and/or anionic surfactants or surfactant mixtures which have good emulsifying, dispersing and wetting properties. The surfactants mentioned below are only to be considered as examples; a large number of further surfactants which are conven-

tionally used in the art of formulation and suitable according to the invention are described in the relevant literature.

Suitable non-ionic surfactants are, especially, polyglycol ether derivatives of aliphatic or cycloaliphatic alcohols, of saturated or unsaturated fatty acids or of alkyl phenols which may contain approximately 3 to approximately 30 glycol ether groups and approximately 8 to approximately 20 carbon atoms in the (cyclo)aliphatic hydrocarbon radical or approximately 6 to approximately 18 carbon atoms in the alkyl moiety of the alkyl phenols. Also suitable are water-soluble polyethylene oxide adducts with polypropylene glycol, ethylenediaminopolypropylene glycol or alkyl polypropylene glycol having 1 to approximately 10 carbon atoms in the alkyl chain and approximately 20 to approximately 250 ethylene glycol ether groups and approximately 10 to approximately 100 propylene glycol ether groups. Normally, the abovementioned compounds contain 1 to approximately 5 ethylene glycol units per propylene glycol unit. Examples which may be mentioned are nonylphenoxypolyethoxyethanol, castor oil polyglycol ether, polypropylene glycol/polyethylene oxide adducts, tributylphenoxypolyethoxyethanol, polyethylene glycol or octylphenoxypolyethoxyethanol. Also suitable are fatty acid esters of polyoxyethylene sorbitan, such as polyoxyethylene sorbitan trioleate.

The cationic surfactants are, especially, quarternary ammonium salts which generally have at least one alkyl radical of approximately 8 to approximately 22 C atoms as substituents and as further substituents (unhalogenated or halogenated) lower alkyl or hydroxyalkyl or benzyl radicals. The salts are preferably in the form of halides, methylsulfates or ethylsulfates. Examples are stearyltrimethylammonium chloride and benzylbis(2-chloroethyl)ethylammonium bromide.

Examples of suitable anionic surfactants are water-soluble soaps or water-soluble synthetic surface-active compounds. Examples of suitable soaps are the alkali, alkaline earth or (unsubstituted or substituted) ammonium salts of fatty acids having approximately 10 to approximately 22 C atoms, such as the sodium or potassium salts of oleic or stearic acid, or of natural fatty acid mixtures which are obtainable for example from coconut or tall oil; mention must also be made of the fatty acid methyl taurates. However, synthetic surfactants are used more frequently, in particular fatty sulfonates, fatty sulfates, sulfonated benzimidazole derivatives or alkylaryl sulfonates. As a rule, the fatty sulfonates and fatty sulfates are present as alkali, alkaline earth or (substituted or unsubstituted) ammonium salts and they ge-

nerally have an alkyl radical of approximately 8 to approximately 22 C atoms, alkyl also to be understood as including the alkyl moiety of acyl radicals; examples which may be mentioned are the sodium or calcium salts of lignosulfonic acid, of the dodecylsulfuric ester or of a fatty alcohol sulfate mixture prepared from natural fatty acids. This group also includes the salts of the sulfuric esters and sulfonic acids of fatty alcohol/ethylene oxide adducts. The sulfonated benzimidazole derivatives preferably contain 2 sulfonyl groups and a fatty acid radical of approximately 8 to approximately 22 C atoms. Examples of alkylarylsulfonates are the sodium, calcium or triethanolammonium salts of decylbenzenesulfonic acid, of dibutyl-naphthalenesulfonic acid or of a naphthalenesulfonic acid/formaldehyde condensate. Also possible are, furthermore, suitable phosphates, such as salts of the phosphoric ester of a p-nonylphenol/(4-14)ethylene oxide adduct, or phospholipids.

As a rule, the compositions comprise 0.1 to 99%, especially 0.1 to 95%, of active ingredient and 1 to 99.9%, especially 5 to 99.9%, of at least one solid or liquid adjuvant, it being possible as a rule for 0 to 25%, especially 0.1 to 20%, of the composition to be surfactants (% in each case meaning percent by weight). Whereas concentrated compositions tend to be preferred for commercial goods, the end consumer as a rule uses dilute compositions which have substantially lower concentrations of active ingredient. Preferred compositions are composed in particular as follows (% = percent by weight):

Emulsifiable concentrates:

active ingredient:	1 to 95%, preferably 5 to 20%
surfactant:	1 to 30%, preferably 10 to 20 %
solvent:	5 to 98%, preferably 70 to 85%

Dusts:

active ingredient:	0.1 to 10%, preferably 0.1 to 1%
solid carrier:	99.9 to 90%, preferably 99.9 to 99%

Suspension concentrates:

active ingredient:	5 to 75%, preferably 10 to 50%
water:	94 to 24%, preferably 88 to 30%
surfactant:	1 to 40%, preferably 2 to 30%

Wettable powders:

active ingredient:	0.5 to 90%, preferably 1 to 80%
surfactant:	0.5 to 20%, preferably 1 to 15%
solid carrier:	5 to 99%, preferably 15 to 98%

Granulates:

active ingredient:	0.5 to 30%, preferably 3 to 15%
solid carrier:	99.5 to 70%, preferably 97 to 85%

The activity of the compositions according to the invention can be broadened considerably, and adapted to prevailing circumstances, by adding other insecticidally or acaricidally active ingredients. Suitable additions to active ingredients here are, for example, representatives of the following classes of active ingredients: organophosphorus compounds, nitrophenol derivatives, thioureas, juvenile hormones, formamidines, benzophenone derivatives, ureas, pyrrole derivatives, carbamates, pyrethroids, chlorinated hydrocarbons, acylureas, pyridylmethyleneamino derivatives, macrolides, neonicotinoids and Bacillus thuringiensis preparations.

Examples of suitable mixing partners for the compounds of formula I include the following compounds selected from the group M_1:

Group M_1:

an adjuvant selected from the group of substances consisting of petroleum oils (alternative name) (628),

an acaricide selected from the group of substances consisting of 1,1-bis(4-chlorophenyl)-2-ethoxyethanol (IUPAC name) (910), 2,4-dichlorophenyl benzenesulfonate (IUPAC/Chemical Abstracts name) (1059), 2-fluoro-*N*-methyl-*N*-1-naphthylacetamide (IUPAC name) (1295), 4-chlorophenyl phenyl sulfone (IUPAC name) (981), abamectin (1), acequinocyl (3), acetoprole [CCN], acrinathrin (9), aldicarb (16), aldoxycarb (863), alpha-cypermethrin (202), amidithion (870), amidoflumet [CCN], amidothioate (872), amiton (875), amiton hydrogen oxalate (875), amitraz (24), aramite (881), arsenous oxide (882), AVI 382 (compound code), AZ 60541 (compound code), azinphos-ethyl (44), azinphos-methyl (45), azobenzene (IUPAC name) (888), azocyclotin (46), azothoate (889), benomyl (62), benoxafos (alternative name) [CCN], benzoximate (71), benzyl benzoate (IUPAC name) [CCN], bifenazate (74), bifenthrin (76), binapacryl (907), brofenvalerate (alternative name), bromo-

cyclen (918), bromophos (920), bromophos-ethyl (921), bromopropylate (94), buprofezin (99), butocarboxim (103), butoxycarboxim (104), butylpyridaben (alternative name), calcium polysulfide (IUPAC name) (111), camphechlor (941), carbanolate (943), carbaryl (115), carbofuran (118), carbophenothion (947), CGA 50'439 (development code) (125), chinomethionat (126), chlorbenside (959), chlordimeform (964), chlordimeform hydrochloride (964), chlorfenapyr (130), chlorfenethol (968), chlorfenson (970), chlorfensulphide (971), chlorfenvinphos (131), chlorobenzilate (975), chloromebuform (977), chloromethiuron (978), chloropropylate (983), chlorpyrifos (145), chlorpyrifos-methyl (146), chlorthiophos (994), cinerin I (696), cinerin II (696), cinerins (696), clofentezine (158), closantel (alternative name) [CCN], coumaphos (174), crotamiton (alternative name) [CCN], crotoxyphos (1010), cufraneb (1013), cyanthoate (1020), cyflumetofen (CAS Reg. No.: 400882-07-7), cyhalothrin (196), cyhexatin (199), cypermethrin (201), DCPM (1032), DDT (219), demephion (1037), demephion-O (1037), demephion-S (1037), demeton (1038), demeton-methyl (224), demeton-O (1038), demeton-O-methyl (224), demeton-S (1038), demeton-S-methyl (224), demeton-S-methylsulphon (1039), diafenthiuron (226), dialifos (1042), diazinon (227), dichlofluanid (230), dichlorvos (236), dicliphos (alternative name), dicofol (242), dicrotophos (243), dienochlor (1071), dimefox (1081), dimethoate (262), dinactin (alternative name) (653), dinex (1089), dinex-diclexine (1089), dinobuton (269), dinocap (270), dinocap-4 [CCN], dinocap-6 [CCN], dinocton (1090), dinopenton (1092), dinosulfon (1097), dinoterbon (1098), dioxathion (1102), diphenyl sulfone (IUPAC name) (1103), disulfiram (alternative name) [CCN], disulfoton (278), DNOC (282), dofenapyn (1113), doramectin (alternative name) [CCN], endosulfan (294), endothion (1121), EPN (297), eprinomectin (alternative name) [CCN], ethion (309), ethoate-methyl (1134), etoxazole (320), etrimfos (1142), fenazaflor (1147), fenazaquin (328), fenbutatin oxide (330), fenothiocarb (337), fenpropathrin (342), fenpyrad (alternative name), fenpyroximate (345), fenson (1157), fentrifanil (1161), fenvalerate (349), fipronil (354), fluacrypyrim (360), fluazuron (1166), flubenzimine (1167), flucycloxuron (366), flucythrinate (367), fluenetil (1169), flufenoxuron (370), flumethrin (372), fluorbenside (1174), fluvalinate (1184), FMC 1137 (development code) (1185), formetanate (405), formetanate hydrochloride (405), formothion (1192), formparanate (1193), gamma-HCH (430), glyodin (1205), halfenprox (424), heptenophos (432), hexadecyl cyclopropanecarboxylate (IUPAC/Chemical Abstracts name) (1216), hexythiazox (441), iodomethane (IUPAC name) (542), isocarbophos (alternative name) (473), isopropyl *O*-(methoxyaminothiophosphoryl)salicylate (IUPAC name) (473), ivermectin (alternative name) [CCN], jasmolin I (696), jasmolin II (696), jodfenphos (1248), lindane (430), lufenuron (490),

malathion (492), malonoben (1254), mecarbam (502), mephosfolan (1261), mesulfen (alternative name) [CCN], methacrifos (1266), methamidophos (527), methidathion (529), methiocarb (530), methomyl (531), methyl bromide (537), metolcarb (550), mevinphos (556), mexacarbate (1290), milbemectin (557), milbemycin oxime (alternative name) [CCN], mipafox (1293), monocrotophos (561), morphothion (1300), moxidectin (alternative name) [CCN], naled (567), NC-184 (compound code), NC-512 (compound code), nifluridide (1309), nikkomycins (alternative name) [CCN], nitrilacarb (1313), nitrilacarb 1:1 zinc chloride complex (1313), NNI-0101 (compound code), NNI-0250 (compound code), omethoate (594), oxamyl (602), oxydeprofos (1324), oxydisulfoton (1325), pp'-DDT (219), parathion (615), permethrin (626), petroleum oils (alternative name) (628), phenkapton (1330), phenthoate (631), phorate (636), phosalone (637), phosfolan (1338), phosmet (638), phosphamidon (639), phoxim (642), pirimiphos-methyl (652), polychloroterpenes (traditional name) (1347), polynactins (alternative name) (653), proclonol (1350), profenofos (662), promacyl (1354), propargite (671), propetamphos (673), propoxur (678), prothidathion (1360), prothoate (1362), pyrethrin I (696), pyrethrin II (696), pyrethrins (696), pyridaben (699), pyridaphenthion (701), pyrimidifen (706), pyrimitate (1370), quinalphos (711), quintiofos (1381), R-1492 (development code) (1382), RA-17 (development code) (1383), rotenone (722), schradan (1389), sebufos (alternative name), selamectin (alternative name) [CCN], SI-0009 (compound code), sophamide (1402), spirodiclofen (738), spiromesifen (739), SSI-121 (development code) (1404), sulfiram (alternative name) [CCN], sulfluramid (750), sulfotep (753), sulfur (754), SZI-121 (development code) (757), tau-fluvalinate (398), tebufenpyrad (763), TEPP (1417), terbam (alternative name), tetrachlorvinphos (777), tetradifon (786), tetranactin (alternative name) (653), tetrasul (1425), thiafenox (alternative name), thiocarboxime (1431), thiofanox (800), thiometon (801), thioquinox (1436), thuringiensin (alternative name) [CCN], triamiphos (1441), triarathene (1443), triazophos (820), triazuron (alternative name), trichlorfon (824), trifenofos (1455), trinactin (alternative name) (653), vamidothion (847), vaniliprole [CCN] and YI-5302 (compound code),

an algicide selected from the group of substances consisting of bethoxazin [CCN], copper dioctanoate (IUPAC name) (170), copper sulfate (172), cybutryne [CCN], dichlone (1052), dichlorophen (232), endothal (295), fentin (347), hydrated lime [CCN], nabam (566), quinoclamine (714), quinonamid (1379), simazine (730), triphenyltin acetate (IUPAC name) (347) and triphenyltin hydroxide (IUPAC name) (347),

an anthelmintic selected from the group of substances consisting of abamectin (1), crufomate (1011), doramectin (alternative name) [CCN], emamectin (291), emamectin

benzoate (291), eprinomectin (alternative name) [CCN], ivermectin (alternative name) [CCN], milbemycin oxime (alternative name) [CCN], moxidectin (alternative name) [CCN], piperazine [CCN], selamectin (alternative name) [CCN], spinosad (737) and thiophanate (1435),

an avicide selected from the group of substances consisting of chloralose (127), endrin (1122), fenthion (346), pyridin-4-amine (IUPAC name) (23) and strychnine (745),

a bactericide selected from the group of substances consisting of 1-hydroxy-1*H*-pyridine-2-thione (IUPAC name) (1222), 4-(quinoxalin-2-ylamino)benzenesulfonamide (IUPAC name) (748), 8-hydroxyquinoline sulfate (446), bronopol (97), copper dioctanoate (IUPAC name) (170), copper hydroxide (IUPAC name) (169), cresol [CCN], dichlorophen (232), dipyrithione (1105), dodicin (1112), fenaminosulf (1144), formaldehyde (404), hydrargaphen (alternative name) [CCN], kasugamycin (483), kasugamycin hydrochloride hydrate (483), nickel bis(dimethyldithiocarbamate) (IUPAC name) (1308), nitrapyrin (580), octhilinone (590), oxolinic acid (606), oxytetracycline (611), potassium hydroxyquinoline sulfate (446), probenazole (658), streptomycin (744), streptomycin sesquisulfate (744), tecloftalam (766) and thiomersal (alternative name) [CCN],

a biological agent selected from the group of substances consisting of *Adoxophyes orana* GV (alternative name) (12), *Agrobacterium radiobacter* (alternative name) (13), *Amblyseius* spp. (alternative name) (19), *Anagrapha falcifera* NPV (alternative name) (28), *Anagrus atomus* (alternative name) (29), *Aphelinus abdominalis* (alternative name) (33), *Aphidius colemani* (alternative name) (34), *Aphidoletes aphidimyza* (alternative name) (35), *Autographa californica* NPV (alternative name) (38), *Bacillus firmus* (alternative name) (48), *Bacillus sphaericus* Neide (scientific name) (49), *Bacillus thuringiensis* Berliner (scientific name) (51), *Bacillus thuringiensis* subsp. *aizawai* (scientific name) (51), *Bacillus thuringiensis* subsp. *israelensis* (scientific name) (51), *Bacillus thuringiensis* subsp. *japonensis* (scientific name) (51), *Bacillus thuringiensis* subsp. *kurstaki* (scientific name) (51), *Bacillus thuringiensis* subsp. *tenebrionis* (scientific name) (51), *Beauveria bassiana* (alternative name) (53), *Beauveria brongniartii* (alternative name) (54), *Chrysoperla carnea* (alternative name) (151), *Cryptolaemus montrouzieri* (alternative name) (178), *Cydia pomonella* GV (alternative name) (191), *Dacnusa sibirica* (alternative name) (212), *Diglyphus isaea* (alternative name) (254), *Encarsia formosa* (scientific name) (293), *Eretmocerus eremicus* (alternative name) (300), *Helicoverpa zea* NPV (alternative name) (431), *Heterorhabditis bacteriophora* and *H. megidis* (alternative name) (433), *Hippodamia convergens* (alternative name) (442), *Leptomastix dactylopii* (alternative name) (488), *Macrolophus caliginosus* (alternative name) (491), *Mamestra brassicae* NPV (alternative name) (494), *Metaphycus helvolus* (alternative

name) (522), *Metarhizium anisopliae* var. *acridum* (scientific name) (523), *Metarhizium anisopliae* var. *anisopliae* (scientific name) (523), *Neodiprion sertifer* NPV and *N. lecontei* NPV (alternative name) (575), *Orius* spp. (alternative name) (596), *Paecilomyces fumosoroseus* (alternative name) (613), *Phytoseiulus persimilis* (alternative name) (644), *Spodoptera exigua* multicapsid nuclear polyhedrosis virus (scientific name) (741), *Steinernema bibionis* (alternative name) (742), *Steinernema carpocapsae* (alternative name) (742), *Steinernema feltiae* (alternative name) (742), *Steinernema glaseri* (alternative name) (742), *Steinernema riobrave* (alternative name) (742), *Steinernema riobravis* (alternative name) (742), *Steinernema scapterisci* (alternative name) (742), *Steinernema* spp. (alternative name) (742), *Trichogramma* spp. (alternative name) (826), *Typhlodromus occidentalis* (alternative name) (844) and *Verticillium lecanii* (alternative name) (848),

a soil sterilant selected from the group of substances consisting of iodomethane (IUPAC name) (542) and methyl bromide (537),

a chemosterilant selected from the group of substances consisting of apholate [CCN], bisazir (alternative name) [CCN], busulfan (alternative name) [CCN], diflubenzuron (250), dimatif (alternative name) [CCN], hemel [CCN], hempa [CCN], metepa [CCN], methiotepa [CCN], methyl apholate [CCN], morzid [CCN], penfluron (alternative name) [CCN], tepa [CCN], thiohempa (alternative name) [CCN], thiotepa (alternative name) [CCN], tretamine (alternative name) [CCN] and uredepa (alternative name) [CCN],

an insect pheromone selected from the group of substances consisting of (*E*)-dec-5-en-1-yl acetate with (*E*)-dec-5-en-1-ol (IUPAC name) (222), (*E*)-tridec-4-en-1-yl acetate (IUPAC name) (829), (*E*)-6-methylhept-2-en-4-ol (IUPAC name) (541), (*E,Z*)-tetradeca-4,10-dien-1-yl acetate (IUPAC name) (779), (*Z*)-dodec-7-en-1-yl acetate (IUPAC name) (285), (*Z*)-hexadec-11-enal (IUPAC name) (436), (*Z*)-hexadec-11-en-1-yl acetate (IUPAC name) (437), (*Z*)-hexadec-13-en-11-yn-1-yl acetate (IUPAC name) (438), (*Z*)-icos-13-en-10-one (IUPAC name) (448), (Z)-tetradec-7-en-1-al (IUPAC name) (782), (*Z*)-tetradec-9-en-1-ol (IUPAC name) (783), (Z)-tetradec-9-en-1-yl acetate (IUPAC name) (784), (7*E*,9*Z*)-dodeca-7,9-dien-1-yl acetate (IUPAC name) (283), (9*Z*,11*E*)-tetradeca-9,11-dien-1-yl acetate (IUPAC name) (780), (9*Z*,12*E*)-tetradeca-9,12-dien-1-yl acetate (IUPAC name) (781), 14-methyloctadec-1-ene (IUPAC name) (545), 4-methylnonan-5-ol with 4-methylnonan-5-one (IUPAC name) (544), alpha-multistriatin (alternative name) [CCN], brevicomin (alternative name) [CCN], codlelure (alternative name) [CCN], codlemone (alternative name) (167), cuelure (alternative name) (179), disparlure (277), dodec-8-en-1-yl acetate (IUPAC name) (286), dodec-9-en-1-yl acetate (IUPAC name) (287), dodeca-8,10-dien-1-yl acetate (IUPAC

name) (284), dominicalure (alternative name) [CCN], ethyl 4-methyloctanoate (IUPAC name) (317), eugenol (alternative name) [CCN], frontalin (alternative name) [CCN], gossyplure (alternative name) (420), grandlure (421), grandlure I (alternative name) (421), grandlure II (alternative name) (421), grandlure III (alternative name) (421), grandlure IV (alternative name) (421), hexalure [CCN], ipsdienol (alternative name) [CCN], ipsenol (alternative name) [CCN], japonilure (alternative name) (481), lineatin (alternative name) [CCN], litlure (alternative name) [CCN], looplure (alternative name) [CCN], medlure [CCN], megatomoic acid (alternative name) [CCN], methyl eugenol (alternative name) (540), muscalure (563), octadeca-2,13-dien-1-yl acetate (IUPAC name) (588), octadeca-3,13-dien-1-yl acetate (IUPAC name) (589), orfralure (alternative name) [CCN], oryctalure (alternative name) (317), ostramone (alternative name) [CCN], siglure [CCN], sordidin (alternative name) (736), sulcatol (alternative name) [CCN], tetradec-11-en-1-yl acetate (IUPAC name) (785), trimedlure (839), trimedlure A (alternative name) (839), trimedlure B_1 (alternative name) (839), trimedlure B_2 (alternative name) (839), trimedlure C (alternative name) (839) and trunc-call (alternative name) [CCN],

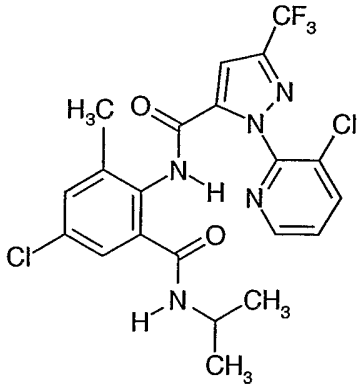
an insect repellent selected from the group of substances consisting of 2-(octylthio)-ethanol (IUPAC name) (591), butopyronoxyl (933), butoxy(polypropylene glycol) (936), dibutyl adipate (IUPAC name) (1046), dibutyl phthalate (1047), dibutyl succinate (IUPAC name) (1048), diethyltoluamide [CCN], dimethyl carbate [CCN], dimethyl phthalate [CCN], ethyl hexanediol (1137), hexamide [CCN], methoquin-butyl (1276), methylneodecanamide [CCN], oxamate [CCN] and picaridin [CCN],

an insecticide selected from the group of substances consisting of 1,1-dichloro-1-nitroethane (IUPAC/Chemical Abstracts name) (1058), 1,1-dichloro-2,2-bis(4-ethylphenyl)-ethane (IUPAC name) (1056), 1,2-dichloropropane (IUPAC/Chemical Abstracts name) (1062), 1,2-dichloropropane with 1,3-dichloropropene (IUPAC name) (1063), 1-bromo-2-chloroethane (IUPAC/Chemical Abstracts name) (916), 2,2,2-trichloro-1-(3,4-dichloro-phenyl)ethyl acetate (IUPAC name) (1451), 2,2-dichlorovinyl 2-ethylsulfinylethyl methyl phosphate (IUPAC name) (1066), 2-(1,3-dithiolan-2-yl)phenyl dimethylcarbamate (IUPAC/ Chemical Abstracts name) (1109), 2-(2-butoxyethoxy)ethyl thiocyanate (IUPAC/Chemical Abstracts name) (935), 2-(4,5-dimethyl-1,3-dioxolan-2-yl)phenyl methylcarbamate (IUPAC/ Chemical Abstracts name) (1084), 2-(4-chloro-3,5-xylyloxy)ethanol (IUPAC name) (986), 2-chlorovinyl diethyl phosphate (IUPAC name) (984), 2-imidazolidone (IUPAC name) (1225), 2-isovalerylindan-1,3-dione (IUPAC name) (1246), 2-methyl(prop-2-ynyl)aminophenyl methylcarbamate (IUPAC name) (1284), 2-thiocyanatoethyl laurate (IUPAC name) (1433), 3-

bromo-1-chloroprop-1-ene (IUPAC name) (917), 3-methyl-1-phenylpyrazol-5-yl dimethylcarbamate (IUPAC name) (1283), 4-methyl(prop-2-ynyl)amino-3,5-xylyl methylcarbamate (IUPAC name) (1285), 5,5-dimethyl-3-oxocyclohex-1-enyl dimethylcarbamate (IUPAC name) (1085), abamectin (1), acephate (2), acetamiprid (4), acethion (alternative name) [CCN], acetoprole [CCN], acrinathrin (9), acrylonitrile (IUPAC name) (861), alanycarb (15), aldicarb (16), aldoxycarb (863), aldrin (864), allethrin (17), allosamidin (alternative name) [CCN], allyxycarb (866), alpha-cypermethrin (202), alpha-ecdysone (alternative name) [CCN], aluminium phosphide (640), amidithion (870), amidothioate (872), aminocarb (873), amiton (875), amiton hydrogen oxalate (875), amitraz (24), anabasine (877), athidathion (883), AVI 382 (compound code), AZ 60541 (compound code), azadirachtin (alternative name) (41), azamethiphos (42), azinphos-ethyl (44), azinphos-methyl (45), azothoate (889), *Bacillus thuringiensis* delta endotoxins (alternative name) (52), barium hexafluorosilicate (alternative name) [CCN], barium polysulfide (IUPAC/Chemical Abstracts name) (892), barthrin [CCN], Bayer 22/190 (development code) (893), Bayer 22408 (development code) (894), bendiocarb (58), benfuracarb (60), bensultap (66), beta-cyfluthrin (194), beta-cypermethrin (203), bifenthrin (76), bioallethrin (78), bioallethrin *S*-cyclopentenyl isomer (alternative name) (79), bioethanomethrin [CCN], biopermethrin (908), bioresmethrin (80), bis(2-chloroethyl) ether (IUPAC name) (909), bistrifluron (83), borax (86), brofenvalerate (alternative name), bromfenvinfos (914), bromocyclen (918), bromo-DDT (alternative name) [CCN], bromophos (920), bromophos-ethyl (921), bufencarb (924), buprofezin (99), butacarb (926), butathiofos (927), butocarboxim (103), butonate (932), butoxycarboxim (104), butylpyridaben (alternative name), cadusafos (109), calcium arsenate [CCN], calcium cyanide (444), calcium polysulfide (IUPAC name) (111), camphechlor (941), carbanolate (943), carbaryl (115), carbofuran (118), carbon disulfide (IUPAC/Chemical Abstracts name) (945), carbon tetrachloride (IUPAC name) (946), carbophenothion (947), carbosulfan (119), cartap (123), cartap hydrochloride (123), cevadine (alternative name) (725), chlorbicyclen (960), chlordane (128), chlordecone (963), chlordimeform (964), chlordimeform hydrochloride (964), chlorethoxyfos (129), chlorfenapyr (130), chlorfenvinphos (131), chlorfluazuron (132), chlormephos (136), chloroform [CCN], chloropicrin (141), chlorphoxim (989), chlorprazophos (990), chlorpyrifos (145), chlorpyrifos-methyl (146), chlorthiophos (994), chromafenozide (150), cinerin I (696), cinerin II (696), cinerins (696), cis-resmethrin (alternative name), cismethrin (80), clocythrin (alternative name), cloethocarb (999), closantel (alternative name) [CCN], clothianidin (165), copper acetoarsenite [CCN], copper arsenate [CCN], copper oleate [CCN], coumaphos (174), coumithoate (1006), crotamiton (alternative name) [CCN], crotoxyphos (1010),

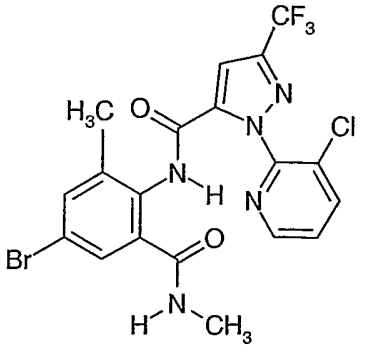
crufomate (1011), cryolite (alternative name) (177), CS 708 (development code) (1012), cyanofenphos (1019), cyanophos (184), cyanthoate (1020), cyclethrin [CCN], cycloprothrin (188), cyfluthrin (193), cyhalothrin (196), cypermethrin (201), cyphenothrin (206), cyromazine (209), cythioate (alternative name) [CCN], *d*-limonene (alternative name) [CCN], *d*-tetramethrin (alternative name) (788), DAEP (1031), dazomet (216), DDT (219), decarbofuran (1034), deltamethrin (223), demephion (1037), demephion-O (1037), demephion-S (1037), demeton (1038), demeton-methyl (224), demeton-O (1038), demeton-O-methyl (224), demeton-S (1038), demeton-S-methyl (224), demeton-S-methylsulphon (1039), diafenthiuron (226), dialifos (1042), diamidafos (1044), diazinon (227), dicapthon (1050), dichlofenthion (1051), dichlorvos (236), dicliphos (alternative name), dicresyl (alternative name) [CCN], dicrotophos (243), dicyclanil (244), dieldrin (1070), diethyl 5-methylpyrazol-3-yl phosphate (IUPAC name) (1076), diflubenzuron (250), dilor (alternative name) [CCN], dimefluthrin [CCN], dimefox (1081), dimetan (1085), dimethoate (262), dimethrin (1083), dimethylvinphos (265), dimetilan (1086), dinex (1089), dinex-diclexine (1089), dinoprop (1093), dinosam (1094), dinoseb (1095), dinotefuran (271), diofenolan (1099), dioxabenzofos (1100), dioxacarb (1101), dioxathion (1102), disulfoton (278), dithicrofos (1108),

the compound of formula A-1



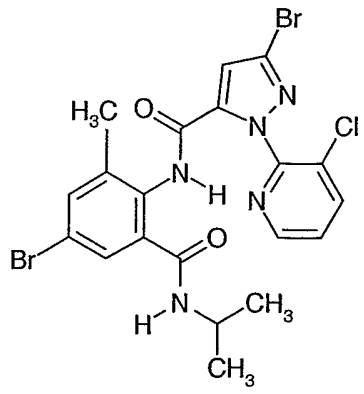
(A-1),

the formula A-2



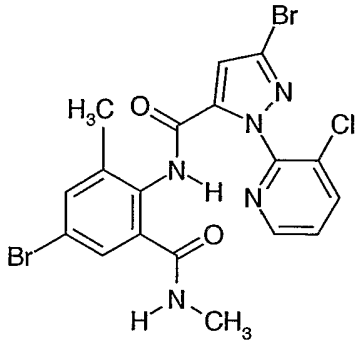
(A-2),

the formula A-3



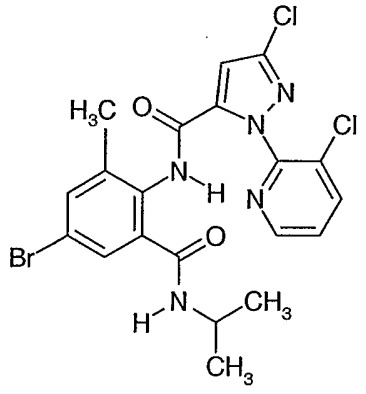
(A-3),

the formula A-4



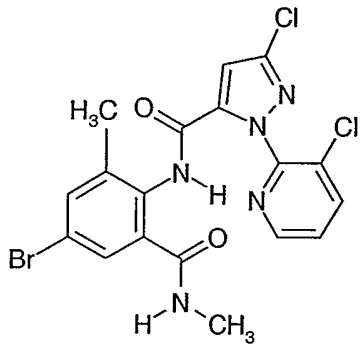
(A-4),

the formula A-5



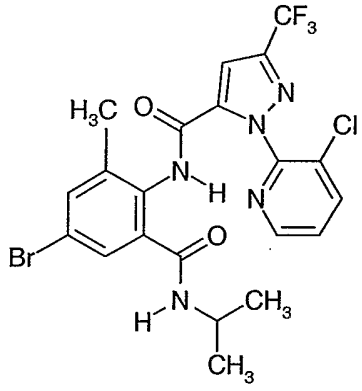
(A-5),

the formula A-6



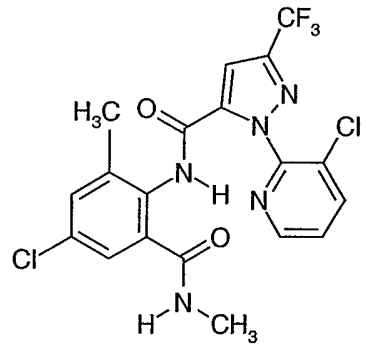
(A-6),

the formula A-7



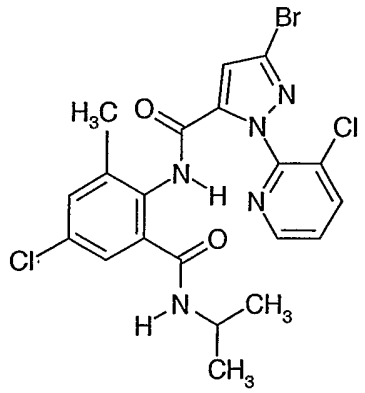
(A-7),

the formula A-8



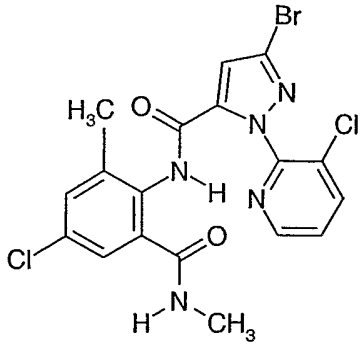
(A-8),

the formula A-9



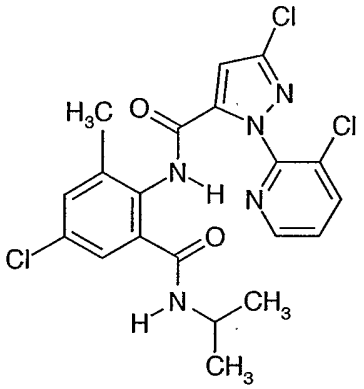
(A-9),

the formula A-10



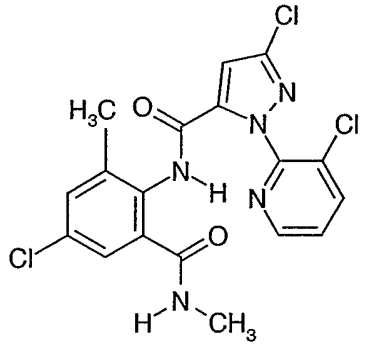
(A-10),

the formula A-11



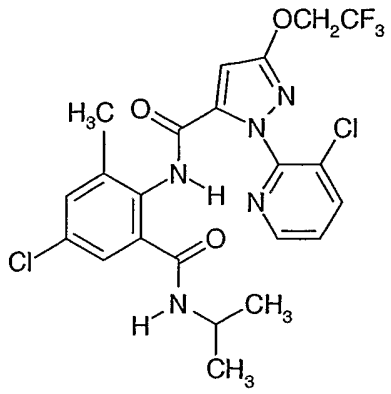
(A-11),

the formula A-12



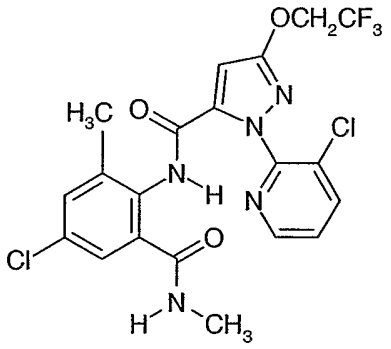
(A-12),

the formula A-13



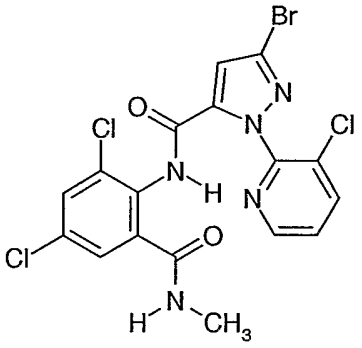
(A-13),

the formula A-14



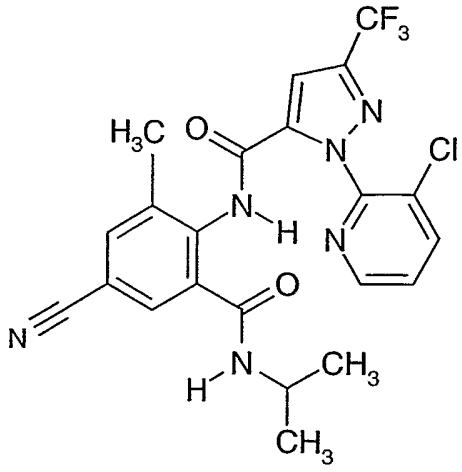
(A-14),

the formula A-15



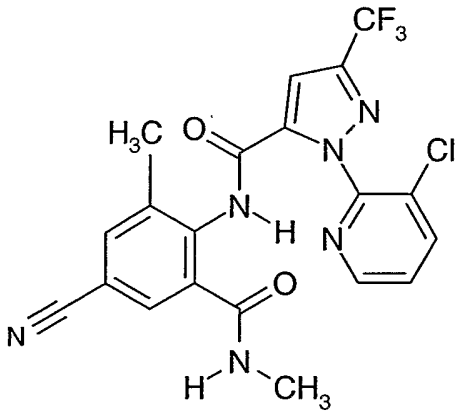
(A-15),

the formula A-16



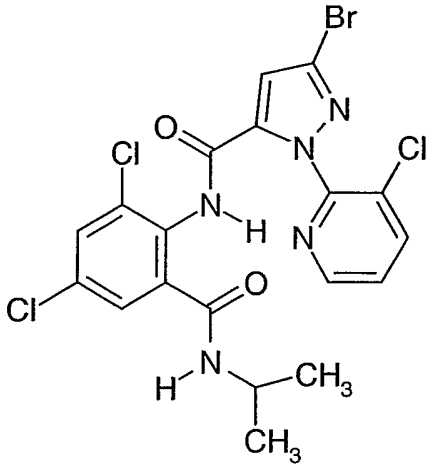
(A-16),

the formula A-17



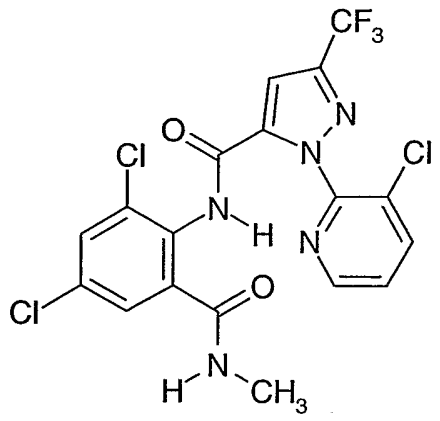
(A-17),

the formula A-18



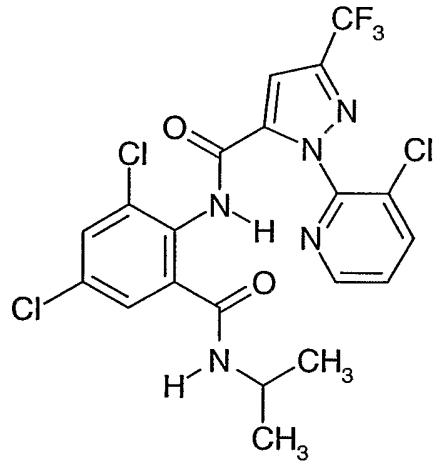
(A-18),

the formula A-19



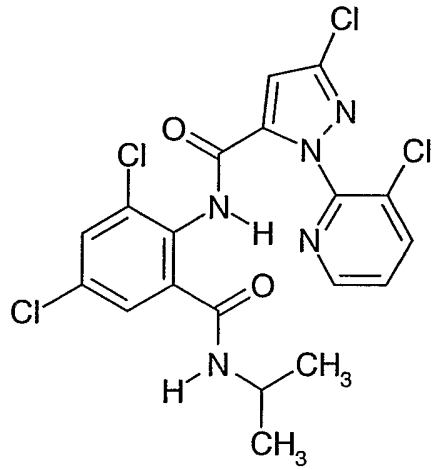
(A-19),

the formula A-20



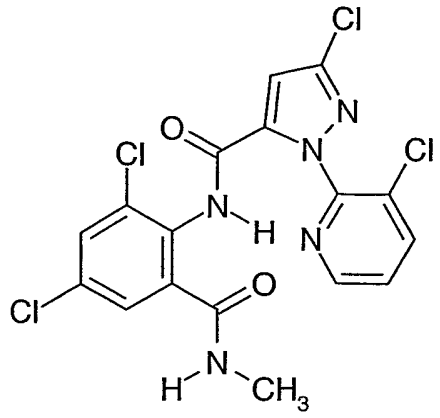
(A-20),

the formula A-21

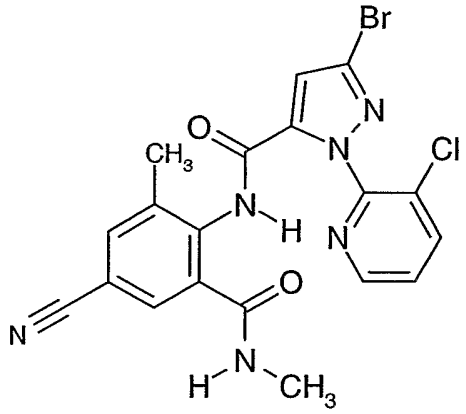


(A-21),

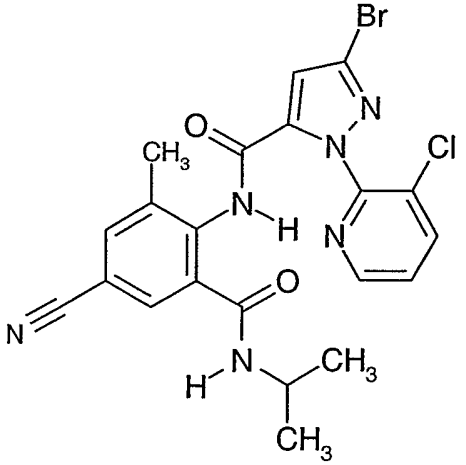
the formula A-22


(A-22),

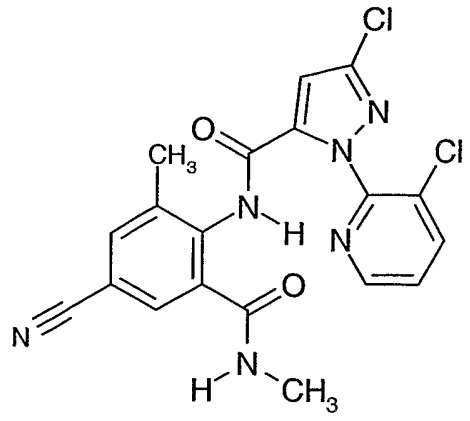
the formula A-23


(A-23),

the formula A-24

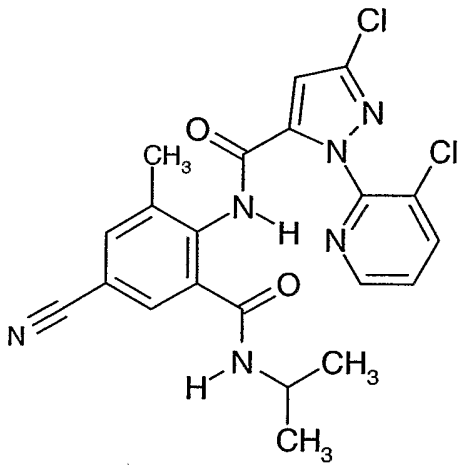

(A-24),

the formula A-25



(A-25),

the formula A-26



(A-26),

DNOC (282), doramectin (alternative name) [CCN], DSP (1115), ecdysterone (alternative name) [CCN], EI 1642 (development code) (1118), emamectin (291), emamectin benzoate (291), EMPC (1120), empenthrin (292), endosulfan (294), endothion (1121), endrin (1122), EPBP (1123), EPN (297), epofenonane (1124), eprinomectin (alternative name) [CCN], esfenvalerate (302), etaphos (alternative name) [CCN], ethiofencarb (308), ethion (309), ethiprole (310), ethoate-methyl (1134), ethoprophos (312), ethyl formate (IUPAC name) [CCN], ethyl-DDD (alternative name) (1056), ethylene dibromide (316), ethylene dichloride (chemical name) (1136), ethylene oxide [CCN], etofenprox (319), etrimfos (1142), EXD (1143), famphur (323), fenamiphos (326), fenazaflor (1147), fenchlorphos (1148), fenethacarb (1149), fenfluthrin (1150), fenitrothion (335), fenobucarb (336), fenoxacrim (1153), fenoxycarb (340), fenpirithrin (1155), fenpropathrin (342), fenpyrad (alternative name), fensulfothion (1158), fenthion (346), fenthion-ethyl [CCN], fenvalerate (349), fipronil (354), flonicamid (358), flubendiamide (CAS. Reg. No.: 272451-65-7), flucofuron (1168), flucycloxuron (366), flucythrinate (367), fluenetil (1169), flufenerim [CCN], flufenoxuron (370), flufenprox (1171), flumethrin (372), fluvalinate (1184), FMC 1137 (development code)

(1185), fonofos (1191), formetanate (405), formetanate hydrochloride (405), formothion (1192), formparanate (1193), fosmethilan (1194), fospirate (1195), fosthiazate (408), fosthietan (1196), furathiocarb (412), furethrin (1200), gamma-cyhalothrin (197), gamma-HCH (430), guazatine (422), guazatine acetates (422), GY-81 (development code) (423), halfenprox (424), halofenozide (425), HCH (430), HEOD (1070), heptachlor (1211), heptenophos (432), heterophos [CCN], hexaflumuron (439), HHDN (864), hydramethylnon (443), hydrogen cyanide (444), hydroprene (445), hyquincarb (1223), imidacloprid (458), imiprothrin (460), indoxacarb (465), iodomethane (IUPAC name) (542), IPSP (1229), isazofos (1231), isobenzan (1232), isocarbophos (alternative name) (473), isodrin (1235), isofenphos (1236), isolane (1237), isoprocarb (472), isopropyl *O*-(methoxy-aminothiophosphoryl)salicylate (IUPAC name) (473), isoprothiolane (474), isothioate (1244), isoxathion (480), ivermectin (alternative name) [CCN], jasmolin I (696), jasmolin II (696), jodfenphos (1248), juvenile hormone I (alternative name) [CCN], juvenile hormone II (alternative name) [CCN], juvenile hormone III (alternative name) [CCN], kelevan (1249), kinoprene (484), lambda-cyhalothrin (198), lead arsenate [CCN], lepimectin (CCN), leptophos (1250), lindane (430), lirimfos (1251), lufenuron (490), lythidathion (1253), *m*-cumenyl methylcarbamate (IUPAC name) (1014), magnesium phosphide (IUPAC name) (640), malathion (492), malonoben (1254), mazidox (1255), mecarbam (502), mecarphon (1258), menazon (1260), mephosfolan (1261), mercurous chloride (513), mesulfenfos (1263), metaflumizone (CCN), metam (519), metam-potassium (alternative name) (519), metam-sodium (519), methacrifos (1266), methamidophos (527), methanesulfonyl fluoride (IUPAC/Chemical Abstracts name) (1268), methidathion (529), methiocarb (530), methocrotophos (1273), methomyl (531), methoprene (532), methoquin-butyl (1276), methothrin (alternative name) (533), methoxychlor (534), methoxyfenozide (535), methyl bromide (537), methyl isothiocyanate (543), methylchloroform (alternative name) [CCN], methylene chloride [CCN], metofluthrin [CCN], metolcarb (550), metoxadiazone (1288), mevinphos (556), mexacarbate (1290), milbemectin (557), milbemycin oxime (alternative name) [CCN], mipafox (1293), mirex (1294), monocrotophos (561), morphothion (1300), moxidectin (alternative name) [CCN], naftalofos (alternative name) [CCN], naled (567), naphthalene (IUPAC/Chemical Abstracts name) (1303), NC-170 (development code) (1306), NC-184 (compound code), nicotine (578), nicotine sulfate (578), nifluridide (1309), nitenpyram (579), nithiazine (1311), nitrilacarb (1313), nitrilacarb 1:1 zinc chloride complex (1313), NNI-0101 (compound code), NNI-0250 (compound code), nornicotine (traditional name) (1319), novaluron (585), noviflumuron (586), *O*-2,5-dichloro-4-iodophenyl *O*-ethyl

ethylphosphonothioate (IUPAC name) (1057), *O,O*-diethyl *O*-4-methyl-2-oxo-2*H*-chromen-7-yl phosphorothioate (IUPAC name) (1074), *O,O*-diethyl *O*-6-methyl-2-propylpyrimidin-4-yl phosphorothioate (IUPAC name) (1075), *O,O,O',O'*-tetrapropyl dithiopyrophosphate (IUPAC name) (1424), oleic acid (IUPAC name) (593), omethoate (594), oxamyl (602), oxydemeton-methyl (609), oxydeprofos (1324), oxydisulfoton (1325), pp'-DDT (219), para-dichlorobenzene [CCN], parathion (615), parathion-methyl (616), penfluron (alternative name) [CCN], pentachlorophenol (623), pentachlorophenyl laurate (IUPAC name) (623), permethrin (626), petroleum oils (alternative name) (628), PH 60-38 (development code) (1328), phenkapton (1330), phenothrin (630), phenthoate (631), phorate (636), phosalone (637), phosfolan (1338), phosmet (638), phosnichlor (1339), phosphamidon (639), phosphine (IUPAC name) (640), phoxim (642), phoxim-methyl (1340), pirimetaphos (1344), pirimicarb (651), pirimiphos-ethyl (1345), pirimiphos-methyl (652), polychlorodicyclopentadiene isomers (IUPAC name) (1346), polychloroterpenes (traditional name) (1347), potassium arsenite [CCN], potassium thiocyanate [CCN], prallethrin (655), precocene I (alternative name) [CCN], precocene II (alternative name) [CCN], precocene III (alternative name) [CCN], primidophos (1349), profenofos (662), profluthrin [CCN], promacyl (1354), promecarb (1355), propaphos (1356), propetamphos (673), propoxur (678), prothidathion (1360), prothiofos (686), prothoate (1362), protrifenbute [CCN], pymetrozine (688), pyraclofos (689), pyrazophos (693), pyresmethrin (1367), pyrethrin I (696), pyrethrin II (696), pyrethrins (696), pyridaben (699), pyridalyl (700), pyridaphenthion (701), pyrimidifen (706), pyrimitate (1370), pyriproxyfen (708), quassia (alternative name) [CCN], quinalphos (711), quinalphos-methyl (1376), quinothion (1380), quintiofos (1381), R-1492 (development code) (1382), rafoxanide (alternative name) [CCN], resmethrin (719), rotenone (722), RU 15525 (development code) (723), RU 25475 (development code) (1386), ryania (alternative name) (1387), ryanodine (traditional name) (1387), sabadilla (alternative name) (725), schradan (1389), sebufos (alternative name), selamectin (alternative name) [CCN], SI-0009 (compound code), SI-0205 (compound code), SI-0404 (compound code), SI-0405 (compound code), silafluofen (728), SN 72129 (development code) (1397), sodium arsenite [CCN], sodium cyanide (444), sodium fluoride (IUPAC/Chemical Abstracts name) (1399), sodium hexafluorosilicate (1400), sodium pentachlorophenoxide (623), sodium selenate (IUPAC name) (1401), sodium thiocyanate [CCN], sophamide (1402), spinosad (737), spiromesifen (739), spirotetramat (CCN), sulcofuron (746), sulcofuron-sodium (746), sulfluramid (750), sulfotep (753), sulfuryl fluoride (756), sulprofos (1408), tar oils (alternative name) (758), tau-fluvalinate (398), tazimcarb (1412), TDE (1414), tebufenozide (762),

tebufenpyrad (763), tebupirimfos (764), teflubenzuron (768), tefluthrin (769), temephos (770), TEPP (1417), terallethrin (1418), terbam (alternative name), terbufos (773), tetrachloroethane [CCN], tetrachlorvinphos (777), tetramethrin (787), theta-cypermethrin (204), thiacloprid (791), thiafenox (alternative name), thiamethoxam (792), thicrofos (1428), thiocarboxime (1431), thiocyclam (798), thiocyclam hydrogen oxalate (798), thiodicarb (799), thiofanox (800), thiometon (801), thionazin (1434), thiosultap (803), thiosultap-sodium (803), thuringiensin (alternative name) [CCN], tolfenpyrad (809), tralomethrin (812), transfluthrin (813), transpermethrin (1440), triamiphos (1441), triazamate (818), triazophos (820), triazuron (alternative name), trichlorfon (824), trichlormetaphos-3 (alternative name) [CCN], trichloronat (1452), trifenofos (1455), triflumuron (835), trimethacarb (840), triprene (1459), vamidothion (847), vaniliprole [CCN], veratridine (alternative name) (725), veratrine (alternative name) (725), XMC (853), xylylcarb (854), YI-5302 (compound code), zeta-cypermethrin (205), zetamethrin (alternative name), zinc phosphide (640), zolaprofos (1469) and ZXI 8901 (development code) (858),

a molluscicide selected from the group of substances consisting of bis(tributyltin) oxide (IUPAC name) (913), bromoacetamide [CCN], calcium arsenate [CCN], cloethocarb (999), copper acetoarsenite [CCN], copper sulfate (172), fentin (347), ferric phosphate (IUPAC name) (352), metaldehyde (518), methiocarb (530), niclosamide (576), niclosamide-olamine (576), pentachlorophenol (623), sodium pentachlorophenoxide (623), tazimcarb (1412), thiodicarb (799), tributyltin oxide (913), trifenmorph (1454), trimethacarb (840), triphenyltin acetate (IUPAC name) (347) and triphenyltin hydroxide (IUPAC name) (347),

a nematicide selected from the group of substances consisting of AKD-3088 (compound code), 1,2-dibromo-3-chloropropane (IUPAC/Chemical Abstracts name) (1045), 1,2-dichloropropane (IUPAC/ Chemical Abstracts name) (1062), 1,2-dichloropropane with 1,3-dichloropropene (IUPAC name) (1063), 1,3-dichloropropene (233), 3,4-dichlorotetrahydrothiophene 1,1-dioxide (IUPAC/Chemical Abstracts name) (1065), 3-(4-chlorophenyl)-5-methylrhodanine (IUPAC name) (980), 5-methyl-6-thioxo-1,3,5-thiadiazinan-3-ylacetic acid (IUPAC name) (1286), 6-isopentenylaminopurine (alternative name) (210), abamectin (1), acetoprole [CCN], alanycarb (15), aldicarb (16), aldoxycarb (863), AZ 60541 (compound code), benclothiaz [CCN], benomyl (62), butylpyridaben (alternative name), cadusafos (109), carbofuran (118), carbon disulfide (945), carbosulfan (119), chloropicrin (141), chlorpyrifos (145), cloethocarb (999), cytokinins (alternative name) (210), dazomet (216), DBCP (1045), DCIP (218), diamidafos (1044), dichlofenthion (1051), dicliphos (alternative name), dimethoate (262), doramectin (alternative name) [CCN], emamectin

(291), emamectin benzoate (291), eprinomectin (alternative name) [CCN], ethoprophos (312), ethylene dibromide (316), fenamiphos (326), fenpyrad (alternative name), fensulfothion (1158), fosthiazate (408), fosthietan (1196), furfural (alternative name) [CCN], GY-81 (development code) (423), heterophos [CCN], iodomethane (IUPAC name) (542), isamidofos (1230), isazofos (1231), ivermectin (alternative name) [CCN], kinetin (alternative name) (210), mecarphon (1258), metam (519), metam-potassium (alternative name) (519), metam-sodium (519), methyl bromide (537), methyl isothiocyanate (543), milbemycin oxime (alternative name) [CCN], moxidectin (alternative name) [CCN], *Myrothecium verrucaria* composition (alternative name) (565), NC-184 (compound code), oxamyl (602), phorate (636), phosphamidon (639), phosphocarb [CCN], sebufos (alternative name), selamectin (alternative name) [CCN], spinosad (737), terbam (alternative name), terbufos (773), tetrachlorothiophene (IUPAC/ Chemical Abstracts name) (1422), thiafenox (alternative name), thionazin (1434), triazophos (820), triazuron (alternative name), xylenols [CCN], YI-5302 (compound code) and zeatin (alternative name) (210),

a nitrification inhibitor selected from the group of substances consisting of potassium ethylxanthate [CCN] and nitrapyrin (580),

a plant activator selected from the group of substances consisting of acibenzolar (6), acibenzolar-*S*-methyl (6), probenazole (658) and *Reynoutria sachalinensis* extract (alternative name) (720),

a rodenticide selected from the group of substances consisting of 2-isovalerylindan-1,3-dione (IUPAC name) (1246), 4-(quinoxalin-2-ylamino)benzenesulfonamide (IUPAC name) (748), alpha-chlorohydrin [CCN], aluminium phosphide (640), antu (880), arsenous oxide (882), barium carbonate (891), bisthiosemi (912), brodifacoum (89), bromadiolone (91), bromethalin (92), calcium cyanide (444), chloralose (127), chlorophacinone (140), cholecalciferol (alternative name) (850), coumachlor (1004), coumafuryl (1005), coumatetralyl (175), crimidine (1009), difenacoum (246), difethialone (249), diphacinone (273), ergocalciferol (301), flocoumafen (357), fluoroacetamide (379), flupropadine (1183), flupropadine hydrochloride (1183), gamma-HCH (430), HCH (430), hydrogen cyanide (444), iodomethane (IUPAC name) (542), lindane (430), magnesium phosphide (IUPAC name) (640), methyl bromide (537), norbormide (1318), phosacetim (1336), phosphine (IUPAC name) (640), phosphorus [CCN], pindone (1341), potassium arsenite [CCN], pyrinuron (1371), scilliroside (1390), sodium arsenite [CCN], sodium cyanide (444), sodium fluoro-acetate (735), strychnine (745), thallium sulfate [CCN], warfarin (851) and zinc phosphide (640),

a synergist selected from the group of substances consisting of 2-(2-butoxyethoxy)-ethyl piperonylate (IUPAC name) (934), 5-(1,3-benzodioxol-5-yl)-3-hexylcyclohex-2-enone (IUPAC name) (903), farnesol with nerolidol (alternative name) (324), MB-599 (development code) (498), MGK 264 (development code) (296), piperonyl butoxide (649), piprotal (1343), propyl isomer (1358), S421 (development code) (724), sesamex (1393), sesasmolin (1394) and sulfoxide (1406),

an animal repellent selected from the group of substances consisting of anthraquinone (32), chloralose (127), copper naphthenate [CCN], copper oxychloride (171), diazinon (227), dicyclopentadiene (chemical name) (1069), guazatine (422), guazatine acetates (422), methiocarb (530), pyridin-4-amine (IUPAC name) (23), thiram (804), trimethacarb (840), zinc naphthenate [CCN] and ziram (856),

a virucide selected from the group of substances consisting of imanin (alternative name) [CCN] and ribavirin (alternative name) [CCN],

and a wound protectant selected from the group of substances consisting of mercuric oxide (512), octhilinone (590) and thiophanate-methyl (802).

The compounds of the group M_1 are known. Where the compounds of the group M_1 are included in "The Pesticide Manual" [The Pesticide Manual - A World Compendium; Thirteenth Edition; Editor: C. D. S. Tomlin; The British Crop Protection Council], they are described therein under the entry number given in round brackets hereinabove for the particular compound; for example, the compound "abamectin" is described under entry number (1). Where "[CCN]" is added hereinabove to the particular compound, the compound in question is included in the "Compendium of Pesticide Common Names", which is accessible on the internet [A. Wood; Compendium of Pesticide Common Names, Copyright © 1995-2004]; for example, the compound "acetoprole" is described under the internet address http://www.alanwood.net/pesticides/acetoprole.html.

Most of the compounds of the group M_1 are referred to hereinabove by a so-called "common name", the relevant "ISO common name" or another "common name" being used in individual cases. If the designation is not a "common name", the nature of the designation used instead is given in round brackets for the particular compound; in that case, the IUPAC name, the IUPAC/Chemical Abstracts name, a "chemical name", a "traditional name", a "compound name" or a "develoment code" is used or, if neither one of those designations

nor a "common name" is used, an "alternative name" is employed. "CAS Reg. No" means the Chemical Abstracts Registry Number.

The compouds of the formulae A-1 to A-26 are described in WO 03/015518 or in WO 04/067528.

The following mixtures of the compounds of formula I with one member of the group M_1 are preferred (in the following listing, "M_1" means one member selected from the group M_1.)
T1.1.1 + M_1; T1.1.2 + M_1; T1.1.3 + M_1; T1.1.4 + M_1; T1.1.5 + M_1; T1.1.6 + M_1; T1.1.7 + M_1; T1.1.8 + M_1; T1.1.9 + M_1; T1.1.10 + M_1; T1.1.11 + M_1; T1.1.12 + M_1; T1.1.13 + M_1; T1.1.14 + M_1; T1.1.15 + M_1; T1.1.16 + M_1; T1.1.17 + M_1; T1.1.18 + M_1; T1.1.19 + M_1; T1.1.20 + M_1; T1.1.21 + M_1; T1.1.22 + M_1; T1.1.23 + M_1; T1.1.24 + M_1; T1.1.25 + M_1; T1.1.26 + M_1; T1.1.27 + M_1; T1.1.28 + M_1; T1.1.29 + M_1; T1.1.30 + M_1; T1.1.31 + M_1; T1.1.32 + M_1; T1.1.33 + M_1; T1.1.34 + M_1; T1.1.35 + M_1; T1.1.36 + M_1; T1.1.37 + M_1; T1.1.38 + M_1; T1.1.39 + M_1; T1.1.40 + M_1; T1.1.41 + M_1; T1.1.42 + M_1; T1.1.43 + M_1; T1.1.44 + M_1; T1.1.45 + M_1; T1.1.46 + M_1; T1.1.47 + M_1; T1.1.48 + M_1; T1.1.49 + M_1; T1.1.50 + M_1; T1.1.51 + M_1; T1.1.52 + M_1; T1.1.53 + M_1; T1.1.54 + M_1; T1.1.55 + M_1; T1.1.56 + M_1; T1.1.57 + M_1; T1.1.58 + M_1; T1.1.59 + M_1; T1.1.60 + M_1; T1.1.61 + M_1; T1.1.62 + M_1; T1.1.63 + M_1; T1.1.64 + M_1; T1.1.65 + M_1; T1.1.66 + M_1; T1.1.67 + M_1; T1.1.68 + M_1; T1.1.69 + M_1; T1.1.70 + M_1; T1.1.71 + M_1; T1.1.72 + M_1; T1.1.73 + M_1; T1.1.74 + M_1; T1.1.75 + M_1; T1.1.76 + M_1; T1.1.77 + M_1; T1.1.78 + M_1; T1.1.79 + M_1; T1.1.80 + M_1; T1.1.81 + M_1; T1.1.82 + M_1; T1.1.83 + M_1; T1.1.84 + M_1; T1.1.85 + M_1; T1.1.86 + M_1; T1.1.87 + M_1; T1.1.88 + M_1; T1.1.89 + M_1; T1.1.90 + M_1; T1.1.91 + M_1; T1.1.92 + M_1; T1.1.93 + M_1; T1.1.94 + M_1; T1.1.95 + M_1; T1.1.96 + M_1; T1.1.97 + M_1; T1.1.98 + M_1; T1.1.99 + M_1; T1.1.100 + M_1; T1.1.101 + M_1; T1.1.102 + M_1; T1.1.103 + M_1; T1.1.104 + M_1; T1.1.105 + M_1; T1.1.106 + M_1; T1.1.107 + M_1; T1.1.108 + M_1; T1.1.109 + M_1; T1.1.110 + M_1; T1.1.111 + M_1; T1.1.112 + M_1; T1.1.113 + M_1; T1.1.114 + M_1; T1.1.115 + M_1; T1.1.116 + M_1; T1.1.117 + M_1; T1.1.118 + M_1; T1.1.119 + M_1; T1.1.120 + M_1; T1.1.121 + M_1; T1.1.122 + M_1; T1.1.123 + M_1; T1.1.124 + M_1; T1.1.125 + M_1; T1.1.126 + M_1; T1.1.127 + M_1; T1.1.128 + M_1; T1.1.129 + M_1; T1.1.130 + M_1; T1.1.131 + M_1; T1.1.132 + M_1; T1.1.133 + M_1; T1.1.134 + M_1; T1.1.135 + M_1; T1.1.136 + M_1; T1.1.137 + M_1; T1.1.138 + M_1; T1.1.139 + M_1; T1.1.140 + M_1; T1.1.141 + M_1; T1.1.142 + M_1; T1.1.143 + M_1; T1.1.144 + M_1; T1.1.145 + M_1; T1.1.146 + M_1; T1.1.147 + M_1; T1.1.148 + M_1; T1.1.149 + M_1; T1.1.150 + M_1; T1.1.151 + M_1; T1.1.152 + M_1; T1.1.153 + M_1; T1.1.154 + M_1; T1.1.155 + M_1; T1.1.156 + M_1; T1.1.157 + M_1; T1.1.158 + M_1;

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+ M_1; T3.1.5 + M_1; T3.1.6 + M_1; T3.1.7 + M_1; T3.1.8 + M_1; T3.1.9 + M_1; T3.1.10 + M_1; T3.1.11 + M_1; T3.1.12 + M_1; T3.1.13 + M_1; T3.1.14 + M_1; T3.1.15 + M_1; T3.1.16 + M_1; T3.1.17 + M_1; T3.1.18 + M_1; T3.1.19 + M_1; T3.1.20 + M_1; T3.1.21 + M_1; T3.1.22 + M_1; T3.1.23 + M_1; T3.1.24 + M_1; T3.1.25 + M_1; T3.1.26 + M_1; T3.1.27 + M_1; T3.1.28 + M_1; T3.1.29 + M_1; T3.1.30 + M_1; T3.1.31 + M_1; T3.1.32 + M_1; T3.1.33 + M_1; T3.1.34 + M_1; T3.1.35 + M_1; T3.1.36 + M_1; T3.1.37 + M_1; T3.1.38 + M_1; T3.1.39 + M_1; T3.1.40 + M_1; T3.1.41 + M_1; T3.1.42 + M_1; T3.1.43 + M_1; T3.1.44 + M_1; T3.1.45 + M_1; T3.1.46 + M_1; T3.1.47 + M_1; T3.1.48 + M_1; T3.1.49 + M_1; T3.1.50 + M_1; T3.1.51 + M_1; T3.1.52 + M_1; T3.1.53 + M_1; T3.1.54 + M_1; T3.1.55 + M_1; T3.1.56 + M_1; T3.1.57 + M_1; T3.1.58 + M_1; T3.1.59 + M_1; T3.1.60 + M_1; T3.1.61 + M_1; T3.1.62 + M_1; T3.1.63 + M_1; T3.1.64 + M_1; T3.1.65 + M_1; T3.1.66 + M_1; T3.1.67 + M_1; T3.1.68 + M_1; T3.1.69 + M_1; T3.1.70 + M_1; T3.1.71 + M_1; T3.1.72 + M_1; T3.1.73 + M_1; T3.1.74 + M_1; T3.1.75 + M_1; T3.1.76 + M_1; T3.1.77 + M_1; T3.1.78 + M_1; T3.1.79 + M_1; T3.1.80 + M_1; T3.1.81 + M_1; T3.1.82 + M_1; T3.1.83 + M_1; T3.1.84 + M_1; T3.1.85 + M_1; T3.1.86 + M_1; T3.1.87 + M_1; T3.1.88 + M_1; T3.1.89 + M_1; T3.1.90 + M_1; T3.1.91 + M_1; T3.1.92 + M_1; T3.1.93 + M_1; T3.1.94 + M_1; T3.1.95 + M_1; T3.1.96 + M_1; T3.1.97 + M_1; T3.1.98 + M_1; T3.1.99 + M_1; T3.1.100 + M_1; T3.1.101 + M_1; T3.1.102 + M_1; T3.1.103 + M_1; T3.1.104 + M_1; T3.1.105 + M_1; T3.1.106 + M_1; T3.1.107 + M_1; T3.1.108 + M_1; T3.1.109 + M_1; T3.1.110 + M_1; T3.1.111 + M_1; T3.1.112 + M_1; T3.1.113 + M_1; T3.1.114 + M_1; T3.1.115 + M_1; T3.1.116 + M_1; T3.1.117 + M_1; T3.1.118 + M_1; T3.1.119 + M_1; T3.1.120 + M_1; T3.1.121 + M_1; T3.1.122 + M_1; T3.1.123 + M_1; T3.1.124 + M_1; T3.1.125 + M_1; T3.1.126 + M_1; T3.1.127 + M_1; T3.1.128 + M_1; T3.1.129 + M_1; T3.1.130 + M_1; T3.1.131 + M_1; T3.1.132 + M_1; T3.1.133 + M_1; T3.1.134 + M_1; T3.1.135 + M_1; T3.1.136 + M_1; T3.1.137 + M_1; T3.1.138 + M_1; T3.1.139 + M_1; T3.1.140 + M_1; T3.1.141 + M_1; T3.1.142 + M_1; T3.1.143 + M_1; T3.1.144 + M_1; T3.1.145 + M_1; T3.1.146 + M_1; T3.1.147 + M_1; T3.1.148 + M_1; T3.1.149 + M_1; T3.1.150 + M_1; T3.1.151 + M_1; T3.1.152 + M_1; T3.1.153 + M_1; T3.1.154 + M_1; T3.1.155 + M_1; T3.1.156 + M_1; T3.1.157 + M_1; T3.1.158 + M_1; T3.1.159 + M_1; T3.1.160 + M_1; T3.1.161 + M_1; T3.1.162 + M_1; T3.1.163 + M_1; T3.1.164 + M_1; T3.1.165 + M_1; T3.1.166 + M_1; T3.1.167 + M_1; T3.1.168 + M_1; T3.1.169 + M_1; T3.1.170 + M_1; T3.1.171 + M_1; T3.1.172 + M_1; T3.1.173 + M_1; T3.1.174 + M_1; T3.1.175 + M_1; T3.1.176 + M_1; T3.1.177 + M_1; T3.1.178 + M_1; T3.1.179 + M_1; T3.1.180 + M_1; T3.1.181 + M_1; T3.1.182 + M_1; T3.1.183 + M_1; T3.1.184 + M_1; T3.1.185 + M_1; T3.1.186 + M_1; T3.1.187 + M_1; T3.1.188 + M_1; T3.1.189 + M_1; T3.1.190 + M_1; T3.1.191 + M_1; T3.1.192 + M_1; T3.1.193 + M_1; T3.1.194 + M_1; T3.1.195 + M_1; T3.1.196 + M_1; T3.1.197 + M_1; T3.1.198 + M_1; T3.1.199 + M_1; T3.1.200 + M_1; T3.1.201 + M_1; T3.1.202 + M_1; T3.1.203 + M_1; T3.1.204 + M_1; T3.1.205 + M_1; T3.1.206 + M_1; T3.1.207 + M_1; T3.1.208 + M_1; T3.1.209 + M_1;

T3.1.210 + M_1; T3.1.211 + M_1; T3.1.212 + M_1; T3.1.213 + M_1; T3.1.214 + M_1; T3.1.215 + M_1; T3.1.216 + M_1; T3.1.217 + M_1; T3.1.218 + M_1; T3.1.219 + M_1; T3.1.220 + M_1; T3.1.221 + M_1; T3.1.222 + M_1; T3.1.223 + M_1; T3.1.224 + M_1; T3.1.225 + M_1; T3.1.226 + M_1; T3.1.227 + M_1; T3.1.228 + M_1; T3.1.229 + M_1; T3.1.230 + M_1; T3.1.231 + M_1; T3.1.232 + M_1; T3.1.233 + M_1; T3.1.234 + M_1; T3.1.235 + M_1; T3.1.236 + M_1; T3.1.237 + M_1; T3.1.238 + M_1; T3.1.239 + M_1; T3.1.240 + M_1; T3.1.241 + M_1; T3.1.242 + M_1; T3.1.243 + M_1; T3.1.244 + M_1; T3.1.245 + M_1; T3.1.246 + M_1; T3.1.247 + M_1; T3.1.248 + M_1; T3.1.249 + M_1; T3.1.250 + M_1; T3.1.251 + M_1; T3.1.252 + M_1; T3.1.253 + M_1; T3.1.254 + M_1; T3.1.255 + M_1; T3.1.256 + M_1; T3.1.257 + M_1; T3.1.258 + M_1; T3.1.259 + M_1; T3.1.260 + M_1; T3.1.261 + M_1; T3.1.262 + M_1; T3.1.263 + M_1; T3.1.264 + M_1; T3.1.265 + M_1; T3.1.266 + M_1; T3.1.267 + M_1; T3.1.268 + M_1; T3.1.269 + M_1; T3.1.270 + M_1; T3.1.271 + M_1; T3.1.272 + M_1; T3.1.273 + M_1; T3.1.274 + M_1; T3.1.275 + M_1; T3.1.276 + M_1; T3.1.277 + M_1; T3.1.278 + M_1; T3.1.279 + M_1; T3.1.280 + M_1; T3.1.281 + M_1; T3.1.282 + M_1; T3.1.283 + M_1; T3.1.284 + M_1; T3.1.285 + M_1; T3.1.286 + M_1; T3.1.287 + M_1; T3.1.288 + M_1; T3.1.289 + M_1; T3.1.290 + M_1; T3.1.291 + M_1; T3.1.292 + M_1; T3.1.293 + M_1; T3.1.294 + M_1; T3.1.295 + M_1; T3.1.296 + M_1; T3.1.297 + M_1; T3.1.298 + M_1; T3.1.299 + M_1; T3.1.300 + M_1; T3.1.301 + M_1; T3.1.302 + M_1; T3.1.303 + M_1; T3.1.304 + M_1; T3.1.305 + M_1; T3.1.306 + M_1; T3.1.307 + M_1; T3.1.308 + M_1; T3.1.309 + M_1; T3.1.310 + M_1; T3.1.311 + M_1; T3.1.312 + M_1; T3.1.313 + M_1; T3.1.314 + M_1; T3.1.315 + M_1; T3.1.316 + M_1; T3.1.317 + M_1; T3.1.318 + M_1; T3.1.319 + M_1; T3.1.320 + M_1; T3.1.321 + M_1; T3.1.322 + M_1; T3.1.323 + M_1; T3.1.324 + M_1; T3.1.325 + M_1; T3.1.326 + M_1; T3.1.327 + M_1; T3.1.328 + M_1; T3.1.329 + M_1; T3.1.330 + M_1; T3.1.331 + M_1; T3.1.332 + M_1; T3.1.333 + M_1; T3.1.334 + M_1; T3.1.335 + M_1; T3.1.336 + M_1; T3.1.337 + M_1; T3.1.338 + M_1; T3.1.339 + M_1; T3.1.340 + M_1; T3.1.341 + M_1; T3.1.342 + M_1; T3.1.343 + M_1; T3.1.344 + M_1; T3.1.345 + M_1; T3.1.346 + M_1; T3.1.347 + M_1; T3.1.348 + M_1; T3.1.349 + M_1; T3.1.350 + M_1; T3.1.351 + M_1; T3.1.352 + M_1; T3.1.353 + M_1; T3.1.354 + M_1; T3.1.355 + M_1; T3.1.356 + M_1; T3.1.357 + M_1; T3.1.358 + M_1; T3.1.359 + M_1; T3.1.360 + M_1; T3.1.361 + M_1; T3.1.362 + M_1; T3.1.363 + M_1; T3.1.364 + M_1; T3.1.365 + M_1; T3.1.366 + M_1; T3.1.367 + M_1; T3.1.368 + M_1; T3.1.369 + M_1; T3.1.370 + M_1; T3.1.371 + M_1; T3.1.372 + M_1; T3.1.373 + M_1; T3.1.374 + M_1; T3.1.375 + M_1; T3.1.376 + M_1; T3.1.377 + M_1; T3.1.378 + M_1; T3.1.379 + M_1; T3.1.380 + M_1; T3.1.381 + M_1; T3.1.382 + M_1; T3.1.383 + M_1; T3.1.384 + M_1; T3.1.385 + M_1; T3.1.386 + M_1; T3.1.387 + M_1; T3.1.388 + M_1; T3.1.389 + M_1; T3.1.390 + M_1; T3.1.391 + M_1; T3.1.392 + M_1; T3.1.393 + M_1; T3.1.394 + M_1; T3.1.395 + M_1; T3.1.396 + M_1; T3.1.397 + M_1; T3.1.398 + M_1; T3.1.399 + M_1; T3.1.400 + M_1; T3.1.401 + M_1; T3.1.402 + M_1; T3.1.403 + M_1; T3.1.404 + M_1; T3.1.405 + M_1; T3.1.406 + M_1; T3.1.407 + M_1; T3.1.408 + M_1; T3.1.409 + M_1; T3.1.410 + M_1; T3.1.411 + M_1; T3.1.412 + M_1; T3.1.413 + M_1;

T3.1.414 + M_1; T3.1.415 + M_1; T3.1.416 + M_1; T3.1.417 + M_1; T3.1.418 + M_1; T3.1.419 + M_1; T3.1.420 + M_1; T3.1.421 + M_1; T3.1.422 + M_1; T3.1.423 + M_1; T3.1.424 + M_1; T3.1.425 + M_1; T3.1.426 + M_1; T3.1.427 + M_1; T3.1.428 + M_1; T3.1.429 + M_1; T3.1.430 + M_1; T3.1.431 + M_1; T3.1.432 + M_1; T3.1.433 + M_1; T3.1.434 + M_1; T3.1.435 + M_1; T3.1.436 + M_1; T3.1.437 + M_1; T3.1.438 + M_1; T3.1.439 + M_1; T3.1.440 + M_1; T3.1.441 + M_1; T3.1.442 + M_1; T3.1.443 + M_1; T3.1.444 + M_1; T3.1.445 + M_1; T3.1.446 + M_1; T3.1.447 + M_1; T3.1.448 + M_1; T3.1.449 + M_1; T3.1.450 + M_1; T3.1.451 + M_1; T3.1.452 + M_1; T3.1.453 + M_1; T3.1.454 + M_1; T3.1.455 + M_1; T3.1.456 + M_1; T3.1.457 + M_1; T3.1.458 + M_1; T3.1.459 + M_1; T3.1.460 + M_1; T3.1.461 + M_1; T3.1.462 + M_1; T3.1.463 + M_1; T3.1.464 + M_1; T3.1.465 + M_1; T3.1.466 + M_1; T3.1.467 + M_1; T3.1.468 + M_1; T3.1.469 + M_1; T3.1.470 + M_1; T3.1.471 + M_1; T3.1.472 + M_1; T3.1.473 + M_1; T3.1.474 + M_1; T3.1.475 + M_1; T3.1.476 + M_1; T3.1.477 + M_1; T3.1.478 + M_1; T3.1.479 + M_1; T3.1.480 + M_1; T3.1.481 + M_1; T3.1.482 + M_1; T3.1.483 + M_1; T3.1.484 + M_1; T3.1.485 + M_1; T3.1.486 + M_1; T3.1.487 + M_1; T3.1.488 + M_1; T3.1.489 + M_1; T3.1.490 + M_1; T3.1.491 + M_1; T3.1.492 + M_1; T3.1.493 + M_1; T3.1.494 + M_1; T3.1.495 + M_1; T3.1.496 + M_1; T3.1.497 + M_1; T3.1.498 + M_1; T3.1.499 + M_1; T3.1.500 + M_1; T3.1.501 + M_1; T3.1.502 + M_1; T3.1.503 + M_1; T3.1.504 + M_1; T3.1.505 + M_1; T3.1.506 + M_1; T3.1.507 + M_1; T3.1.508 + M_1; T3.1.509 + M_1; T3.1.510 + M_1; T3.1.511 + M_1; T3.1.512 + M_1; T3.1.513 + M_1; T3.1.514 + M_1; T3.1.515 + M_1; T3.1.516 + M_1; T3.1.517 + M_1; T3.1.518 + M_1; T3.1.519 + M_1; T3.1.520 + M_1; T3.1.521 + M_1; T3.1.522 + M_1; T3.1.523 + M_1; T3.1.524 + M_1; T3.1.525 + M_1; T3.1.526 + M_1; T3.1.527 + M_1; T3.1.528 + M_1; T3.1.529 + M_1; T3.1.530 + M_1; T3.1.531 + M_1; T3.1.532 + M_1; T3.1.533 + M_1; T3.1.534 + M_1; T3.1.535 + M_1; T3.1.536 + M_1; T3.1.537 + M_1; T3.1.538 + M_1; T3.1.539 + M_1; T3.1.540 + M_1; T3.1.541 + M_1; T3.1.542 + M_1; T3.1.543 + M_1; T3.1.544 + M_1; T3.1.545 + M_1; T3.1.546 + M_1; T3.1.547 + M_1; T3.1.548 + M_1; T3.1.549 + M_1; T3.1.550 + M_1; T3.1.551 + M_1; T3.1.552 + M_1; T3.1.553 + M_1; T3.1.554 + M_1; T3.1.555 + M_1; T3.1.556 + M_1; T3.1.557 + M_1; T3.1.558 + M_1; T3.1.559 + M_1; T3.1.560 + M_1; T3.1.561 + M_1; T3.1.562 + M_1; T3.1.563 + M_1; T3.1.564 + M_1; T3.1.565 + M_1; T3.1.566 + M_1; T3.1.567 + M_1; T3.1.568 + M_1; T3.1.569 + M_1; T3.1.570 + M_1; T3.1.571 + M_1; T3.1.572 + M_1; T3.1.573 + M_1; T3.1.574 + M_1; T3.1.575 + M_1; T3.1.576 + M_1; T3.1.577 + M_1; T3.1.578 + M_1; T3.1.579 + M_1; T3.1.580 + M_1; T3.1.581 + M_1; T3.1.582 + M_1; T3.1.583 + M_1; T3.1.584 + M_1 and T3.1.585 + M_1; T3.1.586 + M_1; T3.1.587 + M_1; T3.1.588 + M_1; T10.4.3 + M_1; T37.13.3 + M_1; T37.13.9 + M_1; T25.9.15 + M_1; T37.13.6 + M_1 and T7.3.48 + M_1.

Examples of especially suitable mixing partners for the compounds of formula I include the following compounds selected from the group M:

Group M:

Azamethiphos; abamectin, lepimectin, chlorfenvinphos; cypermethrin, cypermethrin high-cis; cyromazine; diafenthiuron; diazinon; dichlorvos; dicrotophos; dicyclanil; fenoxycarb; fluazuron; furathiocarb; isazofos; iodfenphos; kinoprene; lufenuron; methacriphos; methidathion; monocrotophos; phosphamidon; profenofos; diofenolan; a compound obtainable from the Bacillus thuringiensis strain GC91 or from strain NCTC11821; pymetrozine; bromopropylate; methoprene; disulfoton; quinalphos; tau-fluvalinate; thiocyclam; thiometon; aldicarb; azinphos-methyl; benfuracarb; bifenthrin; buprofezin; carbofuran; dibutylaminothio; cartap; chlorfluazuron; chlorpyrifos; cyfluthrin; lambda-cyhalothrin; alpha-cypermethrin; zeta-cypermethrin; deltamethrin; diflubenzuron; endosulfan; ethiofencarb; fenitrothion; fenobucarb; fenvalerate; formothion; methiocarb; heptenophos; imidacloprid; thiamethoxam; clothianidin; isoprocarb; methamidophos; methomyl; mevinphos; parathion; parathion-methyl; phosalone; pirimicarb; propoxur; teflubenzuron; terbufos; triazamate; fenobucarb; tebufenozide; fipronil; beta-cyfluthrin; silafluofen; fenpyroximate; pyridaben; fenazaquin; pyriproxyfen; pyrimidifen; nitenpyram; acetamiprid; emamectin; emamectin-benzoate; spinosad; a plant extract that is active against insects; a preparation that comprises nematodes and is active against insects; a preparation obtainable from Bacillus subtilis; a preparation that comprises fungi and is active against insects; a preparation that comprises viruses and is active against insects; chlorfenapyr; acephate; acrinathrin; alanycarb; alphamethrin; amitraz; AZ 60541; azinphos A; azinphos M; azocyclotin; bendiocarb; bensultap; beta-cyfluthrin; BPMC; brofenprox; bromophos A; bufencarb; butocarboxin; butylpyridaben; cadusafos; carbaryl; carbophenothion; chloethocarb; chlorethoxyfos; chlormephos; cis-resmethrin; clocythrin; clofentezine; cyanophos; cycloprothrin; cyhexatin; demeton M; demeton S; demeton-S-methyl; dichlofenthion; dicliphos; diethion; dimethoate; dimethylvinphos; dioxathion; edifenphos; esfenvalerate; ethion; ethofenprox; ethoprophos; etrimphos; fenamiphos; fenbutatin oxide; fenothiocarb; fenpropathrin; fenpyrad; fenthion; fluazinam; flucycloxuron; flucythrinate; flufenoxuron; flufenprox; fonophos; fosthiazate; fubfenprox; HCH; hexaflumuron; hexythiazox; IKI-220; iprobenfos; isofenphos; isoxathion; ivermectin; malathion; mecarbam; mesulfenphos; metaldehyde; metolcarb; milbemectin; moxidectin; naled; NC 184; omethoate; oxamyl; oxydemethon M; oxydeprofos; permethrin; phenthoate; phorate; phosmet; phoxim; pirimiphos M; pirimiphos E; promecarb; propaphos; prothiofos; prothoate; pyrachlophos; pyradaphenthion; pyresmethrin; pyrethrum; tebufenozide; salithion; sebufos; sulfotep; sul-

profos; tebufenpyrad; tebupirimphos; tefluthrin; temephos; terbam; tetrachlorvinphos; thiacloprid; thiafenox; thiodicarb; thiofanox; thionazin; thuringiensin; tralomethrin; triarathene; triazophos; triazuron; trichlorfon; triflumuron; trimethacarb; vamidothion; xylylcarb; YI 5301/5302; zetamethrin; DPX-MP062 — indoxacarb; methoxyfenozide; bifenazate; XMC (3,5-xylyl methylcarbamate); and the fungus pathogen Metarhizium anisopliae.

The following mixtures of the compounds of formula I with one member of the group M are preferred (in the following listing, "M" means one member selected from the group M.)
T1.1.1 + M; T1.1.2 + M; T1.1.3 + M; T1.1.4 + M; T1.1.5 + M; T1.1.6 + M; T1.1.7 + M; T1.1.8 + M; T1.1.9 + M; T1.1.10 + M; T1.1.11 + M; T1.1.12 + M; T1.1.13 + M; T1.1.14 + M; T1.1.15 + M; T1.1.16 + M; T1.1.17 + M; T1.1.18 + M; T1.1.19 + M; T1.1.20 + M; T1.1.21 + M; T1.1.22 + M; T1.1.23 + M; T1.1.24 + M; T1.1.25 + M; T1.1.26 + M; T1.1.27 + M; T1.1.28 + M; T1.1.29 + M; T1.1.30 + M; T1.1.31 + M; T1.1.32 + M; T1.1.33 + M; T1.1.34 + M; T1.1.35 + M; T1.1.36 + M; T1.1.37 + M; T1.1.38 + M; T1.1.39 + M; T1.1.40 + M; T1.1.41 + M; T1.1.42 + M; T1.1.43 + M; T1.1.44 + M; T1.1.45 + M; T1.1.46 + M; T1.1.47 + M; T1.1.48 + M; T1.1.49 + M; T1.1.50 + M; T1.1.51 + M; T1.1.52 + M; T1.1.53 + M; T1.1.54 + M; T1.1.55 + M; T1.1.56 + M; T1.1.57 + M; T1.1.58 + M; T1.1.59 + M; T1.1.60 + M; T1.1.61 + M; T1.1.62 + M; T1.1.63 + M; T1.1.64 + M; T1.1.65 + M; T1.1.66 + M; T1.1.67 + M; T1.1.68 + M; T1.1.69 + M; T1.1.70 + M; T1.1.71 + M; T1.1.72 + M; T1.1.73 + M; T1.1.74 + M; T1.1.75 + M; T1.1.76 + M; T1.1.77 + M; T1.1.78 + M; T1.1.79 + M; T1.1.80 + M; T1.1.81 + M; T1.1.82 + M; T1.1.83 + M; T1.1.84 + M; T1.1.85 + M; T1.1.86 + M; T1.1.87 + M; T1.1.88 + M; T1.1.89 + M; T1.1.90 + M; T1.1.91 + M; T1.1.92 + M; T1.1.93 + M; T1.1.94 + M; T1.1.95 + M; T1.1.96 + M; T1.1.97 + M; T1.1.98 + M; T1.1.99 + M; T1.1.100 + M; T1.1.101 + M; T1.1.102 + M; T1.1.103 + M; T1.1.104 + M; T1.1.105 + M; T1.1.106 + M; T1.1.107 + M; T1.1.108 + M; T1.1.109 + M; T1.1.110 + M; T1.1.111 + M; T1.1.112 + M; T1.1.113 + M; T1.1.114 + M; T1.1.115 + M; T1.1.116 + M; T1.1.117 + M; T1.1.118 + M; T1.1.119 + M; T1.1.120 + M; T1.1.121 + M; T1.1.122 + M; T1.1.123 + M; T1.1.124 + M; T1.1.125 + M; T1.1.126 + M; T1.1.127 + M; T1.1.128 + M; T1.1.129 + M; T1.1.130 + M; T1.1.131 + M; T1.1.132 + M; T1.1.133 + M; T1.1.134 + M; T1.1.135 + M; T1.1.136 + M; T1.1.137 + M; T1.1.138 + M; T1.1.139 + M; T1.1.140 + M; T1.1.141 + M; T1.1.142 + M; T1.1.143 + M; T1.1.144 + M; T1.1.145 + M; T1.1.146 + M; T1.1.147 + M; T1.1.148 + M; T1.1.149 + M; T1.1.150 + M; T1.1.151 + M; T1.1.152 + M; T1.1.153 + M; T1.1.154 + M; T1.1.155 + M; T1.1.156 + M; T1.1.157 + M; T1.1.158 + M; T1.1.159 + M; T1.1.160 + M; T1.1.161 + M; T1.1.162 + M; T1.1.163 + M; T1.1.164 + M; T1.1.165 + M; T1.1.166 + M; T1.1.167 + M;

T1.1.168 + M; T1.1.169 + M; T1.1.170 + M; T1.1.171 + M; T1.1.172 + M; T1.1.173 + M; T1.1.174 + M; T1.1.175 + M; T1.1.176 + M; T1.1.177 + M; T1.1.178 + M; T1.1.179 + M; T1.1.180 + M; T1.1.181 + M; T1.1.182 + M; T1.1.183 + M; T1.1.184 + M; T1.1.185 + M; T1.1.186 + M; T1.1.187 + M; T1.1.188 + M; T1.1.189 + M; T1.1.190 + M; T1.1.191 + M; T1.1.192 + M; T1.1.193 + M; T1.1.194 + M; T1.1.195 + M; T1.1.196 + M; T1.1.197 + M; T1.1.198 + M; T1.1.199 + M; T1.1.200 + M; T1.1.201 + M; T1.1.202 + M; T1.1.203 + M; T1.1.204 + M; T1.1.205 + M; T1.1.206 + M; T1.1.207 + M; T1.1.208 + M; T1.1.209 + M; T1.1.210 + M; T1.1.211 + M; T1.1.212 + M; T1.1.213 + M; T1.1.214 + M; T1.1.215 + M; T1.1.216 + M; T1.1.217 + M; T1.1.218 + M; T1.1.219 + M; T1.1.220 + M; T1.1.221 + M; T1.1.222 + M; T1.1.223 + M; T1.1.224 + M; T1.1.225 + M; T1.1.226 + M; T1.1.227 + M; T1.1.228 + M; T1.1.229 + M; T1.1.230 + M; T1.1.231 + M; T1.1.232 + M; T1.1.233 + M; T1.1.234 + M; T1.1.235 + M; T1.1.236 + M; T1.1.237 + M; T1.1.238 + M; T1.1.239 + M; T1.1.240 + M; T1.1.241 + M; T1.1.242 + M; T1.1.243 + M; T1.1.244 + M; T1.1.245 + M; T1.1.246 + M; T1.1.247 + M; T1.1.248 + M; T1.1.249 + M; T1.1.250 + M; T1.1.251 + M; T1.1.252 + M; T1.1.253 + M; T1.1.254 + M; T1.1.255 + M; T1.1.256 + M; T1.1.257 + M; T1.1.258 + M; T1.1.259 + M; T1.1.260 + M; T1.1.261 + M; T1.1.262 + M; T1.1.263 + M; T1.1.264 + M; T1.1.265 + M; T1.1.266 + M; T1.1.267 + M; T1.1.268 + M; T1.1.269 + M; T1.1.270 + M; T1.1.271 + M; T1.1.272 + M; T1.1.273 + M; T1.1.274 + M; T1.1.275 + M; T1.1.276 + M; T1.1.277 + M; T1.1.278 + M; T1.1.279 + M; T1.1.280 + M; T1.1.281 + M; T1.1.282 + M; T1.1.283 + M; T1.1.284 + M; T1.1.285 + M; T1.1.286 + M; T1.1.287 + M; T1.1.288 + M; T1.1.289 + M; T1.1.290 + M; T1.1.291 + M; T1.1.292 + M; T1.1.293 + M; T1.1.294 + M; T1.1.295 + M; T1.1.296 + M; T1.1.297 + M; T1.1.298 + M; T1.1.299 + M; T1.1.300 + M; T1.1.301 + M; T1.1.302 + M; T1.1.303 + M; T1.1.304 + M; T1.1.305 + M; T1.1.306 + M; T1.1.307 + M; T1.1.308 + M; T1.1.309 + M; T1.1.310 + M; T1.1.311 + M; T1.1.312 + M; T1.1.313 + M; T1.1.314 + M; T1.1.315 + M; T1.1.316 + M; T1.1.317 + M; T1.1.318 + M; T1.1.319 + M; T1.1.320 + M; T1.1.321 + M; T1.1.322 + M; T1.1.323 + M; T1.1.324 + M; T1.1.325 + M; T1.1.326 + M; T1.1.327 + M; T1.1.328 + M; T1.1.329 + M; T1.1.330 + M; T1.1.331 + M; T1.1.332 + M; T1.1.333 + M; T1.1.334 + M; T1.1.335 + M; T1.1.336 + M; T1.1.337 + M; T1.1.338 + M; T1.1.339 + M; T1.1.340 + M; T1.1.341 + M; T1.1.342 + M; T1.1.343 + M; T1.1.344 + M; T1.1.345 + M; T1.1.346 + M; T1.1.347 + M; T1.1.348 + M; T1.1.349 + M; T1.1.350 + M; T1.1.351 + M; T1.1.352 + M; T1.1.353 + M; T1.1.354 + M; T1.1.355 + M; T1.1.356 + M; T1.1.357 + M; T1.1.358 + M; T1.1.359 + M; T1.1.360 + M; T1.1.361 + M; T1.1.362 + M; T1.1.363 + M; T1.1.364 + M; T1.1.365 + M; T1.1.366 + M; T1.1.367 + M; T1.1.368 + M; T1.1.369 + M; T1.1.370 + M; T1.1.371 + M;

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The compositions can also comprise further solid or liquid auxiliaries, such as stabilizers, for example unepoxidized or epoxidized vegetable oils (for example epoxidized coconut oil, rapeseed oil or soya oil), antifoams, for example silicone oil, preservatives, viscosity regulators, binders and/or tackifiers, fertilizers or other active ingredients for achieving specific effects, for example bactericides, fungicides, nematocides, plant activators, molluscicides or herbicides.

The compositions according to the invention are prepared in a manner known per se, in the absence of auxiliaries for example by grinding, screening and/or compressing a solid active ingredient and in the presence of at least one auxiliary for example by intimately mixing and/or grinding the active ingredient with the auxiliary (auxiliaries). These processes for the preparation of the compositions and the use of the compounds I for the preparation of these compositions are also a subject of the invention.

The application methods for the compositions, that is the methods of controlling pests of the abovementioned type, such as spraying, atomizing, dusting, brushing on, dressing, scattering or pouring - which are to be selected to suit the intended aims of the prevailing circumstances - and the use of the compositions for controlling pests of the abovementioned type are other subjects of the invention. Typical rates of concentration are between 0.1 and 1000 ppm, preferably between 0.1 and 500 ppm, of active ingredient. The rate of application per hectare is generally 1 to 2000 g of active ingredient per hectare, in particular 10 to 1000 g/ha, preferably 10 to 600 g/ha.

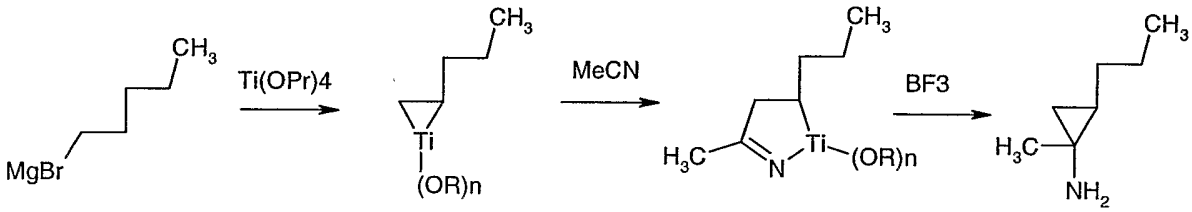
A preferred method of application in the field of crop protection is application to the foliage of the plants (foliar application), it being possible to select frequency and rate of application to match the danger of infestation with the pest in question. Alternatively, the active ingredient can reach the plants via the root system (systemic action), by drenching the locus of the plants with a liquid composition or by incorporating the active ingredient in solid form into the locus of the plants, for example into the soil, for example in the form of granules (soil application). In the case of paddy rice crops, such granules can be metered into the flooded paddy-field.

The compositions according to the invention are also suitable for the protection of plant propagation material, for example seeds, such as fruit, tubers or kernels, or nursery plants, against pests of the abovementioned type. The propagation material can be treated with the compositions prior to planting, for example seed can be treated prior to sowing. Alternatively, the compositions can be applied to seed kernels (coating), either by soaking the kernels in a liquid composition or by applying a layer of a solid composition. It is also possible to apply the compositions when the propagation material is planted to the site of application, for example into the seed furrow during drilling. These treatment methods for plant propagation material and the plant propagation material thus treated are further subjects of the invention.

Preparation Examples

Example P1: Preparation of 1-methyl-2-propyl-cyclopropylamine:

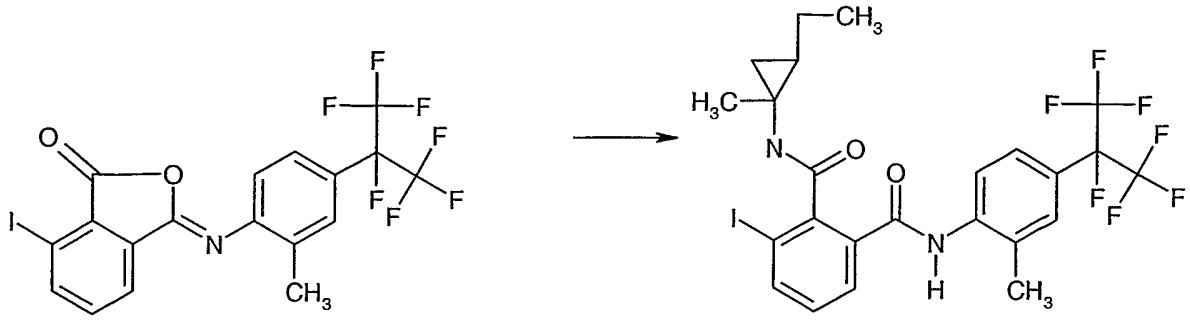
Prepared according to Bertus and Szymoniak, JCS Chemical Communications, 2001, 1792-1793:



A solution of pentylmagnesium bromide in ether (2M, 79ml, 158 mmol) is added dropwise to a stirred solution of titanium isopropoxide (25.6 ml, 24.7 g, 87 mmol) and acetonitrile (4 ml) in diethyl ether (30ml) at 0 °C. After 60 minutes at 0 °C, borontrifluoride etherate (19.8 ml, 22.4g, 158 mmol) is added dropwise at 0 °C, and the reaction mixture stirred for one hour at ambient temperature. The mixture is cooled again to a temperature of 0 °C, NaOH (2M, 100 ml) was added dropwise, and the mixture is extracted with ether. The ether phase is extracted with HCl (2M), the aqueous phase is washed with methylene chloride, cooled, basified with 25% NaOH (aq.), and extracted with ether. The solvent is distilled off at atmospheric pressure to yield 2.7g of 1-methyl-2-propyl-cyclopropylamine as a mixture of cis and trans isomers, which still contains some solvent.

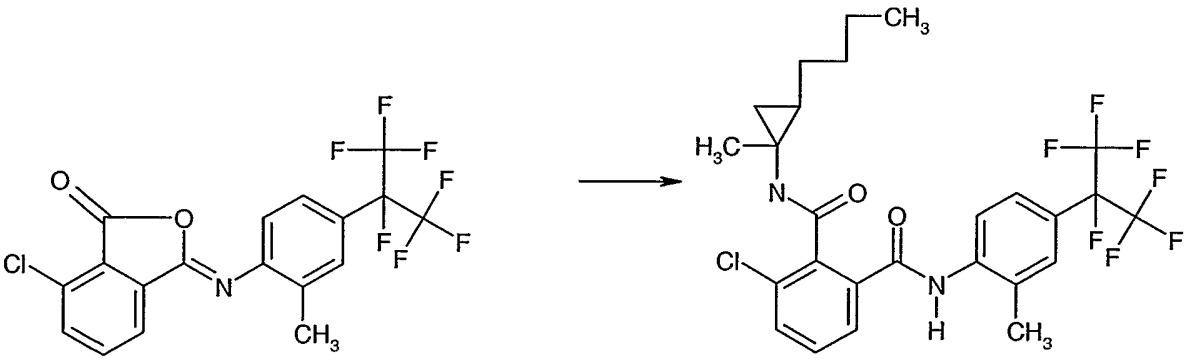
Analogously is prepared:
1-methyl-2-methyl-cyclopropylamine
1-methyl-2-ethyl-cyclopropylamine
1-methyl-2-butyl-cyclopropylamine
1-benzyl-cyclopropylamine

Example P2: Preparation of N^2-(2-Ethyl-1-methyl-cyclopropyl)-3-iodo-N^1-[2-methyl-4-(1,2,2,2-tetrafluoro-1-trifluoromethyl-ethyl)-phenyl]-phthalamide:



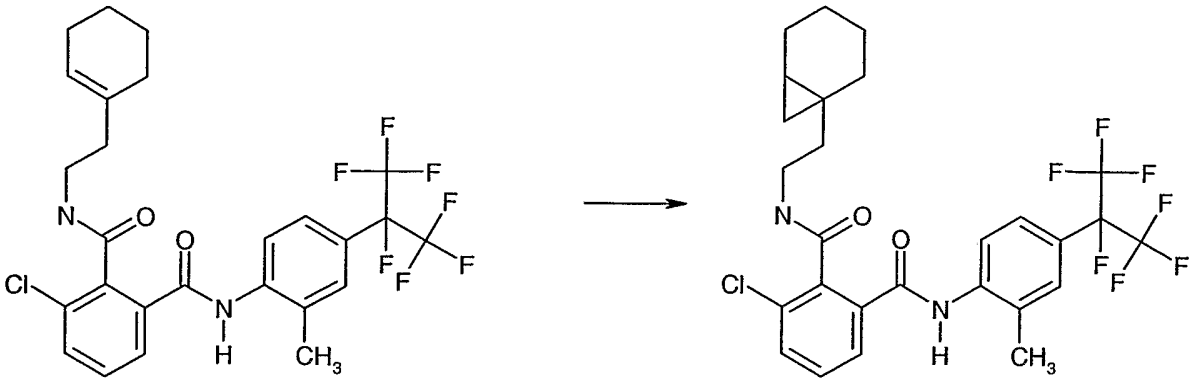
A solution of trans-1-methyl-2-ethyl-cyclopropylamine (110mg, contains solvent) and 7-iodo-3-[(Z)-2-methyl-4-(1,2,2,2-tetrafluoro-1-trifluoromethyl-ethyl)-phenylimino]-3H-isobenzofuran-1-one (590 mg, 1.1 mmol, prepared according to EP-A-1006107, example 3-2) in acetone (2 ml) is left at ambient temperature for 18 hours. Then, the crystalline white precipitate is filtered off and dried to yield 152 mg of N^2-(2-Ethyl-1-methyl-cyclopropyl)-3-iodo-N^1-[2-methyl-4-(1,2,2,2-tetrafluoro-1-trifluoromethyl-ethyl)-phenyl]-phthalamide.

Example P3: Preparation of N^2-(2-Butyl-1-methyl-cyclopropyl)-3-chloro-N^1-[2-methyl-4-(1,2,2,2-tetrafluoro-1-trifluoromethyl-ethyl)-phenyl]-phthalamide:



A solution of 1-methyl-2-butyl-cyclopropylamine (0,3 mmol) and 7-chloro-3-[(Z)-2-methyl-4-(1,2,2,2-tetrafluoro-1-trifluoromethyl-ethyl)-phenylimino]-3H-isobenzofuran-1-one (0.3 mmol) in CH_2Cl_2 (ca 2 ml) is stirred with $NaHCO_3$ (sat. ca 2 ml) in a 60 °C oilbath, whereby the CH_2Cl_2 slowly evaporated. After stirring for 2 hours at a temperature of 60 °C, the mixture is allowed to cool to ambient temperature and the precipitate filtered off and dried to yield 175 mg of crude product. This material is purified by HPLC with an ethyl acetate/ hexane gradient to yield 136 mg of N^2-(2-butyl-1-methyl-cyclopropyl)-3-chloro-N^1-[2-methyl-4-(1,2,2,2-tetrafluoro-1-trifluoromethyl-ethyl)-phenyl]-phthalamide.

Example P4: Preparation of N^2-(2-Bicyclo[4.1.0]hept-1-yl-ethyl)-3-chloro- N^1-[2-methyl-4-(1,2,2,2-tetrafluoro-1-trifluoromethyl-ethyl)-phenyl]-phthalamide:

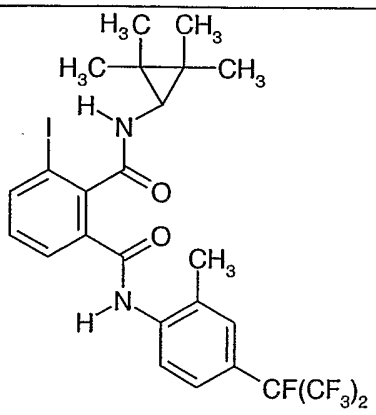
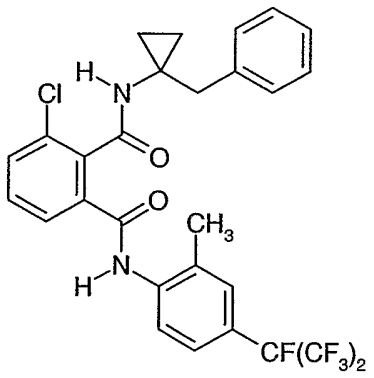
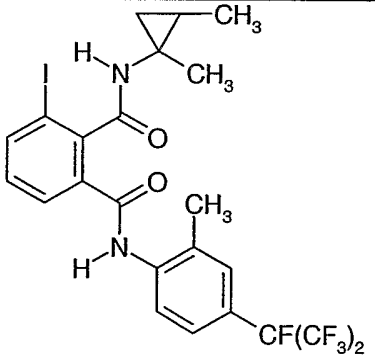


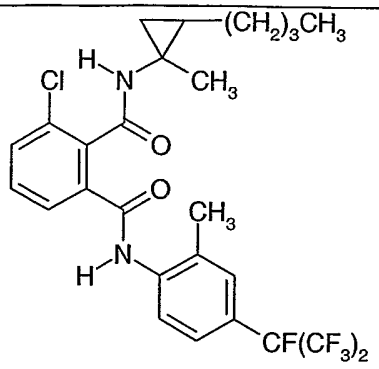
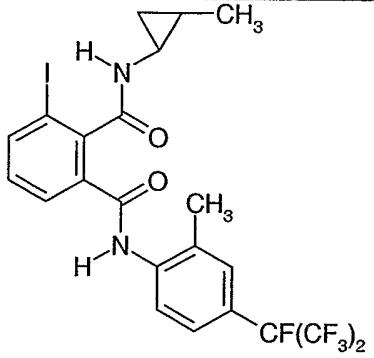
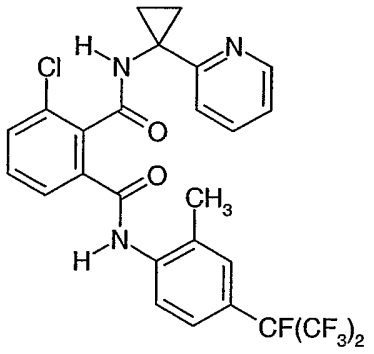
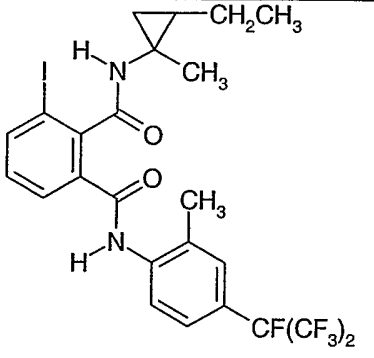
A solution of trifluoroacetic acid (3.42g, 30 mmol) in dichloromethane (30 ml) is added dropwise to a solution of diethylzinc in hexane (1M, 30 ml) and dichloromethane (20 ml) at a temperature of -20 °C over ca 30 minutes keeping the temperature below 0 °C. After 30 minutes at -20 °C, methylene iodide (2.42ml, 30 mmol) is added, and this reagent solution kept under nitrogen at 0 °C.

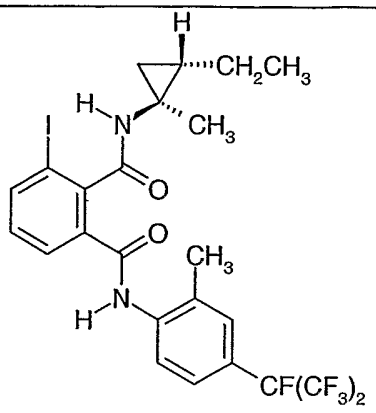
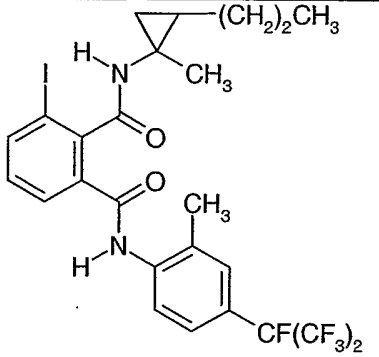
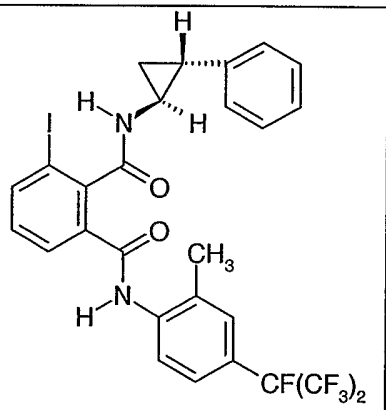
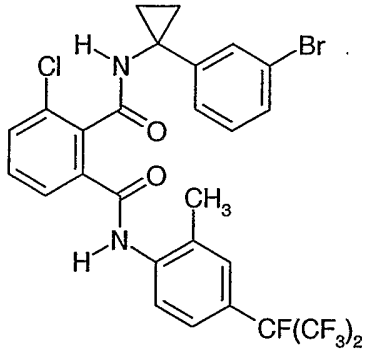
A solution of N^2-(2-Cyclohex-1-enyl-ethyl)-3-chloro- N^1-[2-methyl-4-(1,2,2,2-tetrafluoro-1-trifluoromethyl-ethyl)-phenyl]-phthalamide (170 mg, 0.301 mmol) in methylene chloride is added to 8.6 ml of the above prepared solution at a temperature of -20 °C, and the reaction mixture is left for 18 hours at ambient temperature. HCl (2M, 3 ml), and ethyl acetate (0.5 ml) was added and after shaking the organic phase is washed with saturated sodium bicarbonate, dried, and evaporated to yield 239 mg of crude product. This is purified by HPLC with an EtOAc / hexane gradient to yield 93 mg, which is further chromatographed on silica with EtOAc / hexane (1:3) to yield 61 mg of pure N^2-(2-Bicyclo[4.1.0]hept-1-yl-ethyl)-3-chloro- N^1-[2-methyl-4-(1,2,2,2-tetrafluoro-1-trifluoromethyl-ethyl)-phenyl]-phthalamide.

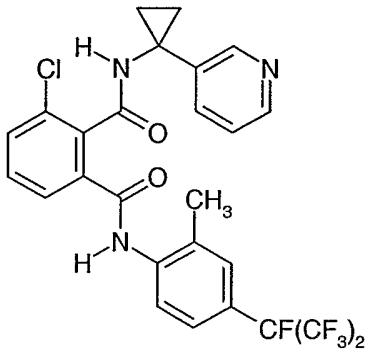
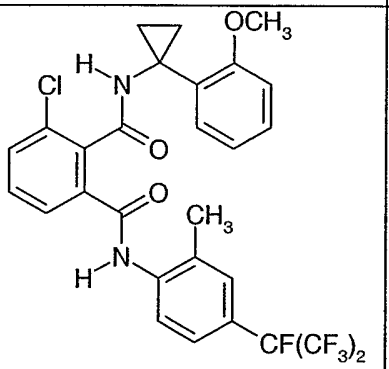
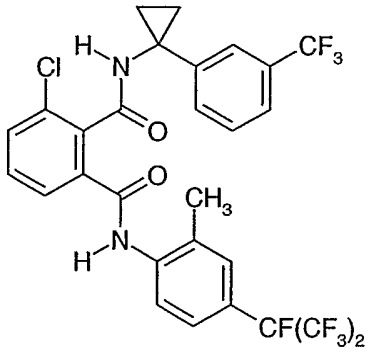
The compounds listed in the following Table P can be prepared analogous to the procedures described above (m.p. = melting point in °C):

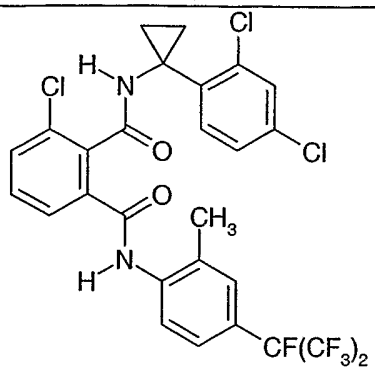
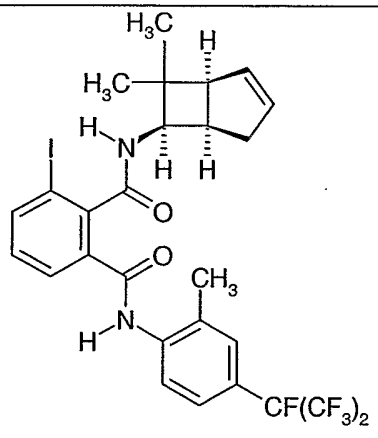
Table P: Compounds of formula I:

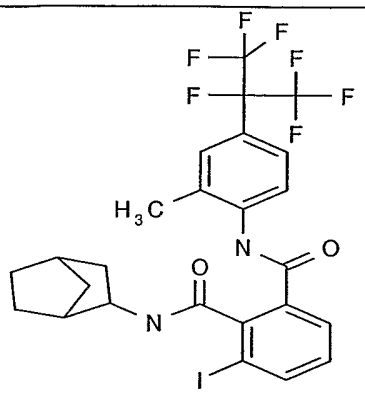
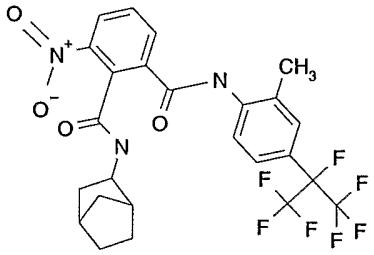
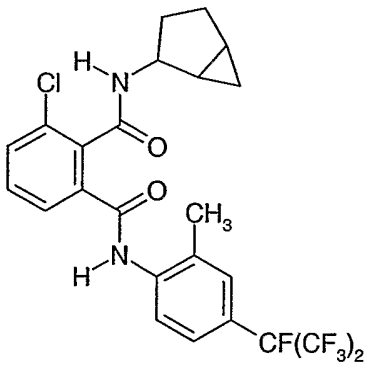
	No.	Structure	Phys. Data
	T1.1.1		MS +ve 662 (M+18) MS -ve 643 (M-H)
	T1.1.138		MS +ve 604 (M+18) MS -ve 585 (M-H)
	T1.1.5		4:1 mixture of diastereomers MS +ve 634 (M + 18) MS -ve 615 (M-H)

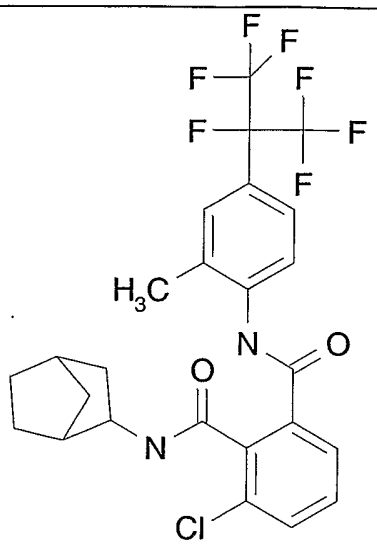
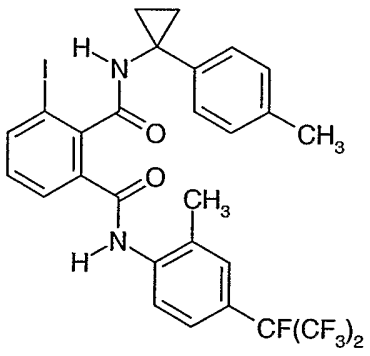
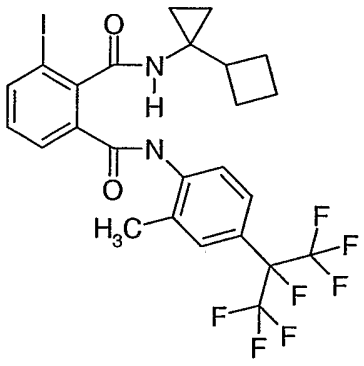
	No.	Structure	Phys. Data
	T1.1.14		2:1 mixture of diastereomers MS +ve 584 (M + 18) MS -ve 565 (M-H)
	T1.1.17		6:1 mixture of diastereomers MS +ve 620 (M + 18) MS -ve 601 (M-H)
	T1.1.22		574 (M+1), 572 (M-1)
	T1.1.25		4:1 mixture of diastereomers MS +ve 648 (M + 18) MS -ve 629 (M-H)

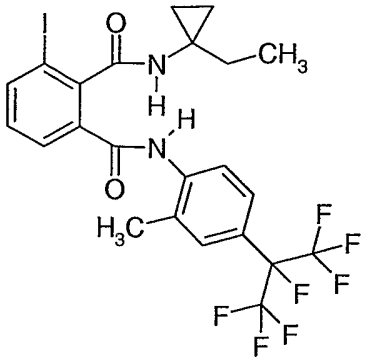
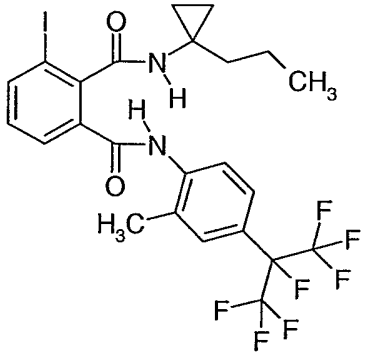
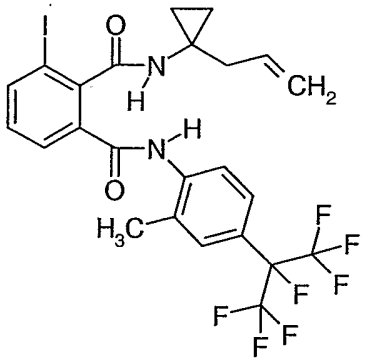
	No.	Structure	Phys. Data
	T1.1.23		(E)-isomer MS +ve 648 (M + 18) MS -ve 629 (M-H)
	T1.1.31		9:1 mixture of diastereomers MS +ve 662 (M + 18) MS -ve 643 (M-H)
	T1.1.340		MS +ve 682 (M+18) MS -ve 663 (M-H)
	T1.1.171		(CDCl3): 0.82-0.91(m, 2H), 1.20-1.39 (m, 5H), 6.56 (t, 1H), 6.92 (d, 1H), 7.18 (d, 1H), 7.40-7.50 (m, 2H), 7.57 (d, 1H), 7.76 (d, 1H),

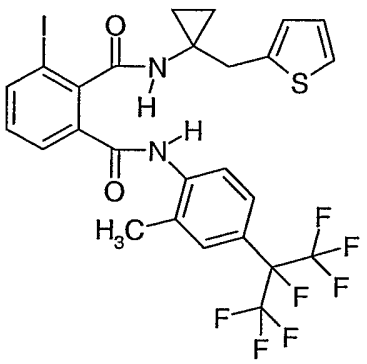
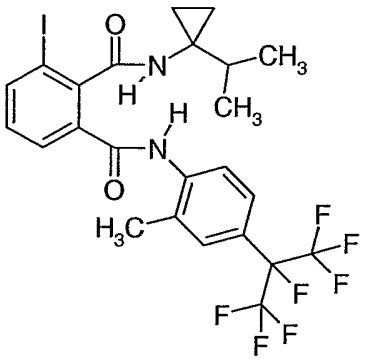
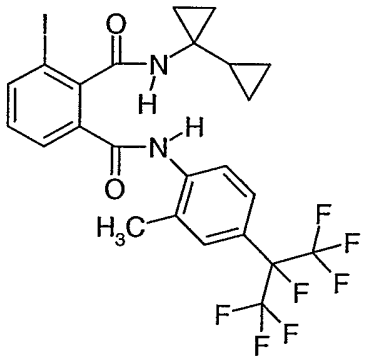
	No.	Structure	Phys. Data
			8.20 (s, 1H), 8.28 (d, 1H), 8.51(s, 1H).
	T1.1.36		574 (M+1), 572, (M-1)
	T1.1.586		603 (M+1), 601 (M-1)
	T1.1.587		641(M+1), 639 (M-1)

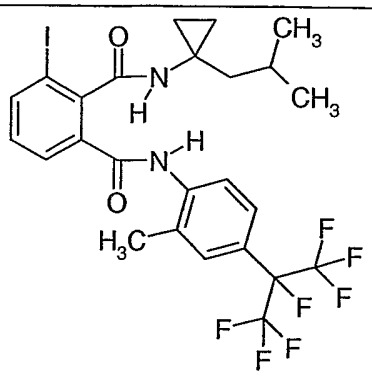
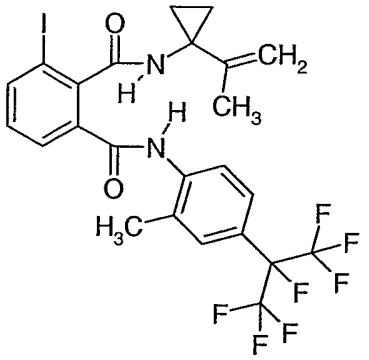
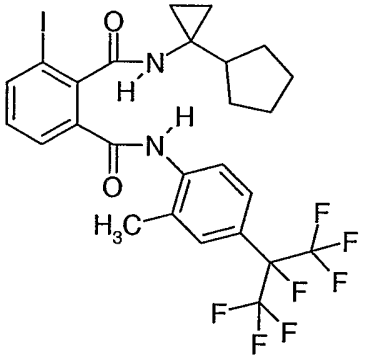
	No.	Structure	Phys. Data
	T1.1.588		641, (M+1)
	T10.4.3		Mixture of diastereomers exo:endo 5:1 1H-NMR (CDCl3) 0.70 (s, 3H, endo); 0.80 (s, 3H, exo); 1.03 (s, 3H, exo); 1.12 (s, 3H, endo); 1.97 (d, 1H exo); 2.13 (dd, 1H, exo); 2.36 (s,3H, exo); 2.52 (m, 1H, exo); 2.71 (m, 1H, exo); 3.92 (m,1H, exo); 4.28 (m, 1H, endo); 5.69 (m, 2H, exo); 6.06 (m, 1H, exo); 7.23 (m, 2H, exo); 7.42 (s, 1H, exo); 7.48 (d, 1H, exo); 7.86 (d, 1H, exo);

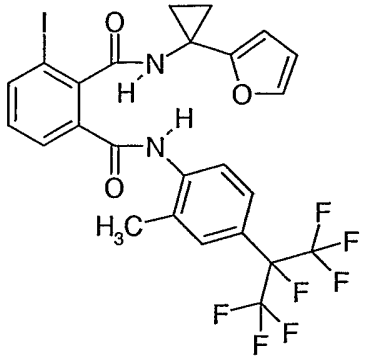
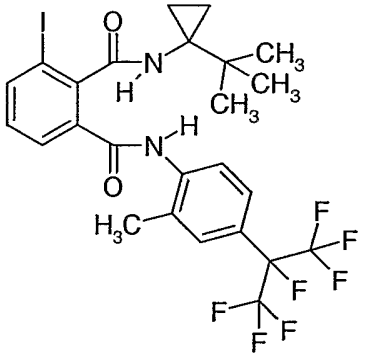
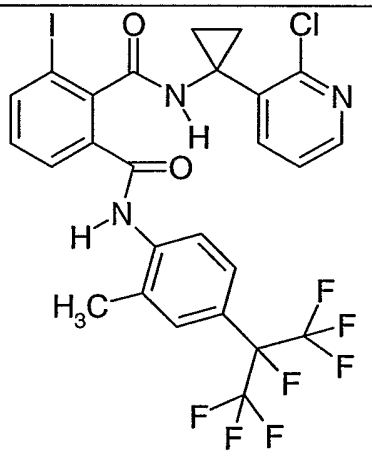
	No.	Structure	Phys. Data
			8.00 (d, 1H, exo); 8.42 (m,)
	T37.13.3		643 (M+1)
	T37.13.9		560 (M-1)
	T25.9.15		1:1 mixture of diastereomers MS +ve 559 (M + 18) MS -ve 535 (M-H)

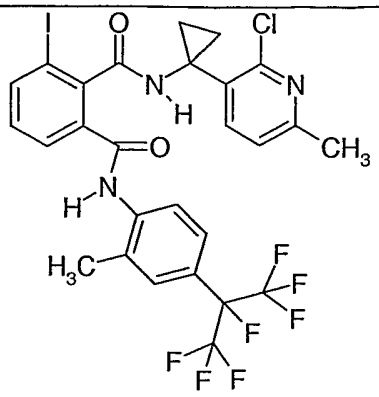
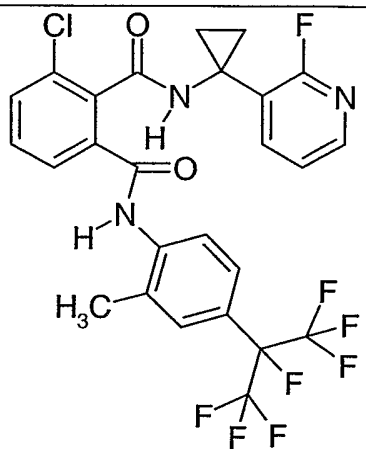
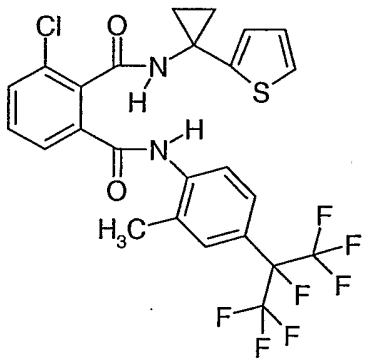
	No.	Structure	Phys. Data
	T37.13.6		551 (M+1)
	T1.1.562		F: 235-6
	T1.1.135		MS +ve 643 (M+1)

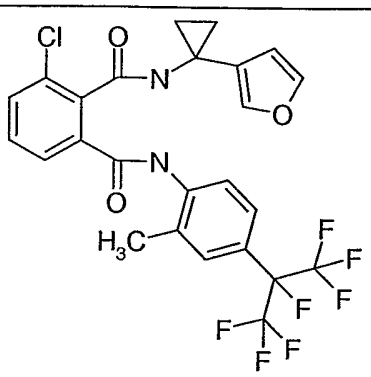
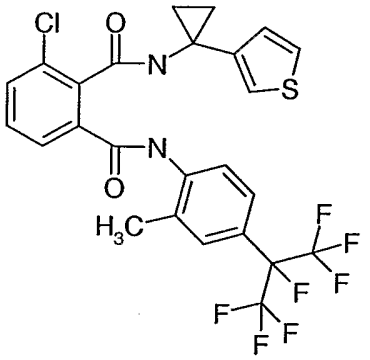
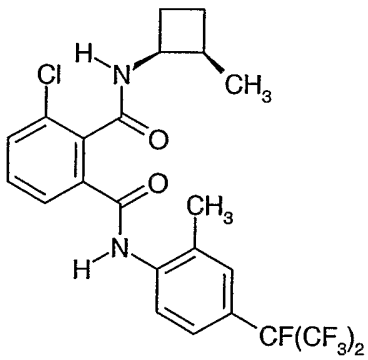
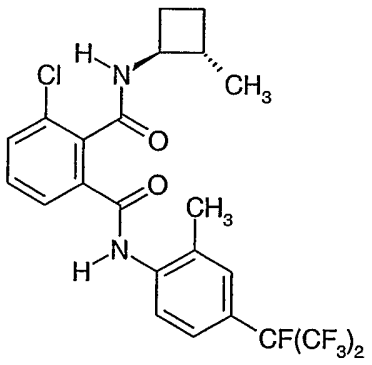
	No.	Structure	Phys. Data
	T1.1.117		1H-NMR (CDCl3): 1.53 (q, 2H, Et)
	T1.1.115		1H-NMR (CDCl3): 0.68 (t, ca 7Hz, 2H, cyclopropyl); 0.98 (t, ca 7Hz, 2H, cyclopropyl)
	T1.1.147		1H-NMR (CDCl3): 0.74 (t, ca 7Hz, 2H, cyclopropyl); 89 (t, ca 7Hz, 2H, cyclopropyl); 4.85 (m, 1H, C=CH); 4.90 (m, 1H, C=CH); 5.68 (m, 1H, C=CH);

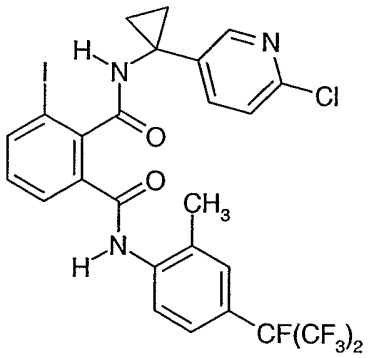
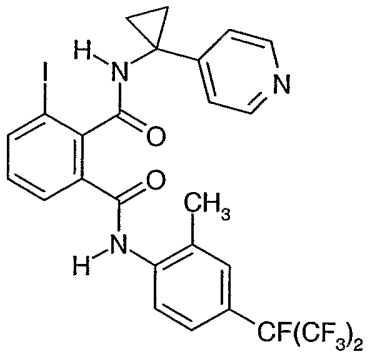
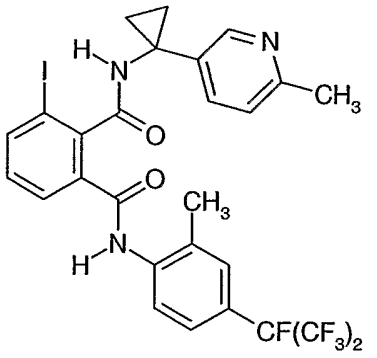
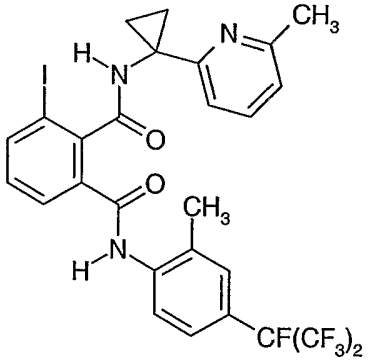
	No.	Structure	Phys. Data
	T1.1.182		1H-NMR (CDCl3): 3.09 (s, CH2); 6.65 (br s, thiophene); 6.84 (dd, thiophene); 7.09 (d, thiophene)
	T1.1.119		1H-NMR (CDCl3): 0.72 (t, ca 7Hz, 2H, cyclopropyl); 0.87 (t, ca 7Hz, 2H, cyclopropyl)
	T1.1.127		1H-NMR (CDCl3): 0.00 (m, 4H, 0.72 cyclopropyl); 0.54 (t, ca 7Hz, 2H, cyclopropyl); 0.70 (t, ca 7Hz, 2H, cyclopropyl); 1.20 (m, 1H, cyclopropyl)

	No.	Structure	Phys. Data
	T1.1.121		1H-NMR (CDCl3): 0.71 (t, ca 7Hz, 2H, cyclopropyl); 0.99 (t, ca 7Hz, 2H, cyclopropyl)
	T1.1.149		1H-NMR (CDCl3): 1.09 (t, ca 7Hz, 2H, cyclopropyl); 1.12 (t, ca 7Hz, 2H, cyclopropyl); 4.48 (s, 1H, C=CH); 4.96 (s, 1H, C=CH)
	T1.1.179		1H-NMR (CDCl3): 0.73 (t, ca 7Hz, 2H, cyclopropyl); 0.89 (t, ca 7Hz, 2H, cyclopropyl); 1.97 (m, 1H, cyclopentyl)

	No.	Structure	Phys. Data
	T1.1.180		MS +ve 677 (M+Na)
	T1.1.125		1H-NMR (CDCl3): 0.82 (s, 9H, tBu); 0.82 (t, ca 7Hz, 2H, cyclopropyl); 0.89 (t, ca 7Hz, 2H, cyclopropyl);
	T1.1.215		m.p. 164-165

	No.	Structure	Phys. Data
	T1.1.212		m.p. 116-117
	T1.1.213		MS +ve 609 (M+18) MS -ve 590 (M-1)
	T1.1.183		MS +ve 596 (M+18) MS -ve 577 (M-1)

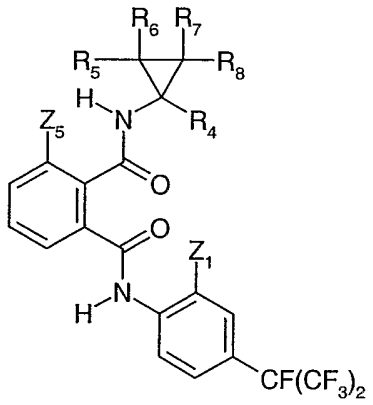
	No.	Structure	Phys. Data
	T1.1.81		MS +ve 580 (M+18) MS -ve 561 (M-1)
	T1.1.185		MS +ve 596 (M+18) MS -ve 577 (M-1)
	T7.3.48 (Z)		MS +ve 525 (M+1), 547 (M+43) MS -ve 523 (M-1)
	T7.3.48 (E)		MS +ve 525 M+1), 558 (M+64)

	No.	Structure	Phys. Data
	T1.1.214		MS +ve: 700 (M+1)
	T1.1.554		MS +ve: 667 (M+1)
	T1.1.563		Mp: 232-233 °C
	T1.1.570		Mp: 256-257 °C

The examples which follow are intended to illustrate the invention and show preferred compounds of formula I. They do not limit the invention. Temperatures are given in degrees Celsius. The abbreviation "M. P." means "melting point".

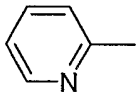
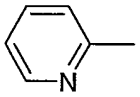
The Table A discloses 588 meanings of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 in a compound of the formula I-A.

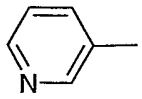
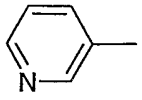
Table A



(I-A)

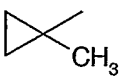
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.1	I	H	Me	Me	Me	Me	
A.1.2	Cl	H	Me	Me	Me	Me	
A.1.3	I	Me	H	H	H	Me	(*E*)
A.1.4	I	Me	H	H	H	Me	(*Z*)
A.1.5	I	Me	H	H	H	Me	(*E*) and (*Z*)
A.1.6	Cl	Me	H	H	H	Me	(*E*)
A.1.7	Cl	Me	H	H	H	Me	(*Z*)
A.1.8	Cl	Me	H	H	H	Me	(*E*) and (*Z*)
A.1.9	I	Me	H	H	H	n-Bu	(*E*)
A.1.10	I	Me	H	H	H	n-Bu	(*Z*)
A.1.11	I	Me	H	H	H	n-Bu	(*E*) and (*Z*)
A.1.12	Cl	Me	H	H	H	n-Bu	(*E*)

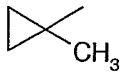
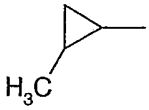
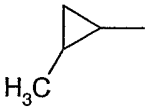
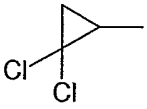
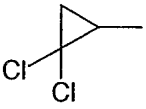
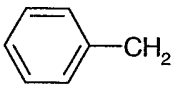
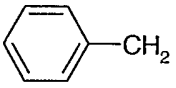
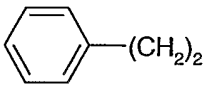
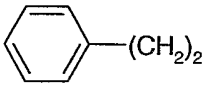
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.13	Cl	Me	H	H	H	n-Bu	(*Z*)
A.1.14	Cl	Me	H	H	H	n-Bu	(*E*) and (*Z*)
A.1.15	I	H	H	H	H	Me	(*E*)
A.1.16	I	H	H	H	H	Me	(*Z*)
A.1.17	I	H	H	H	H	Me	(*E*) and (*Z*)
A.1.18	Cl	H	H	H	H	Me	(*E*)
A.1.19	Cl	H	H	H	H	Me	(*Z*)
A.1.20	Cl	H	H	H	H	Me	(*E*) and (*Z*)
A.1.21	I		H	H	H	H	
A.1.22	Cl		H	H	H	H	
A.1.23	I	Me	H	H	H	Et	(*E*)
A.1.24	I	Me	H	H	H	Et	(*Z*)
A.1.25	I	Me	H	H	H	Et	(*E*) and (*Z*)
A.1.26	Cl	Me	H	H	H	Et	(*E*)
A.1.27	Cl	Me	H	H	H	Et	(*Z*)
A.1.28	Cl	Me	H	H	H	Et	(*E*) and (*Z*)
A.1.29	I	Me	H	H	H	n-Pr	(*E*)
A.1.30	I	Me	H	H	H	n-Pr	(*Z*)
A.1.31	I	Me	H	H	H	n-Pr	(*E*) and (*Z*)
A.1.32	Cl	Me	H	H	H	n-Pr	(*E*)
A.1.33	Cl	Me	H	H	H	n-Pr	(*Z*)
A.1.34	Cl	Me	H	H	H	n-Pr	(*E*) and (*Z*)

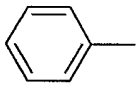
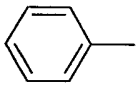
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.35	I		H	H	H	H	
A.1.36	Cl		H	H	H	H	
A.1.37	I	Me	Cl	Cl	H	Et	(*E*)
A.1.38	I	Me	Cl	Cl	H	Et	(*Z*)
A.1.39	I	Me	Cl	Cl	H	Et	(*E*) and (*Z*)
A.1.40	Cl	Me	Cl	Cl	H	Et	(*E*)
A.1.41	Cl	Me	Cl	Cl	H	Et	(*Z*)
A.1.42	Cl	Me	Cl	Cl	H	Et	(*E*) and (*Z*)
A.1.43	I	Me	Br	Br	H	Et	(*E*)
A.1.44	I	Me	Br	Br	H	Et	(*Z*)
A.1.45	I	Me	Br	Br	H	Et	(*E*) and (*Z*)
A.1.46	Cl	Me	Br	Br	H	Et	(*E*)
A.1.47	Cl	Me	Br	Br	H	Et	(*Z*)
A.1.48	Cl	Me	Br	Br	H	Et	(*E*) and (*Z*)
A.1.49	I	Me	H	Br	H	Et	
A.1.50	Cl	Me	H	Br	H	Et	
A.1.51	I	Me	H	Cl	H	Et	
A.1.52	Cl	Me	H	Cl	H	Et	
A.1.53	I	H	H	H	H	Et	(*E*)
A.1.54	I	H	H	H	H	Et	(*Z*)
A.1.55	I	H	H	H	H	Et	(*E*) and (*Z*)
A.1.56	Cl	H	H	H	H	Et	(*E*)

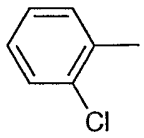
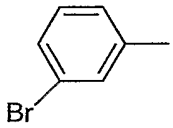
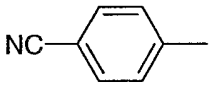
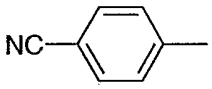
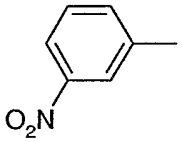
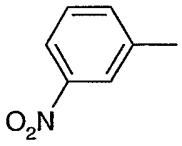
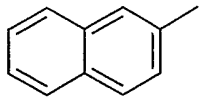
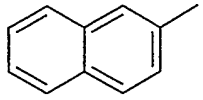
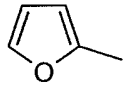
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.57	Cl	H	H	H	H	Et	(*Z*)
A.1.58	Cl	H	H	H	H	Et	(*E*) and (*Z*)
A.1.59	I	H	Cl	Cl	H	Et	(*E*)
A.1.60	I	H	Cl	Cl	H	Et	(*Z*)
A.1.61	I	H	Cl	Cl	H	Et	(*E*) and (*Z*)
A.1.62	Cl	H	Cl	Cl	H	Et	(*E*)
A.1.63	Cl	H	Cl	Cl	H	Et	(*Z*)
A.1.64	Cl	H	Cl	Cl	H	Et	(*E*) and (*Z*)
A.1.65	I	H	Br	Br	H	Et	(*E*)
A.1.66	I	H	Br	Br	H	Et	(*Z*)
A.1.67	I	H	Br	Br	H	Et	(*E*) and (*Z*)
A.1.68	Cl	H	Br	Br	H	Et	(*E*)
A.1.69	Cl	H	Br	Br	H	Et	(*Z*)
A.1.70	Cl	H	Br	Br	H	Et	(*E*) and (*Z*)
A.1.71	I	H	H	Br	H	Et	
A.1.72	Cl	H	H	Br	H	Et	
A.1.73	I	H	H	Cl	H	Et	
A.1.74	Cl	H	H	Cl	H	Et	
A.1.75	I	H	F	F	H	Et	(*E*)
A.1.76	I	H	F	F	H	Et	(*Z*)
A.1.77	I	H	F	F	H	Et	(*E*) and (*Z*)
A.1.78	Cl	H	F	F	H	Et	(*E*)
A.1.79	Cl	H	F	F	H	Et	(*Z*)
A.1.80	Cl	H	F	F	H	Et	(*E*) and (*Z*)
A.1.81	I	H	H	H	Me	Me	

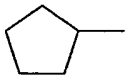
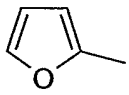
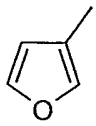
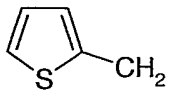
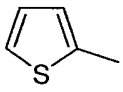
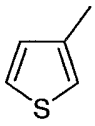
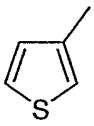
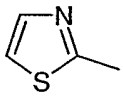
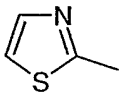
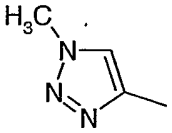
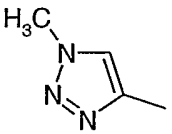
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.82	Cl	H	H	H	Me	Me	
A.1.83	I	Et	H	H	Me	Me	
A.1.84	Cl	Et	H	H	Me	Me	
A.1.85	I	Me	H	H	H	CH_2CN	(*E*)
A.1.86	I	Me	H	H	H	CH_2CN	(*Z*)
A.1.87	I	Me	H	H	H	CH_2CN	(*E*) and (*Z*)
A.1.88	Cl	Me	H	H	H	CH_2CN	(*E*)
A.1.89	Cl	Me	H	H	H	CH_2CN	(*Z*)
A.1.90	Cl	Me	H	H	H	CH_2CN	(*E*) and (*Z*)
A.1.91	I	Me	H	H	H	CH_2Cl	(*E*)
A.1.92	I	Me	H	H	H	CH_2Cl	(*Z*)
A.1.93	I	Me	H	H	H	CH_2Cl	(*E*) and (*Z*)
A.1.94	Cl	Me	H	H	H	CH_2Cl	(*E*)
A.1.95	Cl	Me	H	H	H	CH_2Cl	(*Z*)
A.1.96	Cl	Me	H	H	H	CH_2Cl	(*E*) and (*Z*)
A.1.97	I	Me	H	H	H	CH_2Br	(*E*)
A.1.98	I	Me	H	H	H	CH_2Br	(*Z*)
A.1.99	I	Me	H	H	H	CH_2Br	(*E*) and (*Z*)
A.1.100	Cl	Me	H	H	H	CH_2Br	(*E*)
A.1.101	Cl	Me	H	H	H	CH_2Br	(*Z*)
A.1.102	Cl	Me	H	H	H	CH_2Br	(*E*) and (*Z*)
A.1.103	I	Me	H	H	H	CH_2NO_2	(*E*)
A.1.104	I	Me	H	H	H	CH_2NO_2	(*Z*)
A.1.105	I	Me	H	H	H	CH_2NO_2	(*E*) and (*Z*)
A.1.106	Cl	Me	H	H	H	CH_2NO_2	(*E*)

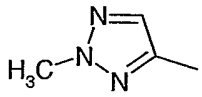
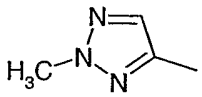
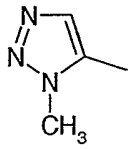
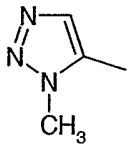
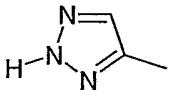
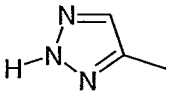
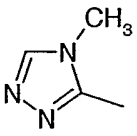
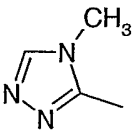
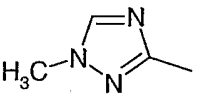
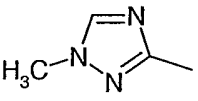
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.107	Cl	Me	H	H	H	CH_2NO_2	(*Z*)
A.1.108	Cl	Me	H	H	H	CH_2NO_2	(*E*) and (*Z*)
A.1.109	I	Me	H	H	H	CN	(*E*)
A.1.110	I	Me	H	H	H	CN	(*Z*)
A.1.111	I	Me	H	H	H	CN	(*E*) and (*Z*)
A.1.112	Cl	Me	H	H	H	CN	(*E*)
A.1.113	Cl	Me	H	H	H	CN	(*Z*)
A.1.114	Cl	Me	H	H	H	CN	(*E*) and (*Z*)
A.1.115	I	n-Pr	H	H	H	H	
A.1.116	Cl	n-Pr	H	H	H	H	
A.1.117	I	Ethyl	H	H	H	H	
A.1.118	Cl	n-Bu	H	H	H	H	
A.1.119	I	i-Pr	H	H	H	H	
A.1.120	Cl	i-Pr	H	H	H	H	
A.1.121	I	i-Bu	H	H	H	H	
A.1.122	Cl	i-Bu	H	H	H	H	
A.1.123	I	s-Bu	H	H	H	H	
A.1.124	Cl	s-Bu	H	H	H	H	
A.1.125	I	t-Bu	H	H	H	H	
A.1.126	Cl	t-Bu	H	H	H	H	
A.1.127	I		H	H	H	H	
A.1.128	Cl		H	H	H	H	
A.1.129	I		H	H	H	H	

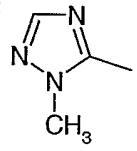
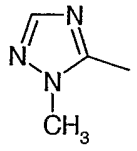
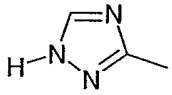
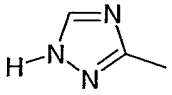
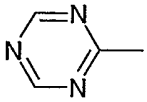
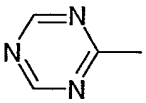
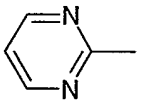
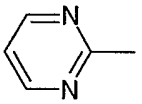
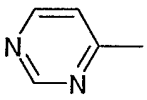
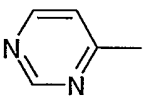
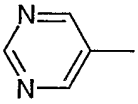
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.130	Cl		H	H	H	H	
A.1.131	I		H	H	H	H	
A.1.132	Cl		H	H	H	H	
A.1.133	I		H	H	H	H	
A.1.134	Cl		H	H	H	H	
A.1.135	I		H	H	H	H	
A.1.136	Cl		H	H	H	H	
A.1.137	I		H	H	H	H	
A.1.138	Cl		H	H	H	H	
A.1.139	I		H	H	H	H	
A.1.140	Cl		H	H	H	H	
A.1.141	I	CH_2=CH	H	H	H	H	
A.1.142	Cl	CH_2=CH	H	H	H	H	

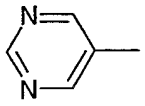
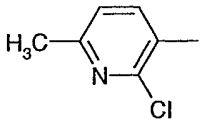
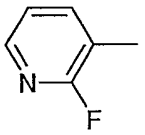
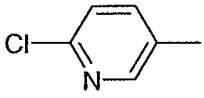
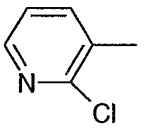
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.143	I	$HC\equiv C$	H	H	H	H	
A.1.144	Cl	$HC\equiv C$	H	H	H	H	
A.1.145	I	$CCl_2=CH$	H	H	H	H	
A.1.146	Cl	$CCl_2=CH$	H	H	H	H	
A.1.147	I	$CH_2=CH-CH_2$	H	H	H	H	
A.1.148	Cl	$CH_2=CH-CH_2$	H	H	H	H	
A.1.149	I	$CH_2=C-CH_3$	H	H	H	H	
A.1.150	Cl	$CH_2=C-CH_3$	H	H	H	H	
A.1.151	I	$HC\equiv C-CH_2$	H	H	H	H	
A.1.152	Cl	$HC\equiv C-CH_2$	H	H	H	H	
A.1.153	I		H	H	H	H	
A.1.154	Cl		H	H	H	H	
A.1.155	NO_2	Me	H	H	H	Et	(*E*)
A.1.156	NO_2	Me	H	H	H	Et	(*Z*)
A.1.157	NO_2	Me	H	H	H	Et	(*E*) and (*Z*)
A.1.158	SCH_3	Me	H	H	H	Et	(*E*)
A.1.159	SCH_3	Me	H	H	H	Et	(*Z*)
A.1.160	SCH_3	Me	H	H	H	Et	(*E*) and (*Z*)
A.1.161	$S(=O)_2CH_3$	Me	H	H	H	Et	(*E*)
A.1.162	$S(=O)_2CH_3$	Me	H	H	H	Et	(*Z*)
A.1.163	$S(=O)_2CH_3$	Me	H	H	H	Et	(*E*) and (*Z*)
A.1.164	SCF_3	Me	H	H	H	Et	(*E*)
A.1.165	SCF_3	Me	H	H	H	Et	(*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.166	SCF_3	Me	H	H	H	Et	(*E*) and (*Z*)
A.1.167	$S(=O)CH_3$	Me	H	H	H	Et	(*E*)
A.1.168	$S(=O)CH_3$	Me	H	H	H	Et	(*Z*)
A.1.169	$S(=O)CH_3$	Me	H	H	H	Et	(*E*) and (*Z*)
A.1.170	I		H	H	H	H	
A.1.171	Cl		H	H	H	H	
A.1.172	I		H	H	H	H	
A.1.173	Cl		H	H	H	H	
A.1.174	I		H	H	H	H	
A.1.175	Cl		H	H	H	H	
A.1.176	I		H	H	H	H	
A.1.177	Cl		H	H	H	H	
A.1.178	I		H	H	H	H	

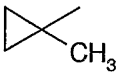
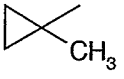
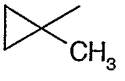
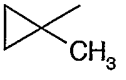
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.179	Cl		H	H	H	H	
A.1.180	I		H	H	H	H	
A.1.181	Cl		H	H	H	H	
A.1.182	I		H	H	H	H	
A.1.183	Cl		H	H	H	H	
A.1.184	I		H	H	H	H	
A.1.185	Cl		H	H	H	H	
A.1.186	I		H	H	H	H	
A.1.187	Cl		H	H	H	H	
A.1.188	I		H	H	H	H	
A.1.189	Cl		H	H	H	H	

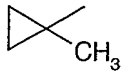
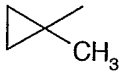
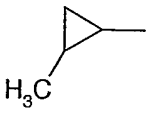
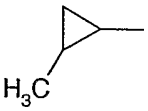
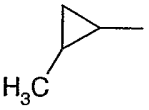
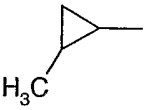
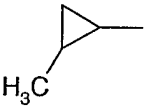
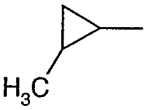
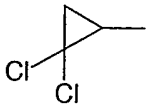
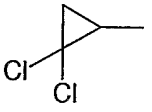
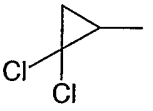
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.190	I		H	H	H	H	
A.1.191	Cl		H	H	H	H	
A.1.192	I		H	H	H	H	
A.1.193	Cl		H	H	H	H	
A.1.194	I		H	H	H	H	
A.1.195	Cl		H	H	H	H	
A.1.196	I		H	H	H	H	
A.1.197	Cl		H	H	H	H	
A.1.198	I		H	H	H	H	
A.1.199	Cl		H	H	H	H	

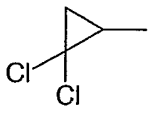
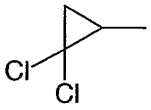
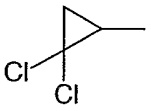
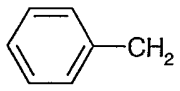
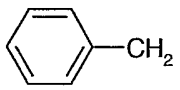
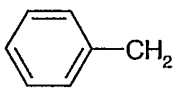
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.200	I		H	H	H	H	
A.1.201	Cl		H	H	H	H	
A.1.202	I		H	H	H	H	
A.1.203	Cl		H	H	H	H	
A.1.204	I		H	H	H	H	
A.1.205	Cl		H	H	H	H	
A.1.206	I		H	H	H	H	
A.1.207	Cl		H	H	H	H	
A.1.208	I		H	H	H	H	
A.1.209	Cl		H	H	H	H	
A.1.210	I		H	H	H	H	

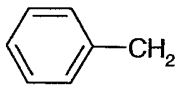
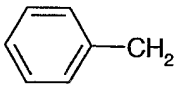
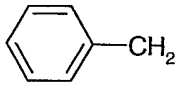
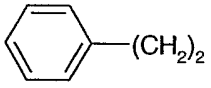
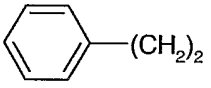
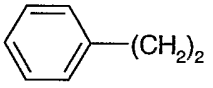
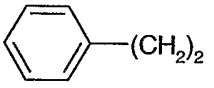
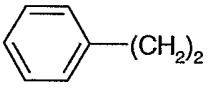
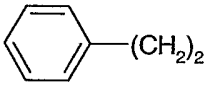
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.211	Cl		H	H	H	H	
A.1.212	I		H	H	H	H	
A.1.213	Cl		H	H	H	H	
A.1.214	I		H	H	H	H	
A.1.215	I		H	H	H	H	
A.1.216	I	CH_2CN	H	H	H	H	
A.1.217	Cl	CH_2CN	H	H	H	H	
A.1.218	I	CH_2Cl	H	H	H	H	
A.1.219	Cl	CH_2Cl	H	H	H	H	
A.1.220	I	CH_2Br	H	H	H	H	
A.1.221	Cl	CH_2Br	H	H	H	H	
A.1.222	I	CH_2NO_2	H	H	H	H	
A.1.223	Cl	CH_2NO_2	H	H	H	H	
A.1.224	I	CN	H	H	H	H	
A.1.225	Cl	CN	H	H	H	H	
A.1.226	I	H	H	H	H	n-Pr	(*E*)
A.1.227	I	H	H	H	H	n-Pr	(*Z*)
A.1.228	I	H	H	H	H	n-Pr	(*E*) and (*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.229	Cl	H	H	H	H	n-Pr	(*E*)
A.1.230	Cl	H	H	H	H	n-Pr	(*Z*)
A.1.231	Cl	H	H	H	H	n-Pr	(*E*) and (*Z*)
A.1.232	I	H	H	H	H	n-Bu	(*E*)
A.1.233	I	H	H	H	H	n-Bu	(*Z*)
A.1.234	I	H	H	H	H	n-Bu	(*E*) and (*Z*)
A.1.235	Cl	H	H	H	H	n-Bu	(*E*)
A.1.236	Cl	H	H	H	H	n-Bu	(*Z*)
A.1.237	Cl	H	H	H	H	n-Bu	(*E*) and (*Z*)
A.1.238	I	H	H	H	H	i-Pr	(*E*)
A.1.239	I	H	H	H	H	i-Pr	(*Z*)
A.1.240	I	H	H	H	H	i-Pr	(*E*) and (*Z*)
A.1.241	Cl	H	H	H	H	i-Pr	(*E*)
A.1.242	Cl	H	H	H	H	i-Pr	(*Z*)
A.1.243	Cl	H	H	H	H	i-Pr	(*E*) and (*Z*)
A.1.244	I	H	H	H	H	i-Bu	(*E*)
A.1.245	I	H	H	H	H	i-Bu	(*Z*)
A.1.246	I	H	H	H	H	i-Bu	(*E*) and (*Z*)
A.1.247	Cl	H	H	H	H	i-Bu	(*E*)
A.1.248	Cl	H	H	H	H	i-Bu	(*Z*)
A.1.249	Cl	H	H	H	H	i-Bu	(*E*) and (*Z*)
A.1.250	I	H	H	H	H	s-Bu	(*E*)
A.1.251	I	H	H	H	H	s-Bu	(*Z*)
A.1.252	I	H	H	H	H	s-Bu	(*E*) and (*Z*)
A.1.253	Cl	H	H	H	H	s-Bu	(*E*)

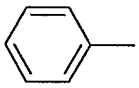
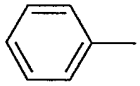
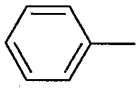
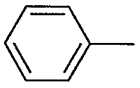
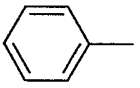
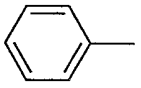
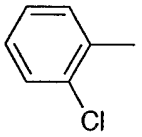
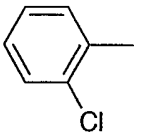
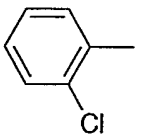
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A.1.254	Cl	H	H	H	H	s-Bu	(*Z*)
A.1.255	Cl	H	H	H	H	s-Bu	(*E*) and (*Z*)
A.1.256	I	H	H	H	H	t-Bu	(*E*)
A.1.257	I	H	H	H	H	t-Bu	(*Z*)
A.1.258	I	H	H	H	H	t-Bu	(*E*) and (*Z*)
A.1.259	Cl	H	H	H	H	t-Bu	(*E*)
A.1.260	Cl	H	H	H	H	t-Bu	(*Z*)
A.1.261	Cl	H	H	H	H	t-Bu	(*E*) and (*Z*)
A.1.262	I	H	H	H	H		(*E*)
A.1.263	I	H	H	H	H		(*Z*)
A.1.264	I	H	H	H	H		(*E*) and (*Z*)
A.1.265	Cl	H	H	H	H		(*E*)
A.1.266	Cl	H	H	H	H		(*Z*)
A.1.267	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.268	I	H	H	H	H		(*E*)
A.1.269	I	H	H	H	H		(*Z*)
A.1.270	I	H	H	H	H		(*E*) and (*Z*)
A.1.271	Cl	H	H	H	H		(*E*)

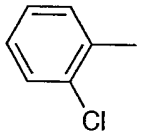
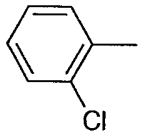
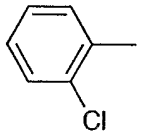
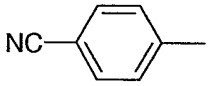
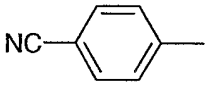
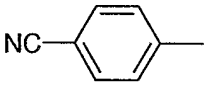
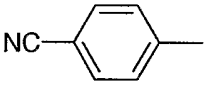
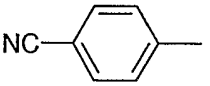
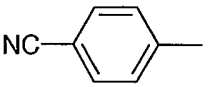
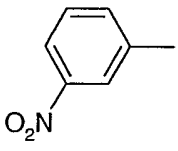
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.272	Cl	H	H	H	H		(*Z*)
A.1.273	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.274	I	H	H	H	H		(*E*)
A.1.275	I	H	H	H	H		(*Z*)
A.1.276	I	H	H	H	H		(*E*) and (*Z*)
A.1.277	Cl	H	H	H	H		(*E*)
A.1.278	Cl	H	H	H	H		(*Z*)
A.1.279	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.280	I	H	H	H	H		(*E*)
A.1.281	I	H	H	H	H		(*Z*)
A.1.282	I	H	H	H	H		(*E*) and (*Z*)

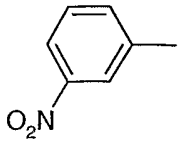
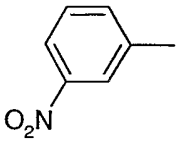
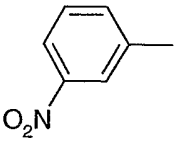
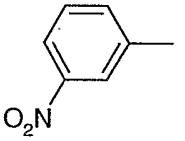
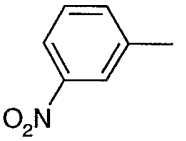
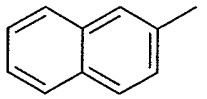
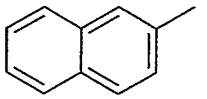
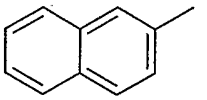
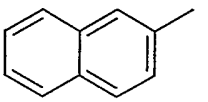
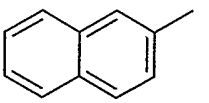
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.283	Cl	H	H	H	H		(*E*)
A.1.284	Cl	H	H	H	H		(*Z*)
A.1.285	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.286	I	H	H	H	H		(*E*)
A.1.287	I	H	H	H	H		(*Z*)
A.1.288	I	H	H	H	H		(*E*) and (*Z*)
A.1.289	Cl	H	H	H	H		(*E*)
A.1.290	Cl	H	H	H	H		(*Z*)
A.1.291	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.292	I	H	H	H	H		(*E*)
A.1.293	I	H	H	H	H		(*Z*)
A.1.294	I	H	H	H	H		(*E*) and (*Z*)

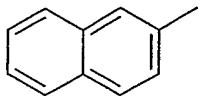
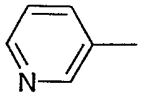
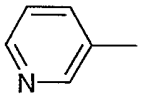
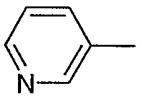
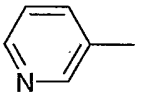
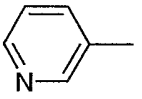
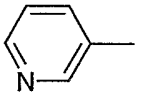
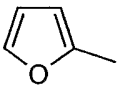
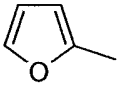
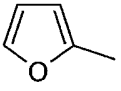
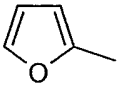
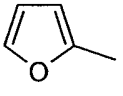
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.295	Cl	H	H	H	H		(*E*)
A.1.296	Cl	H	H	H	H		(*Z*)
A.1.297	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.298	I	H	H	H	H		(*E*)
A.1.299	I	H	H	H	H		(*Z*)
A.1.300	I	H	H	H	H		(*E*) and (*Z*)
A.1.301	Cl	H	H	H	H		(*E*)
A.1.302	Cl	H	H	H	H		(*Z*)
A.1.303	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.304	I	H	H	H	H	CH_2=CH	(*E*)
A.1.305	I	H	H	H	H	CH_2=CH	(*Z*)
A.1.306	I	H	H	H	H	CH_2=CH	(*E*) and (*Z*)
A.1.307	Cl	H	H	H	H	CH_2=CH	(*E*)
A.1.308	Cl	H	H	H	H	CH_2=CH	(*Z*)
A.1.309	Cl	H	H	H	H	CH_2=CH	(*E*) and (*Z*)
A.1.310	I	H	H	H	H	HC≡C	(*E*)

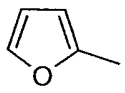
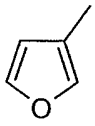
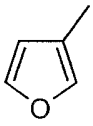
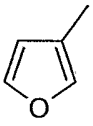
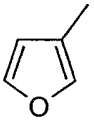
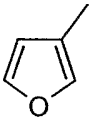
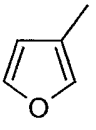
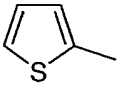
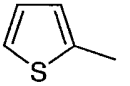
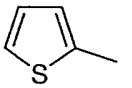
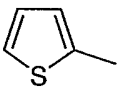
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
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A.1.312	I	H	H	H	H	HC≡C	(*E*) and (*Z*)
A.1.313	Cl	H	H	H	H	HC≡C	(*E*)
A.1.314	Cl	H	H	H	H	HC≡C	(*Z*)
A.1.315	Cl	H	H	H	H	HC≡C	(*E*) and (*Z*)
A.1.316	I	H	H	H	H	CCl_2=CH	(*E*)
A.1.317	I	H	H	H	H	CCl_2=CH	(*Z*)
A.1.318	I	H	H	H	H	CCl_2=CH	(*E*) and (*Z*)
A.1.319	Cl	H	H	H	H	CCl_2=CH	(*E*)
A.1.320	Cl	H	H	H	H	CCl_2=CH	(*Z*)
A.1.321	Cl	H	H	H	H	CCl_2=CH	(*E*) and (*Z*)
A.1.322	I	H	H	H	H	CH_2=CH-CH_2	(*E*)
A.1.323	I	H	H	H	H	CH_2=CH-CH_2	(*Z*)
A.1.324	I	H	H	H	H	CH_2=CH-CH_2	(*E*) and (*Z*)
A.1.325	Cl	H	H	H	H	CH_2=CH-CH_2	(*E*)
A.1.326	Cl	H	H	H	H	CH_2=CH-CH_2	(*Z*)
A.1.327	Cl	H	H	H	H	CH_2=CH-CH_2	(*E*) and (*Z*)
A.1.328	I	H	H	H	H	CH_2=C-CH_3	(*E*)
A.1.329	I	H	H	H	H	CH_2=C-CH_3	(*Z*)
A.1.330	I	H	H	H	H	CH_2=C-CH_3	(*E*) and (*Z*)
A.1.331	Cl	H	H	H	H	CH_2=C-CH_3	(*E*)
A.1.332	Cl	H	H	H	H	CH_2=C-CH_3	(*Z*)
A.1.333	Cl	H	H	H	H	CH_2=C-CH_3	(*E*) and (*Z*)
A.1.334	I	H	H	H	H	HC≡C—CH_2	(*E*)
A.1.335	I	H	H	H	H	HC≡C—CH_2	(*Z*)

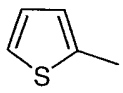
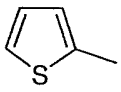
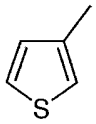
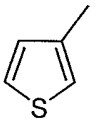
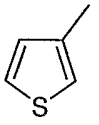
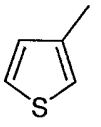
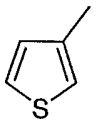
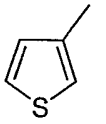
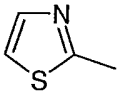
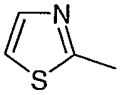
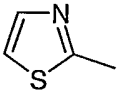
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
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A.1.337	Cl	H	H	H	H	$HC\equiv C-CH_2$	(*E*)
A.1.338	Cl	H	H	H	H	$HC\equiv C-CH_2$	(*Z*)
A.1.339	Cl	H	H	H	H	$HC\equiv C-CH_2$	(*E*) and (*Z*)
A.1.340	I	H	H	H	H		(*E*)
A.1.341	I	H	H	H	H		(*Z*)
A.1.342	I	H	H	H	H		(*E*) and (*Z*)
A.1.343	Cl	H	H	H	H		(*E*)
A.1.344	Cl	H	H	H	H		(*Z*)
A.1.345	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.346	I	H	H	H	H		(*E*)
A.1.347	I	H	H	H	H		(*Z*)
A.1.348	I	H	H	H	H		(*E*) and (*Z*)

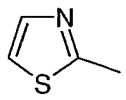
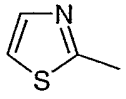
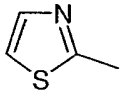
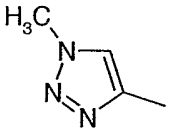
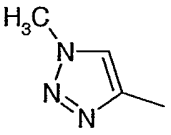
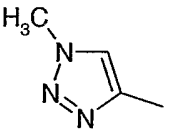
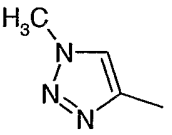
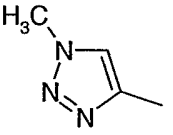
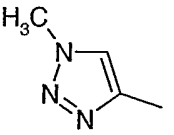
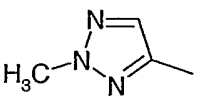
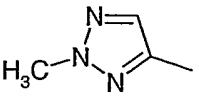
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.349	Cl	H	H	H	H		(*E*)
A.1.350	Cl	H	H	H	H		(*Z*)
A.1.351	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.352	I	H	H	H	H		(*E*)
A.1.353	I	H	H	H	H		(*Z*)
A.1.354	I	H	H	H	H		(*E*) and (*Z*)
A.1.355	Cl	H	H	H	H		(*E*)
A.1.356	Cl	H	H	H	H		(*Z*)
A.1.357	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.358	I	H	H	H	H		(*E*)

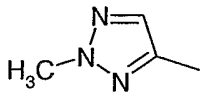
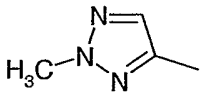
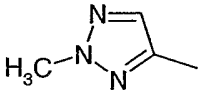
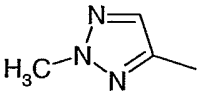
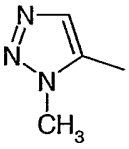
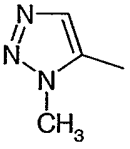
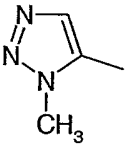
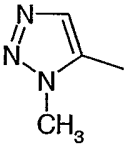
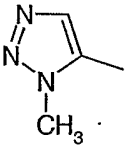
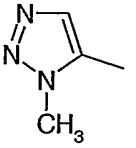
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.359	I	H	H	H	H		(*Z*)
A.1.360	I	H	H	H	H		(*E*) and (*Z*)
A.1.361	Cl	H	H	H	H		(*E*)
A.1.362	Cl	H	H	H	H		(*Z*)
A.1.363	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.364	I	H	H	H	H		(*E*)
A.1.365	I	H	H	H	H		(*Z*)
A.1.366	I	H	H	H	H		(*E*) and (*Z*)
A.1.367	Cl	H	H	H	H		(*E*)
A.1.368	Cl	H	H	H	H		(*Z*)

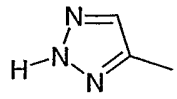
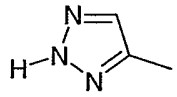
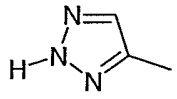
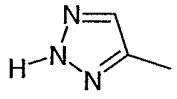
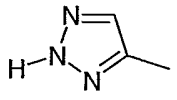
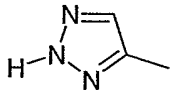
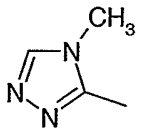
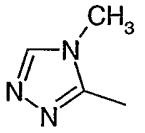
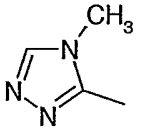
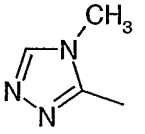
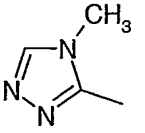
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.369	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.370	I	H	H	H	H		(*E*)
A.1.371	I	H	H	H	H		(*Z*)
A.1.372	I	H	H	H	H		(*E*) and (*Z*)
A.1.373	Cl	H	H	H	H		(*E*)
A.1.374	Cl	H	H	H	H		(*Z*)
A.1.375	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.376	I	H	H	H	H		(*E*)
A.1.377	I	H	H	H	H		(*Z*)
A.1.378	I	H	H	H	H		(*E*) and (*Z*)
A.1.379	Cl	H	H	H	H		(*E*)
A.1.380	Cl	H	H	H	H		(*Z*)

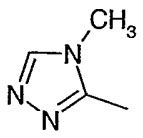
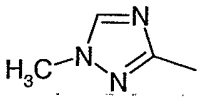
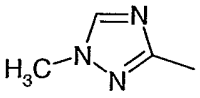
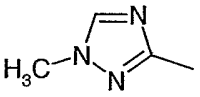
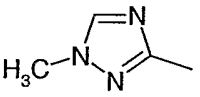
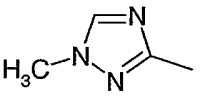
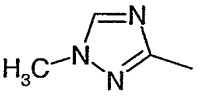
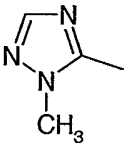
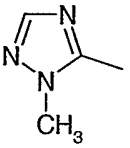
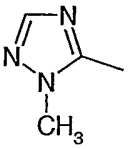
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.381	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.382	I	H	H	H	H		(*E*)
A.1.383	I	H	H	H	H		(*Z*)
A.1.384	I	H	H	H	H		(*E*) and (*Z*)
A.1.385	Cl	H	H	H	H		(*E*)
A.1.386	Cl	H	H	H	H		(*Z*)
A.1.387	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.388	I	H	H	H	H		(*E*)
A.1.389	I	H	H	H	H		(*Z*)
A.1.390	I	H	H	H	H		(*E*) and (*Z*)
A.1.391	Cl	H	H	H	H		(*E*)

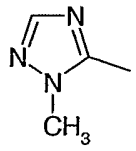
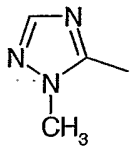
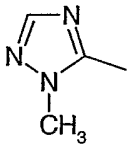
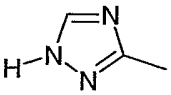
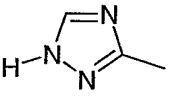
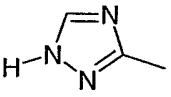
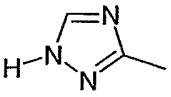
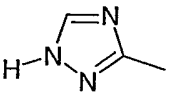
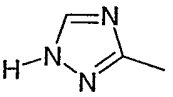
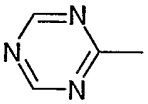
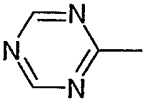
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.392	Cl	H	H	H	H		(*Z*)
A.1.393	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.394	I	H	H	H	H		(*E*)
A.1.395	I	H	H	H	H		(*Z*)
A.1.396	I	H	H	H	H		(*E*) and (*Z*)
A.1.397	Cl	H	H	H	H		(*E*)
A.1.398	Cl	H	H	H	H		(*Z*)
A.1.399	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.400	I	H	H	H	H		(*E*)
A.1.401	I	H	H	H	H		(*Z*)
A.1.402	I	H	H	H	H		(*E*) and (*Z*)

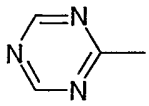
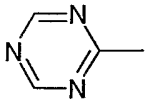
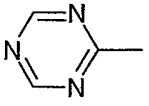
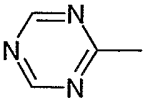
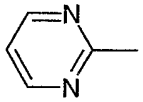
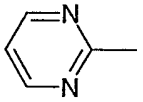
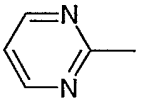
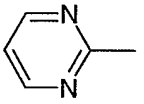
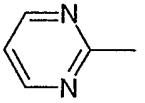
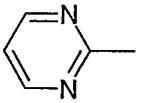
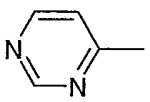
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.403	Cl	H	H	H	H		(*E*)
A.1.404	Cl	H	H	H	H		(*Z*)
A.1.405	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.406	I	H	H	H	H		(*E*)
A.1.407	I	H	H	H	H		(*Z*)
A.1.408	I	H	H	H	H		(*E*) and (*Z*)
A.1.409	Cl	H	H	H	H		(*E*)
A.1.410	Cl	H	H	H	H		(*Z*)
A.1.411	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.412	I	H	H	H	H		(*E*)
A.1.413	I	H	H	H	H		(*Z*)

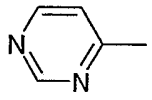
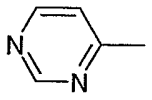
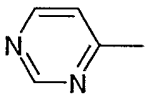
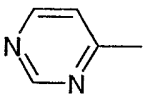
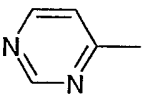
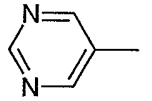
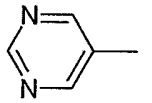
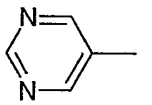
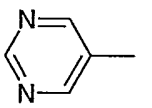
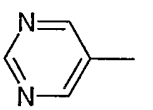
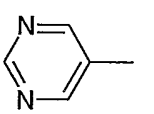
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.414	I	H	H	H	H		(*E*) and (*Z*)
A.1.415	Cl	H	H	H	H		(*E*)
A.1.416	Cl	H	H	H	H		(*Z*)
A.1.417	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.418	I	H	H	H	H		(*E*)
A.1.419	I	H	H	H	H		(*Z*)
A.1.420	I	H	H	H	H		(*E*) and (*Z*)
A.1.421	Cl	H	H	H	H		(*E*)
A.1.422	Cl	H	H	H	H		(*Z*)
A.1.423	Cl	H	H	H	H		(*E*) and (*Z*)

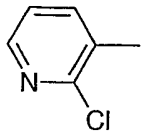
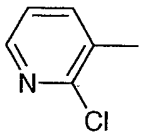
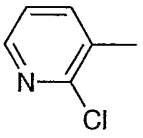
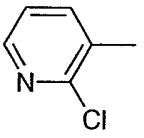
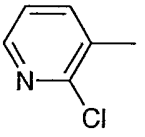
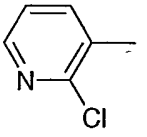
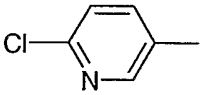
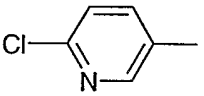
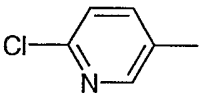
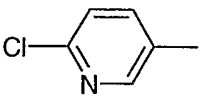
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.424	I	H	H	H	H		(*E*)
A.1.425	I	H	H	H	H		(*Z*)
A.1.426	I	H	H	H	H		(*E*) and (*Z*)
A.1.427	Cl	H	H	H	H		(*E*)
A.1.428	Cl	H	H	H	H		(*Z*)
A.1.429	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.430	I	H	H	H	H		(*E*)
A.1.431	I	H	H	H	H		(*Z*)
A.1.432	I	H	H	H	H		(*E*) and (*Z*)
A.1.433	Cl	H	H	H	H		(*E*)
A.1.434	Cl	H	H	H	H		(*Z*)

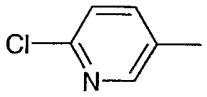
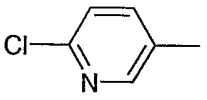
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.435	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.436	I	H	H	H	H		(*E*)
A.1.437	I	H	H	H	H		(*Z*)
A.1.438	I	H	H	H	H		(*E*) and (*Z*)
A.1.439	Cl	H	H	H	H		(*E*)
A.1.440	Cl	H	H	H	H		(*Z*)
A.1.441	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.442	I	H	H	H	H		(*E*)
A.1.443	I	H	H	H	H		(*Z*)
A.1.444	I	H	H	H	H		(*E*) and (*Z*)

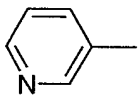
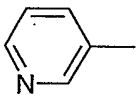
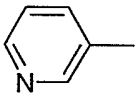
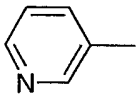
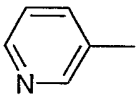
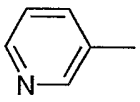
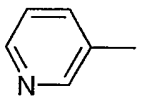
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.445	Cl	H	H	H	H		(*E*)
A.1.446	Cl	H	H	H	H		(*Z*)
A.1.447	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.448	I	H	H	H	H		(*E*)
A.1.449	I	H	H	H	H		(*Z*)
A.1.450	I	H	H	H	H		(*E*) and (*Z*)
A.1.451	Cl	H	H	H	H		(*E*)
A.1.452	Cl	H	H	H	H		(*Z*)
A.1.453	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.454	I	H	H	H	H		(*E*)
A.1.455	I	H	H	H	H		(*Z*)

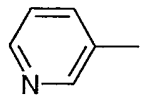
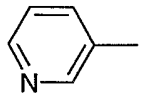
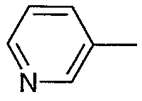
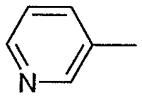
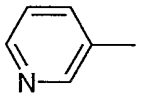
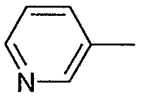
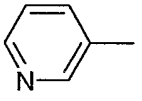
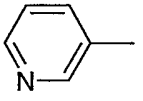
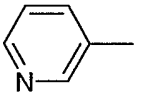
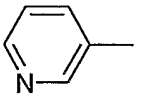
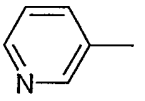
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.456	I	H	H	H	H		(*E*) and (*Z*)
A.1.457	Cl	H	H	H	H		(*E*)
A.1.458	Cl	H	H	H	H		(*Z*)
A.1.459	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.460	I	H	H	H	H		(*E*)
A.1.461	I	H	H	H	H		(*Z*)
A.1.462	I	H	H	H	H		(*E*) and (*Z*)
A.1.463	Cl	H	H	H	H		(*E*)
A.1.464	Cl	H	H	H	H		(*Z*)
A.1.465	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.466	I	H	H	H	H		(*E*)

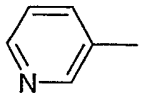
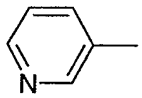
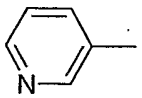
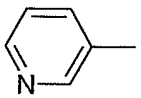
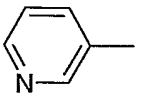
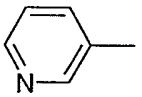
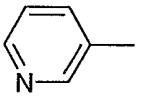
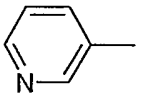
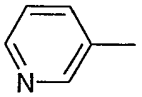
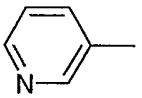
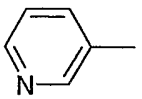
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.467	I	H	H	H	H		(*Z*)
A.1.468	I	H	H	H	H		(*E*) and (*Z*)
A.1.469	Cl	H	H	H	H		(*E*)
A.1.470	Cl	H	H	H	H		(*Z*)
A.1.471	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.472	I	H	H	H	H		(*E*)
A.1.473	I	H	H	H	H		(*Z*)
A.1.474	I	H	H	H	H		(*E*) and (*Z*)
A.1.475	Cl	H	H	H	H		(*E*)
A.1.476	Cl	H	H	H	H		(*Z*)
A.1.477	Cl	H	H	H	H		(*E*) and (*Z*)

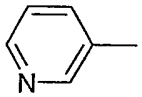
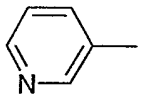
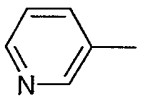
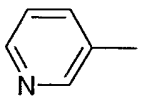
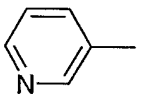
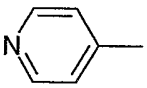
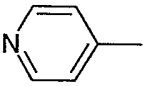
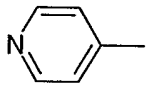
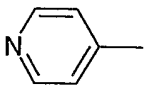
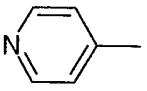
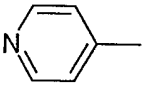
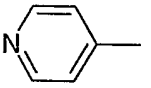
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.478	I	H	H	H	H		(*E*)
A.1.479	I	H	H	H	H		(*Z*)
A.1.480	I	H	H	H	H		(*E*) and (*Z*)
A.1.481	Cl	H	H	H	H		(*E*)
A.1.482	Cl	H	H	H	H		(*Z*)
A.1.483	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.484	I	H	H	H	H		(*E*)
A.1.485	I	H	H	H	H		(*Z*)
A.1.486	I	H	H	H	H		(*E*) and (*Z*)
A.1.487	Cl	H	H	H	H		(*E*)

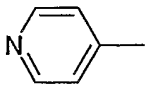
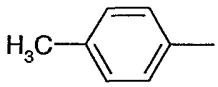
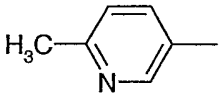
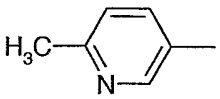
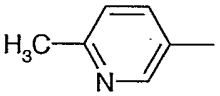
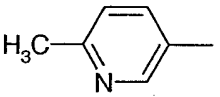
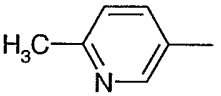
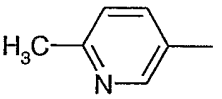
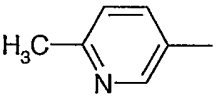
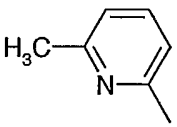
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.488	Cl	H	H	H	H		(*Z*)
A.1.489	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.490	I	H	H	H	H	CH_2CN	(*E*)
A.1.491	I	H	H	H	H	CH_2CN	(*Z*)
A.1.492	I	H	H	H	H	CH_2CN	(*E*) and (*Z*)
A.1.493	Cl	H	H	H	H	CH_2CN	(*E*)
A.1.494	Cl	H	H	H	H	CH_2CN	(*Z*)
A.1.495	Cl	H	H	H	H	CH_2CN	(*E*) and (*Z*)
A.1.496	I	H	H	H	H	CH_2Cl	(*E*)
A.1.497	I	H	H	H	H	CH_2Cl	(*Z*)
A.1.498	I	H	H	H	H	CH_2Cl	(*E*) and (*Z*)
A.1.499	Cl	H	H	H	H	CH_2Cl	(*E*)
A.1.500	Cl	H	H	H	H	CH_2Cl	(*Z*)
A.1.501	Cl	H	H	H	H	CH_2Cl	(*E*) and (*Z*)
A.1.502	I	H	H	H	H	CH_2Br	(*E*)
A.1.503	I	H	H	H	H	CH_2Br	(*Z*)
A.1.504	I	H	H	H	H	CH_2Br	(*E*) and (*Z*)
A.1.505	Cl	H	H	H	H	CH_2Br	(*E*)
A.1.506	Cl	H	H	H	H	CH_2Br	(*Z*)
A.1.507	Cl	H	H	H	H	CH_2Br	(*E*) and (*Z*)
A.1.508	I	H	H	H	H	CH_2NO_2	(*E*)
A.1.509	I	H	H	H	H	CH_2NO_2	(*Z*)
A.1.510	I	H	H	H	H	CH_2NO_2	(*E*) and (*Z*)

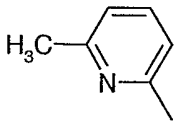
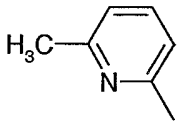
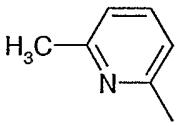
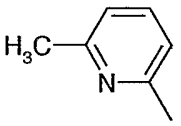
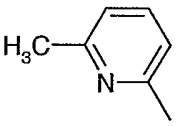
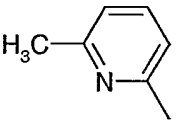
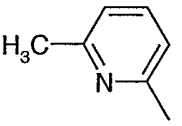
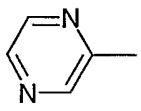
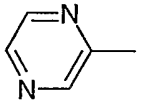
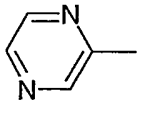
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.511	Cl	H	H	H	H	CH_2NO_2	(*E*)
A.1.512	Cl	H	H	H	H	CH_2NO_2	(*Z*)
A.1.513	Cl	H	H	H	H	CH_2NO_2	(*E*) and (*Z*)
A.1.514	I	H	H	H	H	CN	(*E*)
A.1.515	I	H	H	H	H	CN	(*Z*)
A.1.516	I	H	H	H	H	CN	(*E*) and (*Z*)
A.1.517	Cl	H	H	H	H	CN	(*E*)
A.1.518	Cl	H	H	H	H	CN	(*Z*)
A.1.519	Cl	H	H	H	H	CN	(*E*) and (*Z*)
A.1.520	I		H	H	Me	Me	
A.1.521	Cl		H	H	Me	Me	
A.1.522	I		H	Me	H	Me	
A.1.523	Cl		H	Me	H	Me	
A.1.524	I		H	Me	Me	Me	(*E*)
A.1.525	I		H	Me	Me	Me	(*Z*)
A.1.526	I		H	Me	Me	Me	(*E*) and (*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.527	Cl		H	Me	Me	Me	(*E*)
A.1.528	Cl		H	Me	Me	Me	(*Z*)
A.1.529	Cl		H	Me	Me	Me	(*E*) and (*Z*)
A.1.530	I		H	H	H	Et	(*E*)
A.1.531	I		H	H	H	Et	(*Z*)
A.1.532	I		H	H	H	Et	(*E*) and (*Z*)
A.1.533	Cl		H	H	H	Et	(*E*)
A.1.534	Cl		H	H	H	Et	(*Z*)
A.1.535	Cl		H	H	H	Et	(*E*) and (*Z*)
A.1.536	I		H	H	H	CH_2CN	(*E*)
A.1.537	I		H	H	H	CH_2CN	(*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.538	I		H	H	H	CH_2CN	(*E*) and (*Z*)
A.1.539	Cl		H	H	H	CH_2CN	(*E*)
A.1.540	Cl		H	H	H	CH_2CN	(*Z*)
A.1.541	Cl		H	H	H	CH_2CN	(*E*) and (*Z*)
A.1.542	I		H	H	H	CH_2Cl	(*E*)
A.1.543	I		H	H	H	CH_2Cl	(*Z*)
A.1.544	I		H	H	H	CH_2Cl	(*E*) and (*Z*)
A.1.545	Cl		H	H	H	CH_2Cl	(*E*)
A.1.546	Cl		H	H	H	CH_2Cl	(*Z*)
A.1.547	Cl		H	H	H	CH_2Cl	(*E*) and (*Z*)
A.1.548	I		H	H	H	CH_2Br	(*E*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.549	I		H	H	H	CH_2Br	(*Z*)
A.1.550	I		H	H	H	CH_2Br	(*E*) and (*Z*)
A.1.551	Cl		H	H	H	CH_2Br	(*E*)
A.1.552	Cl		H	H	H	CH_2Br	(*Z*)
A.1.553	I		H	H	H	CH_2Br	(*E*) and (*Z*)
A.1.554	I		H	H	H	H	
A.1.555	Cl		H	H	H	H	
A.1.556	I	H	H	H	H		(*E*)
A.1.557	I	H	H	H	H		(*Z*)
A.1.558	I	H	H	H	H		(*E*) and (*Z*)
A.1.559	Cl	H	H	H	H		(*E*)
A.1.560	Cl	H	H	H	H		(*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.561	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.562	I		H	H	H	H	
A.1.563	Cl		H	H	H	H	
A.1.564	I	H	H	H	H		(*E*)
A.1.565	I	H	H	H	H		(*Z*)
A.1.566	I	H	H	H	H		(*E*) and (*Z*)
A.1.567	Cl	H	H	H	H		(*E*)
A.1.568	Cl	H	H	H	H		(*Z*)
A.1.569	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.570	I		H	H	H	H	

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.571	Cl		H	H	H	H	
A.1.572	I	H	H	H	H		(*E*)
A.1.573	I	H	H	H	H		(*Z*)
A.1.574	I	H	H	H	H		(*E*) and (*Z*)
A.1.575	Cl	H	H	H	H		(*E*)
A.1.576	Cl	H	H	H	H		(*Z*)
A.1.577	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.578	I		H	H	H	H	
A.1.579	Cl		H	H	H	H	
A.1.580	I	H	H	H	H		(*E*)

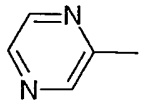
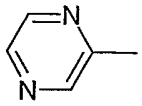
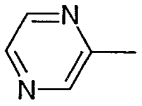
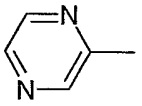
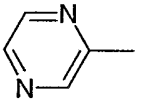
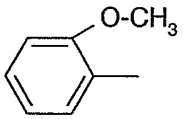
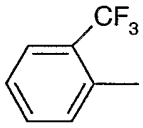
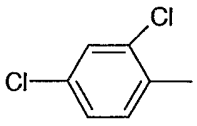
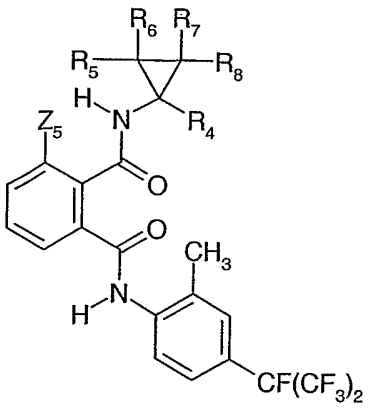
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
A.1.581	I	H	H	H	H		(*Z*)
A.1.582	I	H	H	H	H		(*E*) and (*Z*)
A.1.583	Cl	H	H	H	H		(*E*)
A.1.584	Cl	H	H	H	H		(*Z*)
A.1.585	Cl	H	H	H	H		(*E*) and (*Z*)
A.1.586	Cl		H	H	H	H	
A.1.587	Cl		H	H	H	H	
A.1.588	Cl		H	H	H	H	

Table 1: This table discloses the 588 compounds T1.1.1 to T1.1.588 of the formula

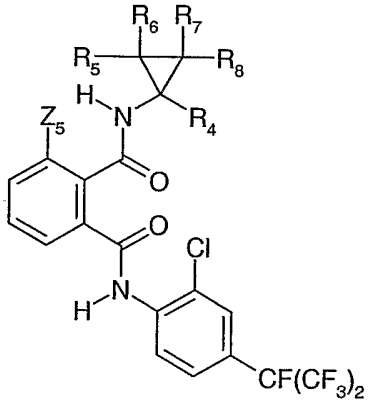


(T1),

in which, for each of these 588 specific compounds, each of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 588 lines A.1.1 to A.1.588, of the Table A.

For example, the specific compound T1.1.23 is the compound of the formula T1, in which each of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 has the specific meaning given in the line A.1.23 of the Table A. According to the same system, also all of the other 587 specific compounds disclosed in the Table 1 as well as all of the specific compounds disclosed in the Tables 2 to 36 are specified analogously.

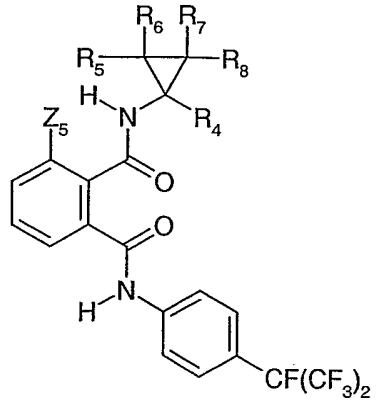
Table 2: This table discloses the 588 compounds T2.1.1 to T2.1.588 of the formula



(T2),

in which, for each of these 588 specific compounds, each of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 588 lines A.1.1 to A.1.588, of the Table A.

Table 3: This table discloses the 588 compounds T3.1.1 to T3.1.588 of the formula

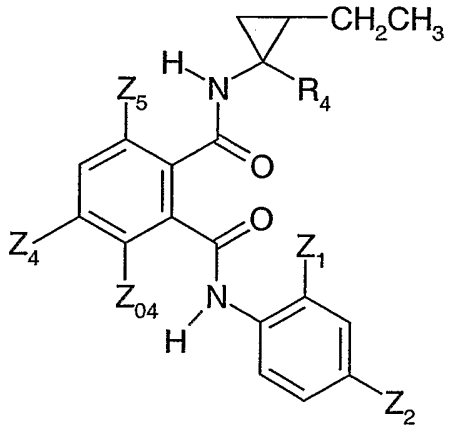


(T3),

in which, for each of these 588 specific compounds, each of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 588 lines A.1.1 to A.1.588, of the Table A.

The Table B discloses 54 meanings of the variables Z_2, Z_3, Z_4, Z_5 and R_4 in a compound of the formula I-B.

Table B



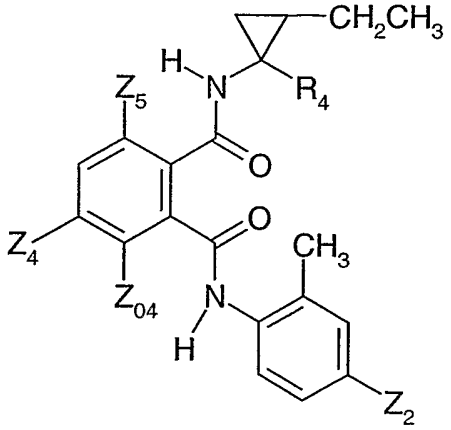
(I-B)

Line	Z_2	Z_{04}	Z_4	Z_5	R_4	Isomer(s)
B.2.1	$CF(CF_3)_2$	H	Cl	I	Me	(*E*)
B.2.2	$CF(CF_3)_2$	H	Cl	I	Me	(*Z*)
B.2.3	$CF(CF_3)_2$	H	Cl	I	Me	(*E*) and (*Z*)
B.2.4	$CF(CF_3)_2$	H	Cl	Cl	Me	(*E*)
B.2.5	$CF(CF_3)_2$	H	Cl	Cl	Me	(*Z*)

Line	Z_2	Z_{04}	Z_4	Z_5	R_4	Isomer(s)
B.2.6	$CF(CF_3)_2$	H	Cl	Cl	Me	(*E*) and (*Z*)
B.2.7	$CF(CF_3)_2$	H	Cl	I	H	(*E*)
B.2.8	$CF(CF_3)_2$	H	Cl	I	H	(*Z*)
B.2.9	$CF(CF_3)_2$	H	Cl	I	H	(*E*) and (*Z*)
B.2.10	$CF(CF_3)_2$	H	Cl	Cl	H	(*E*)
B.2.11	$CF(CF_3)_2$	H	Cl	Cl	H	(*Z*)
B.2.12	$CF(CF_3)_2$	H	Cl	Cl	H	(*E*) and (*Z*)
B.2.13	OCF_3	H	H	I	Me	(*E*)
B.2.14	OCF_3	H	H	I	Me	(*Z*)
B.2.15	OCF_3	H	H	I	Me	(*E*) and (*Z*)
B.2.16	OCF_3	H	H	Cl	Me	(*E*)
B.2.17	OCF_3	H	H	Cl	Me	(*Z*)
B.2.18	OCF_3	H	H	Cl	Me	(*E*) and (*Z*)
B.2.19	CF_3	H	H	I	Me	(*E*)
B.2.20	CF_3	H	H	I	Me	(*Z*)
B.2.21	CF_3	H	H	I	Me	(*E*) and (*Z*)
B.2.22	CF_3	H	H	Cl	Me	(*E*)
B.2.23	CF_3	H	H	Cl	Me	(*Z*)
B.2.24	CF_3	H	H	Cl	Me	(*E*) and (*Z*)
B.2.25	CF_3	H	Cl	I	Me	(*E*)
B.2.26	CF_3	H	Cl	I	Me	(*Z*)
B.2.27	CF_3	H	Cl	I	Me	(*E*) and (*Z*)
B.2.28	CF_3	H	Cl	Cl	Me	(*E*)
B.2.29	CF_3	H	Cl	Cl	Me	(*Z*)
B.2.30	CF_3	H	Cl	Cl	Me	(*E*) and (*Z*)

Line	Z_2	Z_{04}	Z_4	Z_5	R_4	Isomer(s)
B.2.31	CF_2CF_3	H	H	I	Me	(*E*)
B.2.32	CF_2CF_3	H	H	I	Me	(*Z*)
B.2.33	CF_2CF_3	H	H	I	Me	(*E*) and (*Z*)
B.2.34	CF_2CF_3	H	H	Cl	Me	(*E*)
B.2.35	CF_2CF_3	H	H	Cl	Me	(*Z*)
B.2.36	CF_2CF_3	H	H	Cl	Me	(*E*) and (*Z*)
B.2.37	CF_3	Br	H	I	Me	(*E*)
B.2.38	CF_3	Br	H	I	Me	(*Z*)
B.2.39	CF_3	Br	H	I	Me	(*E*) and (*Z*)
B.2.40	CF_3	Br	H	Cl	Me	(*E*)
B.2.41	CF_3	Br	H	Cl	Me	(*Z*)
B.2.42	CF_3	Br	H	Cl	Me	(*E*) and (*Z*)
B.2.43	$CF(CF_3)_2$	Cl	H	I	Me	(*E*)
B.2.44	$CF(CF_3)_2$	Cl	H	I	Me	(*Z*)
B.2.45	$CF(CF_3)_2$	Cl	H	I	Me	(*E*) and (*Z*)
B.2.46	$CF(CF_3)_2$	Cl	H	Cl	Me	(*E*)
B.2.47	$CF(CF_3)_2$	Cl	H	Cl	Me	(*Z*)
B.2.48	$CF(CF_3)_2$	Cl	H	Cl	Me	(*E*) and (*Z*)
B.2.49	$CF(CF_3)_2$	H	NO_2	I	Me	(*E*)
B.2.50	$CF(CF_3)_2$	H	NO_2	I	Me	(*Z*)
B.2.51	$CF(CF_3)_2$	H	NO_2	I	Me	(*E*) and (*Z*)
B.2.52	$CF(CF_3)_2$	H	NO_2	Cl	Me	(*E*)
B.2.53	$CF(CF_3)_2$	H	NO_2	Cl	Me	(*Z*)
B.2.54	$CF(CF_3)_2$	H	NO_2	Cl	Me	(*E*) and (*Z*)

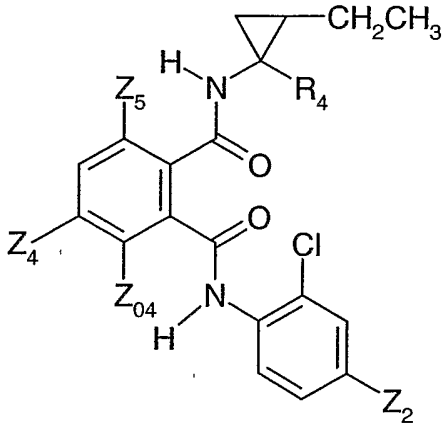
Table 4: This table discloses the 54 compounds T4.2.1 to T4.2.54 of the formula



(T4),

in which, for each of these 54 specific compounds, each of the variables Z_2, Z_{04}, Z_4, Z_5 and R_4 has the specific meaning given in the corresponding line, appropriately selected from the 54 lines B.2.1 to B.2.54, of the Table B.

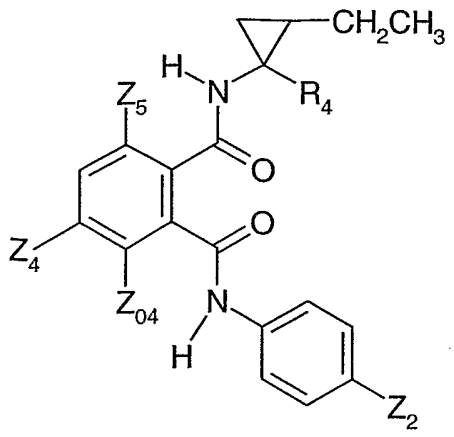
Table 5: This table discloses the 54 compounds T5.2.1 to T5.2.54 of the formula



(T5),

in which, for each of these 54 specific compounds, each of the variables Z_2, Z_{04}, Z_4, Z_5 and R_4 has the specific meaning given in the corresponding line, appropriately selected from the 54 lines B.2.1 to B.2.54, of the Table B.

Table 6: This table discloses the 54 compounds T6.2.1 to T6.2.54 of the formula

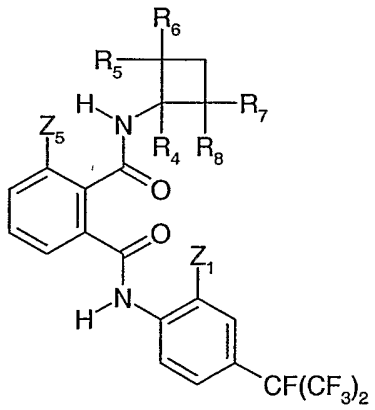


(T6),

in which, for each of these 54 specific compounds, each of the variables Z_2, Z_{04}, Z_4, Z_5 and R_4 has the specific meaning given in the corresponding line, appropriately selected from the 54 lines B.2.1 to B.2.54, of the Table B.

The Table C discloses 309 meanings of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 in a compound of the formula I-C.

Table C



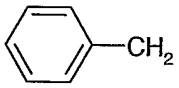
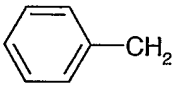
(I-C)

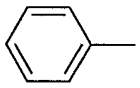
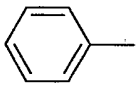
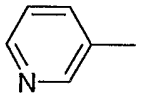
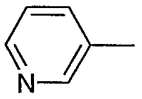
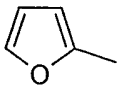
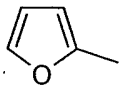
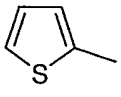
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.1	I	Me	H	H	H	H	
C.3.2	Cl	Me	H	H	H	H	
C.3.3	I	Me	Cl	Cl	H	H	
C.3.4	Cl	Me	Cl	Cl	H	H	
C.3.5	I	Me	Br	Br	H	H	

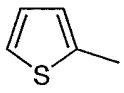
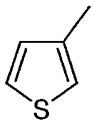
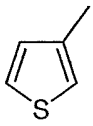
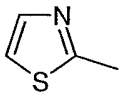
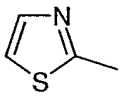
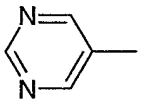
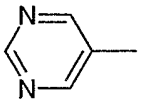
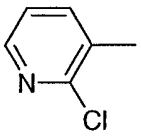
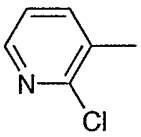
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.6	Cl	Me	Br	Br	H	H	
C.3.7	I	Me	H	Br	H	H	(*E*)
C.3.8	I	Me	H	Br	H	H	(*Z*)
C.3.9	I	Me	H	Br	H	H	(*E*) and (*Z*)
C.3.10	Cl	Me	H	Br	H	H	(*E*)
C.3.11	Cl	Me	H	Br	H	H	(*Z*)
C.3.12	Cl	Me	H	Br	H	H	(*E*) and (*Z*)
C.3.13	I	Me	H	Cl	H	H	(*E*)
C.3.14	I	Me	H	Cl	H	H	(*Z*)
C.3.15	I	Me	H	Cl	H	H	(*E*) and (*Z*)
C.3.16	Cl	Me	H	Cl	H	H	(*E*)
C.3.17	Cl	Me	H	Cl	H	H	(*Z*)
C.3.18	Cl	Me	H	Cl	H	H	(*E*) and (*Z*)
C.3.19	I	H	H	H	H	Et	(*E*)
C.3.20	I	H	H	H	H	Et	(*Z*)
C.3.21	I	H	H	H	H	Et	(*E*) and (*Z*)
C.3.22	Cl	H	H	H	H	Et	(*E*)
C.3.23	Cl	H	H	H	H	Et	(*Z*)
C.3.24	Cl	H	H	H	H	Et	(*E*) and (*Z*)
C.3.25	I	H	Cl	Cl	H	Et	(*E*)
C.3.26	I	H	Cl	Cl	H	Et	(*Z*)
C.3.27	I	H	Cl	Cl	H	Et	(*E*) and (*Z*)
C.3.28	Cl	H	Cl	Cl	H	Et	(*E*)
C.3.29	Cl	H	Cl	Cl	H	Et	(*Z*)
C.3.30	Cl	H	Cl	Cl	H	Et	(*E*) and (*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.31	I	H	Br	Br	H	Et	(*E*)
C.3.32	I	H	Br	Br	H	Et	(*Z*)
C.3.33	I	H	Br	Br	H	Et	(*E*) and (*Z*)
C.3.34	Cl	H	Br	Br	H	Et	(*E*)
C.3.35	Cl	H	Br	Br	H	Et	(*Z*)
C.3.36	Cl	H	Br	Br	H	Et	(*E*) and (*Z*)
C.3.37	I	H	H	Br	H	Et	
C.3.38	Cl	H	H	Br	H	Et	
C.3.39	I	H	H	Cl	H	Et	
C.3.40	Cl	H	H	Cl	H	Et	
C.3.41	I	H	F	F	H	Et	(*E*)
C.3.42	I	H	F	F	H	Et	(*Z*)
C.3.43	I	H	F	F	H	Et	(*E*) and (*Z*)
C.3.44	Cl	H	F	F	H	Et	(*E*)
C.3.45	Cl	H	F	F	H	Et	(*Z*)
C.3.46	Cl	H	F	F	H	Et	(*E*) and (*Z*)
C.3.47	I	H	H	H	Me	Me	
C.3.48	Cl	H	H	H	H	Me	(*E*) and (*Z*)
C.3.49	I	Et	H	H	Me	Me	
C.3.50	Cl	Et	H	H	Me	Me	
C.3.51	I	Me	H	H	H	CH_2CN	(*E*)
C.3.52	I	Me	H	H	H	CH_2CN	(*Z*)
C.3.53	I	Me	H	H	H	CH_2CN	(*E*) and (*Z*)
C.3.54	Cl	Me	H	H	H	CH_2CN	(*E*)
C.3.55	Cl	Me	H	H	H	CH_2CN	(*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.56	Cl	Me	H	H	H	CH_2CN	(*E*) and (*Z*)
C.3.57	I	Me	H	H	H	CH_2Cl	(*E*)
C.3.58	I	Me	H	H	H	CH_2Cl	(*Z*)
C.3.59	I	Me	H	H	H	CH_2Cl	(*E*) and (*Z*)
C.3.60	Cl	Me	H	H	H	CH_2Cl	(*E*)
C.3.61	Cl	Me	H	H	H	CH_2Cl	(*Z*)
C.3.62	Cl	Me	H	H	H	CH_2Cl	(*E*) and (*Z*)
C.3.63	I	Me	H	H	H	CH_2Br	(*E*)
C.3.64	I	Me	H	H	H	CH_2Br	(*Z*)
C.3.65	I	Me	H	H	H	CH_2Br	(*E*) and (*Z*)
C.3.66	Cl	Me	H	H	H	CH_2Br	(*E*)
C.3.67	Cl	Me	H	H	H	CH_2Br	(*Z*)
C.3.68	Cl	Me	H	H	H	CH_2Br	(*E*) and (*Z*)
C.3.69	I	Me	H	H	H	CH_2NO_2	(*E*)
C.3.70	I	Me	H	H	H	CH_2NO_2	(*Z*)
C.3.71	I	Me	H	H	H	CH_2NO_2	(*E*) and (*Z*)
C.3.72	Cl	Me	H	H	H	CH_2NO_2	(*E*)
C.3.73	Cl	Me	H	H	H	CH_2NO_2	(*Z*)
C.3.74	Cl	Me	H	H	H	CH_2NO_2	(*E*) and (*Z*)
C.3.75	I	Me	H	H	H	CN	(*E*)
C.3.76	I	Me	H	H	H	CN	(*Z*)
C.3.77	I	Me	H	H	H	CN	(*E*) and (*Z*)
C.3.78	Cl	Me	H	H	H	CN	(*E*)
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C.3.80	Cl	Me	H	H	H	CN	(*E*) and (*Z*)

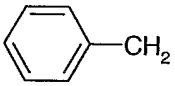
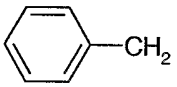
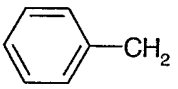
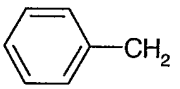
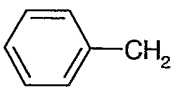
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.81	I	n-Pr	H	H	H	H	
C.3.82	Cl	n-Pr	H	H	H	H	
C.3.83	I	n-Bu	H	H	H	H	
C.3.84	Cl	n-Bu	H	H	H	H	
C.3.85	I	i-Pr	H	H	H	H	
C.3.86	Cl	i-Pr	H	H	H	H	
C.3.87	I	i-Bu	H	H	H	H	
C.3.88	Cl	i-Bu	H	H	H	H	
C.3.89	I	s-Bu	H	H	H	H	
C.3.90	Cl	s-Bu	H	H	H	H	
C.3.91	I	t-Bu	H	H	H	H	
C.3.92	Cl	t-Bu	H	H	H	H	
C.3.93	I		H	H	H	H	
C.3.94	Cl		H	H	H	H	
C.3.95	I		H	H	H	H	
C.3.96	Cl		H	H	H	H	
C.3.97	I		H	H	H	H	
C.3.98	Cl		H	H	H	H	
C.3.99	I	CH_2=CH	H	H	H	H	
C.3.100	Cl	CH_2=CH	H	H	H	H	

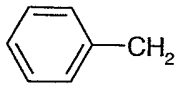
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.101	I	$HC\equiv C$	H	H	H	H	
C.3.102	Cl	$HC\equiv C$	H	H	H	H	
C.3.103	I	$CCl_2=CH$	H	H	H	H	
C.3.104	Cl	$CCl_2=CH$	H	H	H	H	
C.3.105	I	$CH_2=CH-CH_2$	H	H	H	H	
C.3.106	Cl	$CH_2=CH-CH_2$	H	H	H	H	
C.3.107	I	$CH_2=C-CH_3$	H	H	H	H	
C.3.108	Cl	$CH_2=C-CH_3$	H	H	H	H	
C.3.109	I	$HC\equiv C-CH_2$	H	H	H	H	
C.3.110	Cl	$HC\equiv C-CH_2$	H	H	H	H	
C.3.111	I		H	H	H	H	
C.3.112	Cl		H	H	H	H	
C.3.113	I		H	H	H	H	
C.3.114	Cl		H	H	H	H	
C.3.115	I		H	H	H	H	
C.3.116	Cl		H	H	H	H	
C.3.117	I		H	H	H	H	

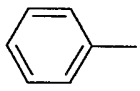
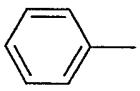
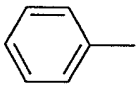
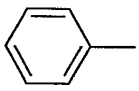
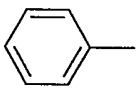
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.118	Cl		H	H	H	H	
C.3.119	I		H	H	H	H	
C.3.120	Cl		H	H	H	H	
C.3.121	I		H	H	H	H	
C.3.122	Cl		H	H	H	H	
C.3.123	I		H	H	H	H	
C.3.124	Cl		H	H	H	H	
C.3.125	I		H	H	H	H	
C.3.126	Cl		H	H	H	H	
C.3.127	I	CH_2CN	H	H	H	H	
C.3.128	Cl	CH_2CN	H	H	H	H	
C.3.129	I	CH_2Cl	H	H	H	H	
C.3.130	Cl	CH_2Cl	H	H	H	H	

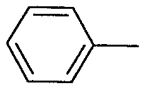
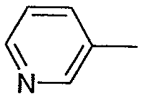
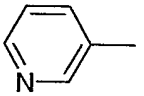
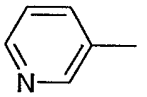
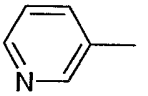
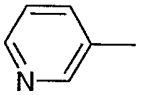
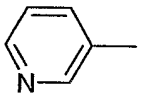
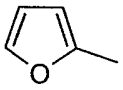
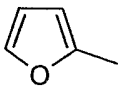
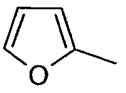
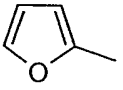
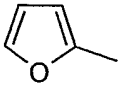
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.131	I	CH_2Br	H	H	H	H	
C.3.132	Cl	CH_2Br	H	H	H	H	
C.3.133	I	CH_2NO_2	H	H	H	H	
C.3.134	Cl	CH_2NO_2	H	H	H	H	
C.3.135	I	CN	H	H	H	H	
C.3.136	Cl	CN	H	H	H	H	
C.3.137	I	H	H	H	H	n-Pr	(*E*)
C.3.138	I	H	H	H	H	n-Pr	(*Z*)
C.3.139	I	H	H	H	H	n-Pr	(*E*) and (*Z*)
C.3.140	Cl	H	H	H	H	n-Pr	(*E*)
C.3.141	Cl	H	H	H	H	n-Pr	(*Z*)
C.3.142	Cl	H	H	H	H	n-Pr	(*E*) and (*Z*)
C.3.143	I	H	H	H	H	n-Bu	(*E*)
C.3.144	I	H	H	H	H	n-Bu	(*Z*)
C.3.145	I	H	H	H	H	n-Bu	(*E*) and (*Z*)
C.3.146	Cl	H	H	H	H	n-Bu	(*E*)
C.3.147	Cl	H	H	H	H	n-Bu	(*Z*)
C.3.148	Cl	H	H	H	H	n-Bu	(*E*) and (*Z*)
C.3.149	I	H	H	H	H	i-Pr	(*E*)
C.3.150	I	H	H	H	H	i-Pr	(*Z*)
C.3.151	I	H	H	H	H	i-Pr	(*E*) and (*Z*)
C.3.152	Cl	H	H	H	H	i-Pr	(*E*)
C.3.153	Cl	H	H	H	H	i-Pr	(*Z*)
C.3.154	Cl	H	H	H	H	i-Pr	(*E*) and (*Z*)
C.3.155	I	H	H	H	H	i-Bu	(*E*)

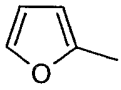
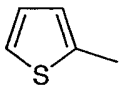
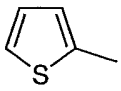
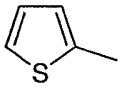
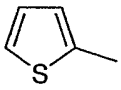
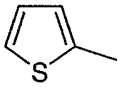
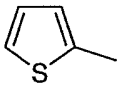
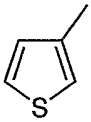
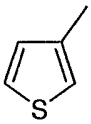
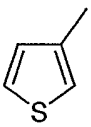
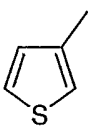
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.156	I	H	H	H	H	i-Bu	(*Z*)
C.3.157	I	H	H	H	H	i-Bu	(*E*) and (*Z*)
C.3.158	Cl	H	H	H	H	i-Bu	(*E*)
C.3.159	Cl	H	H	H	H	i-Bu	(*Z*)
C.3.160	Cl	H	H	H	H	i-Bu	(*E*) and (*Z*)
C.3.161	I	H	H	H	H	s-Bu	(*E*)
C.3.162	I	H	H	H	H	s-Bu	(*Z*)
C.3.163	I	H	H	H	H	s-Bu	(*E*) and (*Z*)
C.3.164	Cl	H	H	H	H	s-Bu	(*E*)
C.3.165	Cl	H	H	H	H	s-Bu	(*Z*)
C.3.166	Cl	H	H	H	H	s-Bu	(*E*) and (*Z*)
C.3.167	I	H	H	H	H	t-Bu	(*E*)
C.3.168	I	H	H	H	H	t-Bu	(*Z*)
C.3.169	I	H	H	H	H	t-Bu	(*E*) and (*Z*)
C.3.170	Cl	H	H	H	H	t-Bu	(*E*)
C.3.171	Cl	H	H	H	H	t-Bu	(*Z*)
C.3.172	Cl	H	H	H	H	t-Bu	(*E*) and (*Z*)
C.3.173	I	H	H	H	H		(*E*)
C.3.174	I	H	H	H	H		(*Z*)
C.3.175	I	H	H	H	H		(*E*) and (*Z*)
C.3.176	Cl	H	H	H	H		(*E*)
C.3.177	Cl	H	H	H	H		(*Z*)

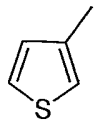
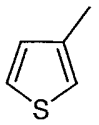
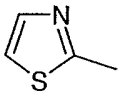
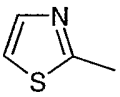
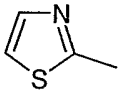
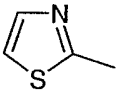
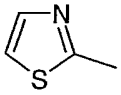
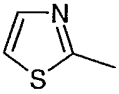
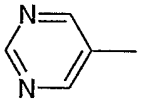
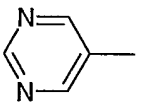
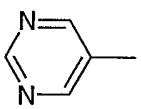
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.178	Cl	H	H	H	H		(*E*) and (*Z*)
C.3.179	I	H	H	H	H		(*E*)
C.3.180	I	H	H	H	H		(*Z*)
C.3.181	I	H	H	H	H		(*E*) and (*Z*)
C.3.182	Cl	H	H	H	H		(*E*)
C.3.183	Cl	H	H	H	H		(*Z*)
C.3.184	Cl	H	H	H	H		(*E*) and (*Z*)
C.3.185	I	H	H	H	H		(*E*)
C.3.186	I	H	H	H	H		(*Z*)
C.3.187	I	H	H	H	H		(*E*) and (*Z*)
C.3.188	Cl	H	H	H	H		(*E*)
C.3.189	Cl	H	H	H	H		(*Z*)

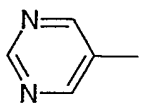
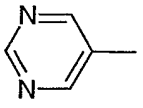
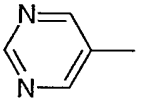
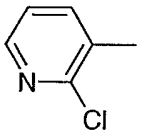
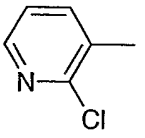
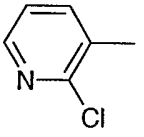
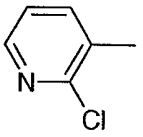
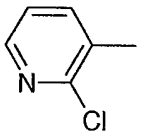
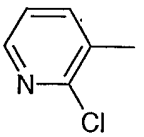
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.190	Cl	H	H	H	H		(*E*) and (*Z*)
C.3.191	I	H	H	H	H	CH_2=CH	(*E*)
C.3.192	I	H	H	H	H	CH_2=CH	(*Z*)
C.3.193	I	H	H	H	H	CH_2=CH	(*E*) and (*Z*)
C.3.194	Cl	H	H	H	H	CH_2=CH	(*E*)
C.3.195	Cl	H	H	H	H	CH_2=CH	(*Z*)
C.3.196	Cl	H	H	H	H	CH_2=CH	(*E*) and (*Z*)
C.3.197	I	H	H	H	H	HC≡C	(*E*)
C.3.198	I	H	H	H	H	HC≡C	(*Z*)
C.3.199	I	H	H	H	H	HC≡C	(*E*) and (*Z*)
C.3.200	Cl	H	H	H	H	HC≡C	(*E*)
C.3.201	Cl	H	H	H	H	HC≡C	(*Z*)
C.3.202	Cl	H	H	H	H	HC≡C	(*E*) and (*Z*)
C.3.203	I	H	H	H	H	CCl_2=CH	(*E*)
C.3.204	I	H	H	H	H	CCl_2=CH	(*Z*)
C.3.205	I	H	H	H	H	CCl_2=CH	(*E*) and (*Z*)
C.3.206	Cl	H	H	H	H	CCl_2=CH	(*E*)
C.3.207	Cl	H	H	H	H	CCl_2=CH	(*Z*)
C.3.208	Cl	H	H	H	H	CCl_2=CH	(*E*) and (*Z*)
C.3.209	I	H	H	H	H	CH_2=CH-CH_2	(*E*)
C.3.210	I	H	H	H	H	CH_2=CH-CH_2	(*Z*)
C.3.211	I	H	H	H	H	CH_2=CH-CH_2	(*E*) and (*Z*)
C.3.212	Cl	H	H	H	H	CH_2=CH-CH_2	(*E*)
C.3.213	Cl	H	H	H	H	CH_2=CH-CH_2	(*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.214	Cl	H	H	H	H	CH_2=CH-CH_2	(*E*) and (*Z*)
C.3.215	I	H	H	H	H	CH_2=C-CH_3	(*E*)
C.3.216	I	H	H	H	H	CH_2=C-CH_3	(*Z*)
C.3.217	I	H	H	H	H	CH_2=C-CH_3	(*E*) and (*Z*)
C.3.218	Cl	H	H	H	H	CH_2=C-CH_3	(*E*)
C.3.219	Cl	H	H	H	H	CH_2=C-CH_3	(*Z*)
C.3.220	Cl	H	H	H	H	CH_2=C-CH_3	(*E*) and (*Z*)
C.3.221	I	H	H	H	H	HC≡C—CH_2	(*E*)
C.3.222	I	H	H	H	H	HC≡C—CH_2	(*Z*)
C.3.223	I	H	H	H	H	HC≡C—CH_2	(*E*) and (*Z*)
C.3.224	Cl	H	H	H	H	HC≡C—CH_2	(*E*)
C.3.225	Cl	H	H	H	H	HC≡C—CH_2	(*Z*)
C.3.226	Cl	H	H	H	H	HC≡C—CH_2	(*E*) and (*Z*)
C.3.227	I	H	H	H	H		(*E*)
C.3.228	I	H	H	H	H		(*Z*)
C.3.229	I	H	H	H	H		(*E*) and (*Z*)
C.3.230	Cl	H	H	H	H		(*E*)
C.3.231	Cl	H	H	H	H		(*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.232	Cl	H	H	H	H		(*E*) and (*Z*)
C.3.233	I	H	H	H	H		(*E*)
C.3.234	I	H	H	H	H		(*Z*)
C.3.235	I	H	H	H	H		(*E*) and (*Z*)
C.3.236	Cl	H	H	H	H		(*E*)
C.3.237	Cl	H	H	H	H		(*Z*)
C.3.238	Cl	H	H	H	H		(*E*) and (*Z*)
C.3.239	I	H	H	H	H		(*E*)
C.3.240	I	H	H	H	H		(*Z*)
C.3.241	I	H	H	H	H		(*E*) and (*Z*)
C.3.242	Cl	H	H	H	H		(*E*)
C.3.243	Cl	H	H	H	H		(*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.244	Cl	H	H	H	H		(*E*) and (*Z*)
C.3.245	I	H	H	H	H		(*E*)
C.3.246	I	H	H	H	H		(*Z*)
C.3.247	I	H	H	H	H		(*E*) and (*Z*)
C.3.248	Cl	H	H	H	H		(*E*)
C.3.249	Cl	H	H	H	H		(*Z*)
C.3.250	Cl	H	H	H	H		(*E*) and (*Z*)
C.3.251	I	H	H	H	H		(*E*)
C.3.252	I	H	H	H	H		(*Z*)
C.3.253	I	H	H	H	H		(*E*) and (*Z*)
C.3.254	Cl	H	H	H	H		(*E*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.255	Cl	H	H	H	H		(*Z*)
C.3.256	Cl	H	H	H	H		(*E*) and (*Z*)
C.3.257	I	H	H	H	H		(*E*)
C.3.258	I	H	H	H	H		(*Z*)
C.3.259	I	H	H	H	H		(*E*) and (*Z*)
C.3.260	Cl	H	H	H	H		(*E*)
C.3.261	Cl	H	H	H	H		(*Z*)
C.3.262	Cl	H	H	H	H		(*E*) and (*Z*)
C.3.263	I	H	H	H	H		(*E*)
C.3.264	I	H	H	H	H		(*Z*)
C.3.265	I	H	H	H	H		(*E*) and (*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.266	Cl	H	H	H	H		(*E*)
C.3.267	Cl	H	H	H	H		(*Z*)
C.3.268	Cl	H	H	H	H		(*E*) and (*Z*)
C.3.269	I	H	H	H	H		(*E*)
C.3.270	I	H	H	H	H		(*Z*)
C.3.271	I	H	H	H	H		(*E*) and (*Z*)
C.3.272	Cl	H	H	H	H		(*E*)
C.3.273	Cl	H	H	H	H		(*Z*)
C.3.274	Cl	H	H	H	H		(*E*) and (*Z*)
C.3.275	I	H	H	H	H	CH_2CN	(*E*)
C.3.276	I	H	H	H	H	CH_2CN	(*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.277	I	H	H	H	H	CH_2CN	(*E*) and (*Z*)
C.3.278	Cl	H	H	H	H	CH_2CN	(*E*)
C.3.279	Cl	H	H	H	H	CH_2CN	(*Z*)
C.3.280	Cl	H	H	H	H	CH_2CN	(*E*) and (*Z*)
C.3.281	I	H	H	H	H	CH_2Cl	(*E*)
C.3.282	I	H	H	H	H	CH_2Cl	(*Z*)
C.3.283	I	H	H	H	H	CH_2Cl	(*E*) and (*Z*)
C.3.284	Cl	H	H	H	H	CH_2Cl	(*E*)
C.3.285	Cl	H	H	H	H	CH_2Cl	(*Z*)
C.3.286	Cl	H	H	H	H	CH_2Cl	(*E*) and (*Z*)
C.3.287	I	H	H	H	H	CH_2Br	(*E*)
C.3.288	I	H	H	H	H	CH_2Br	(*Z*)
C.3.289	I	H	H	H	H	CH_2Br	(*E*) and (*Z*)
C.3.290	Cl	H	H	H	H	CH_2Br	(*E*)
C.3.291	Cl	H	H	H	H	CH_2Br	(*Z*)
C.3.292	Cl	H	H	H	H	CH_2Br	(*E*) and (*Z*)
C.3.293	I	H	H	H	H	CH_2NO_2	(*E*)
C.3.294	I	H	H	H	H	CH_2NO_2	(*Z*)
C.3.295	I	H	H	H	H	CH_2NO_2	(*E*) and (*Z*)
C.3.296	Cl	H	H	H	H	CH_2NO_2	(*E*)
C.3.297	Cl	H	H	H	H	CH_2NO_2	(*Z*)
C.3.298	Cl	H	H	H	H	CH_2NO_2	(*E*) and (*Z*)
C.3.299	I	H	H	H	H	CN	(*E*)
C.3.300	I	H	H	H	H	CN	(*Z*)
C.3.301	I	H	H	H	H	CN	(*E*) and (*Z*)

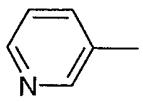
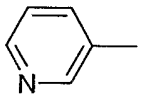
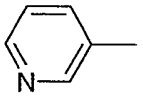
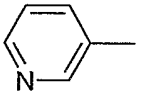
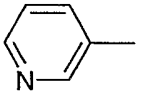
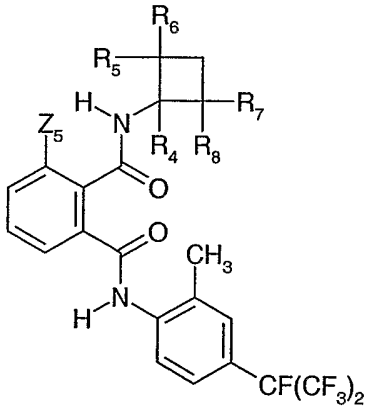
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
C.3.302	Cl	H	H	H	H	CN	(*E*)
C.3.303	Cl	H	H	H	H	CN	(*Z*)
C.3.304	Cl	H	H	H	H	CN	(*E*) and (*Z*)
C.3.305	NO_2		H	H	H	H	
C.3.306	SCH_3		H	H	H	H	
C.3.307	$S(=O)_2CH_3$		H	H	H	H	
C.3.308	SCF_3		H	H	H	H	
C.3.309	$S(=O)CH_3$		H	H	H	H	

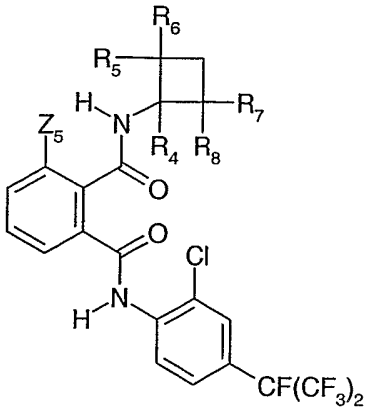
Table 7: This table discloses the 309 compounds T7.3.1 to T7.3.309 of the formula



(T7),

in which, for each of these 309 specific compounds, each of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 309 lines C.3.1 to C.3.309, of the Table C.

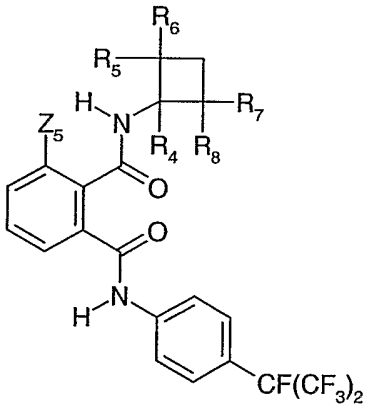
Table 8: This table discloses the 309 compounds T8.3.1 to T8.3.309 of the formula



(T8),

in which, for each of these 309 specific compounds, each of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 309 lines C.3.1 to C.3.309, of the Table C.

Table 9: This table discloses the 309 compounds T9.3.1 to T9.3.309 of the formula

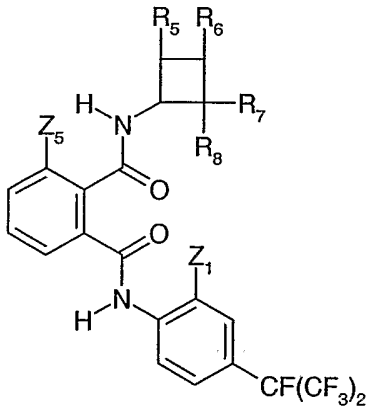


(T9),

in which, for each of these 309 specific compounds, each of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 309 lines C.3.1 to C.3.309, of the Table C.

The Table D discloses 24 meanings of the variables Z_5, R_5, R_6, R_7 and R_8 in a compound of the formula I-D.

Table D

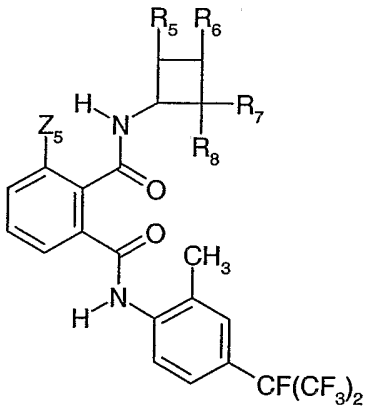


(I-D)

Line	Z_5	R_5 and R_6 taken together	R_7	R_8	Isomer(s)
D.4.1	I	CH_2-CH=CH	Me	Me	Endo
D.4.2	I	CH_2-CH=CH	Me	Me	Exo
D.4.3	I	CH_2-CH=CH	Me	Me	Endo and Exo
D.4.4	Cl	CH_2-CH=CH	Me	Me	Endo
D.4.5	Cl	CH_2-CH=CH	Me	Me	Exo
D.4.6	Cl	CH_2-CH=CH	Me	Me	Endo and Exo
D.4.7	I	CH=CH-CH_2	Me	Me	Endo
D.4.8	I	CH=CH-CH_2	Me	Me	Exo
D.4.9	I	CH=CH-CH_2	Me	Me	Endo and Exo
D.4.10	Cl	CH=CH-CH_2	Me	Me	Endo
D.4.11	Cl	CH=CH-CH_2	Me	Me	Exo
D.4.12	Cl	CH=CH-CH_2	Me	Me	Endo and Exo
D.4.13	I	CH_2	H	H	Endo
D.4.14	I	CH_2	H	H	Exo
D.4.15	I	CH_2	H	H	Endo and Exo
D.4.16	Cl	CH_2	H	H	Endo
D.4.17	Cl	CH_2	H	H	Exo
D.4.18	Cl	CH_2	H	H	Endo and Exo

Line	Z_5	R_5 and R_6 taken together	R_7	R_8	Isomer(s)
D.4.19	I	CH_2-CH_2	H	H	Endo
D.4.20	I	CH_2-CH_2	H	H	Exo
D.4.21	I	CH_2-CH_2	H	H	Endo and Exo
D.4.22	Cl	CH_2-CH_2	H	H	Endo
D.4.23	Cl	CH_2-CH_2	H	H	Exo
D.4.24	Cl	CH_2-CH_2	H	H	Endo and Exo

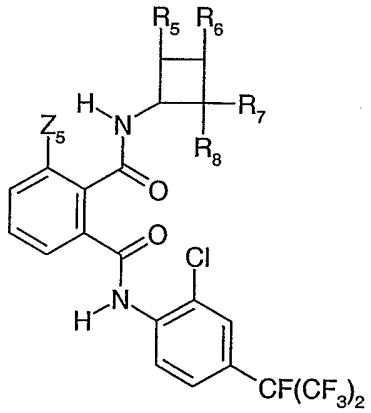
Table 10: This table discloses the 24 compounds T10.4.1 to T10.4.24 of the formula



(T10),

in which, for each of these 24 specific compounds, each of the variables Z_5, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 24 lines D.4.1 to D.4.24, of the Table D.

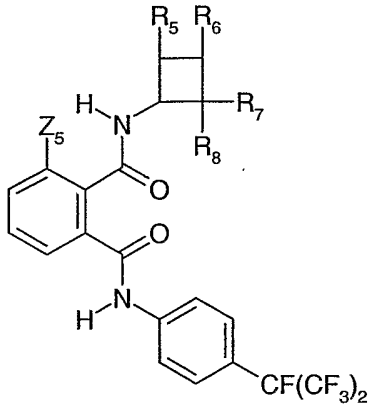
Table 11: This table discloses the 24 compounds T11.4.1 to T11.4.24 of the formula



(T11),

in which, for each of these 24 specific compounds, each of the variables Z_5, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 24 lines D.4.1 to D.4.24, of the Table D.

Table 12: This table discloses the 24 compounds T12.4.1 to T12.4.24 of the formula

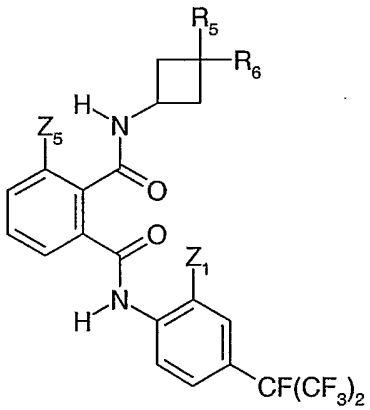


(T12),

in which, for each of these 24 specific compounds, each of the variables Z_5, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 24 lines D.4.1 to D.4.24, of the Table D.

The Table E discloses 8 meanings of the variables Z_5, R_5 and R_6 in a compound of the formula I-E.

Table E

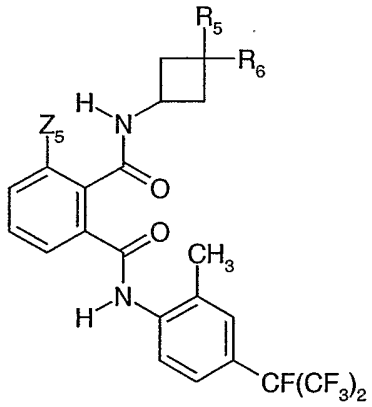


(I-E)

Line	Z_5	R_5	R_6	Isomer(s)
E.5.1	I	Me	Me	

Line	Z_5	R_5	R_6	Isomer(s)
E.5.2	Cl	Me	Me	
E.5.3	I	Me	H	(*E*)
E.5.4	I	Me	H	(*Z*)
E.5.5	I	Me	H	(*E*) and (*Z*)
E.5.6	Cl	Me	H	(*E*)
E.5.7	Cl	Me	H	(*Z*)
E.5.8	Cl	Me	H	(*E*) and (*Z*)

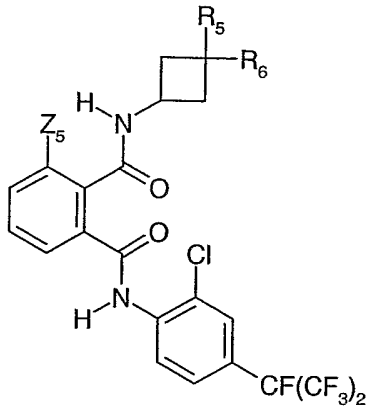
Table 13: This table discloses the 8 compounds T13.5.1 to T13.5.8 of the formula



(T13),

in which, for each of these 8 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 8 lines E.5.1 to E.5.8, of the Table E.

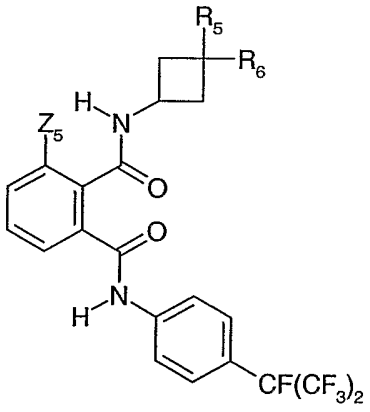
Table 14: This table discloses the 8 compounds T14.5.1 to T14.5.8 of the formula



(T14),

in which, for each of these 8 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 8 lines E.5.1 to E.5.8, of the Table E.

Table 15: This table discloses the 8 compounds T15.5.1 to T15.5.8 of the formula

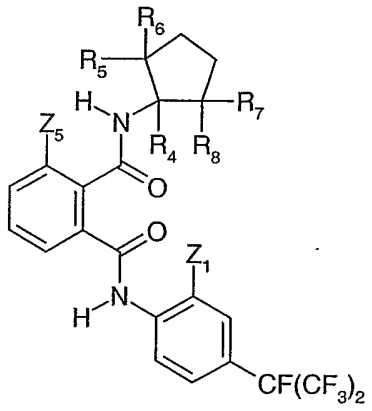


(T15),

in which, for each of these 8 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 8 lines E.5.1 to E.5.8, of the Table E.

The Table F discloses 114 meanings of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 in a compound of the formula I-F.

Table F

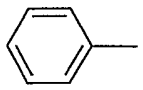
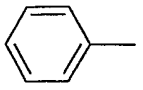
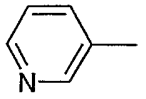
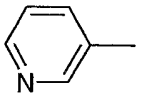
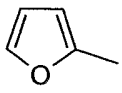
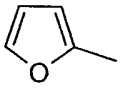
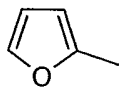
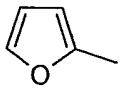


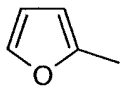
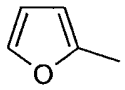
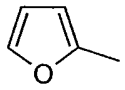
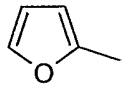
(I-F)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
F.6.1	I	Me	H	H	H	H	
F.6.2	Cl	Me	H	H	H	H	
F.6.3	I	Me	Cl	H	H	H	(*E*)
F.6.4	I	Me	Cl	H	H	H	(*Z*)
F.6.5	I	Me	Cl	H	H	H	(*E*) and (*Z*)
F.6.6	Cl	Me	Cl	H	H	H	(*E*)
F.6.7	Cl	Me	Cl	H	H	H	(*Z*)
F.6.8	Cl	Me	Cl	H	H	H	(*E*) and (*Z*)
F.6.9	I	H	H	H	H	Et	(*E*)
F.6.10	I	H	H	H	H	Et	(*Z*)
F.6.11	I	H	H	H	H	Et	(*E*) and (*Z*)
F.6.12	Cl	H	H	H	H	Et	(*E*)
F.6.13	Cl	H	H	H	H	Et	(*Z*)
F.6.14	Cl	H	H	H	H	Et	(*E*) and (*Z*)
F.6.15	I	H	Cl	Cl	H	Et	(*E*)
F.6.16	I	H	Cl	Cl	H	Et	(*Z*)
F.6.17	I	H	Cl	Cl	H	Et	(*E*) and (*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
F.6.18	Cl	H	Cl	Cl	H	Et	(*E*)
F.6.19	Cl	H	Cl	Cl	H	Et	(*Z*)
F.6.20	Cl	H	Cl	Cl	H	Et	(*E*) and (*Z*)
F.6.21	I	H	Br	Br	H	Et	(*E*)
F.6.22	I	H	Br	Br	H	Et	(*Z*)
F.6.23	I	H	Br	Br	H	Et	(*E*) and (*Z*)
F.6.24	Cl	H	Br	Br	H	Et	(*E*)
F.6.25	Cl	H	Br	Br	H	Et	(*Z*)
F.6.26	Cl	H	Br	Br	H	Et	(*E*) and (*Z*)
F.6.27	I	H	Br	H	H	Et	
F.6.28	Cl	H	Br	H	H	Et	
F.6.29	I	H	Cl	H	H	Et	
F.6.30	Cl	H	Cl	H	H	Et	
F.6.31	I	H	F	F	H	Et	(*E*)
F.6.32	I	H	F	F	H	Et	(*Z*)
F.6.33	I	H	F	F	H	Et	(*E*) and (*Z*)
F.6.34	Cl	H	F	F	H	Et	(*E*)
F.6.35	Cl	H	F	F	H	Et	(*Z*)
F.6.36	Cl	H	F	F	H	Et	(*E*) and (*Z*)
F.6.37	I	H	H	H	Me	Me	
F.6.38	Cl	H	H	H	Me	Me	
F.6.39	I	Et	H	H	Me	Me	
F.6.40	Cl	Et	H	H	Me	Me	
F.6.41	I	Me	H	H	H	CH_2CN	(*E*)
F.6.42	I	Me	H	H	H	CH_2CN	(*Z*)

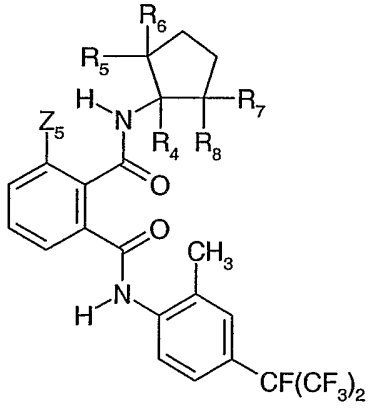
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
F.6.43	I	Me	H	H	H	CH_2CN	(*E*) and (*Z*)
F.6.44	Cl	Me	H	H	H	CH_2CN	(*E*)
F.6.45	Cl	Me	H	H	H	CH_2CN	(*Z*)
F.6.46	Cl	Me	H	H	H	CH_2CN	(*E*) and (*Z*)
F.6.47	I	n-Pr	H	H	H	H	
F.6.48	Cl	n-Pr	H	H	H	H	
F.6.49	I	i-Bu	H	H	H	H	
F.6.50	Cl	i-Bu	H	H	H	H	
F.6.51	I	s-Bu	H	H	H	H	
F.6.52	Cl	s-Bu	H	H	H	H	
F.6.53	I	t-Bu	H	H	H	H	
F.6.54	Cl	t-Bu	H	H	H	H	
F.6.55	I		H	H	H	H	
F.6.56	Cl		H	H	H	H	
F.6.57	I	$CH_2=CH$	H	H	H	H	
F.6.58	Cl	$CH_2=CH$	H	H	H	H	
F.6.59	I	$HC\equiv C$	H	H	H	H	
F.6.60	Cl	$HC\equiv C$	H	H	H	H	
F.6.61	I	$CH_2=CH-CH_2$	H	H	H	H	
F.6.62	Cl	$CH_2=CH-CH_2$	H	H	H	H	
F.6.63	I	$HC\equiv C-CH_2$	H	H	H	H	
F.6.64	Cl	$HC\equiv C-CH_2$	H	H	H	H	

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
F.6.65	I		H	H	H	H	
F.6.66	Cl		H	H	H	H	
F.6.67	I		H	H	H	H	
F.6.68	Cl		H	H	H	H	
F.6.69	I		H	H	H	H	
F.6.70	Cl		H	H	H	H	
F.6.71	I	CN	H	H	H	H	
F.6.72	Cl	CN	H	H	H	H	
F.6.73	I	H	H	H	H	n-Pr	(*E*)
F.6.74	I	H	H	H	H	n-Pr	(*Z*)
F.6.75	I	H	H	H	H	n-Pr	(*E*) and (*Z*)
F.6.76	Cl	H	H	H	H	n-Pr	(*E*)
F.6.77	Cl	H	H	H	H	n-Pr	(*Z*)
F.6.78	Cl	H	H	H	H	n-Pr	(*E*) and (*Z*)
F.6.79	I	H	H	H	H		(*E*)
F.6.80	I	H	H	H	H		(*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
F.6.81	I	H	H	H	H		(*E*) and (*Z*)
F.6.82	Cl	H	H	H	H		(*E*)
F.6.83	Cl	H	H	H	H		(*Z*)
F.6.84	Cl	H	H	H	H		(*E*) and (*Z*)
F.6.85	I	H	H	H	H	CH_2CN	(*E*)
F.6.86	I	H	H	H	H	CH_2CN	(*Z*)
F.6.87	I	H	H	H	H	CH_2CN	(*E*) and (*Z*)
F.6.88	Cl	H	H	H	H	CH_2CN	(*E*)
F.6.89	Cl	H	H	H	H	CH_2CN	(*Z*)
F.6.90	Cl	H	H	H	H	CH_2CN	(*E*) and (*Z*)
F.6.91	I	H	H	H	H	CH_2Cl	(*E*)
F.6.92	I	H	H	H	H	CH_2Cl	(*Z*)
F.6.93	I	H	H	H	H	CH_2Cl	(*E*) and (*Z*)
F.6.94	Cl	H	H	H	H	CH_2Cl	(*E*)
F.6.95	Cl	H	H	H	H	CH_2Cl	(*Z*)
F.6.96	Cl	H	H	H	H	CH_2Cl	(*E*) and (*Z*)
F.6.97	I	H	H	H	H	CH_2Br	(*E*)
F.6.98	I	H	H	H	H	CH_2Br	(*Z*)
F.6.99	I	H	H	H	H	CH_2Br	(*E*) and (*Z*)
F.6.100	Cl	H	H	H	H	CH_2Br	(*E*)
F.6.101	Cl	H	H	H	H	CH_2Br	(*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
F.6.102	Cl	H	H	H	H	CH_2Br	(*E*) and (*Z*)
F.6.103	I	H	H	H	H	CH_2NO_2	(*E*)
F.6.104	I	H	H	H	H	CH_2NO_2	(*Z*)
F.6.105	I	H	H	H	H	CH_2NO_2	(*E*) and (*Z*)
F.6.106	Cl	H	H	H	H	CH_2NO_2	(*E*)
F.6.107	Cl	H	H	H	H	CH_2NO_2	(*Z*)
F.6.108	Cl	H	H	H	H	CH_2NO_2	(*E*) and (*Z*)
F.6.109	I	H	H	H	H	CN	(*E*)
F.6.110	I	H	H	H	H	CN	(*Z*)
F.6.111	I	H	H	H	H	CN	(*E*) and (*Z*)
F.6.112	Cl	H	H	H	H	CN	(*E*)
F.6.113	Cl	H	H	H	H	CN	(*Z*)
F.6.114	Cl	H	H	H	H	CN	(*E*) and (*Z*)

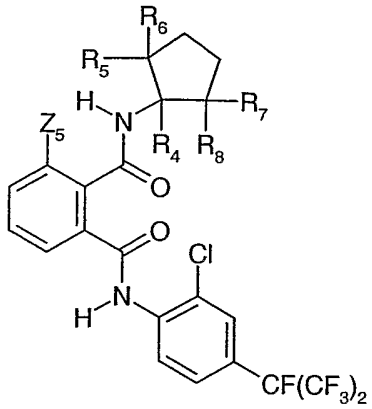
Table 16: This table discloses the 114 compounds T16.6.1 to T16.6.114 of the formula



(T16),

in which, for each of these 114 specific compounds, each of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 114 lines F.6.1 to F.6.114, of the Table F.

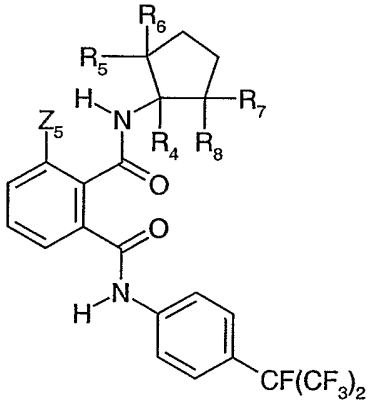
Table 17: This table discloses the 114 compounds T17.6.1 to T17.6.114 of the formula



(T17),

in which, for each of these 114 specific compounds, each of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 114 lines F.6.1 to F.6.114, of the Table F.

Table 18: This table discloses the 114 compounds T18.6.1 to T18.6.114 of the formula

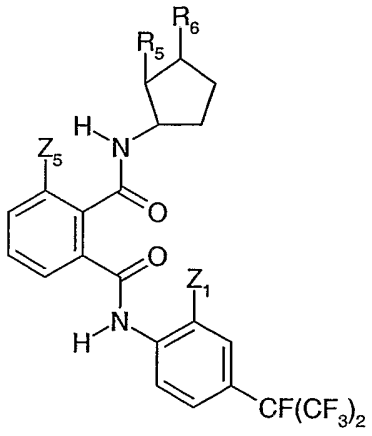


(T18),

in which, for each of these 114 specific compounds, each of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 114 lines F.6.1 to F.6.114, of the Table F.

The Table G discloses 27 meanings of the variables Z_5, R_5 and R_6 in a compound of the formula I-G.

Table G

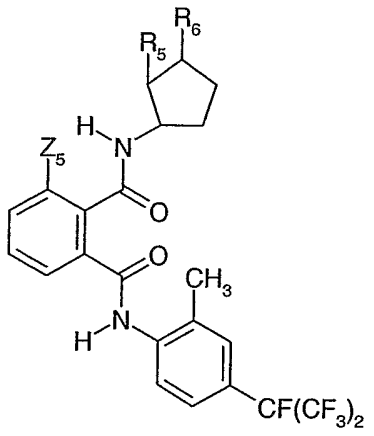


(I-G)

Line	Z_5	R_5 and R_6 taken together	Isomer(s)
G.7.1	I	CH_2	Endo
G.7.2	I	CH_2	Exo
G.7.3	I	CH_2	Endo and Exo
G.7.4	Cl	CH_2	Endo
G.7.5	Cl	CH_2	Exo
G.7.6	Cl	CH_2	Endo and Exo
G.7.7	I	CH_2-CH_2	Endo
G.7.8	I	CH_2-CH_2	Exo
G.7.9	I	CH_2-CH_2	Endo and Exo
G.7.10	Cl	CH_2-CH_2	Endo
G.7.11	Cl	CH_2-CH_2	Exo
G.7.12	Cl	CH_2-CH_2	Endo and Exo
G.7.13	NO_2	CH_2-CH_2	Endo
G.7.14	NO_2	CH_2-CH_2	Exo
G.7.15	NO_2	CH_2-CH_2	Endo and Exo
G.7.16	SCH_3	CH_2-CH_2	Endo
G.7.17	SCH_3	CH_2-CH_2	Exo
G.7.18	SCH_3	CH_2-CH_2	Endo and Exo

Line	Z_5	R_5 and R_6 taken together	Isomer(s)
G.7.19	$S(=O)_2CH_3$	CH_2-CH_2	Endo
G.7.20	$S(=O)_2CH_3$	CH_2-CH_2	Exo
G.7.21	$S(=O)_2CH_3$	CH_2-CH_2	Endo and Exo
G.7.22	SCF_3	CH_2-CH_2	Endo
G.7.23	SCF_3	CH_2-CH_2	Exo
G.7.24	SCF_3	CH_2-CH_2	Endo and Exo
G.7.25	$S(=O)CH_3$	CH_2-CH_2	Endo
G.7.26	$S(=O)CH_3$	CH_2-CH_2	Exo
G.7.27	$S(=O)CH_3$	CH_2-CH_2	Endo and Exo

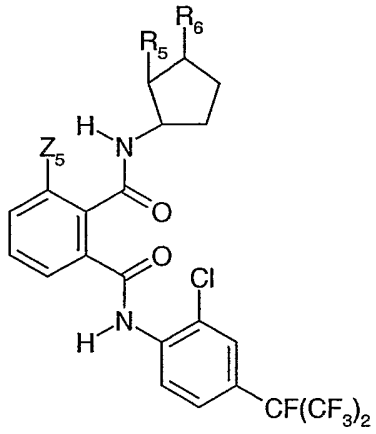
Table 19: This table discloses the 27 compounds T19.7.1 to T19.7.27 of the formula



(T19),

in which, for each of these 27 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 27 lines G.7.1 to G.7.27, of the Table G.

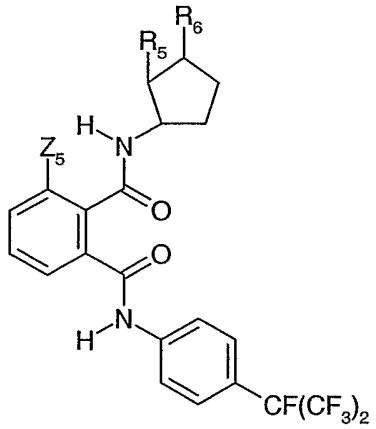
Table 20: This table discloses the 27 compounds T20.7.1 to T20.7.27 of the formula



(T20),

in which, for each of these 27 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 27 lines G.7.1 to G.7.27, of the Table G.

Table 21: This table discloses the 27 compounds T21.7.1 to T21.7.27 of the formula

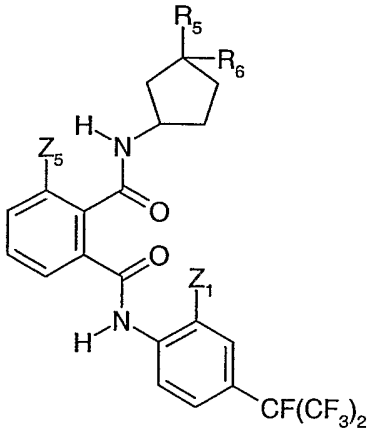


(T21),

in which, for each of these 27 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 27 lines G.7.1 to G.7.27, of the Table G.

The Table H discloses 8 meanings of the variables Z_5, R_5 and R_6 in a compound of the formula I-H.

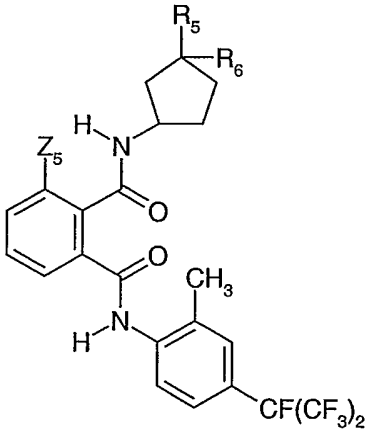
Table H



(I-H)

Line	Z_5	R_5	R_6	Isomer(s)
H.8.1	I	Me	Me	
H.8.2	Cl	Me	Me	
H.8.3	I	Me	H	(*E*)
H.8.4	I	Me	H	(*Z*)
H.8.5	I	Me	H	(*E*) and (*Z*)
H.8.6	Cl	Me	H	(*E*)
H.8.7	Cl	Me	H	(*Z*)
H.8.8	Cl	Me	H	(*E*) and (*Z*)

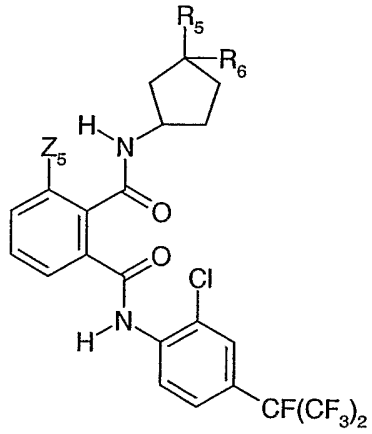
Table 22: This table discloses the 8 compounds T22.8.1 to T22.8.8 of the formula



(T22),

in which, for each of these 8 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 8 lines H.8.1 to H.8.8, of the Table H.

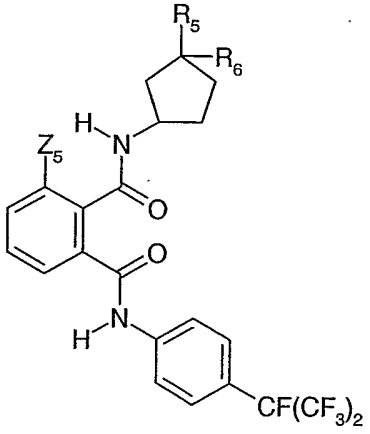
Table 23: This table discloses the 8 compounds T23.8.1 to T23.8.8 of the formula



(T23),

in which, for each of these 8 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 8 lines H.8.1 to H.8.8, of the Table H.

Table 24: This table discloses the 8 compounds T24.8.1 to T24.8.8 of the formula

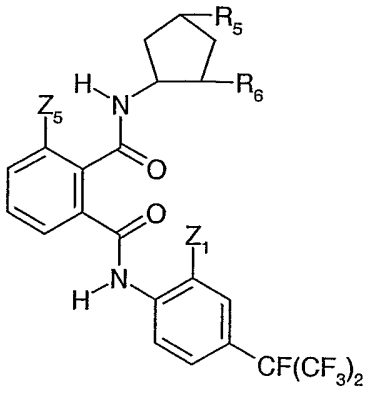


(T24),

in which, for each of these 8 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 8 lines H.8.1 to H.8.8, of the Table H.

The Table I discloses 18 meanings of the variables Z_5, R_5 and R_6 in a compound of the formula I-I.

Table I

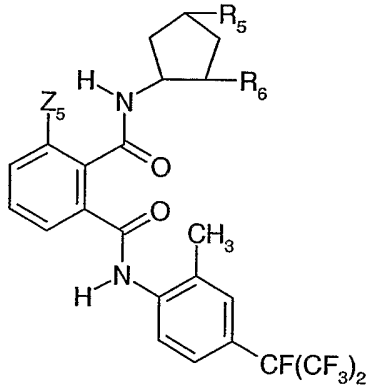


(I-I)

Line	Z_5	R_5 and R_6 taken together	Isomer(s)
I.9.1	I	CH_2-CH_2	Endo
I.9.2	I	CH_2-CH_2	Exo
I.9.3	I	CH_2-CH_2	Endo and Exo
I.9.4	Cl	CH_2-CH_2	Endo
I.9.5	Cl	CH_2-CH_2	Exo
I.9.6	Cl	CH_2-CH_2	Endo and Exo
I.9.7	NO_2	CH_2-CH_2	Endo
I.9.8	NO_2	CH_2-CH_2	Exo
I.9.9	NO_2	CH_2-CH_2	Endo and Exo
I.9.10	I	CH_2	Endo
I.9.11	I	CH_2	Exo
I.9.12	I	CH_2	Endo and Exo
I.9.13	Cl	CH_2	Endo
I.9.14	Cl	CH_2	Exo
I.9.15	Cl	CH_2	Endo and Exo
I.9.16	NO_2	CH_2	Endo
I.9.17	NO_2	CH_2	Exo

Line	Z_5	R_5 and R_6 taken together	Isomer(s)
I.9.18	NO_2	CH_2	Endo and Exo

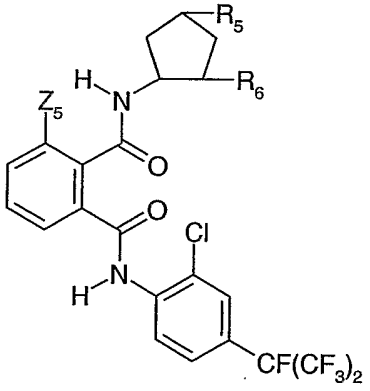
Table 25: This table discloses the 18 compounds T25.9.1 to T25.9.18 of the formula



(T25),

in which, for each of these 18 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 9 lines I.9.1 to I.9.18, of the Table I.

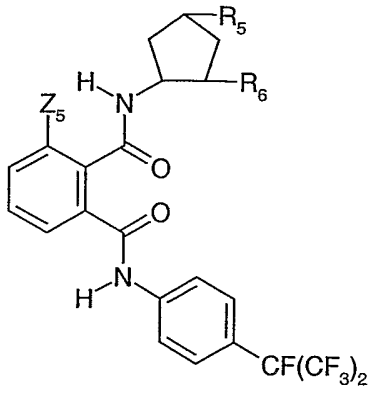
Table 26: This table discloses the 18 compounds T26.9.1 to T26.9.18 of the formula



(T26),

in which, for each of these 18 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 9 lines I.9.1 to I.9.18, of the Table I.

Table 27: This table discloses the 18 compounds T27.9.1 to T27.9.18 of the formula

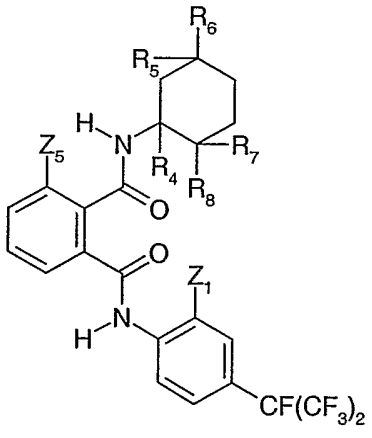


(T27),

in which, for each of these 18 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 18 lines I.9.1 to I.9.18, of the Table I.

The Table J discloses 95 meanings of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 in a compound of the formula I-J.

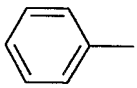
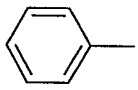
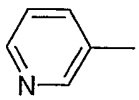
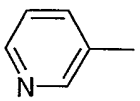
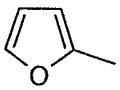
Table J

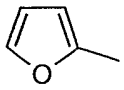
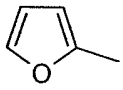
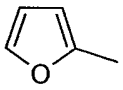
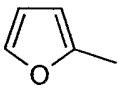
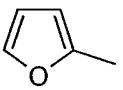
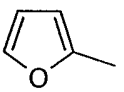
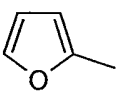


(I-J)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
J.10.1	NO_2	HC≡C	H	H	H	H	
J.10.2	I	Me	H	H	H	H	
J.10.3	Cl	Me	H	H	H	H	
J.10.4	I	Me	H	Br	H	H	(*E*)
J.10.5	I	Me	H	Br	H	H	(*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
J.10.6	I	Me	H	Br	H	H	(*E*) and (*Z*)
J.10.7	Cl	Me	H	Br	H	H	(*E*)
J.10.8	Cl	Me	H	Br	H	H	(*Z*)
J.10.9	Cl	Me	H	Br	H	H	(*E*) and (*Z*)
J.10.10	I	H	H	H	H	Et	(*E*)
J.10.11	I	H	H	H	H	Et	(*Z*)
J.10.12	I	H	H	H	H	Et	(*E*) and (*Z*)
J.10.13	Cl	H	H	H	H	Et	(*E*)
J.10.14	Cl	H	H	H	H	Et	(*Z*)
J.10.15	Cl	H	H	H	H	Et	(*E*) and (*Z*)
J.10.16	I	H	H	H	Me	Me	
J.10.17	Cl	H	H	H	Me	Me	
J.10.18	I	Et	H	H	Me	Me	
J.10.19	Cl	Et	H	H	Me	Me	
J.10.20	I	Me	H	H	H	CH_2CN	(*E*)
J.10.21	I	Me	H	H	H	CH_2CN	(*Z*)
J.10.22	I	Me	H	H	H	CH_2CN	(*E*) and (*Z*)
J.10.23	Cl	Me	H	H	H	CH_2CN	(*E*)
J.10.24	Cl	Me	H	H	H	CH_2CN	(*Z*)
J.10.25	Cl	Me	H	H	H	CH_2CN	(*E*) and (*Z*)
J.10.26	I	n-Pr	H	H	H	H	
J.10.27	Cl	n-Pr	H	H	H	H	
J.10.28	I	i-Bu	H	H	H	H	
J.10.29	Cl	i-Bu	H	H	H	H	
J.10.30	I	s-Bu	H	H	H	H	

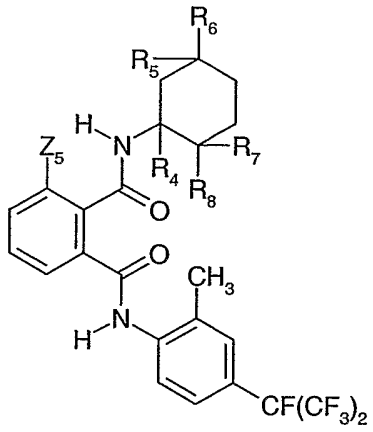
Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
J.10.31	Cl	s-Bu	H	H	H	H	
J.10.32	I	t-Bu	H	H	H	H	
J.10.33	Cl	t-Bu	H	H	H	H	
J.10.34	I		H	H	H	H	
J.10.35	Cl		H	H	H	H	
J.10.36	I	CH_2=CH	H	H	H	H	
J.10.37	Cl	CH_2=CH	H	H	H	H	
J.10.38	I	HC≡C	H	H	H	H	
J.10.39	Cl	HC≡C	H	H	H	H	
J.10.40	I	CH_2=CH-CH_2	H	H	H	H	
J.10.41	Cl	CH_2=CH-CH_2	H	H	H	H	
J.10.42	I	HC≡C—CH_2	H	H	H	H	
J.10.43	Cl	HC≡C—CH_2	H	H	H	H	
J.10.44	I		H	H	H	H	
J.10.45	Cl		H	H	H	H	
J.10.46	I		H	H	H	H	
J.10.47	Cl		H	H	H	H	
J.10.48	I		H	H	H	H	

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
J.10.49	Cl		H	H	H	H	
J.10.50	I	CN	H	H	H	H	
J.10.51	Cl	CN	H	H	H	H	
J.10.52	I	H	H	H	H	n-Pr	(*E*)
J.10.53	I	H	H	H	H	n-Pr	(*Z*)
J.10.54	I	H	H	H	H	n-Pr	(*E*) and (*Z*)
J.10.55	Cl	H	H	H	H	n-Pr	(*E*)
J.10.56	Cl	H	H	H	H	n-Pr	(*Z*)
J.10.57	Cl	H	H	H	H	n-Pr	(*E*) and (*Z*)
J.10.58	I	H	H	H	H		(*E*)
J.10.59	I	H	H	H	H		(*Z*)
J.10.60	I	H	H	H	H		(*E*) and (*Z*)
J.10.61	Cl	H	H	H	H		(*E*)
J.10.62	Cl	H	H	H	H		(*Z*)
J.10.63	Cl	H	H	H	H		(*E*) and (*Z*)
J.10.64	I	H	H	H	H	CH_2CN	(*E*)
J.10.65	I	H	H	H	H	CH_2CN	(*Z*)
J.10.66	I	H	H	H	H	CH_2CN	(*E*) and (*Z*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
J.10.67	Cl	H	H	H	H	CH_2CN	(*E*)
J.10.68	Cl	H	H	H	H	CH_2CN	(*Z*)
J.10.69	Cl	H	H	H	H	CH_2CN	(*E*) and (*Z*)
J.10.70	I	H	H	H	H	CH_2Cl	(*E*)
J.10.71	I	H	H	H	H	CH_2Cl	(*Z*)
J.10.72	I	H	H	H	H	CH_2Cl	(*E*) and (*Z*)
J.10.73	Cl	H	H	H	H	CH_2Cl	(*E*)
J.10.74	Cl	H	H	H	H	CH_2Cl	(*Z*)
J.10.75	Cl	H	H	H	H	CH_2Cl	(*E*) and (*Z*)
J.10.76	I	H	H	H	H	CH_2Br	(*E*)
J.10.77	I	H	H	H	H	CH_2Br	(*Z*)
J.10.78	I	H	H	H	H	CH_2Br	(*E*) and (*Z*)
J.10.79	Cl	H	H	H	H	CH_2Br	(*E*)
J.10.80	Cl	H	H	H	H	CH_2Br	(*Z*)
J.10.81	Cl	H	H	H	H	CH_2Br	(*E*) and (*Z*)
J.10.82	I	H	H	H	H	CH_2NO_2	(*E*)
J.10.83	I	H	H	H	H	CH_2NO_2	(*Z*)
J.10.84	I	H	H	H	H	CH_2NO_2	(*E*) and (*Z*)
J.10.85	Cl	H	H	H	H	CH_2NO_2	(*E*)
J.10.86	Cl	H	H	H	H	CH_2NO_2	(*Z*)
J.10.87	Cl	H	H	H	H	CH_2NO_2	(*E*) and (*Z*)
J.10.88	I	H	H	H	H	CN	(*E*)
J.10.89	I	H	H	H	H	CN	(*Z*)
J.10.90	I	H	H	H	H	CN	(*E*) and (*Z*)
J.10.91	Cl	H	H	H	H	CN	(*E*)

Line	Z_5	R_4	R_5	R_6	R_7	R_8	Isomer(s)
J.10.92	Cl	H	H	H	H	CN	(*Z*)
J.10.93	Cl	H	H	H	H	CN	(*E*) and (*Z*)
J.10.94	I	H	Me	Me	H	H	
J.10.95	Cl	H	Me	Me	H	H	

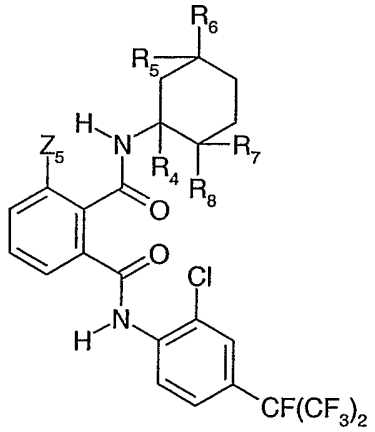
Table 28: This table discloses the 95 compounds T28.10.1 to T28.10.95 of the formula



(T28),

in which, for each of these 95 specific compounds, each of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 95 lines J.10.1 to J.10.95, of the Table J.

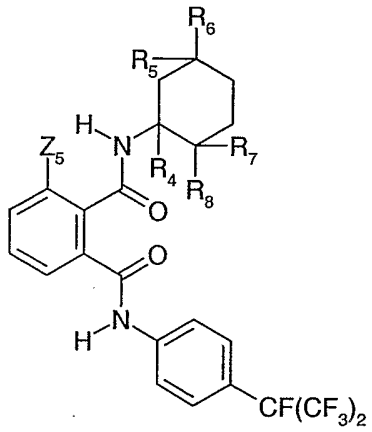
Table 29: This table discloses the 95 compounds T29.10.1 to T29.10.95 of the formula



(T29),

in which, for each of these 95 specific compounds, each of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 95 lines J.10.1 to J.10.95, of the Table J.

Table 30: This table discloses the 95 compounds T30.10.1 to T30.10.95 of the formula

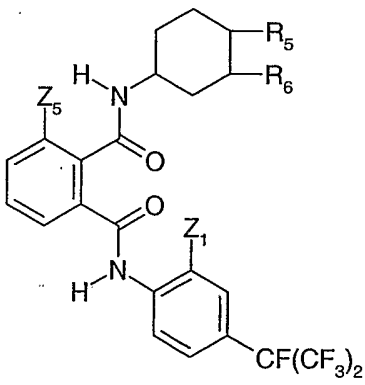


(T30),

in which, for each of these 95 specific compounds, each of the variables Z_5, R_4, R_5, R_6, R_7 and R_8 has the specific meaning given in the corresponding line, appropriately selected from the 95 lines J.10.1 to J.10.95, of the Table J.

The Table K discloses 6 meanings of the variables Z_5, R_5 and R_6 in a compound of the formula I-K.

Table K

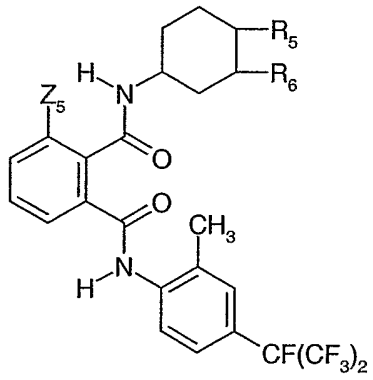


(I-K)

Line	Z_5	R_5 and R_6 taken together	Isomer(s)
K.11.1	I	CH_2	Endo

Line	Z_5	R_5 and R_6 taken together	Isomer(s)
K.11.2	I	CH_2	Exo
K.11.3	I	CH_2	Endo and Exo
K.11.4	Cl	CH_2	Endo
K.11.5	Cl	CH_2	Exo
K.11.6	Cl	CH_2	Endo and Exo

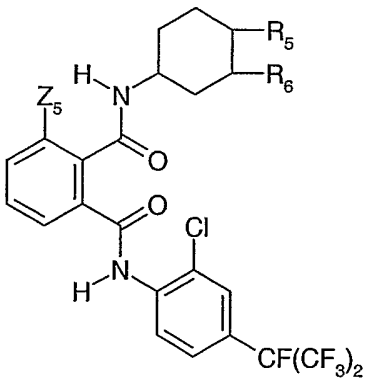
Table 31: This table discloses the 6 compounds T31.11.1 to T31.11.6 of the formula



(T31),

in which, for each of these 6 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 6 lines K.11.1 to K.11.6, of the Table K.

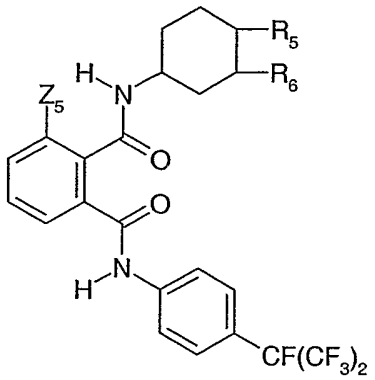
Table 32: This table discloses the 6 compounds T32.11.1 to T32.11.6 of the formula



(T32),

in which, for each of these 6 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 6 lines K.11.1 to K.11.6, of the Table K.

Table 33: This table discloses the 6 compounds T33.11.1 to T33.11.6 of the formula

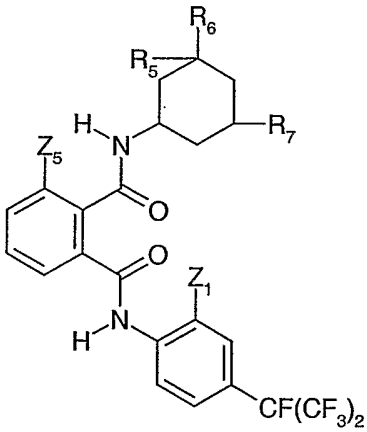


(T33),

in which, for each of these 6 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 6 lines K.11.1 to K.11.6, of the Table K.

The Table L discloses 9 meanings of the variables Z_5, R_5, R_6 and R_7 in a compound of the formula I-L.

Table L

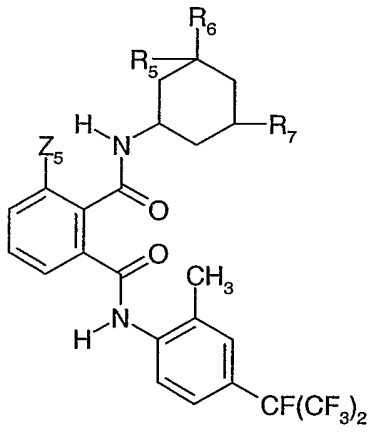


(I-L)

Line	Z_5	R_5	R_6	R_7	Isomer(s)
L.12.1	I	Me	Me	Me	(*E*)

Line	Z_5	R_5	R_6	R_7	Isomer(s)
L.12.2	I	Me	Me	Me	(*Z*)
L.12.3	I	Me	Me	Me	(*E*) and (*Z*)
L.12.4	Cl	Me	Me	Me	(*E*)
L.12.5	Cl	Me	Me	Me	(*Z*)
L.12.6	Cl	Me	Me	Me	(*E*) and (*Z*)
L.12.7	NO_2	Me	Me	Me	(*E*)
L.12.8	NO_2	Me	Me	Me	(*Z*)
L.12.9	NO_2	Me	Me	Me	(*E*) and (*Z*)

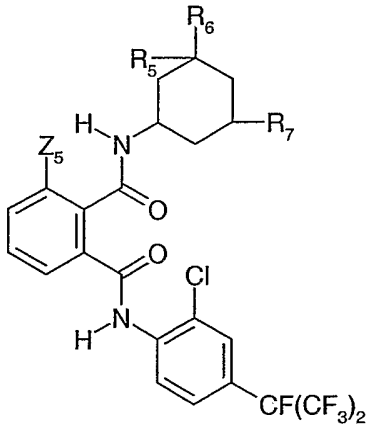
Table 34: This table discloses the 9 compounds T34.12.1 to T34.12.9 of the formula



(T34),

in which, for each of these 9 specific compounds, each of the variables Z_5, R_5, R_6 and R_7 has the specific meaning given in the corresponding line, appropriately selected from the 9 lines L.12.1 to L.12.9, of the Table L.

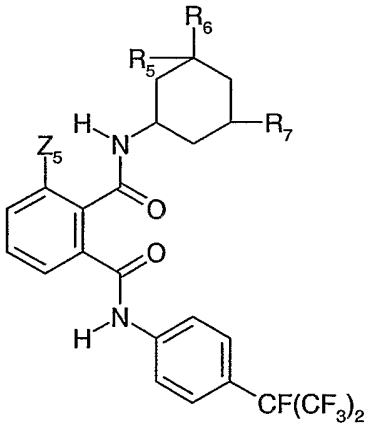
Table 35: This table discloses the 9 compounds T35.12.1 to T35.12.9 of the formula



(T35),

in which, for each of these 9 specific compounds, each of the variables Z_5, R_5, R_6 and R_7 has the specific meaning given in the corresponding line, appropriately selected from the 9 lines L.12.1 to L.12.9, of the Table L.

Table 36: This table discloses the 9 compounds T36.12.1 to T36.12.9 of the formula

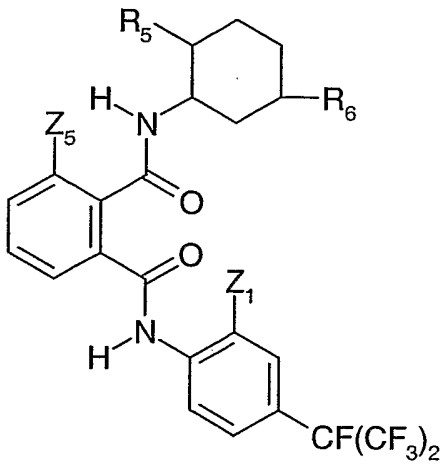


(T36),

in which, for each of these 9 specific compounds, each of the variables Z_5, R_5, R_6 and R_7 has the specific meaning given in the corresponding line, appropriately selected from the 9 lines L.12.1 to L.12.9, of the Table L.

The Table M discloses 9 meanings of the variables Z_5, R_5 and R_6 in a compound of the formula I-M.

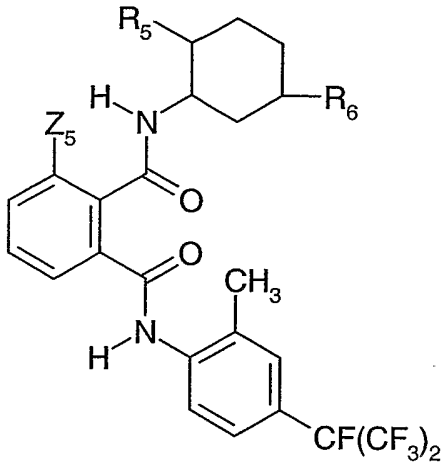
Table M



(I-M)

Line	Z_5	R_5 and R_6 taken together	Isomer(s)
M.13.1	I	CH_2	Endo
M.13.2	I	CH_2	Exo
M.13.3	I	CH_2	Endo and Exo
M.13.4	Cl	CH_2	Endo
M.13.5	Cl	CH_2	Exo
M.13.6	Cl	CH_2	Endo and Exo
M.13.7	NO_2	CH_2	Endo
M.13.8	NO_2	CH_2	Exo
M.13.9	NO_2	CH_2	Endo and Exo

Table 37: This table discloses the 9 compounds T37.13.1 to T37.13.9 of the formula



(T37),

in which, for each of these 9 specific compounds, each of the variables Z_5, R_5 and R_6 has the specific meaning given in the corresponding line, appropriately selected from the 9 lines M.13.1 to M.13.9, of the Table M.

Formulation examples (% = percent by weight)

Example F1: Emulsion concentrates	a)	b)	c)
Active ingredient	25 %	40 %	50 %
Calcium dodecylbenzenesulfonate	5 %	8 %	6 %
Castor oil polyethylene glycol ether (36 mol of EO)	5 %	-	-
Tributylphenoxypolyethylene glycol ether (30 mol of EO)	-	12 %	4 %
Cyclohexanone	-	15 %	20 %
Xylene mixture	65 %	25 %	20 %

Emulsions of any desired concentration can be prepared from such concentrates by dilution with water.

Example F2: Solutions	a)	b)	c)	d)
Active ingredient	80 %	10 %	5 %	95 %
Ethylene glycol monomethyl ether	20 %	-	-	-
Polyethylene glycol MW 400	-	70 %	-	-
N-Methylpyrrolid-2-one	-	20 %	-	-
Epoxidized coconut oil	-	-	1 %	5 %
Petroleum ether (boiling range: 160-190°)	-	-	94 %	-

The solutions are suitable for use in the form of microdrops.

Example F3: Granules	a)	b)	c)	d)
Active ingredient	5 %	10 %	8 %	21 %
Kaolin	94 %	-	79 %	54 %
Highly disperse silica	1 %	-	13 %	7 %
Attapulgite	-	90 %	-	18 %

The active ingredient is dissolved in dichloromethane, the solution is sprayed onto the carrier(s), and the solvent is subsequently evaporated in vacuo.

Example F4: Dusts	a)	b)
Active ingredient	2 %	5 %
Highly disperse silica	1 %	5 %
Talc	97 %	-
Kaolin	-	90 %

Ready-to-use dusts are obtained by intimately mixing the carriers and the active ingredient.

Example F5: Wettable powders	a)	b)	c)
Active ingredient	25 %	50 %	75 %
Sodium lignosulfonate	5 %	5 %	-
Sodium lauryl sulfate	3 %	-	5 %
Sodium diisobutylnaphthalenesulfonate	-	6 %	10 %
Octylphenoxypolyethylene glycol ether (7-8 mol of EO)	-	2 %	-
Highly disperse silica	5 %	10 %	10 %
Kaolin	62 %	27 %	-

The active ingredient is mixed with the additives and the mixture is ground thoroughly in a suitable mill. This gives wettable powders, which can be diluted with water to give suspensions of any desired concentration.

Example F6: Extruder granules

Active ingredient	10 %
Sodium lignosulfonate	2 %
Carboxymethylcellulose	1 %
Kaolin	87 %

The active ingredient is mixed with the additives, and the mixture is ground, moistened with water, extruded, granulated and dried in a stream of air.

Example F7: Coated granules

Active ingredient	3 %
Polyethylene glycol (MW 200)	3 %
Kaolin	94 %

In a mixer, the finely ground active ingredient is applied uniformly to the kaolin, which has been moistened with the polyethylene glycol. This gives dust-free coated granules.

Example F8: Suspension concentrate

Active ingredient	40 %
Ethylene glycol	10 %
Nonylphenoxypolyethylene glycol ether (15 mol of EO)	6 %
Sodium lignosulfonate	10 %
Carboxymethylcellulose	1 %
37 % aqueous formaldehyde solution	0.2 %
Silicone oil (75 % aqueous emulsion)	0.8 %
Water	32 %

The finely ground active ingredient is mixed intimately with the additives. Suspensions of any desired concentration can be prepared from the thus resulting suspension concentrate by dilution with water.

Biological Examples (% = per cent by weight, unless otherwise specified)

Example B1: Activity against Aphis craccivora

Pea seedlings are infected with Aphis craccivora, subsequently sprayed with a spray mixture comprising 400 ppm of active ingredient and then incubated at 20°. 3 and 6 days later, the

percentage reduction in the population (% activity) is determined by comparing the number of dead aphids between the treated and untreated plants.
In this test, compounds listed in the Tables above show good activity.

Example B2: Activity against Diabrotica balteata
Maize seedlings are sprayed with an aqueous emulsion spray mixture comprising 400 ppm of active ingredient and, after the spray coating has dried on, populated with 10 larvae (2nd instar) of Diabrotica balteata and introduced into a plastic container. 6 days later, the percentage reduction in the population (% activity) is determined by comparing the number of dead larvae between the treated and untreated plants.
In this test, compounds listed in the Tables above show good activity.

Example B3: Activity against Heliothis virescens (foliar application)
Young soya plants are sprayed with an aqueous emulsion spray mixture comprising 400 ppm of active ingredient and, after the spray coating has dried on, populated with 10 caterpillars (1st instar) of Heliothis virescens and introduced into a plastic container. 6 days later, the percentage reduction in the population and in the feeding damage (% activity) are determined by comparing the number of dead caterpillars and the feeding damage between the treated and untreated plants.
In this test, compounds listed in the Tables above show good activity. In particular, the compounds T1.1.117, T1.1.115, T1.1.147, T1.1.212, T1.1.562, T1.1.5, T1.1. 17, T1.1.22, T1.1.25, T1.1.340, T1.1.36, T25.9.15, T1.1.562 have an activity of over 80 %.

Example B4: Activity against Heliothis virescens (application to eggs)
Heliothis virescens eggs, which have been deposited on cotton, are sprayed with an aqueous emulsion spray mixture comprising 400 ppm of active ingredient. After 8 days, the percentage hatching rate of the eggs and the survival rate of the caterpillars (% activity) are evaluated in comparison with untreated control batches.
In this test, compounds listed in the Tables above show good activity.

Example B5: Activity against Myzus persicae (foliar application)
Pea seedlings are infected with Myzus persicae, subsequently sprayed with a spray mixture comprising 400 ppm of active ingredient and then incubated at 20°. 3 and 6 days later, the

percentage reduction in the population (% activity) is determined by comparing the number of dead aphids between the treated and untreated plants.
In this test, compounds listed in the Tables above show good activity.

Example B6: Activity against Myzus persicae (systemic application)
Pea seedlings are infected with Myzus persicae, and their roots are subsequently placed into a spray mixture comprising 400 ppm of active ingredient. The seedlings are then incubated at 20°. 3 and 6 days later, the percentage reduction in the population (% activity) is determined by comparing the number of dead aphids between the treated and untreated plants.
In this test, compounds listed in the Tables above show good activity.

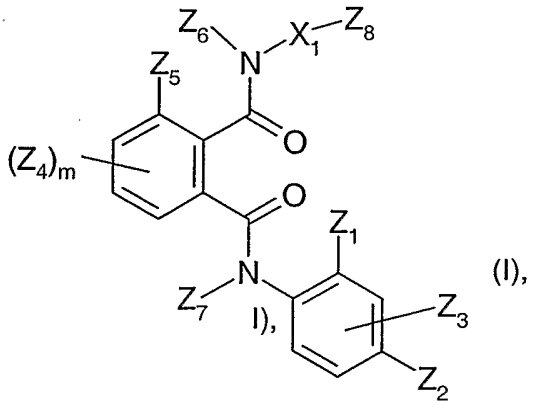
Example B7: Activity against Plutella xylostella
Young cabbage plants are sprayed with an aqueous emulsion spray mixture comprising 400 ppm of active ingredient and, after the spray coating has dried on, populated with 10 caterpillars (3rd instar) of Plutella xylostella and introduced into a plastic container. 3 days later, the percentage reduction in the population and in the feeding damage (% activity) are determined by comparing the number of dead caterpillars and the feeding damage between the treated and untreated plants.
In this test, compounds listed in the Tables above show good activity. In particular, the compounds T1.1.135, T1.1.121, T1.1.149, T1.1.117, T1.1.179, T1.1.115, T1.1.180, T1.1.147, T1.1.119, T1.1.212, T1.1.562, T1.1.5, T1.1.17, T1.1.22, T1.1.25, T1.1.340, T1.1.36, T25.9.15, T1.1.562 have an activity of over 80 %.

Example B8: Activity against Spodoptera littoralis
Young soya plants are sprayed with an aqueous emulsion spray mixture comprising 400 ppm of active ingredient and, after the spray coating has dried on, populated with 10 caterpillars (1st instar) of Spodoptera littoralis and introduced into a plastic container. 3 days later, the percentage reduction in the population and in the feeding damage (% activity) are determined by comparing the number of dead caterpillars and the feeding damage between the treated and untreated plants.

In this test, compounds listed in the Tables above show good activity. In particular, the compounds T1.1.121, T1.1.149, T1.1.117, T1.1.179, T1.1.115, T1.1.119, T1.1.212, T1.1.5, T1.1.17, T1.1.22, T1.1.25, T1.1.340, T1.1.36, T25.9.15 have an activity of over 80 %.

What is claimed is:

1. A compound of formula I



(I),

wherein

X_1 is a chemical bond or is a C_1-C_4-alkylene chain;

each of Z_1 and Z_3, which may be the same or different, represents hydrogen, halogen, nitro, cyano, C_1-C_8alkyl, C_1-C_8haloalkyl, C_2-C_8alkenyl, C_2-C_8haloalkenyl, C_2-C_8alkynyl, C_2-C_8haloalkynyl, C_3-C_6cycloalkyl, C_3-C_6halocycloalkyl, C_1-C_8alkoxy, C_1-C_8haloalkoxy, C_1-C_8alkylthio, C_1-C_8haloalkylthio, C_1-C_8alkylsulfinyl, C_1-C_8haloalkylsulfinyl, C_1-C_8alkylsulfonyl, C_1-C_8haloalkylsulfonyl, C_1-C_6alkylamino, di-(C_1-C_6alkyl)amino, whose C_1-C_6alkyl groups may be the same or different;

Z_2 represents C_1-C_6haloalkoxy or a group $-C(R_1R_2)$-R_3;

R_1 is halogen;

R_2 is halogen or C_1-C_6-haloalkyl;

R_3 is halogen or C_1-C_6-haloalkyl;

each of Z_4 and Z_5, which may be the same or different, represents halogen, cyano, C_1-C_8alkyl, C_1-C_8haloalkyl, C_1-C_8alkoxy, C_1-C_8haloalkoxy, C_1-C_8alkylthio, C_1-C_8haloalkylthio, C_1-C_8alkylsulfinyl, C_1-C_8haloalkylsulfinyl, C_1-C_8alkylsulfonyl, C_1-C_8haloalkylsulfonyl; $-N(R_{13}R_{14})$, $-N(R_{15})$-$C(O)$-OR_{16} or $-N(R_{17})$-$C(O)$-R_{18};

R_{13}, R_{14}, R_{15}, R_{16}, R_{17} and R_{18} independently of one another are C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_3-C_6cycloalkyl(C_1-C_4)alkyl, C_1-C_6alkoxy(C_1-C_4)alkyl, C_1-C_6 alkylthio(C_1-C_4) alkyl, cyano(C_1-C_6)alkyl, phenyl(C_1-C_4) alkyl which may be mono-, di- or trisubstituted by R_{19}, C_3-C_8cycloalkyl, C_3-C_8halocycloalkyl, C_3-C_6alkenyl, C_3-C_6haloalkenyl, C_3-C_6alkinyl or phenyl which may be mono-, di- or trisubstituted by R_{19};

R_{19} represents halogen, cyano, nitro, C_1-C_6alkyl, C_1-C_6haloalkyl, C_3-C_6cycloalkyl, C_3-C_6halocycloalkyl, C_2-C_6alkenyl, C_2-C_6haloalkenyl, C_2-C_6alkinyl, C_2-C_6haloalkinyl, C_1-C_6alkoxy, C_1-C_6haloalkoxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, C_1-C_6alkylamino, di(C_1-C_6 alkyl)amino, C_1-C_6alkoxycarbonyl, C_1-C_6haloalkoxycarbonyl, or phenyl which may be substituted by halogen;
m is 0, 1 or 2;
Z_8 represents C_3-C_6cyanocycloalkyl, C_3-C_6nitrocycloalkyl, C_3-C_6cyanocycloalkenyl or C_3-C_6nitrocycloalkenyl; or
Z_8 represents C_3-C_6cycloalkyl, C_3-C_6cyanocycloalkyl, C_3-C_6nitrocycloalkyl, C_3-C_6halocyloalkyl, C_3-C_6cycloalkenyl, C_3-C_6cyanocycloalkenyl, C_3-C_6nitrocycloalkenyl or C_3-C_6halocyloalkenyl, which are
a) mono-, di- or trisubstituted by substituents selected from C_1-C_8alkyl, C_2-C_8-alkenyl, C_2-C_8alkynyl and silyl(C_1-C_4-alkyl)$_3$; where said substituents for their part may be substituted by cyano, nitro, halogen, C_1-C_6alkylaminosulfonyl, di-(C_1-C_6alkylamino)sulfonyl, or by a three- to ten-membered, monocyclic or fused bicyclic ring system, which may be aromatic, partially saturated or fully saturated and may contain from 1 to 4 hetero atoms selected from nitrogen, oxygen, sulfur, C(O) and C(=NR_9), and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may contain not more than two oxygen atoms, not more than two sulfur atoms, not more than two C(O) groups and not more than one C(=NR_9) group, and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may itself be mono- or poly-substituted by C_1-C_6alkyl, C_1-C_6haloalkyl, C_2-C_6alkenyl, C_2-C_6haloalkenyl, C_2-C_6alkynyl, C_2-C_6haloalkynyl, C_1-C_6alkoxy, C_1-C_6haloalkoxy, C_3-C_6alkenyloxy, C_3-C_6alkynyloxy, mercapto, amino, hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)-amino, halogen, cyano, nitro and/or phenyl, it being possible for the phenyl group in turn to be substituted by hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6halo-alkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6halo-alkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylamino-sulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano or nitro, and

the substituents at the nitrogen atom in the heterocyclic ring being other than halogen, and two oxygen atoms not being located next to one another;
R_9 is hydrogen, hydroxy, C_1-C_6alkyl, C_1-C_6haloalkyl, C_1-C_6alkoxy, C_1-C_6alkylcarbonyl, C_1-C_6alkoxycarbonyl or C_1-C_6alkylsulfonyl; or which are

b) mono-, di- or trisubstituted by a three- to ten-membered, monocyclic or fused bicyclic ring system, which may be aromatic, partially saturated or fully saturated and may contain from 1 to 4 hetero atoms selected from nitrogen, oxygen, sulfur, C(O) and C(=NR_{10}), and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may contain not more than two oxygen atoms, not more than two sulfur atoms, not more than two C(O) groups and not more than one C(=NR_{10}) group, and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may itself be mono- or poly-substituted by C_1-C_6alkyl, C_1-C_6haloalkyl, C_2-C_6alkenyl, C_2-C_6haloalkenyl, C_2-C_6alkynyl, C_2-C_6haloalkynyl, C_1-C_6alkoxy, C_1-C_6haloalkoxy, C_3-C_6alkenyloxy, C_3-C_6alkynyloxy, mercapto, amino, hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano, nitro and/or phenyl, it being possible for the phenyl group in turn to be substituted by hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano or nitro, and the substituents at the nitrogen atom in the heterocyclic ring being other than halogen, and two oxygen atoms not being located next to one another;
R_{10} is hydrogen, hydroxy, C_1-C_6alkyl, C_1-C_6haloalkyl, C_1-C_6alkoxy, C_1-C_6alkylcarbonyl, C_1-C_6alkoxycarbonyl or C_1-C_6alkylsulfonyl; or

Z_8 represents a seven- to twelve-membered monocarbocyclic, bridged or fused bicarbocyclic ring system, which is saturated or partially saturated, where

c) said seven- to twelve-membered monocarbocyclic, bridged or fused bicarbocyclic ring system for its part may be mono-, di- or trisubstituted by substituents selected from C_1-C_8alkyl, C_2-C_8-alkenyl, C_2-C_8alkynyl and silyl(C_1-C_4-alkyl)$_3$; where said substituents for their part may be substituted by cyano, nitro, halogen, C_1-C_6alkylaminosulfonyl, di-(C_1-C_6alkylamino)sulfonyl, or by a three- to ten-membered, monocyclic or fused bicyclic ring system, which may be aromatic, partially saturated or fully saturated and may contain from 1 to 4 hetero atoms selected from nitrogen, oxygen, sulfur, C(O) and C(=NR_{11}), and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may contain not more than two oxygen atoms, not more than two sulfur atoms, not more than two C(O) groups and not more than one C(=NR_{11}) group, and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may itself be mono- or poly-substituted by C_1-C_6alkyl, C_1-C_6haloalkyl, C_2-C_6alkenyl, C_2-C_6haloalkenyl, C_2-C_6alkynyl, C_2-C_6haloalkynyl, C_1-C_6alkoxy, C_1-C_6haloalkoxy, C_3-C_6alkenyloxy, C_3-C_6alkynyloxy, mercapto, amino, hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano, nitro and/or phenyl, it being possible for the phenyl group in turn to be substituted by hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano or nitro, and the substituents at the nitrogen atom in the heterocyclic ring being other than halogen, and two oxygen atoms not being located next to one another;
R_{11} is hydrogen, hydroxy, C_1-C_6alkyl, C_1-C_6haloalkyl, C_1-C_6alkoxy, C_1-C_6alkylcarbonyl, C_1-C_6alkoxycarbonyl or C_1-C_6alkylsulfonyl; or

d) said seven- to twelve-membered monocarbocyclic, bridged or fused bicarbocyclic ring system for its part may be substituted by a three- to ten-membered, monocyclic or fused bicyclic ring system, which may be aromatic, partially saturated or fully saturated and may contain from 1 to 4 hetero atoms selected from nitrogen, oxygen, sulfur, C(O) and C(=NR_{12}), and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may

contain not more than two oxygen atoms, not more than two sulfur atoms, not more than two C(O) groups and not more than one $C(=NR_{12})$ group, and each of said three- to ten-membered, monocyclic or fused bicyclic ring system may itself be mono- or poly-substituted by C_1-C_6alkyl, C_1-C_6haloalkyl, C_2-C_6alkenyl, C_2-C_6haloalkenyl, C_2-C_6alkynyl, C_2-C_6haloalkynyl, C_1-C_6alkoxy, C_1-C_6haloalkoxy, C_3-C_6alkenyloxy, C_3-C_6alkynyloxy, mercapto, amino, hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano, nitro and/or phenyl, it being possible for the phenyl group in turn to be substituted by hydroxy, C_1-C_6alkylthio, C_1-C_6haloalkylthio, C_3-C_6alkenylthio, C_3-C_6haloalkenylthio, C_3-C_6alkynylthio, C_1-C_3alkoxy-C_1-C_3alkylthio, C_1-C_4alkylcarbonyl-C_1-C_3alkylthio, C_1-C_4alkoxycarbonyl-C_1-C_3alkylthio, cyano-C_1-C_3alkylthio, C_1-C_6alkylsulfinyl, C_1-C_6haloalkylsulfinyl, C_1-C_6alkylsulfonyl, C_1-C_6haloalkylsulfonyl, aminosulfonyl, C_1-C_2alkylaminosulfonyl, N,N-di(C_1-C_2alkyl)aminosulfonyl, di(C_1-C_4alkyl)amino, halogen, cyano or nitro, and the substituents at the nitrogen atom in the heterocyclic ring being other than halogen, and two oxygen atoms not being located next to one another;

R_{12} is hydrogen, hydroxy, C_1-C_6alkyl, C_1-C_6haloalkyl, C_1-C_6alkoxy, C_1-C_6alkylcarbonyl, C_1-C_6alkoxycarbonyl or C_1-C_6alkylsulfonyl;

Z_6 is hydrogen or C_1-C_8alkyl; and

Z_7 is hydrogen, C_1-C_8alkyl, C_2-C_8alkenyl or C_2-C_8alkynyl; and agronomically acceptable salts/isomers/enantiomers/tautomers of those compounds.

2. A pesticidal composition, which comprises at least one compound according to claim 1 of the formula I or, where appropriate, a tautomer thereof, in each case in free form or in agrochemically utilizable salt form, as active ingredient and at least one auxiliary.

3. A composition according to claim 2 for controlling insects or representatives of the order Acarina.

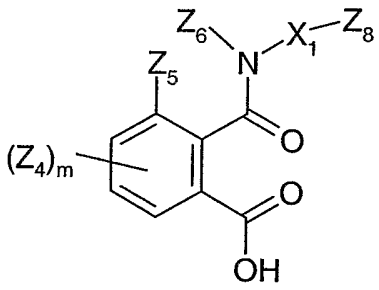
4. A method for controlling pests, which comprises applying a composition according to claim 3 to the pests or their environment.

5. A method according to claim 4 for controlling insects or representatives of the order Acarina.

6. A method according to claim 4 for the protection of plant propagation material from the attack by pests, which comprises treating the propagation material or the site, where the propagation material is planted.

7. Plant propagation material treated in accordance with the method described in claim 6.

8. A compound of formula VII



(VII),

wherein Z_4, m, Z_5, Z_6, X_1 and Z_8 are as defined in formula I in claim 1.

INTERNATIONAL SEARCH REPORT

PCT/EP2005/009392

A. CLASSIFICATION OF SUBJECT MATTER

C07C233/66 C07D213/40 C07D213/61 C07D307/52 C07D333/20
A01N37/22 A01N43/00

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)

C07C C07D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, BEILSTEIN Data, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	page 34; table 1; compounds 849,852,856 page 36; table 1; compounds 991,993 page 37; table 1; compounds 1024,1028 page 44; table 1; compound 1452	1-8
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"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
27 January 2006	02/02/2006

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Kiernan, A

INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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