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Phthalic acid diamide derivatives, agricultural and horticultural insecticides, and a method for application of the insecticides

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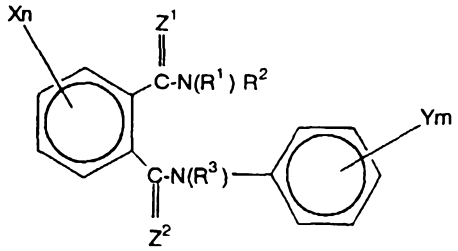
ABSTRACT

The present invention provides a phthalic acid diamide derivative represented by the general formula (I),

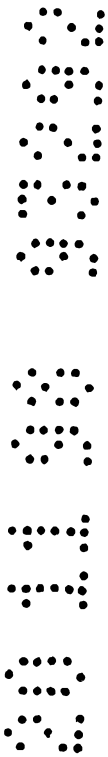


(I)

{wherein R^1, R^2 and R^3 may be same or different, and are each a hydrogen atom, a cyano group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_3-C_6 cycloalkenyl group, a halo-C_3-C_6 cycloalkenyl group, or a group of the formula $-A^1-Q_\ell$; X may be the same or different and are each a hydrogen atom, a halogen atom, a cyano group, a nitro group, a phenyl group, a substituted phenyl group, a naphthyl group, a substituted naphthyl group, a heterocyclic group, a substituted heterocyclic group; or a group of the formula $-A^2-R^7$; n is an integer of 1 to 4; Y may be same or different and are each a hydrogen atom, a halogen atom, a cyano group, a nitro group, a phenyl group, a substituted phenyl group, a naphthyl group, a substituted naphthyl group, a heterocyclic group, a substituted heterocyclic group or a group of the formula $-A^2-R^7$; m is an integer of 1 to 5; Z^1 and Z^2 are each an oxygen atom or a sulfur atom}, and an agricultural and horticultural insecticide containing said phthaldiamide derivative, as well as to provide a method for use of said insecticide.

The agricultural and horticultural insecticides

of the present invention show excellent activities for controlling injurious insects.



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COMPLETE SPECIFICATION

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INVENTION TITLE:

Phthalic acid diamide derivatives, agricultural and horticultural insecticides, and a method for application of the insecticides

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to phthalic acid diamide derivatives, agricultural and horticultural insecticides containing said derivative as an active ingredient, and a method for application of the insecticides.

RELATED ART

Japanese Patent Application Nos. 59-163353 and 61-180753 and J.C.S. Perkin I, 1338-1350, (1978), etc. disclose some of the phthalic acid diamide derivatives of the present invention but neither describe nor suggest their usefulness as agricultural and horticultural insecticides.

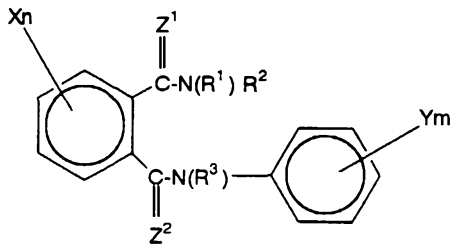
SUMMARY OF THE INVENTION

The present inventors earnestly studied in order to develop a novel agricultural and horticultural insecticide, and consequently found that the phthalic acid diamide derivatives represented by the general formula (I) of the present invention are novel compounds not known as agricultural and horticultural insecticides in any literature and that said derivatives including the compounds disclosed in the above references can be used for a new purpose as agricultural and horticultural insecticides.

Thus, the present invention has been accomplished.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to phthalic acid diamide derivatives of the general formula (I),



(I)

wherein R^1, R^2 and R^3 may be the same or different, and are each a hydrogen atom, a cyano group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_3-C_6 cycloalkenyl group, a halo-C_3-C_6 cycloalkenyl group or a group of the formula $-A^1-Q_\ell$ (wherein A^1 is -O-, -S-, $-SO_2-$, -C(=O)-, a group of the formula $-N(R^4)-$ (wherein R^4 is a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, or a substituted phenylcarbonyl group having at least one substituent which may be the same or different, and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group,

a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different), a C_1-C_8 alkylene group, a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group;

(1) when A^1 is -O- or a group of the formula -N(R^4)- (wherein R^4 is the same as defined above), then Q is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkyl sulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl-C_1-C_4 alkyl group or a substituted phenyl-C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6

alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different;

(2) when A^1 is -S-, $-SO_2-$ or -C(=O)-, then Q is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a C_1-C_6 alkoxy group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a C_1-C_6 alkoxycarbonylamino group, a C_1-C_6 alkoxycarbonyl-C_1-C_6 alkylamino group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkyl-sulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenylamino group, a substituted phenylamino group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl

group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which means pyridyl group, pyridine-N-oxide group, pyrimidinyl group, furyl group, tetrahydrofuryl group, thienyl group, tetrahydrothienyl group, tetrahydropyranyl group, tetrahydrothiopyranyl group, oxazolyl group, isoxazolyl group, oxadiazolyl group, thiazolyl group, isothiazolyl group, thiadiazolyl group, imidazolyl group, triazolyl group or a pyrazolyl group), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is

selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different,

(3) when A^1 is a C_1-C_8 alkylene group, a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group, then Q is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_1-C_6 alkyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a diphenylphosphino group, a diphenylphosphono group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkyl-

sulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-Z^3-R^5$ (wherein Z^3 is

-O-, -S-, -SO-, $-SO_2-$ or a group of the formula $-N(R^6)-$ (wherein R^6 is a hydrogen atom, a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, a substituted phenylcarbonyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl C_1-C_4 alkoxycarbonyl group, or a substituted phenyl C_1-C_4 alkoxycarbonyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different); and

R^5 is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkylcarbonyl group, a halo C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl C_1-C_4 alkyl group, a substituted phenyl C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a

mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different);

ℓ is an integer of 1 to 4); further,

R^1 and R^2 may form a 4 to 7 membered ring by combining to each other, in which the ring may contain the same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen atom;

X may be the same or different, and is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituents which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6

alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^2-R^7$ (wherein A^2 is -O-, -S-, -SO-, $-SO_2-$, -C(=O)-, $-C(=NOR^8)-$ (wherein R^8 is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a phenyl-C_1-C_4 alkyl group, or a substituted phenyl-C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6

alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different), a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group;

(1) when A^2 is -O-, -S-, -SO- or -SO_2-, then R^7 is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_3-C_6 cycloalkenyl group, a halo-C_3-C_6 cycloalkenyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6

alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituents which may be the same or different and are selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^3-R^9$ (wherein A^3 is $-C(=O)-$, $-SO_2-$, a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene

group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_3-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group,

(i) when A^3 is -C(=O)- or $-SO_2-$, then R^9 is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkyl-

sulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different,

(ii) when A^3 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_3-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^9 is a hydrogen atom, a halogen atom, a cyano group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a

C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^4-R^{10}$ (wherein A^4 is -O-, -S-, -SO-, $-SO_2-$, -C(=O)-, or a group of the formula $-N(R^{11})-$ (wherein R^{11} is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl

group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different); and

R^{10} is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_3-C_6 cycloalkenyl group, a halo-C_3-C_6 cycloalkenyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a

cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-

C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different));

(2) when A^2 is -C(=O)- or a group of the formula -C(=NOR^8)- (wherein R^8 is the same as defined above), then R^7 is a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenylamino group, a substituted phenylamino group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a

cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having one or more substituents which may be the same or different and are selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-

C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different,

(3) when A^2 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^7 is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6

alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^5-R^{12}$ (wherein A^5 is -O-, -S-, -SO-, $-SO_2-$ or a group of the formula $-N(R^{13})-$ (wherein R^{13} is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro

group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituents which may be the same or different and are selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a

C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different); and R^{12} is a hydrogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-

C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituents which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^6-R^{14}$ (wherein A^6 is $-C(=O)-$, $-SO_2-$, a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group;

(i) when A^6 is $-C(=O)-$ or $-SO_2-$, then R^{14} is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a

halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6

alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different;

(ii) when A^6 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^{14} is a hydrogen atom, a halogen atom, a cyano group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and are selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenoxy group, a substituted phenoxy group having at least one substituent which may be the same or different and is selected from the

group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenylthio group, a substituted phenylthio group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6- alkyl-sulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a

C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different)));

n is an integer of 1 to 4;

further, X may form a condensed ring (which means naphthalene, tetrahydronaphthalene, indene, indane, quinoline, quinazoline, chroman, isochroman, indole, indoline, benzodioxane, benzodioxole, benzofuran, dihydrobenzofuran, benzothiophene, dihydrobenzothiophene, benzoxazole, benzothiazole, benzimidazole or indazole), by combining together with the adjacent carbon atoms in the phenyl ring, and said condensed ring may have at least one

substituents, which may be the same or different, and selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6

alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), and a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different;

Y is the same or different, and is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a

halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl

group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^2-R^7$ (wherein A^2 and R^7 are the same as defined above);

m is an integer of 1 to 5;

further, Y may form a condensed ring (the condensed ring is the same as defined above), by combining together with the adjacent carbon atoms in the phenyl ring, said condensed ring may have at least one substituents, which may be the same or different, and selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl

group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), and a substituted heterocyclic group (wherein said heterocyclic group is the same as defined above) having at lease one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group,

a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different;

Z^1 and Z^2 each represents an oxygen atom or a sulfur atom; provided that,

(1) when X, R^1 and R^3 are hydrogen atoms at the same time; m is an integer of 2; Y at 2-position is a fluorine atom and Y at 3-position is a chlorine atom; then R^2 is not ethyl group, isopropyl group, cyclohexyl group, 2-propenyl group, methylthiopropyl group and α-methylbenzyl group,

(2) when X and R^3 are hydrogen atoms at the same time; m is an integer of 2; Y at 2-position is a fluorine atom and Y at 3-position is a chlorine atom; then the 4 to 7 membered ring by combining R^1 and R^2 to each other, in which the ring may contain the same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen atom is not morpholino group,

(3) when X, R^1 and R^3 are hydrogen atoms at the same time; and R^2 is 1,2,2-trimethylpropyl group; then Y is not a hydrogen atom, 4-hydroxy group or 2-ethoxy group,

(4)when X, R^1 and R^3 are hydrogen atoms at the same time; R^2 is 2,2-dimethylpropyl group; and m is an integer of 1; then Y is not 2-ethoxy group, and

(5) when X, R^1 and R^3 are hydrogen atoms at the same time; and R^2 is tert-butyl group; and m is an integer of 1; then Y is not 4-chlorine atom, 2-nitro group, 4-nitro group, 3-methoxy group or 4-methoxy group; m is an integer of 2; then Y is not 2,6-dimethyl groups,

(6) when X, R^1 and R^3 are hydrogen atom at the same time; and R^2 is benzyl group; and m is an integer of 1; then Y is not 4-methyl group, and m is an integer of 2; then Y is not 3, 4-dichloro groups,

(7) when X and R^3 are hydrogen atoms at the same time; m is an integer of 1; Y is 4-difluoromethoxy group; then R^1 and R^2 are not formed $-CH_2CH_2-O-CH_2CH_2-$ by combining to each other,

(8) R^1 and R^2 are not hydrogen atoms at the same time,

(9) when Z^1 and Z^2 are oxygen atoms at the same time; X is chlorine atom; n is an integer of 4; Y is 2,6-dinitro-3-chloro-4-trifluromethyl groups; then R^1, R^2 and R^3 are not hydrogen atoms at the same time;

agricultural and horticultural insecticides containing as an active ingredient any of the phthalic acid diamide derivatives of the general formula (I) including known compounds; and a method for application of the insecticides.

In the definition of the general formula (I) representing the phthalic acid diamide derivative of the present invention, the halogen atom includes chlorine atom, bromine atom, iodine atom and fluorine atom. The term "C_1-C_6 alkyl" means a linear or branched alkyl group of 1 to 8 carbon atoms, such as methyl, ethyl, n-propyl, i-propyl, n-butyl, i-butyl, s-butyl, t-butyl, n-pentyl, n-hexyl, or the like. The term "C_1-C_8 alkylene" means a linear or branched alkylene group of 1 to 8 carbon atoms, such as methylene, ethylene, propylene, trimethylene, dimethylmethylene, tetramethylene, i-butylene, dimethylethylene, pentamethylene, hexamethylene, heptamethylene, octamethylene or the like. The term "halo-C_1-C_6 alkyl" means a substituted and linear or branched alkyl group of 1 to 6 carbon atoms having as the substituent(s) one or more halogen atoms which may be the same or different.

As the ring which R^1 and R^2 form by combining to each other, i.e., the 4- to 7-membered ring by combining to each other, in which the ring may contain the same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen atom, there can be exemplified azetidine ring, pyrrolidine ring,

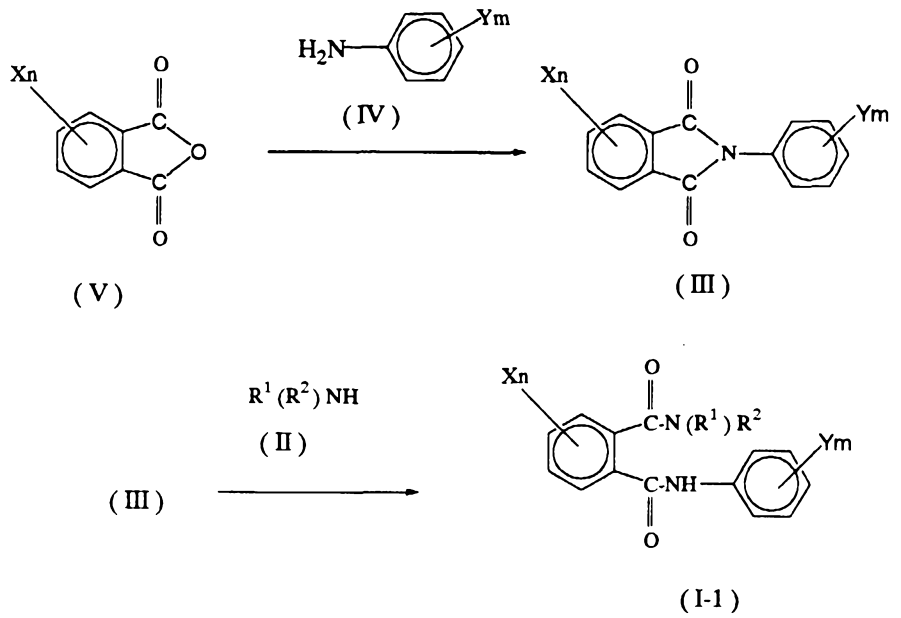
pyrroline ring, piperidine ring, imidazolidine ring, imidazoline ring, oxazolidine ring, thiazolidine ring, isoxazolidine ring, isothiazolidine ring, tetrahydropyridine ring, piperazine ring, morpholine ring, thiomorpholine ring, dioxazine ring, dithiazine ring, etc.

The phthalic acid diamide derivative of the general formula (I) of the present invention contains an asymmetric carbon atom or some asymmetric center in the structural formula in some cases or has two optical isomers in some cases. The present invention includes these optical isomers and all mixtures containing the optical isomers in arbitrary proportions.

Preferable examples of each substituent of the phthalic acid diamide derivative of the general formula (I) of the present invention are as follows. Preferable examples of each of R^1 and R^2 which may be the same or different are hydrogen atom, C_1-C_6 alkyl groups such as methyl, ethyl, i-propyl, etc. Preferable examples of R^3 are hydrogen atom, and C_1-C_6 alkyl groups such as methyl, ethyl, n-propyl, i-propyl, n-butyl, etc. Preferable examples of X are halogen atoms, nitro group, halo-C_1-C_6 alkyl groups, halo-C_1-C_6 alkoxy groups, halo-C_1-C_6 alkylthio groups, etc. Preferable examples of Y are halo-C_1-C_6 alkyl groups, halo-C_1-C_6 alkoxy groups, halo-C_1-C_6 alkylthio groups, etc.

The phthalic acid diamide derivative of the general formula (I) of the present invention can be produced, for example, by any of the processes illustrated below.

Production process 1.



wherein R^1, R^2, X, n, Y and m are as defined above.

A phthalic anhydride derivative of the general formula (V) is reacted with an aniline of the general formula (IV) in the presence of an inert solvent to obtain a phthalimide derivative of the general formula (III). The phthalimide derivative (III) is reacted with an amine of the general formula (II) after or without being isolated, whereby a phthalic acid diamide derivative of the general formula (I-1) can be produced.

(1) General formula (V) → general formula (III)

As the inert solvent used in this reaction, any solvent may be used so long as it does not markedly inhibit the progress of the reaction. There can be exemplified aromatic hydrocarbons such as benzene, toluene, xylene, etc.; halogenated hydrocarbons such as dichloromethane,

chloroform, carbon tetrachloride, etc., chlorinated aromatic hydrocarbons such as chlorobenzene, dichlorobenzene, etc.; a cyclic or cyclic ethers such as diethyl ether, dioxane, tetrahydrofuran, etc., esters such as ethyl acetate, etc.; amides such as dimethylformamide, dimethylacetamide, etc.; acids such as acetic acid, etc.; dimethyl sulfoxide; and 1,3-dimethyl-2-imidazolidinone. These inert solvents may be used alone or as a mixture thereof.

Since the reaction is an equimolar reaction, it is sufficient that the reactants are used in equimolar amounts, though either of them may be used in excess. If necessary, the reaction may be carried out under dehydrating conditions.

As to the reaction temperature, the reaction can be carried out in a temperature range of room temperature to the reflux temperature of the inert solvent used. Although the reaction time is varied depending on the scale of reaction, the reaction temperature, etc., it may be properly chosen in a range of several minutes to 48 hours.

After completion of the reaction, the desired compound is isolated from the reaction solution containing the desired compound by a conventional method, and if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be produced. The desired compound can be subjected to the subsequent reaction without isolation from the reaction solution.

The phthalic anhydride derivative of the general formula (V) can be produced by the process described in J.

Org. Chem., 52, 129 (1987), J. Am. Chem. Soc., 51, 1865 (1929), J. Am. Chem. Soc., 63, 1542 (1941), etc. The aniline of the general formula (IV) can be produced by the process described in J. Org. Chem., 29, 1 (1964), Angew. Chem. Int. Ed. Engl., 24, 871 (1985), Synthesis, 1984, 667, Bulletin of the Chemical Society of Japan, 1973, 2351, DE-2606982, JP-A-1-90163, etc.

(2) General formula (III) → general formula (I-1)

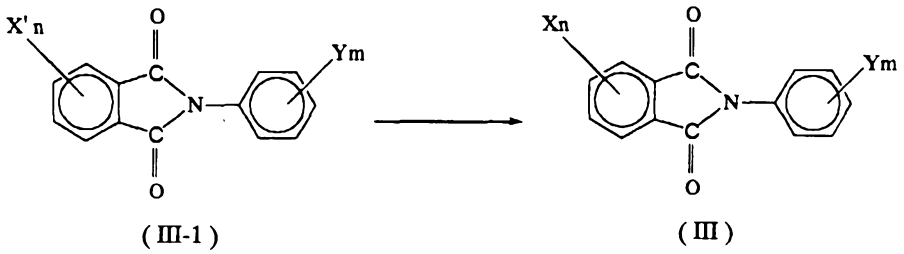
In this reaction, there can be used the inert solvents exemplified above as the inert solvent used in the reaction (1).

Since the reaction is an equimolar reaction, it is sufficient that the reactants are used in equimolar amounts, though the amine of the general formula (II) may be used in excess.

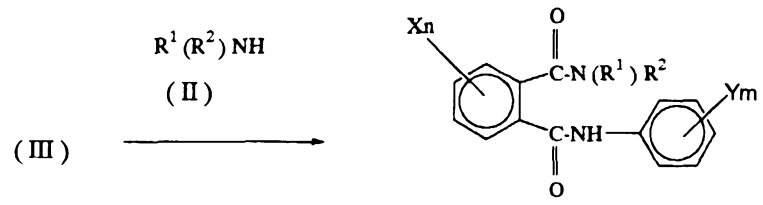
As to the reaction temperature, the reaction can be carried out in a temperature range of room temperature to the reflux temperature of the inert solvent used. Although the reaction time is varied depending on the scale of reaction, the reaction temperature, etc., it may be properly chosen in a range of several minutes to 48 hours.

After completion of the reaction, the desired compound is isolated from the reaction solution containing the desired compound by a conventional method, and if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be produced.

Production process 2.



(III-1) (III)



(III) (II) (I-1)

wherein R^1, R^2, n, X, Y and m are as defined above, and X' is a halogen atom or a nitro group, provided that X is other than a hydrogen atom or a nitro group.

A phthalimide derivative of the general formula (III-1) is reacted with a reactant corresponding to X in the presence of an inert solvent to obtain a phthalimide derivative of the general formula (III). The phthalimide derivative (III) is reacted with an amine of the general formula (II) after or without being isolated, whereby a phthalic acid diamide derivative of the general formula (I-1) can be produced.

(1) General formula (III-1) → general formula (III)

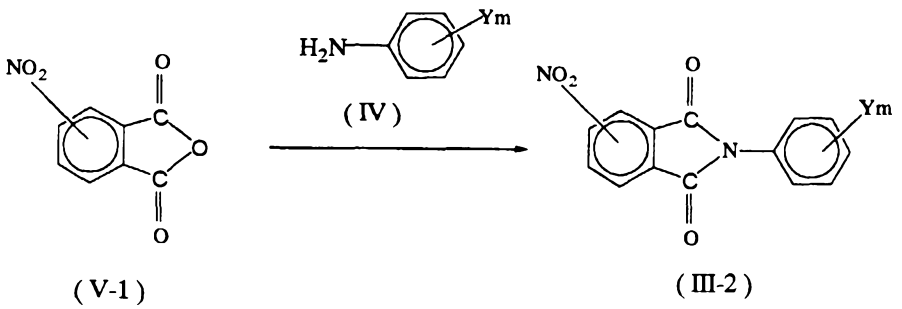
This reaction can be carried out according to the methods described in J. Org. Chem., 42, 3415 (1977), Tetrahedron, 25, 5921 (1969), Synthesis, 1984, 667, Chem. Lett., 1973, 471, J. Org. Chem., 39, 3318 (1974), J. Org.

Chem., 39, 3327 (1974), etc.

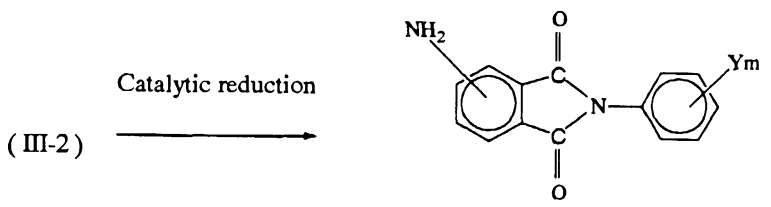
(2) General formula (III) → general formula (I-1)

This reaction can be carried out according to production process 1-(2).

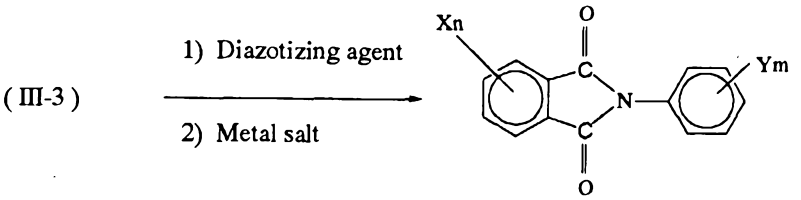
5 Production process 3



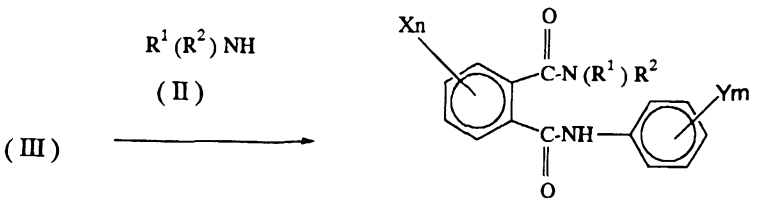
(V-1) (III-2)



(III-2) (III-3)



(III-3) (III)



(III) (I-1)

wherein R^1, R^2, X, Y, m and n are as defined above.

A phthalic anhydride of the general formula (V-1) is reacted with an aniline of the general formula (IV) in the presence of an inert solvent to obtain a phthalimide derivative of the general formula (III-2). The phthalimide derivative (III-2) is subjected to catalytic reduction with hydrogen after or without isolation to obtain a phthalimide derivative of the general formula (III-3). The phthalimide derivative (III-3) is converted to a phthalimide derivative of the general formula (III) by adding a diazotizing agent and then a metal salt after or without isolation of the phthalimide derivative (III-3). The phthalimide derivative (III) is reacted with an amine of the general formula (II) after or without being isolated, whereby a phthalic acid diamide derivative of the general formula (I-1) can be produced.

(1) General formula (V-1) → general formula (III-2)

The desired compound can be produced by this reaction in the same manner as in production process 1-(1).

(2) General formula (III-2) → general formula (III-3)

Any solvent may be used in this reaction so long as it does not markedly inhibit the progress of the reaction. There can be exemplified alcohols such as methanol, ethanol, propanol, etc.; acyclic or cyclic ethers such as diethyl ether, dioxane, tetrahydrofuran, etc., and acids such as acetic acid, etc. These inert solvents may be used alone or as a mixture thereof.

As the catalyst for catalytic reduction used in

this reaction, there can be exemplified palladium carbon, Raney nickel, palladium black, platinum black, etc. The amount of the catalyst used may be properly chosen in a range of 0.1 to 10% by weight based on the weight of the phthalimide derivative of the general formula (III-2). This reaction is carried out under a hydrogen atmosphere and the hydrogen pressure may be properly chosen in a range of 1 to 10 atmospheric pressure.

As to the reaction temperature, the reaction can be carried out in a temperature range of room temperature to the reflux temperature of the inert solvent used. Although the reaction time is varied depending on the scale of reaction, the reaction temperature, etc., it may be properly chosen in a range of several minutes to 48 hours.

After completion of the reaction, the desired compound is isolated from the reaction mixture containing the desired compound by a conventional method, and if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be produced. The desired compound can be subjected to the subsequent reaction without isolation from the reaction mixture.

(3) General formula (III-3) → general formula (III)

In this reaction, an acidic solvent can be used as an inert solvent. The acidic solvent includes, for example, an aqueous hydrochloric acid solution, an aqueous hydrobromic acid solution, an aqueous hydroiodic acid solution, an aqueous sulfuric acid solution, acetic acid and trifluoroacetic acid. These acidic solvents may be

used alone or as a mixture thereof. In addition, these acidic solvents may be used in admixture with ethers such as tetrahydrofuran, dioxane, etc.

The diazotizing agent includes, for example, sodium nitrite, nitrosyl hydrogensulfate and alkyl nitrites. The amount of the diazotizing agent used may be properly chosen in a range of equal amount to excess amount relative to the amount of the phthalimide derivative of the general formula (III-3).

As to the reaction temperature, the reaction can be carried out in a temperature range of -50℃ to the reflux temperature of the inert solvent used. Although the reaction time is varied depending on the scale of reaction, the reaction temperature, etc., it may be properly chosen in a range of several minutes to 48 hours.

As the metal salt added after the production of a diazonium salt, there can be used, for example, cuprous chloride, cuprous bromide, potassium iodide, copper cyanide, potassium xanthate and sodium thiorate. The amount of the metal salt used may be properly chosen in a range of 1 equivalent to excess equivalents per equivalent of the phthalimide derivative of the general formula (III-3).

After completion of the reaction, the desired compound is isolated from the reaction mixture containing the desired compound by a conventional method, and if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be produced.

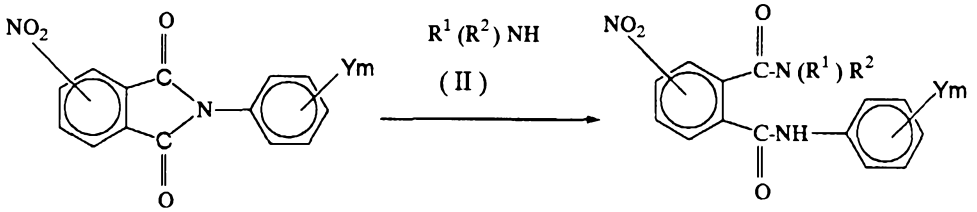
The desired compound can be subjected to the subsequent reaction without isolation from the reaction mixture.

The reaction can be carried out according to the method described in Org. Synth., IV, 160 (1963), Org. Synth., III, 809 (1959), J. Am. Chem. Soc., 92, 3520 (1970), etc.

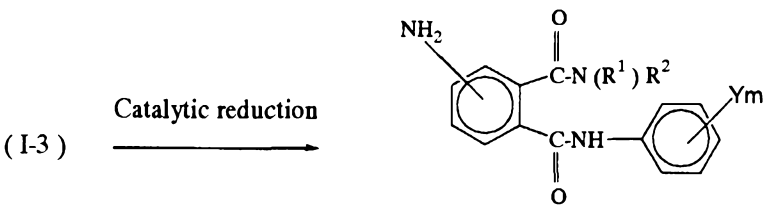
(4) General formula (III) → general formula (I-1)

The desired compound can be produced by this reaction in the same manner as in production process 1-(2).

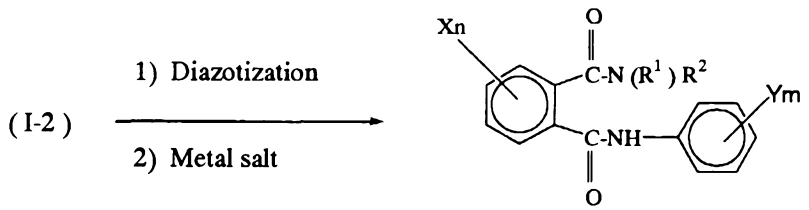
Production process 4.



(III-2) (I-3)



(I-2)



(I-1)

wherein R^1, R^2, X, Y, m and n are as defined above.

A phthalimide derivative of the general formula (III-2) is reacted with an amine of the general formula (II) in the presence of an inert solvent to obtain a phthalic acid diamide derivative of the general formula (I-3). The phthalic acid diamide derivative (I-3) is subjected to catalytic reduction with hydrogen after or without isolation to obtain a phthalic acid diamide derivative of the general formula (I-2). A phthalic acid diamide derivative of the general formula (I-1) can be produced from the phthalic acid diamide derivative (I-2) by adding a diazotizing agent and then a metal salt after or without isolating the phthalic acid diamide derivative (I-2).

(1) General formula (III-2) → general formula (I-3)

The desired compound can be produced by this reaction in the same manner as in production process 1-(2).

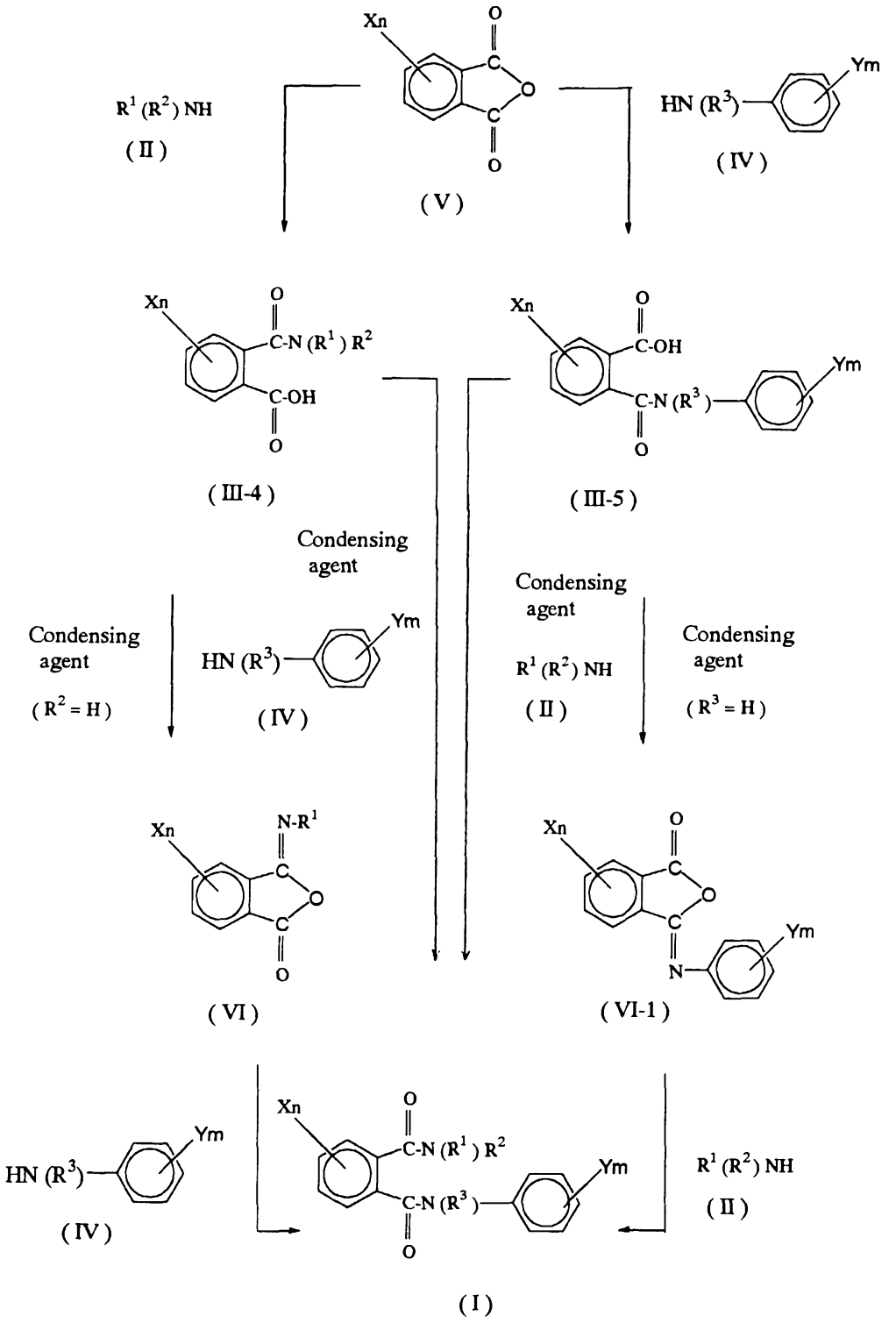
(2) General formula (I-3) → general formula (I-2)

The desired compound can be produced by this reaction in the same manner as in production process 3-(2).

(3) General formula (I-2) → general formula (I-1)

The desired compound can be produced by this reaction in the same manner as in production process 3-(3).

Production process 5.



wherein R^1, R^2, R^3, X, n, Y and m are as defined above.

A phthalic anhydride derivative of the general formula (V) is reacted with an amine of the general formula (II) in the presence of an inert solvent to obtain a phthalamide of the general formula (III-4). The phthalamide (III-4) is treated as follows after or without isolation. When R^2 of the phthalamide (III-4) is a hydrogen atom, the phthalamide (III-4) is condensed into a compound of the general formula (VI) in the presence of a condensing agent, and the compound (VI) is reacted with an aniline of the general formula (IV) in the presence of an inert solvent after or without being isolated. When R^2 of the phthalamide (III-4) is other than a hydrogen atom, the phthalamide (III-4) is condensed with an aniline of the general formula (IV) in the presence of a condensing agent. Thus, a phthalic acid diamide derivative of the general formula (I) can be produced.

Alternatively, a phthalic anhydride derivative of the general formula (V) is reacted with an aniline of the general formula (IV) in the presence of an inert solvent to obtain a phthalanilide of the general formula (III-5). The phthalanilide (III-5) is treated as follows after or without isolation. When R^3 of the phthalanilide (III-5) is a hydrogen atom, the phthalanilide (III-5) is condensed into a compound of the general formula (VI-1) in the presence of a condensing agent, and the compound (VI-1) is reacted with an amine of the general formula (II) in the presence of an inert solvent after or without being isolated. When R^3 of the phthalanilide (III-5) is other

than a hydrogen atom, the phthalanilide (III-5) is condensed with an amine of the general formula (II) in the presence of a condensing agent. Thus, a phthalic acid diamide derivative of the general formula (I) can be produced.

(1) General formula (V) or general formula (VI-1) → general formula (III-4) or general formula (I), respectively

The desired compound can be produced by this reaction in the same manner as in production process 1-(2).

(2) General formula (III-4) or general formula (III-5) → general formula (VI) or general formula (VI-1), respectively

The desired compound can be produced by this reaction according to the method described in J. Med. Chem., 10, 982 (1967).

(3) General formula (VI) or general formula (V) → general formula (I) or general formula (III-5), respectively

The desired compound can be produced by this reaction in the same manner as in production process 1-(2).

(4) General formula (III-4) or general formula (III-5) → general formula (I)

The desired compound can be produced by reacting the phthalamide derivative of the general formula (III-4) or the general formula (III-5) with the aniline of the general formula (IV) or the amine of the general formula (II), respectively, in the presence of a condensing agent and an inert solvent. If necessary, the reaction can be

carried out in the presence of a base.

The inert solvent used in the reaction includes, for example, tetrahydrofuran, diethyl ether, dioxane, chloroform and dichloromethane. As the condensing agent used in the reaction, any condensing agent may be used so long as it is used in usual amide synthesis. The condensing agent includes, for example, Mukaiyama reagent (e.g. 2-chloro-N-methylpyridinium iodide), 1,3-dicyclohexylcarbodiimide (DCC), carbonyldiimidazole (CDI) and diethyl phosphorocyanidate (DEPC). The amount of the condensing agent used may be properly chosen in a range of 1 mole to excess moles per mole of the phthalamide derivative of the general formula (III-4) or the general formula (III-5).

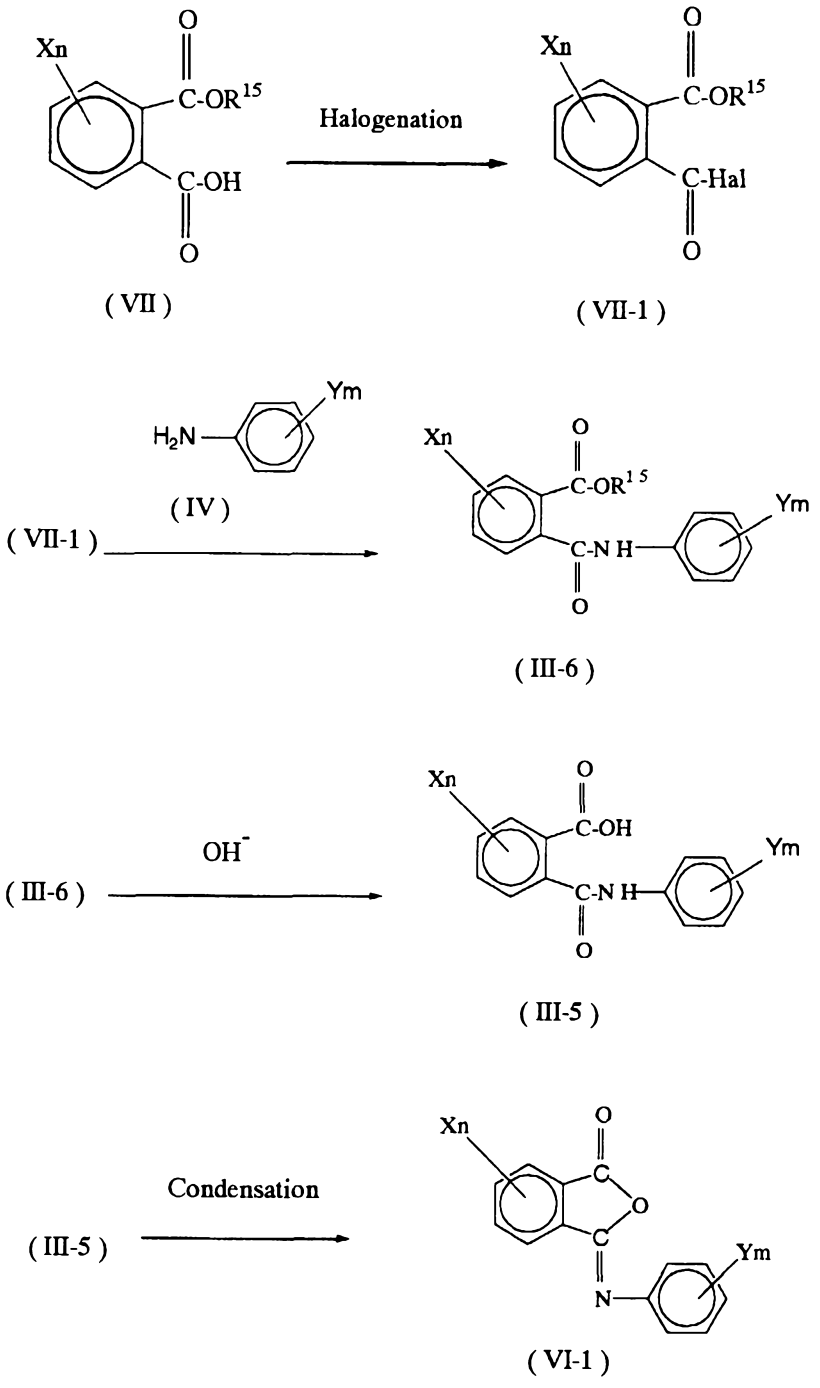
As the base usable in the reaction, there can be exemplified organic bases such as triethylamine, pyridine, etc. and inorganic bases such as potassium carbonate, etc. The amount of the base used may be properly chosen in a range of 1 mole to excess moles per mole of the phthalamide derivative of the general formula (III-4) or the general formula (III-5).

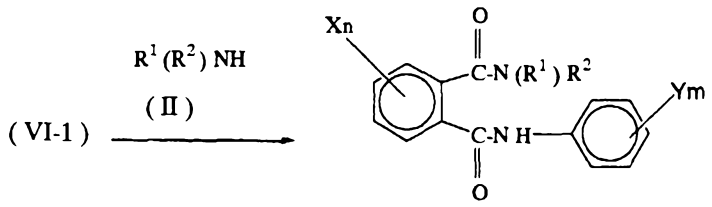
As to the reaction temperature, the reaction can be carried out in a temperature range of 0℃ to the boiling point of the inert solvent used. Although the reaction time is varied depending on the scale of reaction, the reaction temperature, etc., it ranges from several minutes to 48 hours.

After completion of the reaction, the desired compound is isolated from the reaction solution containing

the desired compound by a conventional method, and if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be produced.

Production process 6





(I-1)

wherein R^1, R^2, X, n, Y and m are as defined above, Hal is a halogen atom, and R^{15} is a (C_1-C_3)alkyl group.

A phthalic acid ester derivative of the general formula (VII) is halogenated into a phthaloyl halide of the general formula (VII-1) in the presence or absence of an inert solvent. The phthaloyl halide (VII-1) is reacted with an aniline of the general formula (IV) in the presence of an inert solvent and a base after or without being isolated, to obtain a phthalanilide of the general formula (III-6). The phthalanilide (III-6) is hydrolyzed into a phthalanilide of the general formula (III-5) in the presence or absence of an inert solvent after or without being isolated. The phthalanilide (III-5) is condensed into a phthalic anhydride derivative of the general formula (VI-1) after or without being isolated. The phthalic anhydride derivative (VI-1) is reacted with an amine of the general formula (II), whereby a phthalic acid diamide derivative of the general formula (I-1) can be produced.

(1) General formula (VII) → general formula (VII-1)

As the inert solvent usable in this reaction, any solvent may be used so long as it does not markedly inhibit the progress of the reaction. There can be exemplified

aromatic hydrocarbons such as benzene, toluene, xylene, etc.; halogenated hydrocarbons such as dichloromethane, chloroform, carbon tetrachloride, etc., chlorinated aromatic hydrocarbons such as chlorobenzene, dichlorobenzene, etc.; acyclic or cyclic ethers such as diethyl ether, dioxane, tetrahydrofuran, etc., and esters such as ethyl acetate, etc. These inert solvents may be used alone or as a mixture thereof.

As the halogenating agents, there can be used, for example, thionyl chloride, phosphoryl chloride, and phosphorus trichloride. The amount of the halogenating agent used may be properly chosen in a range of 1 to 10 equivalents per equivalent of the phthalic acid ester of the general formula (VII).

As to the reaction temperature, the reaction can be carried out in a temperature range of 0℃ to the reflux temperature of the inert solvent used. Although the reaction time is varied depending on the scale of reaction, the reaction temperature, etc., it may be properly chosen in a range of several minutes to 48 hours.

After completion of the reaction, the desired compound is isolated from the reaction solution containing the desired compound by a conventional method, and if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be produced. The desired compound can be subjected to the subsequent reaction without isolation from the reaction solution.

The phthalic acid ester of the general formula

(VII) can be produced, for example, by the process described in J. Med. Chem., 31, 1466 (1988).

(2) General formula (VII-1) → general formula (III-6)

As the inert solvent used in this reaction, there may be used, for example, the inert solvents exemplified in production process 1-(1).

As the base, an inorganic base or an organic base may be used. As the inorganic base, there may be used, for example, hydroxides of alkali metals, such as sodium hydroxide, potassium hydroxide, etc. As the organic base, there may be used triethylamine, pyridine, etc. The amount of the base used may be properly chosen in a range of 0.5 to 3 equivalents per equivalent of the phthaloyl halide of the general formula (VII-1).

Since the reaction is an equimolar reaction, it is sufficient that the reactants are used in equimolar amounts, though the amount of the aniline of the general formula (IV) used may be properly chosen in a range of 0.5 to 2 equivalents per equivalent of the phthaloyl halide of the general formula (VII-1).

As to the reaction temperature, the reaction can be carried out in a temperature range of 0°C to the reflux temperature of the inert solvent used. Although the reaction time is varied depending on the scale of reaction, the reaction temperature, etc., it may be properly chosen in a range of several minutes to 48 hours.

After completion of the reaction, the desired compound is isolated from the reaction solution containing

the desired compound by a conventional method, and if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be produced. The desired compound can be subjected to the subsequent reaction without isolation from the reaction solution.

(3) General formula (III-6) → general formula (III-5)

As the inert solvent usable in this reaction, there may be used water, alcohols (e.g. methanol, ethanol and propanol) as water-soluble solvents, and mixed solvents of water and a water-soluble solvent.

As the base used for the hydrolysis, there may be used, for example, hydroxides of alkali metals, such as sodium hydroxide, potassium hydroxide, etc. The amount of the base used may be properly chosen in a range of 1 to 10 equivalents per equivalent of the phthalanilide of the general formula (III-6).

As to the reaction temperature, the reaction can be carried out in a temperature range of 0℃ to the reflux temperature of the inert solvent used. Although the reaction time is varied depending on the scale of reaction, the reaction temperature, etc., it may be properly chosen in a range of several minutes to 48 hours.

After completion of the reaction, the desired compound is isolated from the reaction solution containing the desired compound by a conventional method, and if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be produced. The desired compound can be subjected to the subsequent

reaction without isolation from the reaction solution.

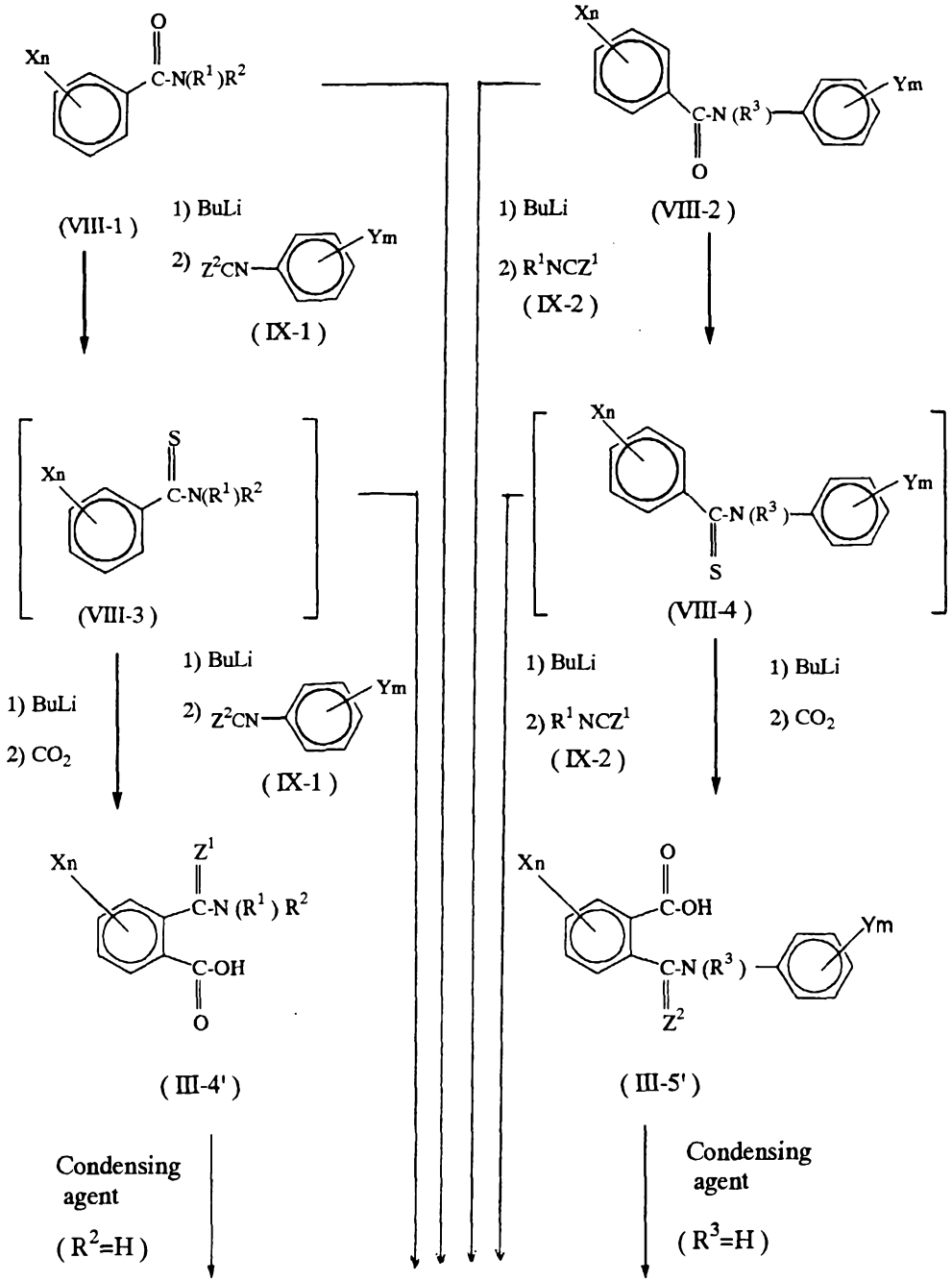
(4) General formula (III-5) → general formula (VI-1)

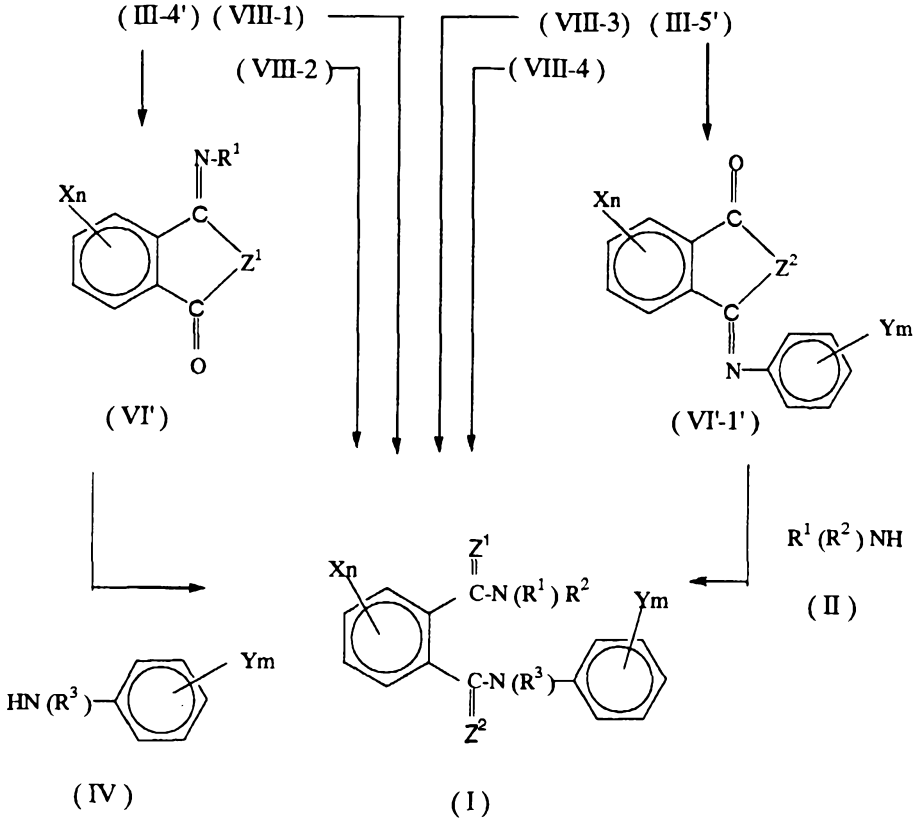
The desired compound can be produced by this reaction according to production process 5-(2).

(5) General formula (VI-1) → general formula (I-1)

The desired compound can be produced by this reaction according to production process 1-(2).

Production process 7.





wherein R^1, R^2, R^3, X, Y, m, n, Z^1 and Z^2 are as defined above.

A benzamide derivative of the general formula (VIII-1) or the general formula (VIII-2) or a thiobenzamide derivative of the general formula (VIII-3) or the general formula (VIII-4) obtained by thiocarbonylation of the benzamide derivative of the general formula (VIII-1) or the general formula (VIII-2), respectively, is subjected to ortho-metallation by using a metal reagent such as butyllithium. The compound thus obtained is directly reacted with an isocyanate or isothiocyanate derivative of the general formula (IX-1) or (IX-2), or the compound is reacted with carbon dioxide to obtain a phthalamide

derivative of the general formula (III-4') or the general formula (III-5'), which is treated in the same manner as in production processes 5-(1) to 5-(4). Thus, a phthalic acid diamide derivative of the general formula (I) can be produced.

(1) General formula (VIII-1) or general formula (VIII-2) → general formula (VIII-3) or general formula (VIII-4), respectively

The desired compound can be produced by this reaction according to the method described in J. Org. Chem., 46, 3558 (1981).

(2) General formula (VIII-1), general formula (VIII-2), general formula (VIII-3) or general formula (VIII-4) → general formula (I)

In this step, the benzamide derivative of the general formula (VIII-1) or the general formula (VIII-2) or the thiobenzamide derivative of the general formula (VIII-3) or the general formula (VIII-4) obtained by thiocarbonylation of the benzamide derivative of the general formula (VIII-1) or the general formula (VIII-2), respectively, is subjected to ortho-lithiation according to the method described in J. Org. Chem., 29, 853 (1964). The compound thus obtained is reacted with the isocyanate or isothiocyanate derivative of the general formula (IX-1) or (IX-2) at -80℃ to room temperature, whereby the desired compound can be produced.

After completion of the reaction, the desired compound is isolated from the reaction solution containing

the desired compound by a conventional method, and if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be obtained.

(3) General formula (VIII-1), general formula (VIII-2), general formula (VIII-3) or general formula (VIII-4) → general formula (III-4') or the general formula (III-5')

In this step, the desired compound can be produced by carrying out the same ortho-lithiation as in the above step (2) and introducing carbon dioxide into the ortho-lithiation product at -80℃ to room temperature.

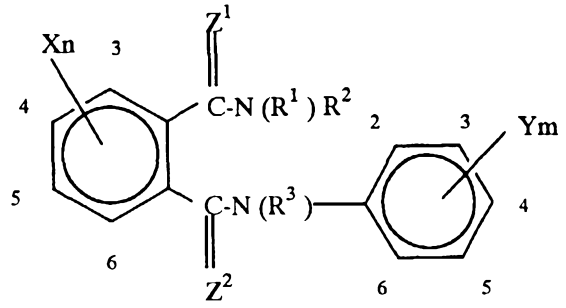
After completion of the reaction, the desired compound is isolated from the reaction solution containing the desired compound by a conventional method, and if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be obtained.

(4) General formula (III-4') or general formula (III-5') → general formula (I)

In this step, the desired compound can be produced in the same manner as in production process 1-(2) or 5-(4).

Tables 1 and 2 show typical examples of the phthalic acid diamide derivative of the general formula (I) used as the active ingredient of the agricultural and horticultural insecticide of the present invention, but the examples are not intended in any way to limit the scope of the present invention.

General formula (I):



(I)

[Table 1]

Table 1 (Z^1, Z^2 = O)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
1	H	H	H	3-NO_2	2-CH_3-5-Cl	173-175
2	CH_3	H	H	H	4-CF_3	129-131
3	CH_3	H	H	3-NO_2	2-CH_3-5-Cl	169-171
4	CH_3	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	167-169
5	CH_3	CH_3	H	6-NO_2	2-CH_3-5-Cl	171-173
6	CH_3	CH_3	H	6-NO_2	2-CH_3-4-$OCHF_2$	167-169
7	C_2H_5	H	H	H	4-CF_3	134-136
8	C_2H_5	H	H	3-Cl	2-CH_3-4-$OCHF_2$	179-180
9	C_2H_5	H	H	6-Cl	2-CH_3-4-$OCHF_2$	189-190
10	C_2H_5	H	H	3-NO_2	2-CH_3-5-Cl	175-177
11	C_2H_5	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	207-208

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
12	C_2H_5	C_2H_5	H	H	4-CF_3	148-150
13	C_2H_5	C_2H_5	H	3-NO_2	2-CH_3-5-Cl	175-177
14	n-C_3H_7	H	H	H	4-CF_3	138-140
15	n-C_3H_7	H	H	3-Cl	2-CH_3-4-$OCHF_2$	171-173
16	n-C_3H_7	H	H	6-Cl	2-CH_3-4-$OCHF_2$	189-191
17	n-C_3H_7	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	184-186
18	n-C_3H_7	H	H	3-NO_2	2-CH_3-5-Cl	187-189
19	n-C_3H_7	H	H	5-CF_3	2,6-$(C_2H_5)_2$	230-232
20	i-C_3H_7	H	H	H	H	192-194
21	i-C_3H_7	H	H	H	2-NO_2	198-200
22	i-C_3H_7	H	H	H	4-NO_2	139-141
23	i-C_3H_7	H	H	H	4-F	199-201
24	i-C_3H_7	H	H	H	2-CH_3	191-193
25	i-C_3H_7	H	H	H	4-CF_3	198-200
26	i-C_3H_7	H	H	H	3-CF_3	174-176
27	i-C_3H_7	H	H	H	4-$CF_2CF_2CF_3$	237-238
28	i-C_3H_7	H	H	H	4-$(CF_2)_3CF_3$	137-139
29	i-C_3H_7	H	H	H	4-OCF_3	155-157
30	i-C_3H_7	H	H	H	4-$OCF_2CHFOC_3F_7$-n	220-222
31	i-C_3H_7	H	H	H	3-SCF_3	176-178
32	i-C_3H_7	H	H	H	4-$SCHF_2$	169-170
33	i-C_3H_7	H	H	H	4-SCH_2CF_3	166-167
34	i-C_3H_7	H	H	H	4-SCF_2CHF_2	169-170

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
35	i-C_3H_7	H	H	H	4-$S(CF_2)_3CF_3$	159-161
36	i-C_3H_7	H	H	H	4-$SCF(CF_3)_2$	145-147
37	i-C_3H_7	H	H	H	4-SCF_2CBrF_2	158-160
38	i-C_3H_7	H	H	H	4-$SOCF_2CBrF_2$	180-182
39	i-C_3H_7	H	H	H	4-$SO(CF_2)_3CF_3$	192-193
40	i-C_3H_7	H	H	H	4-$SO_2CH_2CF_3$	169-170
41	i-C_3H_7	H	H	H	2,3-Cl_2	151-153
42	i-C_3H_7	H	H	H	2,4-Cl_2	162-164
43	i-C_3H_7	H	H	H	3,4-F_2	172-174
44	i-C_3H_7	H	H	H	2,4-$(CH_3)_2$	162-163
45	i-C_3H_7	H	H	H	2-Cl-4-CF_3	197-199
46	i-C_3H_7	H	H	H	2-Cl-4-$CF(CF_3)_2$	201-202
47	i-C_3H_7	H	H	H	2-Cl-4-OCF_3	151-153
48	i-C_3H_7	H	H	H	2-Br-4-OCF_3	146-147
49	i-C_3H_7	H	H	H	2-CH_3-3-Cl	196-198
50	i-C_3H_7	H	H	H	2-CH_3-4-Cl	180-182
51	i-C_3H_7	H	H	H	2-CH_3-5-Cl	161-162
52	i-C_3H_7	H	H	H	2-CH_3-4-Br	159-261
53	i-C_3H_7	H	H	H	2-CH_3-5-F	168-170
54	i-C_3H_7	H	H	H	2-CH_3-5-C_4H_9-t	203-204
55	i-C_3H_7	H	H	H	2-CH_3-4-CF_2CF_3	157-159
56	i-C_3H_7	H	H	H	2-CH_3-4-$CF_2CF_2CF_3$	177-178
57	i-C_3H_7	H	H	H	2-CH_3-4-$CF(CF_3)_2$	230-231

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
58	i-C_3H_7	H	H	H	2-CH_3-4-$OCHF_2$	135-137
59	i-C_3H_7	H	H	H	2-CH_3-4-OCF_3	172-173
60	i-C_3H_7	H	H	H	2-CH_3-4-OCF_2CHF_2	145-146
61	i-C_3H_7	H	H	H	2-CH_3-3-OCF_2CHClF	172-174
62	i-C_3H_7	H	H	H	2-CH_3-4-OCF_2CHClF	142-144
63	i-C_3H_7	H	H	H	2-CH_3-4-CF_2CBrF_2	164-166
64	i-C_3H_7	H	H	H	2-CH_3-4-CF_2CCl_2F	172-173
65	i-C_3H_7	H	H	H	2-CH_3-4-OCF_2CHFCF_3	151-152
66	i-C_3H_7	H	H	H	2-CH_3-4-$OCF_2CBrFCF_3$	163-164
67	i-C_3H_7	H	H	H	2-CH_3-4-$OCF_2CHFOCF_3$	146-148
68	i-C_3H_7	H	H	H	2-CH_3-4-SC_3H_7-i	178-180
69	i-C_3H_7	H	H	H	2-CH_3-4-OCH_2OCH_3	165-166
70	i-C_3H_7	H	H	H	2-CH_3-4-OCH_2SCH_3	160-162
71	i-C_3H_7	H	H	H	2-CH_3-4-$COOCH_3$	163-165
72	i-C_3H_7	H	H	H	2-CH_3-4-OCH_2COOCH_3	121-122
73	i-C_3H_7	H	H	H	2-CH_3-4-(F_5-PhO)	185-187
74	i-C_3H_7	H	H	H	2-CH_3-4-(3-CF_3-PhO)	150-152
75	i-C_3H_7	H	H	H	2-CH_3-4-(2-Cl-4-CF_3-PhO)	183-185
76	i-C_3H_7	H	H	H	2-CH_3-4-(4-Cl-Ph-CH_2O)	188-189
77	i-C_3H_7	H	H	H	2-CH_3-4-(4-Cl-PhS)	181-182
78	i-C_3H_7	H	H	H	2-CH_3-4-(5-CF_3-2-Pyi-O)	165-167
79	i-C_3H_7	H	H	H	2-CH_3-4-(3-Cl-5-CF_3-2-Pyi-O)	184-185

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
80	i-C_3H_7	H	H	H	4-(3-Cl-5-CF_3-2-Pyi-S)	173-175
81	i-C_3H_7	H	H	H	2-CH_3-4-P=O(OC_2H_5)$_2$	134-136
82	i-C_3H_7	H	H	H	2-CH_3-4-OP=S(OCH_3)$_2$	132-134
83	i-C_3H_7	H	H	H	2-CF_3-4-$OCHF_2$	147-149
84	i-C_3H_7	H	H	H	3,5-Cl_2-4-$OCHF_2$	183-185
85	i-C_3H_7	H	H	H	3-N=C(CF_3)-NH-4	217-218
86	i-C_3H_7	H	H	H	3-N=C(CF_3)-N(CH_3)-4	171-173
87	i-C_3H_7	H	H	3-Cl	4-C_4H_9-n	169-171
88	i-C_3H_7	H	H	3-Cl	4-C_4H_9-t	224-226
89	i-C_3H_7	H	H	3-Cl	4-$CF(CF_3)_2$	198-200
90	i-C_3H_7	H	H	3-Cl	4-$CF_2CF_2CF_3$	203-204
91	i-C_3H_7	H	H	3-Cl	4-$(CF_2)_3CF_3$	176-178
92	i-C_3H_7	H	H	3-Cl	4-$OCHF_2$	205-207
93	i-C_3H_7	H	H	3-Cl	4-$OCF_2CHFOC_3F_7$-n	169-171
94	i-C_3H_7	H	H	3-Cl	4-SCH_3	231-232
95	i-C_3H_7	H	H	6-Cl	4-SCH_3	193-195
96	i-C_3H_7	H	H	3-Cl	4-$SOCH_3$	178-182
97	i-C_3H_7	H	H	3-Cl	4-SO_2CH_3	208-210
98	i-C_3H_7	H	H	3-Cl	4-$SCHF_2$	220-222
99	i-C_3H_7	H	H	3-Cl	3-SCF_3	189-191
100	i-C_3H_7	H	H	3-Cl	3-$SOCF_3$	183-187
101	i-C_3H_7	H	H	3-Cl	4-SCH_2CF_3	191-193
102	i-C_3H_7	H	H	3-Cl	4-SCF_2CHF_2	198-200

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
103	i-C_3H_7	H	H	3-Cl	4-SCF_2CBrF_2	201-203
104	i-C_3H_7	H	H	3-Cl	4-$SCF(CF_3)_2$	221-223
105	i-C_3H_7	H	H	3-Cl	4-$S(CF_2)_3CF_3$	199-200
106	i-C_3H_7	H	H	3-Cl	4-$SOCF(CF_3)_2$	204-206
107	i-C_3H_7	H	H	3-Cl	4-$SO_2CH_2CF_3$	202-204
108	i-C_3H_7	H	H	3-Cl	4-$SO_2CF_2CHF_2$	227-230
109	i-C_3H_7	H	H	3-Cl	4-$COCH_3$	217-219
110	i-C_3H_7	H	H	3-Cl	4-Ph	215-217
111	i-C_3H_7	H	H	3-Cl	2,3-Cl_2	168-169
112	i-C_3H_7	H	H	3-Cl	2,4-Cl_2	190-192
113	i-C_3H_7	H	H	3-Cl	2,4-F_2	188-190
114	i-C_3H_7	H	H	3-Cl	2-Cl-4-F	172-173
115	i-C_3H_7	H	H	3-Cl	2-F-4-Cl	181-182
116	i-C_3H_7	H	H	3-Cl	2,3,4-F_3	174-176
117	i-C_3H_7	H	H	3-Cl	2,3-$(CH_3)_2$	187-189
118	i-C_3H_7	H	H	3-Cl	2-CH_3-3-Cl	200-202
119	i-C_3H_7	H	H	3-Cl	2-CH_3-4-Cl	213-215
120	i-C_3H_7	H	H	3-Cl	2-CH_3-5-Cl	183-185
121	i-C_3H_7	H	H	3-Cl	2-CH_3-4-Br	210-212
122	i-C_3H_7	H	H	3-Cl	2-CH_3-4-I	206-208
123	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OCH_3	191-192
124	i-C_3H_7	H	H	3-Cl	2,3-$(CH_3)_2$-4-OCH_3	208-210
125	i-C_3H_7	H	H	3-Cl	2-Cl-4-CF_3	156-157

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
126	i-C_3H_7	H	H	3-Cl	2-Cl-4-$CF(CF_3)_2$	204-206
127	i-C_3H_7	H	H	3-Cl	2-CH_3-4-CF_3	219-220
128	i-C_3H_7	H	H	3-Cl	2-CH_3-4-CF_2CF_3	199-200
129	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OCF_2CCl_3	169-171
130	i-C_3H_7	H	H	3-Cl	2-CH_3-4-$CF_2CF_2CF_3$	214-215
131	i-C_3H_7	H	H	3-Cl	2-CH_3-4-$CF(CF_3)_2$	220-222
132	i-C_3H_7	H	H	3-Cl	2-CH_3-4-$(CF_2)_3CF_3$	188-189
133	i-C_3H_7	H	H	3-Cl	2-CH_3-4-$(CF_2)_5CF_3$	161-163
134	i-C_3H_7	H	H	3-Cl	3-Cl-4-$OCHF_2$	197-199
135	i-C_3H_7	H	H	3-Cl	2-Cl-4-OCF_3	158-159
136	i-C_3H_7	H	H	3-Cl	2-Br-4-OCF_3	169-170
137	i-C_3H_7	H	H	3-Cl	3-F-4-$OCHF_2$	211-212
138	i-C_3H_7	H	H	3-Cl	2-CH_3-4-$OCHF_2$	193-195
139	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OCF_3	199-201
140	i-C_3H_7	H	H	3-Cl	2-CH_3-4-$OCBrF_2$	181-182
141	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OCF_2CHF_2	202-204
142	i-C_3H_7	H	H	3-Cl	2-CH_3-3-OCF_2CHClF	169-171
143	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OCF_2CHClF	194-196
144	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OCF_2CBrF_2	193-194
145	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OCF_2CCl_2F	202-203
146	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OCF_2CHFCF_3	186-187
147	i-C_3H_7	H	H	3-Cl	2-CH_3-4-$OCH_2CF_2CHF_2$	207-208
148	i-C_3H_7	H	H	3-Cl	2-CH_3-4-$OCF_2CBrFCF_3$	205-206

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
149	i-C_3H_7	H	H	3-Cl	2-CH_3-4-$OCF_2CHFOCF_3$	179-181
150	i-C_3H_7	H	H	3-Cl	2-CH_3-4-$OCHF_2$-5-Cl	191-192
151	i-C_3H_7	H	H	3-Cl	3,5-Cl_2-4-$OCHF_2$	205-207
152	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OCF_2CHF_2-5-Cl	211-212
153	i-C_3H_7	H	H	3-Cl	2-CH_3-4-SC_3H_7-i	189-191
154	i-C_3H_7	H	H	3-Cl	2-CH_3-4-$SCHF_2$	189-191
155	i-C_3H_7	H	H	3-Cl	2-CH_3-4-$SOCHF_2$	173-176
156	i-C_3H_7	H	H	3-Cl	2-CH_3-4-SO_2CHF_2	168-170
157	i-C_3H_7	H	H	3-Cl	2-CH_3-4-(F_5-PhO)	224-226
158	i-C_3H_7	H	H	3-Cl	2-CH_3-4-(5-CF_3-2-Pyi-O)	189-191
159	i-C_3H_7	H	H	3-Cl	2-CH_3-4-(3-Cl-5-CF_3-2-Pyi-O)	204-205
160	i-C_3H_7	H	H	3-Cl	4-(3-Cl-5-CF_3-2-Pyi-S)	213-215
161	i-C_3H_7	H	H	3-Cl	2-CH_3-4-P=O(OC_2H_5)$_2$	71-73
162	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OP=S(OCH_3)$_2$	168-170
163	i-C_3H_7	H	H	3-Cl	2-CF_3-4-$OCHF_2$	194-196
164	i-C_3H_7	H	H	3-Cl	3-CF_3-4-$OCHF_2$	208-209
165	i-C_3H_7	H	H	3-Cl	3-N=C(CF_3)-O-4	248-250
166	i-C_3H_7	H	H	3-Cl	3-N=C(CF_3)-NH-4	194-196
167	i-C_3H_7	H	H	3-Cl	3-N=C(CF_3)-N(CH_3)-4	225-227
168	i-C_3H_7	H	H	4-Cl	H	190-192
169	i-C_3H_7	H	H	4-Cl	4-F	213-215
170	i-C_3H_7	H	H	4-Cl	2-CH_3	208-210

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
171	i-C_3H_7	H	H	4-Cl	3-CF_3	196-198
172	i-C_3H_7	H	H	4-Cl	4-OCF_3	192-194
173	i-C_3H_7	H	H	4-Cl	2,4-Cl_2	174-176
174	i-C_3H_7	H	H	4-Cl	3,4-F_2	231-233
175	i-C_3H_7	H	H	4-Cl	2,3-Cl_2	186-188
176	i-C_3H_7	H	H	4-Cl	2-CH_3-3-Cl	203-205
177	i-C_3H_7	H	H	4-Cl	2-CH_3-4-Cl	206-208
178	i-C_3H_7	H	H	4-Cl	2-CH_3-5-Cl	207-208
179	i-C_3H_7	H	H	4-Cl	2-CH_3-5-F	229-231
180	i-C_3H_7	H	H	4-Cl	2-CH_3-4-$OCHF_2$	223-224
181	i-C_3H_7	H	H	5-Cl	H	186-188
182	i-C_3H_7	H	H	5-Cl	4-F	209-211
183	i-C_3H_7	H	H	5-Cl	2-CH_3	187-189
184	i-C_3H_7	H	H	5-Cl	3-CF_3	198-200
185	i-C_3H_7	H	H	5-Cl	4-OCF_3	180-182
186	i-C_3H_7	H	H	5-Cl	2,3-Cl_2	167-169
187	i-C_3H_7	H	H	5-Cl	2,4-Cl_2	165-167
188	i-C_3H_7	H	H	5-Cl	3,4-F_2	207-209
189	i-C_3H_7	H	H	5-Cl	2-CH_3-3-Cl	204-206
190	i-C_3H_7	H	H	5-Cl	2-CH_3-4-Cl	202-204
191	i-C_3H_7	H	H	5-Cl	2-CH_3-5-Cl	209-210
192	i-C_3H_7	H	H	5-Cl	2-CH_3-5-F	192-194
193	i-C_3H_7	H	H	5-Cl	2-CH_3-4-$OCHF_2$	188-189

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
194	i-C_3H_7	H	H	5-Cl	2,3,4-F_3	224-226
195	i-C_3H_7	H	H	6-Cl	4-C_4H_9-n	194-196
196	i-C_3H_7	H	H	6-Cl	4-C_4H_9-t	235-237
197	i-C_3H_7	H	H	6-Cl	4-$CF_2CF_2CF_3$	216-217
198	i-C_3H_7	H	H	6-Cl	4-$CF(CF_3)_2$	209-211
199	i-C_3H_7	H	H	6-Cl	4-$(CF_2)_3CF_3$	196-198
200	i-C_3H_7	H	H	6-Cl	4-$OCHF_2$	223-225
201	i-C_3H_7	H	H	6-Cl	4-$OCF_2CHFOC_3F_7$-n	205-207
202	i-C_3H_7	H	H	6-Cl	4-SCH_2CF_3	189-190
203	i-C_3H_7	H	H	6-Cl	4-SCF_2CHF_2	211-213
204	i-C_3H_7	H	H	6-Cl	4-$SCF(CF_3)_2$	250-252
205	i-C_3H_7	H	H	6-Cl	4-$S(CF_2)_3CF_3$	210-212
206	i-C_3H_7	H	H	6-Cl	3-$SOCF_3$	212-215
207	i-C_3H_7	H	H	6-Cl	4-$COCH_3$	230-232
208	i-C_3H_7	H	H	6-Cl	2,3-Cl_2	179-180
209	i-C_3H_7	H	H	6-Cl	2,4-Cl_2	199-200
210	i-C_3H_7	H	H	6-Cl	2,4-F_2	196-198
211	i-C_3H_7	H	H	6-Cl	2-Cl-4-F	196-197
212	i-C_3H_7	H	H	6-Cl	2-F-4-Cl	184-186
213	i-C_3H_7	H	H	6-Cl	2,3-$(CH_3)_2$	214-216
214	i-C_3H_7	H	H	6-Cl	2-CH_3-4-Cl	233-235
215	i-C_3H_7	H	H	6-Cl	2-CH_3-5-Cl	204-206
216	i-C_3H_7	H	H	6-Cl	2-CH_3-4-Br	242-244

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
217	i-C_3H_7	H	H	6-Cl	2-CH_3-4-I	236-238
218	i-C_3H_7	H	H	6-Cl	2-CH_3-4-OCH_3	195-197
219	i-C_3H_7	H	H	6-Cl	2,3-$(CH_3)_2$-4-OCH_3	242-244
220	i-C_3H_7	H	H	6-Cl	2-Cl-4-CF_3	171-172
221	i-C_3H_7	H	H	6-Cl	2-CH_3-4-CF_3	234-236
222	i-C_3H_7	H	H	6-Cl	2-CH_3-4-OCF_2CCl_3	169-171
223	i-C_3H_7	H	H	6-Cl	2-CH_3-4-CF_2CF_3	215-217
224	i-C_3H_7	H	H	6-Cl	2-CH_3-4-$CF(CF_3)_2$	238-240
225	i-C_3H_7	H	H	6-Cl	2-CH_3-4-$(CF_2)_3CF_3$	177-178
226	i-C_3H_7	H	H	6-Cl	2-CH_3-4-$(CF_2)_5CF_3$	167-169
227	i-C_3H_7	H	H	6-Cl	3,5-Cl_2-4-$OCHF_2$	196-198
228	i-C_3H_7	H	H	6-Cl	2-CH_3-4-OCF_2CCl_2F	218-220
229	i-C_3H_7	H	H	6-Cl	2-CH_3-4-OCF_2CBrF_2	214-215
230	i-C_3H_7	H	H	6-Cl	2-CH_3-4-$OCH_2CF_2CHF_2$	212-213
231	i-C_3H_7	H	H	6-Cl	2-Cl-4-$CF(CF_2)_2$	212-214
232	i-C_3H_7	H	H	6-Cl	3-Cl-4-$OCHF_2$	204-206
233	i-C_3H_7	H	H	6-Cl	3-F-4-$OCHF_2$	225-227
234	i-C_3H_7	H	H	6-Cl	2-Cl-4-OCF_3	161-162
235	i-C_3H_7	H	H	6-Cl	2-Br-4-OCF_3	188-189
236	i-C_3H_7	H	H	6-Cl	2-CH_3-4-$OCHF_2$	213-215
237	i-C_3H_7	H	H	6-Cl	2-CH_3-4-OCF_3	212-214
238	i-C_3H_7	H	H	6-Cl	2-CH_3-4-$OCBrF_2$	195-196
239	i-C_3H_7	H	H	6-Cl	2-CH_3-4-OCF_2CHF_2	199-201

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
240	i-C_3H_7	H	H	6-Cl	2-CH_3-3-OCF_2CHClF	195-197
241	i-C_3H_7	H	H	6-Cl	2-CH_3-4-OCF_2CHClF	204-213
242	i-C_3H_7	H	H	6-Cl	2-CH_3-4-OCF_2CHFCF_3	199-200
243	i-C_3H_7	H	H	6-Cl	2-CH_3-4-$OCF_2CBrFCF_3$	226-227
244	i-C_3H_7	H	H	6-Cl	2-CH_3-4-$OCF_2CHFOCF_3$	210-212
245	i-C_3H_7	H	H	6-Cl	2-CH_3-4-$OCHF_2$-5-Cl	234-235
246	i-C_3H_7	H	H	6-Cl	2-CH_3-4-OCF_2CHF_2-5-Cl	230-232
247	i-C_3H_7	H	H	6-Cl	2-CH_3-4-$SCHF_2$	199-201
248	i-C_3H_7	H	H	6-Cl	2-CH_3-4-(F_5-PhO)	243-245
249	i-C_3H_7	H	H	6-Cl	2-CH_3-4-(5-CF_3-2-Pyi-O)	116-120
250	i-C_3H_7	H	H	6-Cl	2-CH_3-4-(3-Cl-5-CF_3-2-Pyi-O)	219-221
251	i-C_3H_7	H	H	6-Cl	2-CH_3-4-$P=O(OC_2H_5)_2$	146-147
252	i-C_3H_7	H	H	6-Cl	2-CH_3-4-$OP=S(OCH_3)_2$	183-185
253	i-C_3H_7	H	H	6-Cl	2-CF_3-4-$OCHF_2$	234-236
254	i-C_3H_7	H	H	6-Cl	3-CF_3-4-$OCHF_2$	204-205
255	i-C_3H_7	H	H	6-Cl	3-N=C(CF_3)-O-4	270-272
256	i-C_3H_7	H	H	6-Cl	3-N=C(CF_3)-NH-4	213-215
257	i-C_3H_7	H	H	6-Cl	3-N=C(CF_3)-N(CH_3)-4	239-241
258	i-C_3H_7	H	H	3,6-Cl_2	2-CH_3-4-$OCHF_2$	221-222
259	i-C_3H_7	H	H	3,6-Cl_2	2-CH_3-4-Cl	234-235
260	i-C_3H_7	H	H	3,4,5,6-Cl_4	2-CH_3-4-Cl	265-266

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
261	i-C_3H_7	H	H	3-Br	4-CF_3	221-223
262	i-C_3H_7	H	H	3-Br	4-OCF_3	208-210
263	i-C_3H_7	H	H	3-Br	2,3-$(CH_3)_2$	248-250
264	i-C_3H_7	H	H	3-Br	2,4-$(CH_3)_2$	223-224
265	i-C_3H_7	H	H	3-Br	2,4,6-$(CH_3)_3$	254-255
266	i-C_3H_7	H	H	3-Br	2-CH_3-3-Cl	215-217
267	i-C_3H_7	H	H	3-Br	2-CH_3-4-Cl	176-178
268	i-C_3H_7	H	H	3-Br	2-CH_3-5-Cl	196-198
269	i-C_3H_7	H	H	3-Br	2,3-$(CH_3)_2$-4-Cl	222-224
270	i-C_3H_7	H	H	3-Br	2,4-$(CH_3)_2$-3-Cl	236-238
271	i-C_3H_7	H	H	3-Br	2-C_2H_5-4-Cl	205-207
272	i-C_3H_7	H	H	3-Br	2-CH_3-4-Br	220-222
273	i-C_3H_7	H	H	3-Br	2,3-$(CH_3)_2$-4-Br	200-202
274	i-C_3H_7	H	H	3-Br	2-CH_3-4-I	203-205
275	i-C_3H_7	H	H	3-Br	2-CH_3-4-F	223-224
276	i-C_3H_7	H	H	3-Br	2-Cl-4-CF_3	156-157
277	i-C_3H_7	H	H	3-Br	2-CH_3-4-CF_3	227-228
278	i-C_3H_7	H	H	3-Br	2-CH_3-4-CF_2CF_3	201-202
279	i-C_3H_7	H	H	3-Br	2-CH_3-4-$CF_2CF_2CF_3$	199-200
280	i-C_3H_7	H	H	3-Br	2-CH_3-4-$CF(CF_3)_2$	222-224
281	i-C_3H_7	H	H	3-Br	2-CH_3-4-$(CF_2)_3CF_3$	190-191
282	i-C_3H_7	H	H	3-Br	2-CH_3-4-OCH_3	199-200

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
283	i-C_3H_7	H	H	3-Br	2-CH_3-4-$OCH_2CF_2CHF_2$	206-207
284	i-C_3H_7	H	H	3-Br	2,4-$(CH_3)_2$-3-$OCHF_2$	187-189
285	i-C_3H_7	H	H	3-Br	2,3-$(CH_3)_2$-4-OCH_3	206-208
286	i-C_3H_7	H	H	3-Br	2-Cl-4-OCF_3	165-167
287	i-C_3H_7	H	H	3-Br	2-Br-4-OCF_3	179-180
288	i-C_3H_7	H	H	3-Br	2-CH_3-4-$OCHF_2$	205-207
289	i-C_3H_7	H	H	3-Br	2-CH_3-4-OCF_3	211-213
290	i-C_3H_7	H	H	3-Br	2-CH_3-4-$OCBrF_2$	178-180
291	i-C_3H_7	H	H	3-Br	2-CH_3-4-OCF_2CHFCF_3	196-197
292	i-C_3H_7	H	H	3-Br	2-CH_3-4-OCF_2CHClF	194-195
293	i-C_3H_7	H	H	3-Br	2-CH_3-4-OCF_2CHF_2	205-207
294	i-C_3H_7	H	H	3-Br	2-CH_3-3-Cl-4-$OCHF_2$	229-230
295	i-C_3H_7	H	H	3-Br	2,3-$(CH_3)_2$-4-$OCHF_2$	219-220
296	i-C_3H_7	H	H	3-Br	2-CH_3-4-SCH_3	215-217
297	i-C_3H_7	H	H	3-Br	2-CH_3-4-(3-CF_3-PhO)	156-158
298	i-C_3H_7	H	H	3-Br	2-CH_3-4-(3-Cl-5-CF_3-2-Pyi-O)	206-208
299	i-C_3H_7	H	H	3-Br	2-CH_3-4-(5-CF_3-2-Pyi-O)	182-184
300	i-C_3H_7	H	H	3-Br	-3-OCH_2O-4-	195-198
301	i-C_3H_7	H	H	6-Br	4-CF_3	190-192
302	i-C_3H_7	H	H	6-Br	4-OCF_3	210-212
303	i-C_3H_7	H	H	6-Br	2,3-$(CH_3)_2$	250-252

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
304	i-C_3H_7	H	H	6-Br	2,4,6-$(CH_3)_3$	272-274
305	i-C_3H_7	H	H	6-Br	2-CH_3-3-Cl	214-216
306	i-C_3H_7	H	H	6-Br	2-CH_3-4-Cl	198-200
307	i-C_3H_7	H	H	6-Br	2-CH_3-5-Cl	194-196
308	i-C_3H_7	H	H	6-Br	2,3-$(CH_3)_2$-4-Cl	227-229
309	i-C_3H_7	H	H	6-Br	2,4-$(CH_3)_2$-3-Cl	249-251
310	i-C_3H_7	H	H	6-Br	2-C_2H_5-4-Cl	243-245
311	i-C_3H_7	H	H	6-Br	2-CH_3-4-Br	227-228
312	i-C_3H_7	H	H	6-Br	2,3-$(CH_3)_2$-4-Br	209-211
313	i-C_3H_7	H	H	6-Br	2-CH_3-4-I	227-229
314	i-C_3H_7	H	H	6-Br	2-CH_3-4-F	231-232
315	i-C_3H_7	H	H	6-Br	2-Cl-4-CF_3	169-170
316	i-C_3H_7	H	H	6-Br	2-CH_3-4-CF_3	232-234
317	i-C_3H_7	H	H	6-Br	2-CH_3-4-$CF(CF_3)_2$	236-238
318	i-C_3H_7	H	H	6-Br	2-CH_3-4-$(CF_2)_3CF_3$	208-210
319	i-C_3H_7	H	H	6-Br	2-CH_3-4-$OCH_2CF_2CHF_2$	209-211
320	i-C_3H_7	H	H	6-Br	2,4-$(CH_3)_2$-3-$OCHF_2$	247-249
321	i-C_3H_7	H	H	6-Br	2,3-$(CH_3)_2$-4-OCH_3	250-252
322	i-C_3H_7	H	H	6-Br	2-CH_3-4-OCH_3	220-222
323	i-C_3H_7	H	H	6-Br	2-Cl-4-OCF_3	182-183
324	i-C_3H_7	H	H	6-Br	2-Br-4-OCF_3	195-196
325	i-C_3H_7	H	H	6-Br	2-CH_3-4-$OCHF_2$	225-226
326	i-C_3H_7	H	H	6-Br	2-CH_3-4-OCF_3	223-225

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
327	i-C_3H_7	H	H	6-Br	2-CH_3-4-$OCBrF_2$	194-196
328	i-C_3H_7	H	H	6-Br	2-CH_3-4-OCF_2CHFCF_3	212-213
329	i-C_3H_7	H	H	6-Br	2-CH_3-4-OCF_2CHClF	211-213
330	i-C_3H_7	H	H	6-Br	2-CH_3-4-OCF_2CHF_2	214-215
331	i-C_3H_7	H	H	6-Br	2,3-$(CH_3)_2$-4-$OCHF_2$	228-229
332	i-C_3H_7	H	H	6-Br	2-CH_3-3-Cl-4-$OCHF_2$	224-225
333	i-C_3H_7	H	H	6-Br	2-CH_3-4-SCH_3	215-217
334	i-C_3H_7	H	H	6-Br	2-CH_3-4-(3-CF_3-PhO)	194-195
335	i-C_3H_7	H	H	6-Br	2-CH_3-4-(5-CF_3--2-Pyi-O)	201-203
336	i-C_3H_7	H	H	6-Br	2-CH_3-4-(3-Cl-5-CF_3-2-Pyi-O)	234-236
337	i-C_3H_7	H	H	6-Br	-3-OCH_2O-4-	205-207
338	i-C_3H_7	H	H	3,4-Br_2	2-CH_3-4-$OCHF_2$	196-197
339	i-C_3H_7	H	H	3,4-Br_2	2-CH_3-4-Cl	199-201
340	i-C_3H_7	H	H	3,6-Br	2-CH_3-4-$OCHF_2$	233-234
341	i-C_3H_7	H	H	3,6-Br_2	2-CH_3-4-Cl	245-247
342	i-C_3H_7	H	H	5,6-Br_2	2-CH_3-4-$OCHF_2$	208-210
343	i-C_3H_7	H	H	5,6-Br_2	2-CH_3-4-Cl	259-261
344	i-C_3H_7	H	H	3,4,5,6-Br_4	2-CH_3-4-Cl	270-272
345	i-C_3H_7	H	H	3-I	4-Cl	230-232
346	i-C_3H_7	H	H	3-I	4-Br	251-253
347	i-C_3H_7	H	H	3-I	4-I	231-233

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
348	i-C_3H_7	H	H	3-I	3-CF_3	194-197
349	i-C_3H_7	H	H	3-I	4-CF_3	223-224
350	i-C_3H_7	H	H	3-I	4-$CF_2CF_2CF_3$	217-219
351	i-C_3H_7	H	H	3-I	4-$CF(CF_3)_2$	209-211
352	i-C_3H_7	H	H	3-I	4-OCF_3	222-223
353	i-C_3H_7	H	H	3-I	4-$OCF_2CHFOCF_3$	192-194
354	i-C_3H_7	H	H	3-I	4-$SCHF_2$	204-206
355	i-C_3H_7	H	H	3-I	4-SCH_2CF_3	195-197
356	i-C_3H_7	H	H	3-I	4-SCF_2CHF_2	196-198
357	i-C_3H_7	H	H	3-I	4-SCF_2CBrF_2	203-205
358	i-C_3H_7	H	H	3-I	4-$SCF(CF_3)_2$	170-172
359	i-C_3H_7	H	H	3-I	4-$S(CF_2)_3CF_3$	185-187
360	i-C_3H_7	H	H	3-I	3,4-F_2	227-229
361	i-C_3H_7	H	H	3-I	2-CH_3-3-Cl	222-224
362	i-C_3H_7	H	H	3-I	2-CH_3-4-Cl	215-217
363	i-C_3H_7	H	H	3-I	2-CH_3-5-Cl	210-212
364	i-C_3H_7	H	H	3-I	2,4-$(CH_3)_2$-3-Cl	226-228
365	i-C_3H_7	H	H	3-I	2,3-$(CH_3)_2$-4-Cl	235-237
366	i-C_3H_7	H	H	3-I	2-CH_3-4-Br	227-229
367	i-C_3H_7	H	H	3-I	2-CH_3-4-I	201-203
368	i-C_3H_7	H	H	3-I	2-CH_3-4-F	227-228
369	i-C_3H_7	H	H	3-I	2-Cl-4-CF_3	170-171
370	i-C_3H_7	H	H	3-I	2-CH_3-3-CF_3	179-181

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
371	i-C_3H_7	H	H	3-I	2-CH_3-4-CF_3	202-203
372	i-C_3H_7	H	H	3-I	2-CH_3-4-CF_2CF_3	195-196
373	i-C_3H_7	H	H	3-I	2-CH_3-4-$CF_2CF_2CF_3$	193-195
374	i-C_3H_7	H	H	3-I	2-CH_3-4-$CF(CF_3)_2$	211-213
375	i-C_3H_7	H	H	3-I	2-CH_3-4-$(CF_2)_3CF_3$	203-204
376	i-C_3H_7	H	H	3-I	2-CH_3-4-OCH_3	204-206
377	i-C_3H_7	H	H	3-I	2-CH_3-4-O-C_3H_7-i	209-211
378	i-C_3H_7	H	H	3-I	2,3-$(CH_3)_2$-4-OCH_3	220-222
379	i-C_3H_7	H	H	3-I	2-CH_3-4-OCH_2CF_3	223-224
380	i-C_3H_7	H	H	3-I	2-CH_3-4-OCF_2CBrF_2	228-230
381	i-C_3H_7	H	H	3-I	2-CH_3-4-OCF_2CCl_2F	230-231
382	i-C_3H_7	H	H	3-I	3-F-4-$OCHF_2$	208-210
383	i-C_3H_7	H	H	3-I	3,5-Cl_2-4-$OCHF_2$	234-236
384	i-C_3H_7	H	H	3-I	3-OCH_3-4-$OCHF_2$	196-198
385	i-C_3H_7	H	H	3-I	3,4-$(OCHF_2)_2$	171-172
386	i-C_3H_7	H	H	3-I	2-CH_3-4-OCF_3	214-216
387	i-C_3H_7	H	H	3-I	2-CH_3-4-$OCHF_2$	207-209
388	i-C_3H_7	H	H	3-I	2-CH_3-4-$OCH_2CF_2CHF_2$	229-231
389	i-C_3H_7	H	H	3-I	2-CH_3-4-$OCBrF_2$	181-182
390	i-C_3H_7	H	H	3-I	2-CH_3-4-OCF_2CHF_2	197-199
391	i-C_3H_7	H	H	3-I	2-CH_3-4-OCF_2CHF_2-5-Cl	198-200
392	i-C_3H_7	H	H	3-I	2-CH_3-4-OCF_2CHClF	200-201
393	i-C_3H_7	H	H	3-I	2-CH_3-4-OCF_2CHFCF_3	213-214

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
394	i-C_3H_7	H	H	3-I	2-CH_3-4-$OCF_2CBrFCF_3$	233-234
395	i-C_3H_7	H	H	3-I	2-CH_3-4-$OCF_2CHFOCF_3$	213-215
396	i-C_3H_7	H	H	3-I	2-CH_3-4-$OCHF_2$-5-Cl	230-232
397	i-C_3H_7	H	H	3-I	2-CH_3-4-(F_5-PhO)	245-247
398	i-C_3H_7	H	H	3-I	2-CH_3-4-(3-CF_3-PhO)	168-170
399	i-C_3H_7	H	H	3-I	2-CH_3-4-(5-CF_3-2-Pyi-O)	186-188
400	i-C_3H_7	H	H	3-I	2-CH_3-4-(3-Cl-5-CF_3-2-Pyi-O)	212-214
401	i-C_3H_7	H	H	3-I	2-CH_3-4-SO_2CH_3	172-175
402	i-C_3H_7	H	H	3-I	2-CH_3-4-SC_3H_7-i	190-192
403	i-C_3H_7	H	H	3-I	2-CH_3-4-$SCF_2CF_2CF_3$	227-228
404	i-C_3H_7	H	H	3-I	2-CH_3-4-(4-Cl-PhS)	191-192
405	i-C_3H_7	H	H	3-I	4-(3-Cl-5-CF_3-2-Pyi-S)	198-200
406	i-C_3H_7	H	H	3-I	2-Br-4-OCF_3	196-198
407	i-C_3H_7	H	H	3-I	2-Cl-4-$CF_2CF_2CF_3$	162-164
408	i-C_3H_7	H	H	3-I	2-Cl-4-OCF_3	173-175
409	i-C_3H_7	H	H	3-I	2-CF_3-4-$OCHF_2$	219-220
410	i-C_3H_7	H	H	3-I	3-CF_3-4-$OCHF_2$	128-130
411	i-C_3H_7	H	H	6-I	4-Cl	251-253
412	i-C_3H_7	H	H	6-I	4-Br	270-272
413	i-C_3H_7	H	H	6-I	4-I	242-244
414	i-C_3H_7	H	H	6-I	3-CF_3	210-212

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
415	i-C_3H_7	H	H	6-I	4-CF_3	201-202
416	i-C_3H_7	H	H	6-I	4-$CF(CF_3)_2$	238-240
417	i-C_3H_7	H	H	6-I	4-$CF_2CF_2CF_3$	238-240
418	i-C_3H_7	H	H	6-I	4-OCF_3	193-194
419	i-C_3H_7	H	H	6-I	4-$OCF_2CHFOC_3F_7$-n	213-214
420	i-C_3H_7	H	H	6-I	4-SCH_2CF_3	217-219
421	i-C_3H_7	H	H	6-I	4-$SCHF_2$	224-226
422	i-C_3H_7	H	H	6-I	4-SCF_2CHF_2	213-215
423	i-C_3H_7	H	H	6-I	4-SCF_2CBrF_2	220-222
424	i-C_3H_7	H	H	6-I	4-$SCF_2CF_2CF_3$	196-197
425	i-C_3H_7	H	H	6-I	4-$SCF(CF_3)_2$	216-218
426	i-C_3H_7	H	H	6-I	4-$S(CF_2)_3CF_3$	201-203
427	i-C_3H_7	H	H	6-I	2-CH_3-3-Cl	252-254
428	i-C_3H_7	H	H	6-I	2-CH_3-4-Cl	244-246
429	i-C_3H_7	H	H	6-I	2,4-$(CH_3)_2$-3-Cl	260-262
430	i-C_3H_7	H	H	6-I	2-CH_3-4-Br	241-243
431	i-C_3H_7	H	H	6-I	2-CH_3-4-I	213-215
432	i-C_3H_7	H	H	6-I	2-CH_3-4-F	251-252
433	i-C_3H_7	H	H	6-I	2-Cl-4-CF_3	195-196
434	i-C_3H_7	H	H	6-I	2,3-$(CH_3)_2$-4-Cl	253-255
435	i-C_3H_7	H	H	6-I	2-CH_3-3-CF_3	245-251
436	i-C_3H_7	H	H	6-I	2-CH_3-4-CF_3	220-221
437	i-C_3H_7	H	H	6-I	2-CH_3-4-CF_2CF_3	203-205

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
438	i-C_3H_7	H	H	6-I	2-CH_3-4-$CF_2CF_2CF_3$	154-156
439	i-C_3H_7	H	H	6-I	2-CH_3-4-$CF(CF_3)_2$	237-239
440	i-C_3H_7	H	H	6-I	2-CH_3-4-$(CF_2)_3CF_3$	168-170
441	i-C_3H_7	H	H	6-I	2-CH_3-4-OCH_3	215-217
442	i-C_3H_7	H	H	6-I	2-CH_3-4-O-C_3H_7-i	212-214
443	i-C_3H_7	H	H	6-I	2-CH_3-4-OCH_2CF_3	233-234
444	i-C_3H_7	H	H	6-I	2-CH_3-4-OCF_2CBrF_2	242-244
445	i-C_3H_7	H	H	6-I	2-CH_3-4-OCF_2CCl_2F	251-253
446	i-C_3H_7	H	H	6-I	2-CH_3-4-$OCF_2CBrFCF_3$	251-253
447	i-C_3H_7	H	H	6-I	2-CH_3-4-$OCH_2CF_2CHF_2$	235-237
448	i-C_3H_7	H	H	6-I	3-F-4-$OCHF_2$	214-216
449	i-C_3H_7	H	H	6-I	3,5-Cl_2-4-$OCHF_2$	211-213
450	i-C_3H_7	H	H	6-I	3-OCH_3-4-$OCHF_2$	215-217
451	i-C_3H_7	H	H	6-I	2,3-$(CH_3)_2$-4-OCH_3	253-254
452	i-C_3H_7	H	H	6-I	2-CH_3-4-$OCBrF_2$	192-194
453	i-C_3H_7	H	H	6-I	2-CH_3-4-OCF_2CHF_2	216-218
454	i-C_3H_7	H	H	6-I	2-CH_3-4-OCF_2CHF_2-5-Cl	230-232
455	i-C_3H_7	H	H	6-I	2-CH_3-4-OCF_2CHClF	205-207
456	i-C_3H_7	H	H	6-I	2-CH_3-4-OCF_2CHFCF_3	222-223
457	i-C_3H_7	H	H	6-I	2-CH_3-4-$OCF_2CHFOCF_3$	258-260
458	i-C_3H_7	H	H	6-I	2-CH_3-4-(3-CF_3-PhO)	198-199
459	i-C_3H_7	H	H	6-I	2-CH_3-4-(F_5-PhO)	262-264
460	i-C_3H_7	H	H	6-I	2-CH_3-4-(5-CF_3-2-Pyi-O)	245-246

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
461	i-C_3H_7	H	H	6-I	2-CH_3-4-(3-Cl-5-CF_3-2-Pyi-O)	231-232
462	i-C_3H_7	H	H	6-I	2-CH_3-4-SC_3H_7-i	197-199
463	i-C_3H_7	H	H	6-I	2-CH_3-4-(4-Cl-PhS)	211-213
464	i-C_3H_7	H	H	6-I	2-CH_3-4-OCF_3	230-232
465	i-C_3H_7	H	H	6-I	2-CF_3-4-$OCHF_2$	238-239
466	i-C_3H_7	H	H	6-I	2-Br-4-OCF_3	215-217
467	i-C_3H_7	H	H	6-I	2-Cl-4-OCF_3	186-188
468	i-C_3H_7	H	H	6-I	2-Cl-4-$CF_2CF_2CF_3$	199-200
469	i-C_3H_7	H	H	6-I	2-CH_3-4-$OCHF_2$	226-228
470	i-C_3H_7	H	H	6-I	2-CH_3-4-$OCHF_2$-5-Cl	239-240
471	i-C_3H_7	H	H	6-I	3-CF_3-4-$OCHF_2$	238-239
472	i-C_3H_7	H	H	3-F	4-$(CF_2)_3CF_3$	187-188
473	i-C_3H_7	H	H	3-F	4-$CF_2CF_2CF_3$	182-183
474	i-C_3H_7	H	H	3-F	4-$CF(CF_3)_2$	206-208
475	i-C_3H_7	H	H	3-F	4-OCF_3	197-199
476	i-C_3H_7	H	H	3-F	4-$OCF_2CHFOC_3F_7$-n	142-144
477	i-C_3H_7	H	H	3-F	4-$SCHF_2$	190-192
478	i-C_3H_7	H	H	3-F	4-SCH_2CF_3	157-158
479	i-C_3H_7	H	H	3-F	4-SCF_2CHF_2	177-178
480	i-C_3H_7	H	H	3-F	4-SCF_2CBrF_2	197-199
481	i-C_3H_7	H	H	3-F	4-$SCF(CF_3)_2$	206-208
482	i-C_3H_7	H	H	3-F	4-$S(CF_2)_3CF_3$	173-174

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
483	i-C_3H_7	H	H	3-F	4-$SOCH_2CF_3$	115-119
484	i-C_3H_7	H	H	3-F	4-$SOCF_2CBrF_2$	181-182
485	i-C_3H_7	H	H	3-F	4-$SOCF(CF_3)_2$	195-197
486	i-C_3H_7	H	H	3-F	4-$SO(CF_2)_3CF_3$	175-176
487	i-C_3H_7	H	H	3-F	4-$SO_2CH_2CF_3$	199-202
488	i-C_3H_7	H	H	3-F	2,3-Cl_2	175-177
489	i-C_3H_7	H	H	3-F	2-CH_3-3-Cl	193-194
490	i-C_3H_7	H	H	3-F	2-CH_3-4-Cl	192-194
491	i-C_3H_7	H	H	3-F	2-CH_3-5-Cl	191-193
492	i-C_3H_7	H	H	3-F	2-CH_3-4-I	192-194
493	i-C_3H_7	H	H	3-F	2-CH_3-5-F	175-177
494	i-C_3H_7	H	H	3-F	2-CH_3-3-F	187-189
495	i-C_3H_7	H	H	3-F	2-CH_3-4-CF_2CF_3	213-214
496	i-C_3H_7	H	H	3-F	2-CH_3-4-$CF_2CF_2CF_3$	191-192
497	i-C_3H_7	H	H	3-F	2-CH_3-4-$CF(CF_3)_2$	241-243
498	i-C_3H_7	H	H	3-F	2-CH_3-4-$(CF_2)_3CF_3$	138-139
499	i-C_3H_7	H	H	3-F	2-CH_3-3-$OCHF_2$	172-174
500	i-C_3H_7	H	H	3-F	2-CH_3-4-$OCHF_2$	160-162
501	i-C_3H_7	H	H	3-F	2-CH_3-4-OCF_2CCl_3	162-163
502	i-C_3H_7	H	H	3-F	2-CH_3-4-OCF_2CCl_2F	207-208
503	i-C_3H_7	H	H	3-F	2-CH_3-4-OCF_2CBrF_2	196-197
504	i-C_3H_7	H	H	3-F	2-Cl-4-CF_3	169-170
505	i-C_3H_7	H	H	3-F	2-Cl-4-$CF_2CF_2CF_3$	169-170

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
506	i-C_3H_7	H	H	3-F	3,5-Cl_2-4-$OCHF_2$	201-202
507	i-C_3H_7	H	H	3-F	2-Cl-4-$CF(CF_3)_2$	223-225
508	i-C_3H_7	H	H	3-F	2-Cl-4-OCF_3	169-170
509	i-C_3H_7	H	H	3-F	2-Br-4-OCF_3	164-165
510	i-C_3H_7	H	H	3-F	2-CH_3-4-OCF_3	183-184
511	i-C_3H_7	H	H	3-F	2-CH_3-4-$OCBrF_2$	177-178
512	i-C_3H_7	H	H	3-F	2-CH_3-4-OCF_2CHF_2	172-173
513	i-C_3H_7	H	H	3-F	2-CH_3-4-OCF_2CHClF	168-169
514	i-C_3H_7	H	H	3-F	2-CH_3-4-OCF_2CHFCF_3	160-162
515	i-C_3H_7	H	H	3-F	2-CH_3-4-$OCF_2CHFOCF_3$	148-150
516	i-C_3H_7	H	H	3-F	2-CH_3-4-$OCF_2CBrFCF_3$	148-150
517	i-C_3H_7	H	H	3-F	2-CH_3-4-$OCHF_2$-5-Cl	187-188
518	i-C_3H_7	H	H	3-F	2-CH_3-4-SC_3H_7-i	165-167
519	i-C_3H_7	H	H	3-F	2-CH_3-4-(3-CF_3-PhO)	135-136
520	i-C_3H_7	H	H	3-F	2-CH_3-4-(F_5-PhO)	206-207
521	i-C_3H_7	H	H	3-F	2-CH_3-4-(2-Cl-4-CF_3-PhO)	215-217
522	i-C_3H_7	H	H	3-F	2-CH_3-4-(4-Cl-PhS)	176-178
523	i-C_3H_7	H	H	3-F	2-CH_3-4-(5-CF_3-2-Pyi-O)	175-176
524	i-C_3H_7	H	H	3-F	2-CH_3-4-(3-Cl-5-CF_3-2-Pyi-O)	188-190
525	i-C_3H_7	H	H	3-F	4-(3-Cl-5-CF_3-2-Pyi-S)	213-215
526	i-C_3H_7	H	H	3-F	2-CH_3-4-$OP=S(OCH_3)_2$	175-177

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
527	i-C_3H_7	H	H	3-F	2-CF_3-4-$OCHF_2$	180-182
528	i-C_3H_7	H	H	3-F	-3-OCH_2O-4-	197-199
529	i-C_3H_7	H	H	4-F	2-CH_3-4-Cl	217-218
530	i-C_3H_7	H	H	4-F	2-CH_3-5-Cl	202-203
531	i-C_3H_7	H	H	4-F	2-CH_3-4-$OCHF_2$	191-193
532	i-C_3H_7	H	H	5-F	2-CH_3-4-Cl	197-198
533	i-C_3H_7	H	H	5-F	2-CH_3-4-$CF_2CF_2CF_3$	213-215
534	i-C_3H_7	H	H	5-F	2-CH_3-4-$OCHF_2$	181-182
535	i-C_3H_7	H	H	6-F	4-$CF_2CF_2CF_3$	201-202
536	i-C_3H_7	H	H	6-F	4-$(CF_2)_3CF_3$	156-158
537	i-C_3H_7	H	H	6-F	4-OCF_3	212-214
538	i-C_3H_7	H	H	6-F	4-$OCF_2CHFOC_3F_7$-n	178-180
539	i-C_3H_7	H	H	6-F	4-SCH_2CF_3	176-178
540	i-C_3H_7	H	H	6-F	4-SCF_2CHF_2	230-232
541	i-C_3H_7	H	H	6-F	4-$SCF(CF_3)_2$	218-220
542	i-C_3H_7	H	H	6-F	4-$S(CF_2)_3CF_3$	178-181
543	i-C_3H_7	H	H	6-F	2,3-Cl_2	158-160
544	i-C_3H_7	H	H	6-F	2-CH_3-3-Cl	182-184
545	i-C_3H_7	H	H	6-F	2-CH_3-4-Cl	204-206
546	i-C_3H_7	H	H	6-F	2-CH_3-5-Cl	196-199
547	i-C_3H_7	H	H	6-F	2-CH_3-4-I	213-215
548	i-C_3H_7	H	H	6-F	2-CH_3-3-F	165-167
549	i-C_3H_7	H	H	6-F	2-CH_3-5-F	181-183

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
550	i-C_3H_7	H	H	6-F	2-Cl-4-CF_3	190-191
551	i-C_3H_7	H	H	6-F	2-CH_3-4-CF_2CF_3	222-223
552	i-C_3H_7	H	H	6-F	2-CH_3-4-OCF_2CCl_3	184-185
553	i-C_3H_7	H	H	6-F	2-CH_3-4-OCF_2CCl_2F	214-215
554	i-C_3H_7	H	H	6-F	2-CH_3-4-OCF_2CBrF_2	208-210
555	i-C_3H_7	H	H	6-F	2-CH_3-4-$CF_2CF_2CF_3$	168-170
556	i-C_3H_7	H	H	6-F	2-CH_3-4-$CF(CF_3)_2$	255-257
557	i-C_3H_7	H	H	6-F	2-CH_3-4-$(CF_2)_3CF_3$	157-159
558	i-C_3H_7	H	H	6-F	2-CH_3-3-$OCHF_2$	177-179
559	i-C_3H_7	H	H	6-F	2-CH_3-4-$OCHF_2$	176-178
560	i-C_3H_7	H	H	6-F	3,5-Cl_2-4-$OCHF_2$	198-200
561	i-C_3H_7	H	H	6-F	2-Cl-4-$CF(CF_3)_2$	241-243
562	i-C_3H_7	H	H	6-F	2-Cl-4-OCF_3	171-172
563	i-C_3H_7	H	H	6-F	2-Br-4-OCF_3	181-182
564	i-C_3H_7	H	H	6-F	2-CH_3-4-OCF_3	193-195
565	i-C_3H_7	H	H	6-F	2-CH_3-4-$OCBrF_2$	181-183
566	i-C_3H_7	H	H	6-F	2-CH_3-4-OCF_2CHF_2	185-187
567	i-C_3H_7	H	H	6-F	2-CH_3-4-OCF_2CHClF	175-176
568	i-C_3H_7	H	H	6-F	2-CH_3-4-OCF_2CHFCF_3	176-178
569	i-C_3H_7	H	H	6-F	2-CH_3-4-$OCF_2CBrFCF_3$	217-219
570	i-C_3H_7	H	H	6-F	2-CH_3-4-$OCF_2CHFOCF_3$	183-185
571	i-C_3H_7	H	H	6-F	2-CH_3-4-$OCHF_2$-5-Cl	209-211
572	i-C_3H_7	H	H	6-F	2-CH_3-4-(3-CF_3-PhO)	184-185

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
573	i-C_3H_7	H	H	6-F	2-CH_3-4-(F_5-PhO)	227-228
574	i-C_3H_7	H	H	6-F	2-CH_3-4-(2-Cl-4-CF_3-PhO)	220-222
575	i-C_3H_7	H	H	6-F	2-CH_3-4-(4-Cl-PhS)	190-193
576	i-C_3H_7	H	H	6-F	2-CH_3-4-(5-CF_3-2-Pyi-O)	206-207
577	i-C_3H_7	H	H	6-F	2-CH_3-4-(3-Cl-5-CF_3-2-Pyi-O)	177-179
578	i-C_3H_7	H	H	6-F	2-CH_3-4-OP=S(OCH_3)$_2$	188-190
579	i-C_3H_7	H	H	6-F	2-CF_3-4-$OCHF_2$	223-225
580	i-C_3H_7	H	H	6-F	-3-OCH_2O-4-	201-203
581	i-C_3H_7	H	H	3,6-F_2	2-CH_3-4-$OCHF_2$	203-204
582	i-C_3H_7	H	H	3,6-F_2	2-CH_3-4-Cl	221-222
583	i-C_3H_7	H	H	3,4,5,6-F_4	2-CH_3-5-Cl	189-191
584	i-C_3H_7	H	H	3-NO_2	2,3-Cl_2	201-203
585	i-C_3H_7	H	H	3-NO_2	H	236-238
586	i-C_3H_7	H	H	3-NO_2	2-Cl	190-192

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
587	i-C_3H_7	H	H	3-NO_2	3-Cl	227-229
588	i-C_3H_7	H	H	3-NO_2	4-Cl	238-240
589	i-C_3H_7	H	H	3-NO_2	2-Br	170-172
590	i-C_3H_7	H	H	3-NO_2	3-Br	196-198
591	i-C_3H_7	H	H	3-NO_2	4-Br	205-207
592	i-C_3H_7	H	H	3-NO_2	2-F	199-201
593	i-C_3H_7	H	H	3-NO_2	3-F	228-230
594	i-C_3H_7	H	H	3-NO_2	4-F	250-252
595	i-C_3H_7	H	H	3-NO_2	4-I	187-189
596	i-C_3H_7	H	H	3-NO_2	4-NO_2	201-203
597	i-C_3H_7	H	H	3-NO_2	3-CN	220-222
598	i-C_3H_7	H	H	3-NO_2	4-CN	226-228
599	i-C_3H_7	H	H	3-NO_2	2-CH_3	227-228
600	i-C_3H_7	H	H	3-NO_2	3-CH_3	195-197
601	i-C_3H_7	H	H	3-NO_2	4-CH_3	196-198
602	i-C_3H_7	H	H	3-NO_2	2-C_2H_5	189-191
603	i-C_3H_7	H	H	3-NO_2	2-C_3H_7-i	190-192
604	i-C_3H_7	H	H	3-NO_2	4-C_3H_7-i	221-223
605	i-C_3H_7	H	H	3-NO_2	4-C_4H_9-n	193-195
606	i-C_3H_7	H	H	3-NO_2	4-CF_3	192-194
607	i-C_3H_7	H	H	3-NO_2	3-CF_3	220-222
608	i-C_3H_7	H	H	3-NO_2	2-CF_3	215-217
609	i-C_3H_7	H	H	3-NO_2	4-$CF_2CF_2CF_3$	184-185

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
610	i-C_3H_7	H	H	3-NO_2	4-$CF(CF_3)_2$	243-244
611	i-C_3H_7	H	H	3-NO_2	4-$(CF_2)_3CF_3$	220-221
612	i-C_3H_7	H	H	3-NO_2	2-OCH_3	172-174
613	i-C_3H_7	H	H	3-NO_2	3-OCH_3	201-203
614	i-C_3H_7	H	H	3-NO_2	4-OCH_3	221-223
615	i-C_3H_7	H	H	3-NO_2	3-O-C_3H_7-i	198-200
616	i-C_3H_7	H	H	3-NO_2	3-$OCHF_2$	188-190
617	i-C_3H_7	H	H	3-NO_2	4-$OCHF_2$	222-224
618	i-C_3H_7	H	H	3-NO_2	4-OCF_3	234-236
619	i-C_3H_7	H	H	3-NO_2	4-$OCF_2CHFOC_3F_7$-n	138-140
620	i-C_3H_7	H	H	3-NO_2	4-$COOCH_3$	192-194
621	i-C_3H_7	H	H	3-NO_2	3-SCH_3	205-207
622	i-C_3H_7	H	H	3-NO_2	2-SCH_3	201-203
623	i-C_3H_7	H	H	3-NO_2	3-SCF_3	203-205
624	i-C_3H_7	H	H	3-NO_2	4-SCH_2CF_3	155-156
625	i-C_3H_7	H	H	3-NO_2	4-$SCHF_2$	183-185
626	i-C_3H_7	H	H	3-NO_2	4-SCF_2CHF_2	235-237
627	i-C_3H_7	H	H	3-NO_2	4-SCF_2CF_3	190-192
628	i-C_3H_7	H	H	3-NO_2	4-SCF_2CBrF_2	228-230
629	i-C_3H_7	H	H	3-NO_2	4-$SCF(CF_3)_2$	242-243
630	i-C_3H_7	H	H	3-NO_2	4-$S(CF_2)_3CF_3$	229-230
631	i-C_3H_7	H	H	3-NO_2	4-$SO(CF_2)_3CF_3$	190-193
632	i-C_3H_7	H	H	3-NO_2	4-O-Ph	228-230

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
633	i-C_3H_7	H	H	3-NO_2	2,4-Cl_2	202-204
634	i-C_3H_7	H	H	3-NO_2	2,5-Cl_2	230-232
635	i-C_3H_7	H	H	3-NO_2	2,6-Cl_2	210-212
636	i-C_3H_7	H	H	3-NO_2	3,4-Cl_2	227-229
637	i-C_3H_7	H	H	3-NO_2	3,5-Cl_2	194-196
638	i-C_3H_7	H	H	3-NO_2	2,3-F_2	184-186
639	i-C_3H_7	H	H	3-NO_2	2,4-F_2	210-212
640	i-C_3H_7	H	H	3-NO_2	2,5-F_2	191-193
641	i-C_3H_7	H	H	3-NO_2	2,6-F_2	173-175
642	i-C_3H_7	H	H	3-NO_2	3,4-F_2	241-243
643	i-C_3H_7	H	H	3-NO_2	3-Cl-4-F	203-205
644	i-C_3H_7	H	H	3-NO_2	2,3,4-Cl_3	203-205
645	i-C_3H_7	H	H	3-NO_2	2,3,4-F_3	202-204
646	i-C_3H_7	H	H	3-NO_2	2,3,4,5,6-F_5	192-194
647	i-C_3H_7	H	H	3-NO_2	2,3-$(CH_3)_2$	200-202
648	i-C_3H_7	H	H	3-NO_2	2,4-$(CH_3)_2$	201-203
649	i-C_3H_7	H	H	3-NO_2	2,5-$(CH_3)_2$	221-223
650	i-C_3H_7	H	H	3-NO_2	2,6-$(CH_3)_2$	234-236
651	i-C_3H_7	H	H	3-NO_2	3,4-$(CH_3)_2$	195-197
652	i-C_3H_7	H	H	3-NO_2	2,4,6-$(CH_3)_3$	229-231
653	i-C_3H_7	H	H	3-NO_2	2,6-$(C_2H_5)_2$	258-260
654	i-C_3H_7	H	H	3-NO_2	3,5-$(CF_3)_2$	225-227
655	i-C_3H_7	H	H	3-NO_2	3-Cl-4-CH_3	208-210

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
656	i-C_3H_7	H	H	3-NO_2	2-Cl-4-CH_3	195-197
657	i-C_3H_7	H	H	3-NO_2	2-F-4-Cl-5-CH_3	193-195
658	i-C_3H_7	H	H	3-NO_2	3-Cl-4-$OCHF_2$	222-224
659	i-C_3H_7	H	H	3-NO_2	3,5-Cl_2-4-$OCHF_2$	218-220
660	i-C_3H_7	H	H	3-NO_2	2-Cl-4-CF_3	217-219
661	i-C_3H_7	H	H	3-NO_2	2-Cl-5-CF_3	193-195
662	i-C_3H_7	H	H	3-NO_2	2,6-Cl_2-4-CF_3	226-228
663	i-C_3H_7	H	H	3-NO_2	2-CH_3-3-Cl	198-200
664	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-Cl	235-237
665	i-C_3H_7	H	H	3-NO_2	2-CH_3-5-Cl	218-219
666	i-C_3H_7	H	H	3-NO_2	2-CH_3-6-Cl	248-250
667	i-C_3H_7	H	H	3-NO_2	2-C_2H_5-4-Cl	235-237
668	i-C_3H_7	H	H	3-NO_2	2-CH_3-4,5-Cl_2	196-198
669	i-C_3H_7	H	H	3-NO_2	2,3-$(CH_3)_2$-4-Cl	226-228
670	i-C_3H_7	H	H	3-NO_2	2,4-$(CH_3)_2$-3-Cl	203-205
671	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-Br	214-216
672	i-C_3H_7	H	H	3-NO_2	2-CH_3-5-Br	191-193
673	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-I	227-227
674	i-C_3H_7	H	H	3-NO_2	2-CH_3-3-F	199-201
675	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-F	226-228
676	i-C_3H_7	H	H	3-NO_2	2-CH_3-5-F	213-215
677	i-C_3H_7	H	H	3-NO_2	2-C_2H_5-5-F	191-193
678	i-C_3H_7	H	H	3-NO_2	3-CF_3-4-Cl	215-217

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
679	i-C_3H_7	H	H	3-NO_2	2-CF_3-4-Cl	208-210
680	i-C_3H_7	H	H	3-NO_2	3-CH_3-4-Br	199-201
681	i-C_3H_7	H	H	3-NO_2	2-CH_3-3-CF_3	221-222
682	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-CF_3	236-237
683	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-CF_2CF_3	218-219
684	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-$CF_2CF_2CF_3$	188-189
685	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-$CF(CF_3)_2$	248-250
686	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-$(CF_2)_3CF_3$	225-226
687	i-C_3H_7	H	H	3-NO_2	2-CH_3-3-OCH_3	198-200
688	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-OCH_3	208-210
689	i-C_3H_7	H	H	3-NO_2	2,3-$(CH_3)_2$-4-OCH_3	253-255
690	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-O-C_3H_7-i	233-234
691	i-C_3H_7	H	H	3-NO_2	3-CF_3-5-OCH_3	214-216
692	i-C_3H_7	H	H	3-NO_2	2-CF_3-4-$OCHF_2$	201-203
693	i-C_3H_7	H	H	3-NO_2	3-CF_3-4-$OCHF_2$	231-232
694	i-C_3H_7	H	H	3-NO_2	2,4-$(CH_3)_2$-3-OCH_3	201-203
695	i-C_3H_7	H	H	3-NO_2	2-CH_3-3-$OCHF_2$	200-202
696	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	186-188
697	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-OCH_2CF_3	241-243
698	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-OCF_2CBrF_2	229-230
699	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-$OCH_2CF_2CHF_2$	199-200
700	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-$OCF_2CBrFCF_3$	224-226
701	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-$OCH_2CHFOCF_3$	208-210

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
702	i-C_3H_7	H	H	3-NO_2	3-OCH_3-4-$OCHF_2$	242-243
703	i-C_3H_7	H	H	3-NO_2	2-Cl-4-$CF(CF_3)_2$	198-200
704	i-C_3H_7	H	H	3-NO_2	2-Cl-4-OCF_3	188-190
705	i-C_3H_7	H	H	3-NO_2	2-Br-4-OCF_3	202-203
706	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-NO_2	201-203
707	i-C_3H_7	H	H	3-NO_2	2-Cl-5-NO_2	193-195
708	i-C_3H_7	H	H	3-NO_2	2-CH_3-5-NO_2	197-199
709	i-C_3H_7	H	H	3-NO_2	2,3-$(CH_3)_2$-4-NO_2	207-209
710	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-OCF_3	184-186
711	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-$OCBrF_2$	217-218
712	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-OCF_2CHF_2	205-207
713	i-C_3H_7	H	H	3-NO_2	2-CH_3-3-OCF_2CHClF	164-166
714	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-OCF_2CHClF	192-193
715	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-OCF_2CCl_2F	212-213
716	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-OCF_2CHFCF_3	198-199
717	i-C_3H_7	H	H	3-NO_2	2-CH_3-3-Cl-4-$OCHF_2$	236-238
718	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-OCF_2CHF_2-5-Cl	233-234
719	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-SCH_3	214-216
720	i-C_3H_7	H	H	3-NO_2	2,3-$(CH_3)_2$-4-SCH_3	254-256
721	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-SC_3H_7-i	209-211
722	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-$SCHF_2$	225-227
723	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-$N(CH_3)_2$	215-217
724	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-(3-CF_3-PhO)	174-175

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
725	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-(F_5-PhO)	242-244
726	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-(2-Cl-4-CF_3-PhO)	191-192
727	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-(4-Cl-PhS)	165-167
728	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-(5-CF_3-2-Pyi-O)	216-218
729	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-(3-Cl-5-CF_3-2-Pyi-O)	236-238
730	i-C_3H_7	H	H	3-NO_2	4-(3-Cl-5-CF_3-2-Pyi-S)	190-192
731	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-P=O(OC_2H_5)$_2$	128-130
732	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-P=S(OCH_3)$_2$	128-130
733	i-C_3H_7	H	H	3-NO_2	-3-OCH_2O-4-	229-231
734	i-C_3H_7	H	H	3-NO_2	3-$CH_2CH_2CH_2$-4	209-211
735	i-C_3H_7	H	H	3-NO_2	2-$CH_2CH_2CH_2$-3	226-228
736	i-C_3H_7	H	H	3-NO_2	3-N=C(CF_3)-NH-4	162-164
737	i-C_3H_7	H	H	3-NO_2	3-N=C(CF_3)-N(CH_3)-4	186-188
738	i-C_3H_7	H	H	5-NO_2	2-CH_3-5-Cl	226-228
739	i-C_3H_7	H	H	6-NO_2	2-CH_3-5-Cl	247-249
740	i-C_3H_7	H	H	6-NO_2	2-Cl-4-CF_3	Crystals
741	i-C_3H_7	H	H	6-NO_2	2-Cl-4-$CF_2CF_2CF_3$	192-193
742	i-C_3H_7	H	H	6-NO_2	2-CH_3-4-CF_3	239-240
743	i-C_3H_7	H	H	6-NO_2	2-CH_3-4-OCF_2CHFCF_3	252-253

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
744	i-C_3H_7	H	H	3-CN	2-CH_3-4-Cl	162-164
745	i-C_3H_7	H	H	6-CN	2-CH_3-4-Cl	Crystals
749	i-C_3H_7	H	H	3-CH_3	4-OCF_3	180-182
750	i-C_3H_7	H	H	3-CH_3	2-CH_3-4-Cl	169-171
751	i-C_3H_7	H	H	3-CH_3	2-CH_3-4-$OCHF_2$	192-193
752	i-C_3H_7	H	H	5-CH_3	2-CH_3-5-Cl	193-195
753	i-C_3H_7	H	H	6-C_2H_5	2-CH_3-4-Cl	180-182
754	i-C_3H_7	H	H	3-CF_3	H	202-204
755	i-C_3H_7	H	H	3-CF_3	2-CH_3-5-Cl	196-198
756	i-C_3H_7	H	H	3-CF_3	2-CH_3-3-Cl	216-218
757	i-C_3H_7	H	H	3-CF_3	2,6-$(C_2H_5)_2$	238-239
758	i-C_3H_7	H	H	3-CF_3	2-CH_3-4-Cl	207-209
759	i-C_3H_7	H	H	3-CF_3	2-CH_3-4-$OCHF_2$	212-213
760	i-C_3H_7	H	H	5-CF_3	2,6-$(C_2H_5)_2$	240-241
761	i-C_3H_7	H	H	5-CF_3	2-CH_3-4-Cl	203-205
762	i-C_3H_7	H	H	5-CF_3	3-CF_3-5-OCH_3	209-210
763	i-C_3H_7	H	H	5-CF_3	2-CH_3-4-$OCHF_2$	196-197
764	i-C_3H_7	H	H	6-CF_3	H	152-154
765	i-C_3H_7	H	H	6-CF_3	2-CH_3-3-Cl	158-160
766	i-C_3H_7	H	H	6-CF_3	2-CH_3-5-Cl	273-275

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
767	i-C_3H_7	H	H	3-OCH_3	4-OCF_3	178-180
768	i-C_3H_7	H	H	3-OCH_3	2-CH_3-4-Br	214-215
769	i-C_3H_7	H	H	6-OCH_3	4-OCF_3	189-190
770	i-C_3H_7	H	H	6-OCH_3	2-CH_3-5-Cl	155-157
771	i-C_3H_7	H	H	6-OCH_3	2-CH_3-4-Br	195-197
772	i-C_3H_7	H	H	3-$OCHF_2$	2-CH_3-4-Cl	212-213
773	i-C_3H_7	H	H	3-$OCHF_2$	2-CH_3-5-Cl	198-200
774	i-C_3H_7	H	H	3-$OCHF_2$	2-CH_3-4-$OCHF_2$	174-175
775	i-C_3H_7	H	H	4-$OCHF_2$	2-CH_3-5-Cl	215-217
776	i-C_3H_7	H	H	5-$OCHF_2$	2-CH_3-5-Cl	173-175
777	i-C_3H_7	H	H	6-$OCHF_2$	2-CH_3-4-Cl	224-226
778	i-C_3H_7	H	H	6-$OCHF_2$	2-CH_3-5-Cl	191-193
779	i-C_3H_7	H	H	6-$OCHF_2$	2-CH_3-4-$OCHF_2$	199-200
780	i-C_3H_7	H	H	3-SCH_3	2-CH_3-3-Cl	191-193
781	i-C_3H_7	H	H	3-SCH_3	2-CH_3-4-Cl	188-190
782	i-C_3H_7	H	H	3-SCH_3	2-CH_3-4-Br	185-187
783	i-C_3H_7	H	H	3-SCH_3	2-CH_3-4-$OCHF_2$	159-161
784	i-C_3H_7	H	H	6-SCH_3	2-CH_3-4-Br	201-202
785	i-C_3H_7	H	H	6-SCH_3	2-CH_3-3-Cl	207-209
786	i-C_3H_7	H	H	6-SCH_3	2-CH_3-4-Cl	204-206
787	i-C_3H_7	H	H	6-SCH_3	2-CH_3-4-$OCHF_2$	212-214
788	i-C_3H_7	H	H	3-SC_3H_7-i	2-CH_3-4-Cl	183-184
789	i-C_3H_7	H	H	6-SC_3H_7-i	2-CH_3-4-Cl	228-229

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
790	i-C_3H_7	H	H	3-$SOCH_3$	2-CH_3-4-Br	125-130
791	i-C_3H_7	H	H	3-$SOCH_3$	2-CH_3-4-$OCHF_2$	215-217
792	i-C_3H_7	H	H	6-$SOCH_3$	2-CH_3-4-Br	203-208
793	i-C_3H_7	H	H	3-SOC_3H_7-i	2-CH_3-4-Cl	157-160
794	i-C_3H_7	H	H	6-SOC_3H_7-i	2-CH_3-4-Cl	170-173
795	i-C_3H_7	H	H	3-SO_2CH_3	2-CH_3-4-$OCHF_2$	211-213
796	i-C_3H_7	H	H	3-$SO_2C_3H_7$-i	2-CH_3-4-Cl	240-242
797	i-C_3H_7	H	H	3-SCH_2CF_3	2-CH_3-4-$OCHF_2$	184-186
798	i-C_3H_7	H	H	6-SCH_2CF_3	2-CH_3-4-$OCHF_2$	239-241
799	i-C_3H_7	H	H	3-$SOCH_2CF_3$	2-CH_3-4-$OCHF_2$	198-200
800	i-C_3H_7	H	H	6-$SOCH_2CF_3$	2-CH_3-4-$OCHF_2$	238-240
801	i-C_3H_7	H	H	6-C≡CH	2-CH_3-4-Cl	253-255
802	i-C_3H_7	H	H	6-$COOCH_3$	2-CH_3-4-Cl	149-151
803	i-C_3H_7	H	H	3-$CONHC_3H_7$-i	2-CH_3-4-Cl	187-189
804	i-C_3H_7	H	H	6-$CONHC_3H_7$-i	2-CH_3-4-Cl	191-193
807	i-C_3H_7	H	H	3-Ph	2-CH_3-4-Cl	228-229
808	i-C_3H_7	H	H	6-Ph	4-OCF_3	213-214
809	i-C_3H_7	H	H	6-Ph	2-CH_3-4-Cl	254-256
810	i-C_3H_7	H	H	3-O-Ph	2-CH_3-4-$OCHF_2$	175-177
811	i-C_3H_7	H	H	6-O-Ph	2-CH_3-4-$OCHF_2$	194-196
812	i-C_3H_7	H	H	3-(4-Cl-PhO)	2-CH_3-4-Br	204-206

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
813	i-C_3H_7	H	H	3-S-Ph	2-CH_3-4-Cl	204-206
814	i-C_3H_7	H	H	3-S-Ph	2-CH_3-4-Br	193-194
815	i-C_3H_7	H	H	6-S-Ph	2-CH_3-4-Cl	211-213
816	i-C_3H_7	H	H	6-S-Ph	2-CH_3-4-Br	193-194
817	i-C_3H_7	H	H	3-SO-Ph	2-CH_3-4-Cl	201-203
818	i-C_3H_7	H	H	3-SO_2-Ph	2-CH_3-4-Cl	189-191
819	i-C_3H_7	H	H	3-CH=CH-CH=CH-4	2-CH_3-4-$OCHF_2$	158-160
820	i-C_3H_7	H	H	5-CH=CH-CH=CH-6	2-CH_3-4-$OCHF_2$	154-155
821	i-C_3H_7	H	H	3-CH=CH-CH=CH-4	2-CH_3-5-Cl	156-158
822	i-C_3H_7	H	H	4-CH=CH-CH=CH-5	2-CH_3-5-Cl	229-231
823	i-C_3H_7	H	H	5-CH=CH-CH=CH-6	2-CH_3-5-Cl	232-234
824	i-C_3H_7	CH_3	H	H	4-CF_3	178-180
825	i-C_3H_7	CH_3	H	3-NO_2	2-CH_3-4-$OCHF_2$	148-149
826	i-C_3H_7	CH_3	H	H	2-CH_3-4-Cl	82-83
827	i-C_3H_7	H	CH_3	H	2-CH_3-4-Cl	165-166
828	i-C_3H_7	CH_2OCH_3	H	H	2-CH_3-4-Cl	Oil
829	n-C_4H_9	H	H	H	4-CF_3	171-173
830	n-C_4H_9	H	H	3-NO_2	2-CH_3-5-Cl	172-174
831	i-C_4H_9	H	H	3-NO_2	2-CH_3-5-Cl	186-188
832	i-C_4H_9	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	192-193
833	i-C_4H_9	H	H	H	4-CF_3	149-151
834	i-C_4H_9	CH_3	H	6-NO_2	2-CH_3-4-$OCHF_2$	135-137

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
835	s-C_4H_9	H	H	H	4-CF_3	194-195
836	s-C_4H_9	H	H	3-Cl	2-CH_3-4-$OCHF_2$	203-205
837	s-C_4H_9	H	H	6-Cl	2-CH_3-4-$OCHF_2$	213-215
838	s-C_4H_9	H	H	3-NO_2	2-CH_3-5-Cl	205-207
839	s-C_4H_9	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	228-229
840	t-C_4H_9	H	H	H	H	237-239
841	t-C_4H_9	H	H	H	2-CH_3-5-Cl	200-202
842	t-C_4H_9	H	H	3-NO_2	2-CH_3-5-Cl	256-258
843	t-C_4H_9	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	172-173
844	$CH_2C(CH_3)_3$	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	226-227
845	$CH(C_2H_5)_2$	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	245-246
846	$CH(CH_3)CH(CH_3)_2$	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	245-247
847	n-C_8H_{17}	H	H	3-NO_2	2-CH_3-5-Cl	164-166
848	c-C_3H_5	H	H	H	4-CF_3	195-197
849	c-C_3H_5	H	H	3-Cl	2-CH_3-4-$OCHF_2$	156-158
850	c-C_3H_5	H	H	6-Cl	2-CH_3-4-$OCHF_2$	179-181
851	c-C_3H_5	H	H	3-NO_2	2-CH_3-5-Cl	194-196
852	c-C_3H_5	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	191-192
853	c-C_4H_7	H	H	H	2-CH_3-5-Cl	205-207
854	c-C_4H_7	H	H	3-NO_2	2-CH_3-5-Cl	206-208
855	c-C_4H_7	H	H	3-NO_2	2-CH_3-5-F	199-201
856	c-C_5H_9	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	219-220
857	c-C_5H_9	H	H	H	4-CF_3	208-210

Table 1 (Cont'd)

No.	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
858	c-C_5H_9	H	H	3-NO_2	2-CH_3-5-Cl	200-202
859	c-C_6H_{11}	H	H	3-NO_2	2-CH_3-5-Cl	225-227
860	CH_2-C_3H_5-c	H	H	3-NO_2	2-CH_3-5-F	190-192
861	CH_2CH_2Cl	H	H	3-NO_2	2-CH_3-5-F	179-181
862	CH_2CH_2F	H	H	3-NO_2	2-CH_3-5-F	179-181
863	CH_2CH_2F	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	190-191
864	CH_2CF_3	H	H	H	2-CH_3-5-Cl	187-189
865	$CH_2CH=CH_2$	H	H	H	4-CF_3	161-163
866	$CH_2CH=CH_2$	H	H	3-NO_2	2-CH_3-5-Cl	175-177
867	$CH_2CH=CH_2$	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	194-195
868	$CH_2C\equiv CH$	H	H	H	4-CF_3	185-188
869	$CH_2C\equiv CH$	H	H	3-NO_2	2-CH_3-5-Cl	191-193
870	$CH_2C\equiv CH$	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	190-191
871	$CH_2CH_2OCH_3$	H	H	3-NO_2	2-CH_3-5-Cl	165-167
872	$CH_2CH_2OCH_3$	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	165-167
873	$CH(CH_3)CH_2OCH_3$	H	H	H	4-CF_3	252-253
874	$CH(CH_3)CH_2OCH_3$	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	153-155
875	$CH_2CH(OC_2H_5)_2$	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	149-151
876	CH_2-Ph	H	H	H	4-CF_3	148-150
877	CH_2-Ph	H	H	3-NO_2	2-CH_3-5-Cl	196-198
878	$CH(CH_3)$-Ph	H	H	3-NO_2	2-CH_3-5-Cl	168-170
879	$CH(CH_3)$-Ph	H	H	3-NO_2	2-CH_3-4-$OCHF_2$	187-189

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
880	CH_2CH_2O-(2,4-$(CH_3)_2$-Ph)	H	H	3-NO_2	2-CH_3-5-Cl	126-128
881	-$CH_2CH_2CH_2CH_2$-	H	H	4-CF_3		170-171
882	-$CH_2CH_2CH_2CH_2$-	H	6-NO_2	2-CH_3-5-Cl		157-159
883	-$CH_2CH_2CH_2CH_2$-	H	6-NO_2	2-CH_3-4-$OCHF_2$		163-165
884	-$CH_2CH_2OCH_2CH_2$-	H	H	4-CF_3		167-168
885	-$CH_2CH_2OCH_2CH_2$-	H	6-NO_2	2-CH_3-5-Cl		192-194
886	-$CH_2CH_2OCH_2CH_2$-	H	6-NO_2	2-CH_3-4-$OCHF_2$		186-188
887	-$CH_2CH(CH_3)OCH(CH_3)CH_2$-	H	6-NO_2	3-CF_3-5-OCH_3		164-165
888	CH_2-3-Pyi	H	H	3-NO_2	2-CH_3-4-Br	180-182
889	i-C_3H_7	H	H	H	4-CF_2CF_3	155-157
890	i-C_3H_7	H	H	3-NO_2	4-CF_2CF_3	223-225
891	i-C_3H_7	H	H	3-F	4-CF_2CF_3	199-201
892	i-C_3H_7	H	H	6-F	4-CF_2CF_3	213-215
893	i-C_3H_7	H	H	3-Cl	4-CF_2CF_3	214-216
894	i-C_3H_7	H	H	6-Cl	4-CF_2CF_3	225-227
895	i-C_3H_7	H	H	3-I	4-CF_2CF_3	208-210
896	i-C_3H_7	H	H	6-I	4-CF_2CF_3	224-226
897	i-C_3H_7	H	H	H	2-CH_3-4-OSO_2-(4-CH_3-Ph)	135-137
898	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-OSO_2-(4-CH_3-Ph)	208-210

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
899	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OSO_2-(4-CH_3-Ph)	187-189
900	i-C_3H_7	H	H	6-Cl	2-CH_3-4-OSO_2-(4-CH_3-Ph)	218-220
901	i-C_3H_7	H	H	3-F	2-F-4-O-(4-CF_3-2-Cl-Ph)	137-139
902	i-C_3H_7	H	H	6-F	2-F-4-O-(4-CF_3-2-Cl-Ph)	155-157
903	i-C_3H_7	H	H	3-Cl	2-F-4-O-(4-CF_3-2-Cl-Ph)	119-121
904	i-C_3H_7	H	H	6-Cl	2-F-4-O-(4-CF_3-2-Cl-Ph)	154-156
905	i-C_3H_7	H	H	3-F	2-CH_3-4-SCF_2CF_3	140-142
906	i-C_3H_7	H	H	6-F	2-CH_3-4-SCF_2CF_3	162-164
907	i-C_3H_7	H	H	3-Cl	2-CH_3-4-SCF_2CF_3	172-173
908	i-C_3H_7	H	H	6-Cl	2-CH_3-4-SCF_2CF_3	193-195
909	i-C_3H_7	H	H	3-I	2-CH_3-4-SCF_2CF_3	207-209
910	i-C_3H_7	H	H	6-I	2-CH_3-4-SCF_2CF_3	196-198
911	i-C_3H_7	H	H	3-Cl	4-CH=C(Cl)CF_3	196.3-208.2
912	i-C_3H_7	H	H	6-Cl	4-CH=C(Cl)CF_3	202.8-209.4
913	i-C_3H_7	H	H	3-Cl	4-CH=CBr_2	209.8-214.8
914	i-C_3H_7	H	H	6-Cl	4-CH=CBr_2	207.7-213.9
915	i-C_3H_7	H	H	3-Cl	4-CH=CCl_2	120.1

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
916	i-C_3H_7	H	H	6-Cl	4-CH=CCl_2	199.7
917	i-C_3H_7	H	H	3-I	4-CH=C(Cl)CF_3	196.6
918	i-C_3H_7	H	H	6-I	4-CH=C(Cl)CF_3	203.3
919	i-C_3H_7	H	H	3-I	2-C_2H_5-4-I	195.5
920	i-C_3H_7	H	H	6-I	2-C_2H_5-4-I	242.3
921	C_2H_5	H	H	H	2-C_2H_5-3-Cl-6-C_2H_5	171-173
922	i-C_3H_7	H	H	H	2-C_2H_5-3-Cl-6-C_2H_5	185-186
923	t-C_4H_9	H	H	H	2-C_2H_5-3-Cl-6-C_2H_5	166-167
924	i-C_3H_7	H	H	3-Cl	2-C_2H_5-3-Cl-6-C_2H_5	260-261
925	i-C_3H_7	H	H	3-I	2-C_2H_5-3-Cl-6-C_2H_5	269-271
926	t-C_4H_9	H	H	3-Cl	2-C_2H_5-3-Cl-6-C_2H_5	221-222
927	t-C_4H_9	H	H	H	2-CH_3-4-Cl	216-218
928	t-C_4H_9	H	H	H	4-CF_3	220-221
929	t-C_4H_9	H	H	H	4-OCF_3	178-179
930	t-C_4H_9	H	H	H	2-CH_3-4-OCF_3	184-185
931	t-C_4H_9	H	H	H	2-CH_3-4-CF_2CF_3	223-224
932	t-C_4H_9	H	H	3-Cl	2-CH_3-4-CF_2CF_3	219-220
933	t-C_4H_9	H	CH_3	H	4-OCF_3	155-158
934	t-C_4H_9	H	H	3-Cl	4-CF_3	228-229
935	t-C_4H_9	H	H	6-Cl	4-CF_3	253-255
936	t-C_4H_9	H	H	3-Cl	4-OCF_3	268-270
937	t-C_4H_9	H	H	3-Cl	2-CH_3-4-Cl	242-244
938	t-C_4H_9	H	H	6-Cl	2-CH_3-4-Cl	262-264

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
939	t-C_4H_9	H	H	3-I	4-CF_3	268-269
940	t-C_4H_9	H	H	3-I	4-OCF_3	263-265
941	t-C_4H_9	H	H	3-I	2-CH_3-4-Cl	218-220
942	t-C_4H_9	H	H	3-I	2-CH_3-4-CF_2CF_3	205-207
943	t-C_4H_9	H	H	6-I	2-CH_3-4-CF_2CF_3	216-217
944	t-C_4H_9	H	H	3-Cl	2-CH_3-4-OCF_3	260-262
945	n-C_4H_9	H	H	3-I	2-CH_3-4-CF_2CF_3	173.1-178.5
946	n-C_4H_9	H	H	6-I	2-CH_3-4-CF_2CF_3	181.8-187.7
947	n-C_5H_{11}	H	H	3-I	2-CH_3-4-CF_2CF_3	140.2-151.4
948	n-C_5H_{11}	H	H	6-I	2-CH_3-4-CF_2CF_3	168.7-171.3
949	n-C_6H_{13}	H	H	3-I	2-CH_3-4-CF_2CF_3	135.5-143.9
950	n-C_6H_{13}	H	H	6-I	2-CH_3-4-CF_2CF_3	167.1-169.9
951	i-C_3H_7	H	H	3-I	2-C_2H_5-4-I	254.8-273.8
952	i-C_3H_7	H	H	3-I	2-n-C_3H_7-4-I	179.7
953	i-C_3H_7	H	H	3-CH_3	2-CH_3-4-CF_2CF_3	184-186
954	i-C_3H_7	H	H	6-CH_3	2-CH_3-4-CF_2CF_3	177-179
955	t-C_4H_9	H	H	3-CH_3	2-CH_3-4-CF_2CF_3	198-200
956	t-C_4H_9	H	H	6-CH_3	2-CH_3-4-CF_2CF_3	236-237
957	t-C_4H_9	H	H	3-I	2-CH_3-4-OCF_3	208-210
958	t-C_4H_9	H	H	6-I	2-CH_3-4-OCF_3	253-255
959	n-C_3H_7	H	H	3-I	2-CH_3-3-Cl	190-192
960	n-C_3H_7	H	H	6-I	2-CH_3-3-Cl	159-161
961	n-C_3H_7	H	H	6-I	2-C_2H_5-3-Cl-6-C_2H_5	225-228

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
962	i-C_3H_7	H	H	3-NO_2	4-$OCOCF_3$	185-187
963	i-C_3H_7	H	H	3-Cl	4-$OCOCF_3$	Paste
964	i-C_3H_7	H	H	3-I	4-$OCOCF_3$	Paste
965	i-C_3H_7	H	H	3-I	2-i-C_3H_7-4-I	132.5
966	i-C_3H_7	H	H	3-I	2-n-C_4H_9-4-I	194.2-198.3
967	i-C_3H_7	H	H	3-I	2-CH_3-4-Br-6-CH_3	119.1
968	i-C_3H_7	H	H	3-Cl	4-$CO_2CH(CF_3)_2$	168-170
969	i-C_3H_7	H	H	3-I	4-$CO_2CH(CF_3)_2$	193-195
970	i-C_3H_7	H	H	3-NO_2	4-$CO_2CH(CF_3)_2$	215-217
971	i-C_3H_7	H	H	3-Cl	2-CH_3-4-C≡C-(2,4-Cl_2-Ph)	123-125
972	i-C_3H_7	H	H	3-I	2-CH_3-4-C≡C-(2,4-Cl_2-Ph)	138-140
973	i-C_3H_7	H	H	3-Cl	3-OCF_2CF_2-4	125-128
974	i-C_3H_7	H	H	3-I	3-OCF_2CF_2-4	123-126
975	i-C_3H_7	H	H	H	3-OCF_2CF_2O-4	152-154
976	i-C_3H_7	H	H	3-NO_2	3-OCF_2CF_2O-4	247-248
977	i-C_3H_7	H	H	3-Cl	3-OCF_2CF_2O-4	224-226
978	i-C_3H_7	H	H	H	4-$C(CF_3)_2OH$	87-89
979	i-C_3H_7	H	H	3-NO_2	4-$C(CF_3)_2OH$	205-207
980	i-C_3H_7	H	H	3-Cl	4-$C(CF_3)_2OH$	187-189
981	$CH_2CH_2OCH_3$	H	H	3-I	2-CH_3-4-CF_2CF_3	145.3-151.7
982	$CH_2CH_2OCH_3$	H	H	6-I	2-CH_3-4-CF_2CF_3	166.7-169.4

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
983	$CH_2CH_2OC_2H_5$	H	H	3-I	2-CH_3-4-CF_2CF_3	146.5-150.3
984	$CH_2CH_2OC_2H_5$	H	H	6-I	2-CH_3-4-CF_2CF_3	157.3-160.4
985	$(CH_2)_3OCH_3$	H	H	3-I	2-CH_3-4-CF_2CF_3	151.9-155.8
986	$(CH_2)_3OCH_3$	H	H	6-I	2-CH_3-4-CF_2CF_3	156.5-158.8
987	$CH_2CH=CH_2$	H	H	3-I	2-CH_3-4-CF_2CF_3	157.5
988	$CH_2CH=CH_2$	H	H	6-I	2-CH_3-4-CF_2CF_3	164.6-171.3
989	$CH_2C\equiv CH$	H	H	3-I	2-CH_3-4-CF_2CF_3	153.6-158.4
990	$CH_2C\equiv CH$	H	H	6-I	2-CH_3-4-CF_2CF_3	171.5-178.1
991	c-C_5H_9	H	H	3-I	2-CH_3-4-CF_2CF_3	212.9
992	c-C_5H_9	H	H	6-I	2-CH_3-4-CF_2CF_3	205.2
993	c-C_6H_{11}	H	H	3-I	2-CH_3-4-CF_2CF_3	219.7-224.3
994	c-C_6H_{11}	H	H	6-I	2-CH_3-4-CF_2CF_3	239.0-244.4
995	i-C_3H_7	H	H	H	4-SCF_3	182-184
996	i-C_3H_7	H	H	3-NO_2	4-SCF_3	228-229
997	i-C_3H_7	H	H	3-Cl	4-SCF_3	229-231
998	i-C_3H_7	H	H	3-I	4-SCF_3	226-227
999	i-C_3H_7	H	H	H	4-$SOCF_3$	175-178
1000	i-C_3H_7	H	H	3-NO_2	4-$SOCF_3$	202-205
1001	i-C_3H_7	H	H	3-Cl	4-$SOCF_3$	242-244
1002	i-C_3H_7	H	H	3-I	4-$SOCF_3$	229-231
1003	i-C_3H_7	H	H	3-I	3-OCF_2CF_2O-4	163-165
1004	i-C_3H_7	H	H	3-I	4-$C(CF_3)_2OH$	227-229
1005	i-C_4H_9	H	H	3-I	2-CH_3-4-CF_2CF_3	200.4-206.8

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1006	i-C_4H_9	H	H	6-I	2-CH_3-4-CF_2CF_3	179.2-181.8
1007	s-C_4H_9	H	H	3-I	2-CH_3-4-CF_2CF_3	226.0-230.9
1008	s-C_4H_9	H	H	6-I	2-CH_3-4-CF_2CF_3	216.1-218.0
1009	s-C_5H_{11}	H	H	3-I	2-CH_3-4-CF_2CF_3	215.3-218.2
1010	s-C_5H_{11}	H	H	6-I	2-CH_3-4-CF_2CF_3	191.4-210.5
1011	$CH(C_2H_5)_2$	H	H	3-I	2-CH_3-4-CF_2CF_3	234.8-236.9
1012	$CH(C_2H_5)_2$	H	H	6-I	2-CH_3-4-CF_2CF_3	253.7-255.7
1013	$CH(C_2H_5)CH_2O-CH_3$	H	H	3-I	2-CH_3-4-CF_2CF_3	177
1014	$CH(C_2H_5)CH_2O-CH_3$	H	H	6-I	2-CH_3-4-CF_2CF_3	198.3-201.0
1015	i-C_5H_{11}	H	H	3-I	2-CH_3-4-CF_2CF_3	190.0-192.5
1016	i-C_5H_{11}	H	H	6-I	2-CH_3-4-CF_2CF_3	187.8
1017	i-C_3H_7	H	H	3-I	2-C_2H_5-4-CF_2CF_3	232.5-235.8
1018	t-C_4H_9	H	H	H	2-CH_3-4-$OCHF_2$	138-140
1019	t-C_4H_9	H	H	3-Cl	2-CH_3-4-$OCHF_2$	206-208
1020	t-C_4H_9	H	H	3-I	2-CH_3-4-$OCHF_2$	204-206
1021	t-C_4H_9	H	H	H	2-Cl-4-OCF_3	162-164
1022	t-C_4H_9	H	H	3-Cl	2-Cl-4-OCF_3	189-191
1023	t-C_4H_9	H	H	3-I	2-Cl-4-OCF_3	188-190
1024	c-C_3H_5	H	H	3-I	2-CH_3-4-CF_2CF_3	156.0-165.0
1025	c-C_3H_5	H	H	6-I	2-CH_3-4-CF_2CF_3	173.2-176.4

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1026	$CH_2CH(CH_3)-C_2H_5$	H	H	3-I	$2-CH_3-4-CF_2CF_3$	148.6
1027	$CH_2CH(CH_3)-C_2H_5$	H	H	6-I	$2-CH_3-4-CF_2CF_3$	157.8
1028	CH_2-c-C_6H_{11}	H	H	3-I	$2-CH_3-4-CF_2CF_3$	186.8-188.7
1029	CH_2(4-t-C_4H_9-c-C_6H_{11})	H	H	3-I	$2-CH_3-4-CF_2CF_3$	226.0-231.2
1030	CH_2(4-t-C_4H_9-c-C_6H_{11})	H	H	6-I	$2-CH_3-4-CF_2CF_3$	215.4
1031	$CH(CH_3)CH_2O-CH_3$	H	H	3-I	$2-CH_3-4-CF_2CF_3$	187.2-189.9
1032	$CH(CH_3)CH_2O-CH_3$	H	H	6-I	$2-CH_3-4-CF_2CF_3$	169.7-176.1
1033	$CH(CH_3)CH-(CH_3)_2$	H	H	3-I	$2-CH_3-4-CF_2CF_3$	208.3-212.7
1034	$CH(CH_3)CH-(CH_3)_2$	H	H	6-I	$2-CH_3-4-CF_2CF_3$	219.3-223.0
1035	C_2H_5	C_2H_5	H	3-I	$2-CH_3-4-CF_2CF_3$	131.3
1036	C_2H_5	C_2H_5	H	6-I	$2-CH_3-4-CF_2CF_3$	137
1037	t-C_4H_9	H	H	H	$2-CH_3-4-CF(CF_3)_2$	172-175
1038	t-C_4H_9	H	H	3-Cl	$2-CH_3-4-CF(CF_3)_2$	241-243
1039	t-C_4H_9	H	H	3-I	$2-CH_3-4-CF(CF_3)_2$	238-240
1040	CH_2CF_3	H	H	3-I	$2-CH_3-4-CF_2CF_3$	166.1-175.5

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1041	CH_2CF_3	H	H	6-I	2-CH_3-4-CF_2CF_3	184.7-202.5
1042	i-C_3H_7	CH_3	H	3-I	2-CH_3-4-CF_2CF_3	201.4
1043	i-C_4H_9	CH_3	H	3-I	2-CH_3-4-CF_2CF_3	183.5-189.0
1044	n-C_3H_7	n-C_3H_7	H	3-I	2-CH_3-4-CF_2CF_3	142.6-145.4
1045	$CH_2CH=CH_2$	$CH_2CH=CH_2$	H	3-I	2-CH_3-4-CF_2CF_3	100.2-105.6
1046	$CH_2CH_2O-C_2H_5$	$CH_2CH_2O-C_2H_5$	H	3-I	2-CH_3-4-CF_2CF_3	84.0-87.3
1047	$CH_2CH_2CH_2CH_2$		H	3-I	2-CH_3-4-CF_2CF_3	172.7-177.3
1048	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-CF_2CF_3	119.1
1049	t-C_4H_9	H	H	H	2-CH_3-4-$OCBrF_2$	195-197
1050	t-C_4H_9	H	H	3-Cl	2-CH_3-4-$OCBrF_2$	198-200
1051	t-C_4H_9	H	H	3-I	2-CH_3-4-$OCBrF_2$	196-198
1052	t-C_4H_9	H	H	H	4-$C(CF_3)_2OH$	123-125
1053	t-C_4H_9	H	H	3-Cl	4-$C(CF_3)_2OH$	185-187
1054	t-C_4H_9	H	H	3-I	4-$C(CF_3)_2OH$	203-205
1055	i-C_3H_7	H	H	3-I	2,4-F_2	236-237
1056	C_2H_5	H	H	3-I	2-CH_3-4-OCF_2-CHF_2	176-178
1057	C_2H_5	H	H	6-I	2-CH_3-4-OCF_2-CHF_2	207-209
1058	n-C_3H_7	H	H	3-I	2-CH_3-4-OCF_2-CHF_2	185-187

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
1059	n-C_3H_7	H	H	6-I	2-CH_3-4-OCF_2-CHF_2	215-217
1060	t-C_4H_9	H	H	H	2-CH_3-4-OCF_2-CHF_2	197-198
1061	t-C_4H_9	H	H	3-Cl	2-CH_3-4-OCF_2-CHF_2	192-194
1062	t-C_4H_9	H	H	3-I	2-CH_3-4-OCF_2-CHF_2	217-218
1063	i-C_3H_7	H	H	3-Cl	2-CH_3-4-O-(3,5-$(CH_3O)_2$-2-Pym)	186-188
1064	i-C_3H_7	H	H	3-I	2-CH_3-4-O-(3,5-$(CH_3O)_2$-2-Pym)	201-202
1065	t-C_4H_9	H	H	H	3-OCF_2CF_2O-4	156-158
1066	t-C_4H_9	H	H	3-Cl	3-OCF_2CF_2O-4	240-241
1067	t-C_4H_9	H	H	3-I	3-OCF_2CF_2O-4	252-253
1068	CH_3	CH_3	H	3-I	2-CH_3-4-CF_2CF_3	148.7
1069	n-C_3H_7	CH_3	H	3-I	2-CH_3-4-CF_2CF_3	129.3
1070	$CH_2CH_2OCH_2CH_2$		H	3-I	2-CH_3-4-CF_2CF_3	164.7
1071	i-C_3H_7	i-C_3H_7	H	H	2-CH_3-4-CF_2CF_3	169.1
1072	i-C_3H_7	i-C_3H_7	H	6-I	2-CH_3-4-CF_2CF_3	201.2
1073	C_2H_5	H	H	3-I	2-CH_3-4-$CF(CF_3)_2$	194-195

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1074	C_2H_5	H	H	6-I	2-CH_3-4-$CF(CF_3)_2$	218-220
1075	n-C_3H_7	H	H	3-I	2-CH_3-4-$CF(CF_3)_2$	188-190
1076	n-C_3H_7	H	H	6-I	2-CH_3-4-$CF(CF_3)_2$	201-203
1077	i-C_3H_7	H	H	H	4-SO_2CF_3	184-186
1078	i-C_3H_7	H	H	3-Cl	4-SO_2CF_3	239-241
1079	i-C_3H_7	H	H	3-I	4-SO_2CF_3	225-227
1080	t-C_4H_9	H	H	3-I	4-SO_2CF_3	230-232
1081	i-C_3H_7	i-C_3H_7	H	3-I	2-CH_3-4-CF_2CF_3	Paste
1082	$CH_2CH_2CH_2CH_2CH_2$		H	3-I	2-CH_3-4-CF_2CF_3	140.0-146.8
1083	$CH_2CH_2CH(CH_3)CH_2$-CH_2-		H	3-I	2-CH_3-4-CF_2CF_3	171.4
1086	i-C_3H_7	H	H	H	2-CH_3-4-OCF_2CF_2-Ph	138-140
1087	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OCF_2CF_2-Ph	160-162
1088	i-C_3H_7	H	H	3-I	2-CH_3-4-OCF_2CF_2-Ph	209-211
1089	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-OCF_2CF_2-Ph	190-192

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1090	i-C_3H_7	H	H	H	2-CH_3-4-SCH_2CH_2-$CF=CF_2$	190-192
1091	i-C_3H_7	H	H	H	2-CH_3-4-$SOCH_2CH_2$-$CF=CF_2$	149-153
1092	i-C_3H_7	H	H	H	2-CH_3-4-SO_2CH_2-$CH_2CF=CF_2$	183-185
1093	i-C_3H_7	H	H	3-Cl	2-CH_3-4-SCH_2CH_2-$CF=CF_2$	168-170
1094	i-C_3H_7	H	H	3-Cl	2-CH_3-4-$SOCH_2CH_2$-$CF=CF_2$	164-167
1095	i-C_3H_7	H	H	3-Cl	2-CH_3-4-SO_2CH_2-$CH_2CF=CF_2$	181-183
1096	i-C_3H_7	H	H	3-I	2-CH_3-4-SCH_2CH_2-$CF=CF_2$	193-195
1097	i-C_3H_7	H	H	3-I	2-CH_3-4-$SOCH_2CH_2$-$CF=CF_2$	182-186
1098	i-C_3H_7	H	H	3-I	2-CH_3-4-SO_2CH_2-$CH_2CF=CF_2$	208-210
1099	i-C_3H_7	H	H	H	3-OCF_2O-4	216-218
1100	i-C_3H_7	H	H	3-NO_2	3-OCF_2O-4	227-229
1101	i-C_3H_7	H	H	3-Cl	3-OCF_2O-4	243-245
1102	i-C_3H_7	H	H	3-I	3-OCF_2O-4	229-231

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1103	t-C_4H_9	H	H	H	3-OCF_2O-4	209-211
1104	t-C_4H_9	H	H	3-Cl	3-OCF_2O-4	206-208
1105	t-C_4H_9	H	H	3-I	3-OCF_2O-4	228-230
1106	i-C_3H_7	H	H	H	4-$SCBrF_2$	175-177
1107	i-C_3H_7	H	H	H	4-$SOCBrF_2$	158-161
1108	i-C_3H_7	H	H	3-NO_2	4-$SCBrF_2$	180-182
1109	i-C_3H_7	H	H	3-NO_2	4-$SOCBrF_2$	195-198
1110	i-C_3H_7	H	H	3-Cl	4-$SCBrF_2$	156-158
1111	i-C_3H_7	H	H	3-Cl	4-$SOCBrF_2$	218-220
1112	i-C_3H_7	H	H	3-I	4-$SCBrF_2$	206-208
1113	i-C_3H_7	H	H	3-I	4-$SOCBrF_2$	158-160
1114	t-C_4H_9	H	H	3-Cl	4-$SCBrF_2$	210-212
1115	t-C_4H_9	H	H	3-I	4-$SCBrF_2$	219-220
1116	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-CF_2CF_3	179.8-183.7
1117	$CH_2CH_2CH_2$ -$CH_2CH_2CH_2$		H	3-I	2-CH_3-4-CF_2CF_3	170.7
1118	C_2H_5	C_2H_5	H	3-NO_2	2-CH_3-4-OCF_3	161.9
1119	C_2H_5	C_2H_5	H	3-NO_2	2-CH_3-4-$CF(CF_3)_2$	169.1
1120	CH_3	CH_3	CH_3	3-I	2-CH_3-4-CF_2CF_3	141.9-146.6
1121	i-C_3H_7	CH_3	CH_3	3-I	2-CH_3-4-CF_2CF_3	Paste
1122	C_2H_5	C_2H_5	CH_3	3-I	2-CH_3-4-CF_2CF_3	Paste
1123	i-C_3H_7	H	H	H	4-SCF_3	135-137
1124	i-C_3H_7	H	H	3-NO_2	4-SCF_3	187-189

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1125	i-C_3H_7	H	H	3-Cl	4-SCF_3	192-194
1126	i-C_3H_7	H	H	3-I	4-SCF_3	194-196
1127	t-C_4H_9	H	H	3-I	4-SCF_3	195-197
1128	C_2H_5	C_2H_5	H	3-I	4-SCF_3	173-175
1129	C_2H_5	C_2H_5	H	3-I	3-OCF_2O-4	128-130
1130	C_2H_5	C_2H_5	H	3-I	4-$C(CF_3)_2OH$	152-154
1131	C_2H_5	C_2H_5	H	3-NO_2	2-CH_3-4-OCF_3	178.7-182.6
1132	C_2H_5	C_2H_5	H	3-NO_2	2-CH_3-4-OCF_2CHF_2	160.8-165.0
1133	C_2H_5	C_2H_5	H	3-NO_2	2-Cl-4-CF_2CF_3	91.9-95.2
1134	C_2H_5	C_2H_5	H	3-NO_2	2-F-4-CF_2CF_3	162.6-166.8
1135	C_2H_5	C_2H_5	H	3-NO_2	2-CH_3-4-Cl	188.8-190.8
1136	C_2H_5	C_2H_5	H	3-NO_2	4-OCF_3	185.7-187.9
1137	C_2H_5	C_2H_5	H	6-NO_2	2-CH_3-4-OCF_2CHF_2	111.2
1138	C_2H_5	C_2H_5	H	6-NO_2	2-CH_3-4-Cl	149.7
1139	C_2H_5	C_2H_5	H	6-NO_2	4-OCF_3	173.4
1140	$CH_2CH(CH_3)CH_2$-$CH(CH_3)CH_2$		H	6-I	2-CH_3-4-CF_2CF_3	166.4
1141	t-C_4H_9	H	H	3-I	2-CH_3-4-CF_3	197-198
1142	i-C_3H_7	H	H	3-I	3-N=$C(CF_2CF_3)$O-4	214-216
1143	t-C_4H_9	H	H	3-I	3-N=$C(CF_2CF_3)$O-4	253-254
1144	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-CF_3	160-161
1145	i-C_3H_7	H	H	H	3-$OCHFCF_2O$-4	102-104
1146	i-C_3H_7	H	H	3-NO_2	3-$OCHFCF_2O$-4	190-192

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
1147	i-C_3H_7	H	H	3-Cl	3-$OCHFCF_2O$-4	123-125
1148	i-C_3H_7	H	H	3-I	3-$OCHFCF_2O$-4	218-220
1149	t-C_4H_9	H	H	H	3-$OCHFCF_2O$-4	165-167
1150	t-C_4H_9	H	H	3-I	3-$OCHFCF_2O$-4	240-241
1151	C_2H_5	C_2H_5	H	3-I	3-$OCHFCF_2O$-4	193-195
1152	t-C_5H_{11}	H	H	3-F	2-CH_3-4-CF_2CF_3	223.3
1153	t-C_5H_{11}	H	H	3-F	2-CH_3-4-$CF(CF_3)_2$	222
1154	t-C_5H_{11}	H	H	3-F	2-CH_3-4-OCF_3	193.6-195.8
1155	t-C_5H_{11}	H	H	3-F	2-CH_3-4-$OCHF_2$	165.5-174.0
1156	n-C_3H_7	n-C_3H_7	H	3-I	2-CH_3-4-OCF_3	132.2-135.0
1157	n-C_3H_7	n-C_3H_7	H	3-I	2-CH_3-4-$OCHF_2$	81.4-87.8
1158	n-C_3H_7	n-C_3H_7	H	3-I	2-CH_3-4-OCF_2CHF_2	116.3
1159	i-C_3H_7	C_2H_5	H	3-I	2-CH_3-4-CF_2CF_3	124.4
1160	i-C_3H_7	C_2H_5	H	3-I	4-OCF_3	137.3-144.1
1161	i-C_3H_7	H	H	3-I	3-OCF_2CHFO-4	161-163
1162	i-C_3H_7	H	H	3-NO_2	3-OCF_2CHFO-4	238-240
1163	i-C_3H_7	H	H	3-Cl	3-OCF_2CHFO-4	243-245
1164	i-C_3H_7	H	H	3-I	3-OCF_2CHFO-4	192-194
1165	t-C_4H_9	H	H	H	3-OCF_2CHFO-4	205-207
1166	t-C_4H_9	H	H	3-I	3-OCF_2CHFO-4	238-240
1167	C_2H_5	C_2H_5	H	3-I	3-OCF_2CHFO-4	195-197

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1168	i-C_3H_7	H	H	3-I	2-CH_3-4-$SOCF_3$	148-152
1169	t-C_4H_9	H	H	3-I	2-CH_3-4-$SOCF_3$	165-168
1173	i-C_3H_7	H	H	3-I	3-N=C(4-CF_3-Ph)-O-4	253-255
1174	t-C_4H_9	H	H	3-I	3-N=C(4-CF_3-Ph)-O-4	251-253
1175	C_2H_5	C_2H_5	H	3-I	3-N=C(4-CF_3-Ph)-O-4	231-233
1176	i-C_3H_7	H	H	3-I	3-O-C(2-CF_3-Ph)=N-4	242-244
1177	t-C_4H_9	H	H	3-I	3-O-C(2-CF_3-Ph)=N-4	229-231
1178	C_2H_5	C_2H_5	H	3-I	3-O-C(2-CF_3-Ph)=N-4	203-205
1179	C_2H_5	C_2H_5	C_2H_5	3-I	2-CH_3-4-CF_2CF_3	Paste
1180	i-C_3H_7	H	H	3-I	3-O-C(CF_2CF_3)=N-4	130-132
1181	t-C_4H_9	H	H	3-I	3-O-C(CF_2CF_3)=N-4	205-207
1182	C_2H_5	C_2H_5	H	3-I	3-O-C(CF_2CF_3)=N-4	188-190
1183	i-C_3H_7	H	H	3-CF_3	2-CH_3-4-OCF_3	222-224
1184	i-C_3H_7	H	H	3-CF_3	2-CH_3-4-CF_2CF_3	219-221

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1185	C_2H_5	C_2H_5	H	3-CF_3	2-CH_3-4-OCF_3	192-194
1186	C_2H_5	C_2H_5	H	3-CF_3	2-CH_3-4-CF_2CF_3	218-220
1187	i-C_3H_7	H	H	3-Cl	2-F-4-OCF_3	126-128
1188	i-C_3H_7	H	H	3-I	2-F-4-OCF_3	220-222
1189	t-C_4H_9	H	H	3-I	2-F-4-OCF_3	198-200
1190	C_2H_5	C_2H_5	H	3-I	2-F-4-OCF_3	129-131
1191	i-C_3H_7	H	H	3-OCF_3	2-CH_3-4-CF_2CF_3	190-192
1192	t-C_4H_9	H	H	3-OCF_3	2-CH_3-4-CF_2CF_3	205-207
1193	C_2H_5	C_2H_5	H	3-OCF_3	2-CH_3-4-CF_2CF_3	146-148
1202	i-C_3H_7	H	H	4-I	2-CH_3-4-CF_2CF_3	197-199
1203	i-C_3H_7	H	H	5-I	2-CH_3-4-CF_2CF_3	201-203
1204	i-C_3H_7	H	H	4-I	2-CH_3-4-$OCHF_2$	241-243
1205	i-C_3H_7	H	H	5-I	2-CH_3-4-$OCHF_2$	214-216
1206	i-C_3H_7	H	H	3-CF_3	2-CH_3-4-OCF_2CHF_2	195-197
1207	i-C_3H_7	H	H	3-CF_3	2-CH_3-4-$CF(CF_3)_2$	227-229
1208	i-C_3H_7	H	H	H	2-C_2H_5-4-OCF_3	160-162
1209	i-C_3H_7	H	H	3-Cl	2-C_2H_5-4-OCF_3	205-207
1210	i-C_3H_7	H	H	3-I	2-C_2H_5-4-OCF_3	241-243
1211	t-C_4H_9	H	H	3-I	2-C_2H_5-4-OCF_3	224-225
1212	C_2H_5	C_2H_5	H	3-I	2-C_2H_5-4-OCF_3	141-143
1221	i-C_3H_7	H	H	3,4-Cl_2	2-CH_3-4-OCF_3	199-200
1222	i-C_3H_7	H	H	3,4-Cl_2	2-CH_3-4-CF_2CF_3	208-209
1223	i-C_3H_7	H	H	3,4-Cl_2	2-CH_3-4-$CF(CF_3)_2$	228-229

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
1224	i-C_3H_7	H	H	3,5-Cl_2	2-CH_3-4-OCF_3	228-230
1225	i-C_3H_7	H	H	3,5-Cl_2	2-CH_3-4-CF_2CF_3	219-220
1226	i-C_3H_7	H	H	3,5-Cl_2	2-CH_3-4-$CF(CF_3)_2$	211-212
1227	i-C_3H_7	H	H	3-Cl-4-F	2-CH_3-4-OCF_3	184-186
1228	i-C_3H_7	H	H	3-Cl-4-F	2-CH_3-4-CF_2CF_3	178-180
1229	i-C_3H_7	H	H	3-Cl-4-F	2-CH_3-4-$CF(CF_3)_2$	200-201
1230	t-C_4H_9	H	H	3-CF_3	2-CH_3-4-OCF_3	209-210
1231	t-C_4H_9	H	H	3-CF_3	2-CH_3-4-CF_2CF_3	210-211
1232	t-C_4H_9	H	H	3-CF_3	2-CH_3-4-$CF(CF_3)_2$	242-243
1233	i-C_3H_7	H	H	3-OCF_3	2-CH_3-4-OCF_3	219-220
1234	t-C_4H_9	H	H	3-OCF_3	2-CH_3-4-OCF_3	222-223
1235	C_2H_5	C_2H_5	H	3-OCF_3	2-CH_3-4-OCF_3	125-126
1236	i-C_3H_7	H	H	3-OCF_3	2-CH_3-4-$CF(CF_3)_2$	235-236
1237	t-C_4H_9	H	H	3-OCF_3	2-CH_3-4-$CF(CF_3)_2$	220-222
1238	C_2H_5	C_2H_5	H	3-OCF_3	2-CH_3-4-$CF(CF_3)_2$	156-157
1245	i-C_3H_7	H	H	3-CN	2-CH_3-4-CF_2CF_3	168-170
1246	i-C_3H_7	H	H	4-I	2-CH_3-4-OCF_3	238-240
1247	i-C_3H_7	H	H	5-I	2-CH_3-4-OCF_3	205-206
1248	i-C_3H_7	H	H	4-I	2-CH_3-4-OCF_2CHF_2	222-223

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1249	i-C_3H_7	H	H	5-I	2-CH_3-4-OCF_2CHF_2	203-204
1250	i-C_3H_7	H	H	4-I	2-CH_3-4-$CF(CF_3)_2$	215-216
1251	i-C_3H_7	H	H	5-I	2-CH_3-4-$CF(CF_3)_2$	216-217
1256	i-C_3H_7	H	H	3-Cl -4-F	2-CH_3-4-CF_2CF_3	235-236
1257	t-C_4H_9	H	H	3-Cl -4-F	2-CH_3-4-CF_2CF_3	225-226
1258	C_2H_5	C_2H_5	H	3-Cl -4-F	2-CH_3-4-CF_2CF_3	155-156
1259	i-C_3H_7	H	H	3-Cl -4-F	2-CH_3-4-OCF_3	229-231
1260	t-C_4H_9	H	H	3-Cl -4-F	2-CH_3-4-OCF_3	237-238
1261	C_2H_5	C_2H_5	H	3-Cl -4-F	2-CH_3-4-OCF_3	140-141
1262	i-C_3H_7	H	H	3-Cl -4-F	2-CH_3-4-$CF(CF_3)_2$	264-265
1263	t-C_4H_9	H	H	3-Cl -4-F	2-CH_3-4-$CF(CF_3)_2$	253-154
1264	C_2H_5	C_2H_5	H	3-Cl -4-F	2-CH_3-4-$CF(CF_3)_2$	158-159
1266	i-C_3H_7	H	H	3,4-Br_2	2-CH_3-4-CF_2CF_3	162-164

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1277	i-C_3H_7	H	H	4-Cl	2-CH_3-4-CF_2CF_3	185-186
1278	t-C_4H_9	H	H	4-Cl	2-CH_3-4-CF_2CF_3	206-207
1280	C_2H_5	C_2H_5	H	4-Cl	2-CH_3-4-CF_2CF_3	163-164
1281	C_2H_5	C_2H_5	H	4-Cl-6-I	2-CH_3-4-CF_2CF_3	193-194
1283	i-C_3H_7	H	H	3,4-F_2	2-CH_3-4-OCF_3	194-195
1284	t-C_4H_9	H	H	3,4-F_2	2-CH_3-4-OCF_3	216-217
1285	C_2H_5	C_2H_5	H	3,4-F_2	2-CH_3-4-OCF_3	156-157
1287	i-C_3H_7	H	H	4,5-F_2	2-CH_3-4-OCF_3	195-196
1288	t-C_4H_9	H	H	4,5-F_2	2-CH_3-4-OCF_3	223-224
1290	i-C_3H_7	H	H	3-I	2-CH_3-4-OC-(CF_2CF_3)=C-(CF_3)$_2$	226-227
1291	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OC-(CF_2CF_3)=C-(CF_3)$_2$	204-205
1292	i-C_3H_7	H	H	3-I	2-CH_3-4-OC-(OCH_3)=C-(CF_3)$_2$	198-199
1293	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OC-(OCH_3)=C-(CF_3)$_2$	179-180

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1294	$CH(CH_3)CH_2OH$	H	H	H	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	73-74
1295	$i\text{-}C_3H_7$	H	H	6-Cl	$2\text{-}OCH_3\text{-}5\text{-}Ph$	120
1296	$i\text{-}C_3H_7$	H	H	3-Cl	$2\text{-}OCH_3\text{-}5\text{-}Ph$	195
1297	$n\text{-}C_3H_7$	H	H	6-Cl	$2\text{-}OCH_3\text{-}5\text{-}Ph$	200
1298	$CH(CH_3)CH_2OH$	H	H	3-Cl	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	195
1299	$CH(C_2H_5)CH_2OH$	H	H	H	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	78
1300	$CH(CH_3)CH_2OH$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	98-99
1301	$i\text{-}C_3H_7$	H	H	3-Cl	$2\text{-}CH_3\text{-}4\text{-}C\equiv C\text{-}C_4H_9\text{-}t$	210
1302	$i\text{-}C_3H_7$	H	H	6-Cl	$2\text{-}CH_3\text{-}4\text{-}C\equiv C\text{-}C_4H_9\text{-}t$	205
1303	$n\text{-}C_3H_7$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	200
1304	$n\text{-}C_3H_7$	H	H	6-I	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	195
1305	$i\text{-}C_3H_7$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}C\equiv C\text{-}C_4H_9\text{-}t$	205
1306	$i\text{-}C_3H_7$	H	H	6-I	$2\text{-}CH_3\text{-}4\text{-}C\equiv C\text{-}C_4H_9\text{-}t$	170
1307	$CH_2\text{-}Ph$	H	H	3-Cl	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	175
1308	$CH_2\text{-}Ph$	H	H	6-Cl	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	175
1309	$CH_2\text{-}(2\text{-}Cl\text{-}Ph)$	H	H	3-Cl	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	170
1310	$CH_2\text{-}(2\text{-}Cl\text{-}Ph)$	H	H	6-Cl	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	210
1311	CH_3	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	190
1312	CH_3	H	H	6-I	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	200

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1313	C_2H_5	H	H	3-I	2-CH_3-4-C_2F_5	182
1314	C_2H_5	H	H	6-I	2-CH_3-4-C_2F_5	205
1315	$CH_2CH(OH)CH_3$	H	H	3-Cl	2-CH_3-4-C_2F_5	187
1316	$CH(C_2H_5)CH_2OH$	H	H	3-Cl	2-CH_3-4-C_2F_5	208
1317	$C(CH_3)_2CH_2OH$	H	H	3-Cl	2-CH_3-4-C_2F_5	181-182
1318	$CH_2CH(OH)C_2H_5$	H	H	3-Cl	2-CH_3-4-C_2F_5	171-172
1319	CH_2CH_2-Ph	H	H	3-Cl	2-CH_3-4-C_2F_5	150
1320	CH_2CH_2-Ph	H	H	6-Cl	2-CH_3-4-C_2F_5	190
1321	$CH(CH_3)$-Ph	H	H	3-Cl	2-CH_3-4-C_2F_5	160
1322	$CH(CH_3)$-Ph	H	H	6-Cl	2-CH_3-4-C_2F_5	190
1323	i-C_3H_7	H	H	3-Cl	2-CH_3-4 -$CH_2CH_2C(CH_3)_3$	220
1324	i-C_3H_7	H	H	6-Cl	2-CH_3-4 -$CH_2CH_2C(CH_3)_3$	205
1325	i-C_3H_7	H	H	3-Cl	2-CH_3-4-C≡C-Ph	215
1326	i-C_3H_7	H	H	6-Cl	2-CH_3-4-C≡C-Ph	230
1327	O-n-C_3H_7	H	H	3-Cl	2-CH_3-4-C_2F_5	165
1328	O-n-C_3H_7	H	H	6-Cl	2-CH_3-4-C_2F_5	150
1329	O-CH_2CH=CHCl (E)	H	H	3-Cl	2-CH_3-4-C_2F_5	150
1330	i-C_3H_7	H	H	3-Cl	2-CH_3-4-CN	230
1331	$(CH_2)_3$-Ph	H	H	3-Cl	2-CH_3-4-C_2F_5	112
1332	$(CH_2)_3$-Ph	H	H	6-Cl	2-CH_3-4-C_2F_5	105

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1333	CH_2(4-Cl-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	198
1334	CH_2(4-Cl-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	156
1335	CH_2(3-Cl-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	168
1336	CH_2(3-Cl-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	177
1337	CH_2(2-CH_3-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	152
1338	CH_2(2-CH_3-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	147
1339	CH_2(3-CH_3-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	Crystals
1340	CH_2(3-CH_3-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	173
1341	CH_2(4-CH_3-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	175
1342	CH_2(4-CH_3-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	Crystals
1343	CH_2(2-CH_3O-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	Crystals
1344	CH_2(2-CH_3O-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	176
1345	CH_2(3-CH_3O-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	73
1346	CH_2(3-CH_3O-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	86
1347	CH_2(4-CH_3O-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	169
1348	CH_2(4-CH_3O-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	168
1349	CH_2(2,4-Cl_2-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	169
1350	CH_2(2,4-Cl_2-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	205
1351	CH_2(3,4-Cl_2-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	179
1352	CH_2(3,4-Cl_2-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	192
1353	CH_2(2,3-Cl_2-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	179
1354	CH_2(2,3-Cl_2-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	208
1355	CH_2-2-Pyi	H	H	3-Cl	2-CH_3-4-C_2F_5	143

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1356	$(CH_2)_2$(2-Cl-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	141
1357	$(CH_2)_2$(2-Cl-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	Paste
1358	$(CH_2)_2$(3-Cl-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	117
1359	$(CH_2)_2$(3-Cl-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	Paste
1360	$(CH_2)_2$(4-Cl-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	118
1361	$(CH_2)_2$(4-Cl-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	138
1362	CH(CH_3)(2-Cl-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	Paste
1363	CH(CH_3)(2-Cl-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	197
1364	CH(CH_3)(3-Cl-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	100
1365	CH(CH_3)(3-Cl-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	Crystals
1366	CH(CH_3)(4-Cl-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	195
1367	CH(CH_3)(4-Cl-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	Paste
1368	$(CH_2)_2O$(2-Cl-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	162
1369	$(CH_2)_2O$(2-Cl-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	160
1370	$(CH_2)_2O$(3-Cl-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	115
1371	$(CH_2)_2O$(3-Cl-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	172
1372	$(CH_2)_2O$(4-Cl-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	185
1373	$(CH_2)_2O$(4-Cl-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	148
1374	$(CH_2)_2O$-Ph	H	H	3-Cl	2-CH_3-4-C_2F_5	154
1375	$(CH_2)_2O$-Ph	H	H	6-Cl	2-CH_3-4-C_2F_5	183
1376	$(CH_2)_2NH$-Ph	H	H	3-Cl	2-CH_3-4-C_2F_5	104
1377	$(CH_2)_2NH$-Ph	H	H	6-Cl	2-CH_3-4-C_2F_5	Paste
1378	CH(CH_3)CH_2OH	H	H	6-Cl	2-CH_3-4-C_2F_5	192

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1379	$CH(Ph)CH_2OH$	H	H	H	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	100-101
1380	$CH(4\text{-}t\text{-}C_4H_9\text{-}Ph)\text{-}CH_2OH$	H	H	H	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	107-108
1381	$C(CH_3)_2CH_2OH$	H	H	H	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	227
1382	$i\text{-}C_3H_7$	H	H	3-Cl	$2\text{-}F\text{-}4\text{-}C_2F_5$	190
1383	$i\text{-}C_3H_7$	H	H	3-Cl	$2\text{-}Cl\text{-}4\text{-}C_2F_5$	180
1384	$i\text{-}C_3H_7$	H	H	3-Cl	$2\text{-}CF_3\text{-}4\text{-}C_2F_5$	235
1385	$i\text{-}C_3H_7$	H	H	3-I	$2\text{-}F\text{-}4\text{-}C_2F_5$	190
1386	$i\text{-}C_3H_7$	H	H	3-I	$2\text{-}Cl\text{-}4\text{-}C_2F_5$	200
1387	$i\text{-}C_3H_7$	H	H	3-I	$2\text{-}CF_3\text{-}4\text{-}C_2F_5$	255
1388	$i\text{-}C_3H_7$	H	H	3-I	$2\text{-}OCH_3\text{-}4\text{-}C_2F_5$	152
1389	$i\text{-}C_3H_7$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}CN$	215
1390	2-Fur	H	H	3-Cl	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	178
1391	2-Fur	H	H	6-Cl	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	149
1392	2-TetFur	H	H	3-Cl	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	153
1393	2-TetFur	H	H	6-Cl	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	130
1394	CH_2-4-Pyi	H	H	3-Cl	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	88
1395	CH_2-4-Pyi	H	H	6-Cl	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	Paste
1396	$(CH_2)_3OH$	H	H	H	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	83-84
1397	$(CH_2)_2OH$	H	H	H	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	136
1398	$CH_2CH(OH)CH_2Ph$	H	H	H	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	77-78
1399	$(CH_2)_3OH$	H	H	3-Cl	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	188
1400	CH_2-Ph	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	172

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1401	CH_2-Ph	H	H	6-I	2-CH_3-4-C_2F_5	212
1402	CH_2(2-Cl-Ph)	H	H	3-I	2-CH_3-4-C_2F_5	136
1403	CH_2(2-Cl-Ph)	H	H	6-I	2-CH_3-4-C_2F_5	214
1404	CH_2(2-CH_3-Ph)	H	H	3-I	2-CH_3-4-C_2F_5	100
1405	CH_2(2-CH_3-Ph)	H	H	6-I	2-CH_3-4-C_2F_5	185
1406	CH_2-Ph	CH_3	H	3-Cl	2-CH_3-4-C_2F_5	Paste
1407	CH_2-Ph	CH_2-Ph	H	3-Cl	2-CH_3-4-C_2F_5	136
1408	CH_2-Ph	CH_2-Ph	H	6-Cl	2-CH_3-4-C_2F_5	Paste
1409	i-C_3H_7	H	H	3-I	2-C_2F_5-4-Br	250
1410	i-C_3H_7	H	H	3-I	2-C_2F_5-4-C_2F_5	245
1411	$CH_2C\equiv CH$	H	H	H	2-CH_3-4-C_2F_5	133-135
1412	CH(4-Ph-Ph)CH_2-OH	H	H	3-Cl	2-CH_3-4-C_2F_5	112
1414	$C(CH_3)_2C\equiv CH$	H	H	H	2-CH_3-4-C_2F_5	207
1415	$C(CH_3)_2CH_2OH$	H	H	6-Cl	2-CH_3-4-C_2F_5	231
1416	CH(4-Cl-Ph)CH_2-OH	H	H	6-Cl	2-CH_3-4-C_2F_5	225
1417	$C(CH_3)_2$-Ph	H	H	3-Cl	2-CH_3-4-C_2F_5	190
1418	$C(CH_3)_2CH_2$-Ph	H	H	3-Cl	2-CH_3-4-C_2F_5	192
1419	CH_2-3-Pyi	H	H	3-Cl	2-CH_3-4-C_2F_5	Paste
1420	CH_2-3-Pyi	H	H	6-Cl	2-CH_3-4-C_2F_5	Paste

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1421	CH_2-Ph	H	H	3-Cl	2-CH_3-4-$OCHF_2$	187
1422	CH_2-Ph	H	H	6-Cl	2-CH_3-4-$OCHF_2$	198
1423	CH_2-(2-Cl-Ph)	H	H	3-Cl	2-CH_3-4-$OCHF_2$	178
1424	CH_2-(2-Cl-Ph)	H	H	6-Cl	2-CH_3-4-$OCHF_2$	192
1425	CH_2-(2-CH_3-Ph)	H	H	3-Cl	2-CH_3-4-$OCHF_2$	183
1426	CH_2-(2-CH_3-Ph)	H	H	6-Cl	2-CH_3-4-$OCHF_2$	192
1427	t-C_4H_9	H	H	3-I	2-F-4-C_2F_5	220
1428	t-C_4H_9	H	H	3-I	2-Cl-4-C_2F_5	187
1429	t-C_4H_9	H	H	3-I	2-CF_3-4-C_2F_5	240
1430	CH_2-Ph	H	H	3-I	2-CH_3-4-$OCHF_2$	176
1431	CH_2-Ph	H	H	6-I	2-CH_3-4-$OCHF_2$	196
1432	CH_2-(2-Cl-Ph)	H	H	3-I	2-CH_3-4-$OCHF_2$	189
1433	CH_2-(2-Cl-Ph)	H	H	6-I	2-CH_3-4-$OCHF_2$	227
1434	CH_2-(2-CH_3-Ph)	H	H	3-I	2-CH_3-4-$OCHF_2$	215
1435	CH_2-(2-CH_3-Ph)	H	H	6-I	2-CH_3-4-$OCHF_2$	209
1436	CH_2-Ph	CH_3	H	6-Cl	2-CH_3-4-C_2F_5	Paste
1437	CH_2-Ph	CH_3	H	3-Cl	2-CH_3-4-$OCHF_2$	Paste
1438	CH_2-Ph	CH_3	H	3-I	2-CH_3-4-C_2F_5	175
1439	CH_2-Ph	CH_3	H	6-I	2-CH_3-4-C_2F_5	Paste
1440	CH_2-Ph	CH_3	H	3-I	2-CH_3-4-$OCHF_2$	Paste
1441	$CH(C_2H_5)CH_2OH$	H	H	6-Cl	2-CH_3-4-C_2F_5	213
1442	(R)-C*H(Ph)-CH_2OH	H	H	3-Cl	2-CH_3-4-C_2F_5	105-107

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1443	(R)-C*H(Ph)-CH_2OH	H	H	6-Cl	2-CH_3-4-C_2F_5	145-146
1445	(S)-C*H(CH_3)-CH_2OH	H	H	3-Cl	2-CH_3-4-C_2F_5	93-95
1446	(S)-C*H(CH_3)-CH_2OH	H	H	6-Cl	2-CH_3-4-C_2F_5	93-95
1447	t-C_4H_9	H	H	3-Cl	4-C_2F_5	275
1448	t-C_4H_9	H	H	3-Cl	2-F-4-C_2F_5	225
1449	t-C_4H_9	H	H	3-Cl	2-Cl-4-C_2F_5	200
1450	n-C_3H_7	H	H	3-I	2-CH_3-4-$OCHF_2$	181
1451	n-C_3H_7	H	H	6-I	2-CH_3-4-$OCHF_2$	233
1452	c-C_3H_5	H	H	3-I	2-CH_3-4-$OCHF_2$	182
1453	c-C_3H_5	H	H	6-I	2-CH_3-4-$OCHF_2$	231
1454	s-C_4H_9	H	H	3-I	2-CH_3-4-$OCHF_2$	225
1455	s-C_4H_9	H	H	6-I	2-CH_3-4-$OCHF_2$	244
1456	$CH_2C\equiv CH$	H	H	3-I	2-CH_3-4-$OCHF_2$	196
1457	CH_2-Ph	C_2H_5	H	3-Cl	2-CH_3-4-C_2F_5	Paste
1458	(R)-C*H(CH_3)-Ph	H	H	3-Cl	2-CH_3-4-$OCHF_2$	136
1459	(S)-C*H(CH_3)-Ph	H	H	3-Cl	2-CH_3-4-$OCHF_2$	136

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1460	(R)-C*H(CH_3)-CH_2OH	H	H	3-Cl	2-CH_3-4-C_2F_5	94-95
1461	(R)-C*H(CH_3)-CH_2OH	H	H	6-Cl	2-CH_3-4-C_2F_5	94-95
1464	$C(CH_3)_2CH_2OH$	H	H	3-I	2-CH_3-4-C_2F_5	118
1465	$CH(CH_3)CH_2OH$	H	H	6-I	2-CH_3-4-C_2F_5	130-131
1466	$C(CH_3)_2C\equiv CH$	H	H	3-Cl	2-CH_3-4-C_2F_5	210-211
1467	$C(CH_3)_2C\equiv CH$	H	H	6-Cl	2-CH_3-4-C_2F_5	230
1468	CH_2(2-F-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	187
1469	CH_2(2-F-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	165
1470	CH_2-Ph	H	H	3-F	2-CH_3-4-C_2F_5	158
1471	CH_2-Ph	H	H	6-F	2-CH_3-4-C_2F_5	134
1472	s-C_4H_9	H	H	3-I	2-F-4-C_2F_5	200
1473	s-C_4H_9	H	H	3-I	2-Cl-4-C_2F_5	205
1474	i-C_3H_7	H	H	3-I	2-F-4-n-C_3F_7	165
1475	t-C_4H_9	H	H	3-I	2-C_2H_5-4-C_2F_5	235
1476	$CH_2CH(OH)Ph$	H	H	3-Cl	2-CH_3-4-C_2F_5	108
1477	$CH_2CH(OH)Ph$	H	H	6-Cl	2-CH_3-4-C_2F_5	105
1478	$C(CH_3)_2C\equiv CH$	H	H	3-Cl	2-CH_3-4-C_2F_5	105

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1479	$C(CH_3)_2C\equiv C$-2-Thi	H	H	3-Cl	2-CH_3-4-C_2F_5	110
1480	$C(CH_3)_2C\equiv C$-Ph	H	H	6-Cl	2-CH_3-4-C_2F_5	194
1481	(R)-C*H(CH_3)-CH_2OH	H	H	3-I	2-CH_3-4-C_2F_5	103-105
1482	(S)-C*H(CH_3)-CH_2OH	H	H	3-I	2-CH_3-4-C_2F_5	103-105
1483	(R)-C*H(CH_3)-CH_2OH	H	H	6-I	2-CH_3-4-C_2F_5	173-174
1484	$C(CH_3)_2$(4-Cl-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	218
1485	$C(CH_3)_2$(3-Cl-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	128
1486	CH_2-Ph	H	H	3-Cl	2-F-4-C_2F_5	162
1487	CH_2-Ph	H	H	3-Cl	2-Cl-4-C_2F_5	153
1488	C_2H_5	H	H	3-Cl	2-F-4-C_2F_5	135
1489	C_2H_5	H	H	3-Cl	2-Cl-4-C_2F_5	125
1490	C_2H_5	H	H	3-Cl	2-F-4-n-C_3F_7	128
1491	n-C_3H_7	H	H	3-Cl	2-F-4-C_2F_5	153
1492	n-C_3H_7	H	H	3-Cl	2-Cl-4-C_2F_5	147
1493	n-C_3H_7	H	H	3-Cl	2-F-4-n-C_3F_7	142
1494	i-C_3H_7	H	H	3-Cl	2-F-4-n-C_3F_7	142
1495	i-C_3H_7	H	H	3-Cl	2-C_2H_5-4-C_2F_5	213

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1496	t-C_4H_9	H	H	3-Cl	2-F-4-n-C_3F_7	172
1497	t-C_4H_9	H	H	3-Cl	2-C_2H_5-4-C_2F_5	194
1498	s-C_4H_9	H	H	3-Cl	2-F-4-C_2F_5	209
1499	s-C_4H_9	H	H	3-Cl	2-Cl-4-C_2F_5	194
1500	s-C_4H_9	H	H	3-Cl	2-F-4-n-C_3F_7	182
1501	s-C_4H_9	H	H	3-Cl	2-C_2H_5-4-C_2F_5	212
1502	C_2H_5	H	H	3-I	2-F-4-C_2F_5	135
1503	C_2H_5	H	H	3-I	2-Cl-4-C_2F_5	155
1504	t-C_4H_9	H	H	3-I	2-F-4-n-C_3F_7	180
1505	t-C_4H_9	H	H	3-F	2-CH_3-4-C_2F_5	220
1506	t-C_4H_9	H	H	3-F	2-CH_3-4-$OCHF_2$	186
1507	t-C_4H_9	H	H	3-F	2-F-4-C_2F_5	214
1508	t-C_4H_9	H	H	3-F	2-Cl-4-C_2F_5	222
1509	t-C_4H_9	H	H	3-F	2-F-4-n-C_3F_7	179
1510	C_2H_5	H	H	3-F	2-F-4-C_2F_5	125
1511	C_2H_5	H	H	6-F	2-F-4-C_2F_5	155
1512	n-C_3H_7	H	H	3-F	2-F-4-C_2F_5	130
1513	n-C_3H_7	H	H	6-F	2-F-4-C_2F_5	170
1514	i-C_3H_7	H	H	3-F	2-F-4-C_2F_5	190
1515	i-C_3H_7	H	H	6-F	2-F-4-C_2F_5	180
1516	i-C_3H_7	H	H	3-F	2-Cl-4-C_2F_5	210
1517	i-C_3H_7	H	H	6-F	2-Cl-4-C_2F_5	160

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1518	(S)-C*H(CH_3)-CH_2OH	H	H	6-I	2-CH_3-4-C_2F_5	173-174
1519	$C(CH_3)_2CH_2OH$	H	H	3-I	2-CH_3-4-OCF_3	205
1520	$C(CH_3)_2CH_2OH$	H	H	6-I	2-CH_3-4-OCF_3	248
1521	i-C_3H_7	H	H	3-I	2-CH_3-4-(4-CF_3O-Ph)	247-250
1522	i-C_3H_7	H	H	3-I	2-CH_3-4-(4-CF_3-Ph)	243-246
1523	CH_2(2-CF_3-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	183
1524	n-C_3H_7	H	H	3-I	2-F-4-n-C_3F_7	145
1525	C_2H_5	C_2H_5	H	3-F	2-CH_3-4-C_2F_5	135
1526	C_2H_5	C_2H_5	H	3-F	2-CH_3-4-i-C_3F_7	150
1527	C_2H_5	C_2H_5	H	3-F	2-CH_3-4-OCF_3	125
1528	C_2H_5	C_2H_5	H	3-F	2-CH_3-4-$OCHF_2$	110
1529	C_2H_5	C_2H_5	H	3-F	2-CH_3-4-OCF_2CHF_2	155
1530	C_2H_5	C_2H_5	H	3-F	2-F-4-C_2F_5	130
1531	C_2H_5	C_2H_5	H	3-F	2-Cl-4-C_2F_5	110
1532	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-i-C_3F_7	142
1533	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-OCF_3	142
1534	C_2H_5	C_2H_5	H	3-I	4-OCF_3	142
1535	C_2H_5	C_2H_5	H	3-Cl	2-CH_3-4-C_2F_5	150
1536	C_2H_5	C_2H_5	H	3-Cl	2-CH_3-4-OCF_3	123
1537	C_2H_5	C_2H_5	H	3-Cl	2-CH_3-4-i-C_3F_7	147

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1538	C_2H_5	C_2H_5	H	3-Cl	2-CH_3-4-$OCHF_2$	92
1539	C_2H_5	C_2H_5	H	3-Cl	2-CH_3-4-OCF_2CHF_2	135
1540	C_2H_5	C_2H_5	H	3-Cl	2-Cl-4-C_2F_5	110
1541	C_2H_5	C_2H_5	H	3-Cl	2-F-4-C_2F_5	113
1542	C_2H_5	C_2H_5	H	3-Cl	2-CH_3-Cl	142
1543	C_2H_5	C_2H_5	H	3-Cl	2-C_2H_5-4-C_2F_5	101
1544	C_2H_5	C_2H_5	H	3-Cl	4-OCF_3	138
1545	C_2H_5	C_2H_5	H	3-Cl	4-CF_3	188
1546	C_2H_5	C_2H_5	H	3-F	2-CH_3-4-Cl	135
1547	C_2H_5	C_2H_5	H	3-F	4-CF_3	175
1548	C_2H_5	C_2H_5	H	3-F	4-OCF_3	155
1549	C_2H_5	C_2H_5	H	3-F	2-C_2H_5-4-C_2F_5	80
1550	C_2H_5	C_2H_5	H	3-NO_2	2-CH_3-4-C_2F_5	185
1551	C_2H_5	C_2H_5	H	6-NO_2	2-CH_3-4-C_2F_5	145
1552	t-C_4H_9	H	H	3-I	3-CH_3-4-C_2F_5	215
1553	CH_2-Ph	CH_3	CH_3	3-Cl	2-CH_3-4-C_2F_5	Paste
1554	CH(CH_3)-Ph	H	CH_3	3-Cl	2-CH_3-4-C_2F_5	Paste
1555	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-$OCHF_2$	138-139
1556	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-OCF_2CHF_2	136
1557	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-Cl	179
1558	C_2H_5	C_2H_5	H	3-I	4-CF_3	187
1559	C_2H_5	C_2H_5	H	3-I	2-C_2H_5-4-C_2F_5	106
1560	C_2H_5	C_2H_5	H	3-I	2-Cl-4-C_2F_5	103-105

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1561	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-C_2F_5	115
1562	t-C_4H_9	H	H	3-I	2-Br-4-C_2F_5	185
1563	i-C_3H_7	H	H	3-I	3-CH_3-4-C_2F_5	240
1564	i-C_3H_7	H	H	H	4-O-(2-Pym)	246
1565	$C(CH_3)_2$ -CH_2CH_3	H	H	3-I	2-CH_3-4-C_2F_5	193
1566	$C(CH_3)_2$ -CH_2CH_3	H	H	3-I	2-CH_3-4-OCF_3	180
1567	$C(CH_3)_2CH_2CH_3$	H	H	3-I		178-179
1568	$C(CH_3)_2CH_2CH_3$	H	H	3-I	2-CH_3-4-$OCHF_2$	176-177
1569	$C(CH_3)_2CH=CH_2$	H	H	3-Cl	2-CH_3-4-C_2F_5	223-224
1570	$C(CH_3)_2CH\equiv C$ -(4-CH_3-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	92-93
1571	$C(CH_3)_2CH\equiv C$ -(2,4-Cl_2-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	96-97
1572	$C(CH_3)_2CH\equiv C$ -(4-CH_3O-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	88-89
1573	n-C_3H_7	C_2H_5	H	3-I	2-CH_3-4-C_2F_5	93
1574	n-C_3H_7	C_2H_5	H	3-I	2-CH_3-4-OCF_3	109
1575	n-C_3H_7	C_2H_5	H	3-I	2-CH_3-4-$OCHF_2$	102
1576	CH_2(4-CF_3O-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	172
1577	CH_2(4-CF_3O-Ph)	H	H	6-Cl	2-CH_3-4-C_2F_5	193
1578	CH_2(3-Cl-Ph)	CH_3	H	3-Cl	2-CH_3-4-C_2F_5	Paste
1579	CH_2(2-F-Ph)	CH_3	H	3-Cl	2-CH_3-4-C_2F_5	115
1580	i-C_3H_7	H	H	3-I	2-Br-4-C_2F_5	190

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1581	n-C_3H_7	C_2H_5	H	3-F	2-CH_3-4-C_2F_5	120
1582	n-C_3H_7	C_2H_5	H	3-F	4-OCF_3	115
1583	n-C_3H_7	C_2H_5	H	3-F	4-$OCHF_2$	85
1584	n-C_3H_7	C_2H_5	H	3-F	2-Cl-4-C_2F_5	75
1585	$C(CH_3)_2CH\equiv C$ -(4-CF_3-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	102-103
1586	$C(CH_3)_2CH\equiv C$ -(2,6-Cl_2-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	115-117
1587	$C(CH_3)_2CH\equiv C$ -2-Pyi	H	H	3-Cl	2-CH_3-4-C_2F_5	169
1588	$C(CH_3)_2CH\equiv CH$	H	H	3-Cl	2-CH_3-4-$OCHF_2$	191-192
1589	$C(CH_3)_2CH=CH_2$	H	H	6-Cl	2-CH_3-4-C_2F_5	242
1590	$C(CH_3)_2CH\equiv C$ -3-Pyi	H	H	3-Cl	2-CH_3-4-C_2F_5	134-135
1591	i-C_3H_7	H	H	H	2-CH_3-4-(2,6 -$(CH_3O)_2$-Ph)	165
1592	i-C_3H_7	H	H	H	2-CH_3-4-(3,5 -$(CH_3O)_2$-Ph)	150
1593	C_2H_5	C_2H_5	H	H	2-CH_3-4-(3,5 -$(CH_3O)_2$-Ph)	Paste
1594	i-C_3H_7	H	H	3-Cl	2-F-4-(OCF_2O)-5	195
1595	i-C_3H_7	H	H	3-I	2-F-4-(OCF_2O)-5	208
1596	t-C_4H_9	H	H	3-I	2-F-4-(OCF_2O)-5	202

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1597	i-C_3H_7	H	H	3-Cl	2-CH_3-4-($OCHFCF_2$ -O)-5	211
1598	i-C_3H_7	H	H	3-I	2-CH_3-4-($OCHFCF_2$ -O)-5	212
1599	t-C_4H_9	H	H	3-I	2-CH_3-4-($OCHFCF_2$ -O)-5	217
1600	i-C_3H_7	H	H	3-I	2-Cl-4-($OCHFCF_2$ -O)-5	210
1601	i-C_3H_7	H	H	3-I	2-Cl-4-(OCF_2CHF -O)-5	214
1602	$C(CH_3)_2C{\equiv}CH$	H	H	3-Cl	2-CH_3-4-OCF_3	178-180
1603	$C(CH_3)_2CHBr$ -CH_2Br	H	H	3-Cl	2-CH_3-4-C_2F_5	130-131
1604	$C(CH_3)_2CH{=}CH$ -Ph(E)	H	H	3-Cl	2-CH_3-4-C_2F_5	90-93
1605	$C(CH_3)_2CH_2Br$	H	H	3-I	2-CH_3-4-OCF_3	139-141
1606	(S)-C*H -(CH_3)-CH_2Br	H	H	3-I	2-CH_3-4-C_2F_5	105-107
1607	(R)-C*H -(CH_3)-CH_2Br	H	H	3-I	2-CH_3-4-C_2F_5	105-107
1608	i-C_3H_7	H	H	3-I	3-Cl-4-C_2F_5	145
1609	t-C_4H_9	H	H	3-I	3-Cl-4-C_2F_5	260

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1610	i-C_3H_7	H	H	3-I	2-CH_3-4-C_2F_5-5-CH_3	210
1611	t-C_4H_9	H	H	3-I	2-CH_3-4-C_2F_5-5-CH_3	215
1612	i-C_3H_7	H	H	3-I	2,3-$(CH_3)_2$-4-C_2F_5	210
1613	t-C_4H_9	H	H	3-I	2,3-$(CH_3)_2$-4-C_2F_5	220
1614	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-(4-F-Ph)	130-133
1615	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-(4-Cl-Ph)	173-175
1616	i-C_3H_7	H	H	H	2-CH_3-4-O-(2-Thz)	149
1617	i-C_3H_7	H	H	3-I	Mixture of 2-CH_3-4-(4-(2-CH_3-Thz)) and 2-CH_3-5-(4-(2-CH_3-Thz)) (1:1)	235
1618	i-C_3H_7	H	H	3-I	2-CH_3-4-O-(2-Pym)	239
1619	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-(4-CF_3-Ph)	112-115
1620	i-C_3H_7	H	H	3-I	4-CF_2CF_2O-5	239
1621	i-C_3H_7	H	H	3-Cl	4-CF_2CF_2O-5	243
1622	i-C_3H_7	H	H	3-I	2-Cl-4-OCF_2O-5	226
1623	i-C_3H_7	H	H	3-Cl	2-Cl-4-OCF_2O-5	223
1624	t-C_4H_9	H	H	3-I	2-Cl-4-OCF_2O-5	221
1625	i-C_3H_7	H	H	3-I	2-Cl-4-OCF_2CF_2O	241
1626	i-C_3H_7	H	H	3-I	2-Cl-3-OCF_2CF_2O-4	219
1627	$C(CH_3)_2CH_2Cl$	H	H	3-I	2-CH_3-4-OCF_3	160
1628	$C(CH_3)_2C\equiv C$-3-Thi	H	H	3-Cl	2-CH_3-4-C_2F_5	78-80

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1629	$C(CH_3)_2C\equiv CH$	H	H	3-I	2-CH_3-4-C_2F_5	187-188
1630	i-C_3H_7	H	H	3-I	2-CH_3-4-(3,5-$(CH_3O)_2$-Ph)	199
1631	i-C_3H_7	H	H	H	3-OCH_2O-4	195
1632	i-C_3H_7	H	H	H	2-F-4-Cl	177
1633	$C(CH_3)_2C\equiv C$-(4-CF_3O-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	92-93
1634	$C(CH_3)_2C\equiv CH$	H	H	3-I	2-CH_3-4-OCF_3	188-189
1635	$C(CH_3)_2C\equiv CH$	H	H	3-I	2-CH_3-4-$OCHF_2$	175-176
1636	i-C_3H_7	H	H	3-I	4-N=(n-C_3F_7)C-O-5	182
1637	i-C_3H_7	H	H	3-I	4-O-C(n-C_3F_7)=N-5	250
1638	i-C_3H_7	H	H	3-Cl	4-O-C(n-C_3F_7)=N-5	168
1639	t-C_4H_9	H	H	3-I	4-O-C(n-C_3F_7)=N-5	248
1640	i-C_3H_7	H	H	3-I	2,3-$(CH_3)_2$-4-C_2F_5	195
1641	i-C_3H_7	H	H	3-I	2-CH_3-4-$OC(CF_3)$=N-5	229
1642	i-C_3H_7	H	H	3-Cl	2-Cl-3-OCF_2CF_2O-4	188
1643	i-C_3H_7	H	H	3-Cl	2-Cl-4-OCF_2CF_2O-5	203
1644	t-C_4H_9	H	H	3-I	2-Cl-3-OCF_2CF_2O-4	189
1645	t-C_4H_9	H	H	3-I	2-Cl-4-OCF_2CF_2O-5	234
1646	$C(CH_3)_2CH_2Cl$	H	H	3-I	2-CH_3-4-C_2F_5	168-169
1647	$C(CH_3)_2CH_2Br$	H	H	3-I	2-CH_3-4-C_2F_5	167-168
1648	$C(CH_3)_2C\equiv C$-Naph	H	H	3-I	2-CH_3-4-C_2F_5	90

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1649	$C(CH_3)_2C\equiv C$ -(5-Br-2-Pyi)	H	H	3-Cl	2-CH_3-4-C_2F_5	105-106
1650	$C(CH_3)_2C\equiv C$ -(2,4-F_2-Ph)	H	H	3-Cl	2-CH_3-4-C_2F_5	103-105
1651	(S)-C*H(CH_3) -CH_2F	H	H	3-Cl	2-CH_3-4-C_2F_5	135
1652	(S)-C*H -(CH_3)-CH_2Br	H	H	3-Cl	2-CH_3-4-C_2F_5	193-198
1653	i-C_3H_7	H	H	3-I	2-CH_3-4-C_2F_5-5 -Cl	210
1654	t-C_4H_9	H	H	3-I	2-CH_3-4-C_2F_5-5 -Cl	200
1655	i-C_3H_7	H	H	3-I	2-CH_3-4-C_2F_5-5 -CH_3	190
1656	t-C_4H_9	H	H	3-I	2-CH_3-4-C_2F_5-5 -CH_3	195
1657	i-C_3H_7	H	H	H	3-(2-CH_3-4-Thz)	211
1658	i-C_3H_7	H	H	3-I	3-(2-CF_3-4-Thz)	122
1659	i-C_3H_7	H	H	3-I	3-(2-CH_3-4-Oxa)	102
1660	i-C_3H_7	H	H	3-I	2-I-4-OCF_2O-5	252
1661	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OCF_2O-5	218
1662	t-C_4H_9	H	H	3-I	2-CH_3O-4-C_2F_5	135

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1663	i-C_3H_7	H	H	3-I	2-CH_3-4-i-C_3F_7-5-F	235
1664	t-C_4H_9	H	H	3-I	2-CH_3-4-i-C_3F_7-5-F	230
1665	i-C_3H_7	H	H	3-I	2-CH_3-4-i-C_3F_7-5-Cl	210
1666	i-C_3H_7	H	H	3-I	2-CH_3-4-CF_2CF_2O-5	198
1667	i-C_3H_7	H	H	3-I	2-CH_3-4-i-C_3F_7	270
1668	t-C_4H_9	H	H	3-I	2-CH_3-4-i-C_3F_7	290
1669	i-C_3H_7	H	H	3-I	2-F-4-i-C_3F_7	205
1670	t-C_4H_9	H	H	3-I	2-F-4-i-C_3F_7	210
1671	i-C_3H_7	H	H	3-I	2-SCH_3-4-i-C_3F_7	205
1672	t-C_4H_9	H	H	3-I	2-SCH_3-4-i-C_3F_7	205
1673	i-C_3H_7	H	H	3-I	2,4-$(CH_3)_2$-4-i-C_3F_7	240
1674	t-C_4H_9	H	H	3-I	2,4-$(CH_3)_2$-4-i-C_3F_7	245
1675	i-C_3H_7	H	H	3-I	4-(2-CH_3-4-Thz)	217
1676	i-C_3H_7	H	H	3-I	4-(2-CH_3-4-Oxa)	212
1677	i-C_3H_7	H	H	3-I	4-(2-i-C_3H_7-4-Thz)	199
1678	i-C_3H_7	H	H	3-NO_2	4-(2-CH_3-4-Thz)	230
1679	i-C_3H_7	H	H	3-I	2-Cl-3-OCF_2CHFO-4	188
1680	i-C_3H_7	H	H	3-I	2-Cl-3-$OCHFCF_2O$-4	191
1681	i-C_3H_7	H	H	3-I	Mixture of 2-Cl-3-$OCHFCF_2O$-4-5-Cl and 2-Cl-3-$OCHFCF_2O$-4-6-Cl (1:1)	199

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1682	i-C_3H_7	H	H	3-I	2-Cl-3-N=C(CF_3)-O-4	265
1683	t-C_4H_9	H	H	3-I	2-Cl-3-N=C(CF_3)-O-4	259
1684	i-C_3H_7	H	H	3-I	2-Br-4-OCF_2CHFO-5	185
1685	i-C_3H_7	H	H	3-I	Mixture of 2,3-Br_2-4-OCF_2CHFO-5; 2,5-Br_2-3-$OCHFCF_2O$-4; and 2,6-Br_2-3-OCF_2CHFO-4(1:1:1)	250
1686	i-C_3H_7	H	H	3-I	Mixture of 2,3-Br_2-4-$OCHFCF_2O$-5; 2,5-Br_2-3-OCF_2CHFO-4; and 2,6-Br_2-3-OCF_2CHFO-4(1:1:1)	228
1689	i-C_3H_7	H	H	3-I	2,3-$(CH_3)_2$-4-i-C_3F_7	270
1690	t-C_4H_9	H	H	3-I	2,3-$(CH_3)_2$-4-i-C_3F_7	280
1691	i-C_3H_7	H	H	3-I	2-i-C_3H_7-4-i-C_3F_7	240
1692	t-C_4H_9	H	H	3-I	2-i-C_3H_7-4-i-C_3F_7	245
1693	i-C_3H_7	H	H	3-I	2-OC_2H_5-4-i-C_3F_7	195
1694	t-C_4H_9	H	H	3-I	2-OC_2H_5-4-i-C_3F_7	210
1695	i-C_3H_7	H	H	3-I	3-F-4-i-C_3F_7	265
1696	t-C_4H_9	H	H	3-I	3-F-4-i-C_3F_7	285
1697	i-C_3H_7	H	H	3-I	3-Cl-4-i-C_3F_7	295
1698	i-C_3H_7	H	H	3-I	2-Br-4-i-C_3F_7-5-CH_3	240
1699	i-C_3H_7	H	H	3-I	2-Br-4-i-C_3F_7	240
1700	i-C_3H_7	H	H	3-I	2-SCH_3-4-C_2F_5	200
1703	i-C_3H_7	H	H	3-I	4-(2-c-C_3H_5-4-Thz)	198

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1714	i-C_3H_7	H	H	3-I	2-C_2H_5-4-i-C_3F_7	220
1715	i-C_3H_7	H	H	3-I	2-OCH_3-4-i-C_3F_7	190
1716	i-C_3H_7	H	H	3-I	2,6$(CH_3)_2$-4-i-C_3F_7	275
1717	i-C_3H_7	H	H	3-I	2,6-$(CH_3)_2$-4-C_2F_5	250
1722	i-C_3H_7	H	H	3-I	2-Cl-4-i-C_3F_7	220
1723	t-C_4H_9	H	H	3-I	2-Cl-4-i-C_3F_7	210
1726	i-C_3H_7	H	H	3-I	2-$(CH_2)_4$-3-4-i-C_3F_7	260
1727	t-C_4H_9	H	H	3-I	2-$(CH_2)_4$-3-4-i-C_3F_7	272
1732	i-C_3H_7	H	H	3-I	2-Cl-3-OCF_2CF_2O-4	245
1733	i-C_3H_7	H	H	3-I	2-Cl-3-$OCHFCF_2O$-4	190
1737	i-C_3H_7	H	H	3-I	4-$C(CH_3)$=$NOCH_3$	190
1742	i-C_3H_7	H	H	3-I	2-OCF_2O-3	190
1743	i-C_3H_7	H	H	3-I	2-OCF_2O-3-6-Cl	213
1744	i-C_3H_7	H	H	3-I	2-OCF_2O-3-4-Cl	202
1745	i-C_3H_7	H	H	3-I	2-OCF_2O-3-4,6-Cl_2	228
1746	i-C_3H_7	H	H	3-I	2-OCF_2O-3-4-i-C_3F_7	175
1747	t-C_4H_9	H	H	3-I	2-OCF_2O-3-4-Cl	235
1748	t-C_4H_9	H	H	3-I	2-OCF_2O-3-4,6-Cl_2	243
1749	i-C_3H_7	H	H	3-I	4-$C(CH_3)$=$NOCH_2$-Ph	205
1750	i-C_3H_7	H	H	3-I	4-$C(CH_3)$=$NOCH_2$ -CH=CH_2	Decomp.

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1751	CH_3	CH_3	H	H	2-CH_3-4-Cl	149
1752	C_2H_5	C_2H_5	H	H	2-CH_3-4-Cl	172
1753	n-C_3H_7	n-C_3H_7	H	H	2-CH_3-4-Cl	126
1762	i-C_3H_7	H	H	3-I	3-C(i-C_3F_7)=NN-(i-C_3F_7)-4	Paste
1763	i-C_3H_7	H	H	3-I	4-i-C_3H_7-2-N=CH-S-3	200
1764	i-C_3H_7	H	H	3-I	3-S-C(i-C_3H_7)=N-4	218
1765	i-C_3H_7	H	H	3-I	4-(2-CF_3-4-Thz)	105
1766	i-C_3H_7	H	H	3-I	3-SCH_3-4-i-C_3F_7	160
1767	i-C_3H_7	H	H	3-I	2-Ph-4-i-C_3F_7	240
1768	i-C_3H_7	H	H	3-I	2-OPh-4-i-C_3F_7	180
1769	i-C_3H_7	H	H	3-I	2-OCH_3-4-i-C_3F_7	265
1770	$(CH_2)_2$-3-Pyi	H	H	3-I	2-CH_3-4-i-C_3F_7	Amorphous
1771	$(CH_2)_2$-3-Pyi	H	H	6-I	2-CH_3-4-i-C_3F_7	Amorphous
1772	$(CH_2)_2$-3-Pyi	H	H	3-I	2-CH_3-4-OCF_3	169-173
1773	CH(CH_3)-2-Pyi	H	H	3-I	2-CH_3-4-i-C_3F_7	Amorphous
1774	CH(CH_3)-2-Pyi	H	H	6-I	2-CH_3-4-i-C_3F_7	Amorphous
1775	CH(CH_3)-2-Pyi	H	H	3-I	2-CH_3-4-OCF_3	158-161
1776	CH(CH_3)-2-Pyi	H	H	6-I	2-CH_3-4-OCF_3	213-216
1777	CH(CH_3)-2-Pyi	H	H	3-I	2-CH_3-4-C_2F_5	149-152
1778	CH(CH_3)-2-Pyi	H	H	6-I	2-CH_3-4-C_2F_5	194-196

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1780	$N(Ph)COCF_3$	H	H	3-I	$2-CH_3-4-C_2F_5$	239-241
1799	$CH(CH_3)$-2-Fur	H	H	3-I	$2-CH_3-4-i-C_3F_7$	191
1800	$CH(CH_3)$-2-Thi	H	H	3-I	$2-CH_3-4-i-C_3F_7$	159
1801	$i-C_3H_7$	H	H	$3-CF_3$	$2-CH_3-4-C_2F_5$	210-212
1802	$i-C_3H_7$	H	H	3-Cl-6-CF_3S	$2-CH_3-4-C_2F_5$	236-237
1803	$i-C_3H_7$	H	H	$3-CF_3SO$	$2-CH_3-4-C_2F_5$	186-187
1804	$i-C_3H_7$	H	H	$6-CF_3SO$	$2-CH_3-4-C_2F_5$	206-208
1805	$i-C_3H_7$	H	H	$3-CF_3SO$	$2-CH_3-4-i-C_3F_7$	211-213
1815	$i-C_3H_7$	H	H	3-I	$2-CH_3-4-s-C_4F_9$	190
1816	$i-C_3H_7$	H	H	3-I	$2-OH-4-i-C_3F_7$	155
1824	$i-C_3H_7$	H	H	3-I	$2-N=C(CF_3)O-3-4-i-C_3F_7$	132
1825	$i-C_3H_7$	H	H	3-I	$2-N=C(CF_3)O-3$	145
1826	$t-C_4H_9$	H	H	3-I	$2-N=C(CF_3)O-3-4-i-C_3F_7$	110
1827	$t-C_4H_9$	H	H	3-I	$2-N=C(CF_3)O-3$	120
1829	$(CH_2)_2NH-CO_2C_2H_5$	H	H	3-I	$2-CH_3-4-i-C_3F_7$	155
1830	$(CH_2)_2NHCO_2CH_2Ph$	H	H	3-I	$2-CH_3-4-C_2F_5$	155
1831	$(CH_2)_2CH=CF_2$	H	H	3-I	$2-CH_3-4-C_2F_5$	180

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1838	i-C_3H_7	H	H	H	2-CH_3-4-OCF_2CF_3	
1839	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-OCF_2CF_3	
1840	i-C_3H_7	H	H	3-F	2-CH_3-4-OCF_2CF_3	
1841	i-C_3H_7	H	H	3-Cl	2-CH_3-4-OCF_2CF_3	
1842	i-C_3H_7	H	H	3-Br	2-CH_3-4-OCF_2CF_3	
1843	i-C_3H_7	H	H	3-Cl-4-F	2-CH_3-4-OCF_2CF_3	
1844	i-C_3H_7	H	H	3,4-Cl_2	2-CH_3-4-OCF_2CF_3	
1845	i-C_3H_7	H	H	3-I	4-OCF_2CF_3	
1846	i-C_3H_7	H	H	3-I	2-Cl-4-OCF_2CF_3	
1847	i-C_3H_7	H	H	3-I	2-CH_3-4-OCF_2CF_3	
1848	t-C_4H_9	H	H	3-I	2-CH_3-4-OCF_2CF_3	
1849	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-OCF_2CF_3	
1850	i-C_3H_7	H	H	3-I	2-C_2H_5-4-OCF_2CF_3	
1851	i-C_3H_7	H	H	H	2-CH_3-4-O-n-C_3F_7	
1852	i-C_3H_7	H	H	3-NO_2	2-CH_3-4-O-n-C_3F_7	
1853	i-C_3H_7	H	H	3-F	2-CH_3-4-O-n-C_3F_7	
1854	i-C_3H_7	H	H	3-Cl	2-CH_3-4-O-n-C_3F_7	
1855	i-C_3H_7	H	H	3-Br	2-CH_3-4-O-n-C_3F_7	
1856	t-C_4H_9	H	H	3-Cl-4-F	2-CH_3-4-O-n-C_3F_7	
1857	C_2H_5	C_2H_5	H	3,4-Cl_2	2-CH_3-4-O-n-C_3F_7	
1858	i-C_3H_7	H	H	3-I	4-O-n-C_3F_7	
1859	i-C_3H_7	H	H	3-I	2-Cl-4-O-n-C_3F_7	
1860	i-C_3H_7	H	H	3-I	2-CH_3-4-O-n-C_3F_7	

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1861	t-C_4H_9	H	H	3-I	2-CH_3-4-O-n-C_3F_7	
1862	C_2H_5	C_2H_5	H	3-I	2-CH_3-4-O-n-C_3F_7	
1863	i-C_3H_7	H	H	3-I	2-C_2H_5-4-OCF_2CF_3	
1864	i-C_3H_7	H	H	3-I	2-CH_3-4-C≡C-t-C_4F_9	
1865	i-C_3H_7	H	H	3-I	2-CH_3-4-C≡C-CF_3	
1866	i-C_3H_7	H	H	3-I	2-CH_3-4-C≡C-i-C_3F_7	
1867	i-C_3H_7	H	H	3-I	2-CH_3-4-CF=CF_2	
1868	i-C_3H_7	H	H	3-I	2-CH_3-4-CF=$CFCF_3$	
1869	i-C_3H_7	H	H	3-I	2-CH_3-4-C(CF_3)=CF_2	
1870	i-C_3H_7	H	H	3-I	2-CH_3-4-$COCH_3$	
1871	i-C_3H_7	H	H	3-I	2-CH_3-4-$COCF_3$	195
1872	i-C_3H_7	H	H	3-I	2-CH_3-4-COC_2F_5	
1873	i-C_3H_7	H	H	3-I	2-CH_3-4-COCF(CH_3)$_2$	
1874	i-C_3H_7	H	H	3-I	2-CH_3-4-$COOCH_3$	217
1875	i-C_3H_7	H	H	3-I	2-CH_3-4-$COOC_2H_5$	
1876	i-C_3H_7	H	H	3-I	2-CH_3-4-C(CH_3)=$NOCH_3$	218
1877	i-C_3H_7	H	H	3-I	2-CH_3-4-C(CH_3)=NOC_2H_5	
1878	i-C_3H_7	H	H	3-I	2-CH_3-4-C(CH_3)=NO-$CH_2CH=CH_2$	
1879	i-C_3H_7	H	H	3-I	2-CH_3-4-C(CH_3)=NO-$CH_2C≡CH$	
1880	i-C_3H_7	H	H	3-I	2-CH_3-4-C(CH_3)=$NOCH_2$-Ph	
1881	i-C_3H_7	H	H	3-I	2-CH_3-4-CH_2OH	

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1882	i-C_3H_7	H	H	3-I	4-CH(OH)CH_3	
1883	i-C_3H_7	H	H	3-I	2-CH_3-4-CH(OH)CH_3	
1884	i-C_3H_7	H	H	3-I	2-CH_3-4-CH_2ON=C(CH_3)$_2$	
1885	i-C_3H_7	H	H	3-I	2-CH_3-4-CH_2ON=C(Ph)-i-C_3H_7	
1886	i-C_3H_7	H	H	3-I	2-OCH_2O-3-4-i-C_3F_7	
1887	i-C_3H_7	H	H	3-I	2-OCH_2CH_2O-3-4-i-C_3F_7	
1888	i-C_3H_7	H	H	3-I	2-OCF_2CF_2O-3-4-i-C_3F_7	
1889	i-C_3H_7	H	H	3-I	2-OCF_2CHFO-3-4-i-C_3F_7	
1890	i-C_3H_7	H	H	3-I	2-OCHFCF_2O-3-4-i-C_3F_7	
1891	i-C_3H_7	H	H	3-I	2-SCH_2S-3-4-i-C_3F_7	
1892	i-C_3H_7	H	H	3-I	2-SCF_2S-3-4-i-C_3F_7	
1893	i-C_3H_7	H	H	3-I	2-SCH_2CH_2S-3-4-i-C_3F_7	
1894	i-C_3H_7	H	H	3-I	2-SCF_2CF_2S-3-4-i-C_3F_7	
1895	i-C_3H_7	H	H	3-I	2-CH_2OCH_2-3-4-i-C_3F_7	
1896	i-C_3H_7	H	H	3-I	2-CH_2SCH_2-3-4-i-C_3F_7	
1897	i-C_3H_7	H	H	3-I	2-CF_2OCF_2-3-4-i-C_3F_7	
1898	i-C_3H_7	H	H	3-I	2-CF_2SCF_2-3-4-i-C_3F_7	
1899	i-C_3H_7	H	H	3-Br	2-CH_3-4-i-C_3F_7	
1900	i-C_3H_7	H	H	3-Br-4-Cl	2-CH_3-4-i-C_3F_7	
1901	i-C_3H_7	H	H	3-I-4-F	2-CH_3-4-i-C_3F_7	
1902	i-C_3H_7	H	H	3-I-4-Cl	2-CH_3-4-i-C_3F_7	

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1903	i-C_3H_7	H	H	3-I-4-CF_3	2-CH_3-4-i-C_3F_7	
1904	i-C_3H_7	H	H	3-I-4-OCH_3	2-CH_3-4-i-C_3F_7	
1905	i-C_3H_7	H	H	3-I-4-Br	2-CH_3-4-i-C_3F_7	
1906	i-C_3H_7	H	H	3-Cl-4-CF_3	2-CH_3-4-i-C_3F_7	
1907	i-C_3H_7	H	H	3-CF_3-4-Cl	2-CH_3-4-i-C_3F_7	
1908	i-C_3H_7	H	H	3-CF_3-4-F	2-CH_3-4-i-C_3F_7	
1919	i-C_3H_7	H	H	3-CF_3-4-OCH_3	2-CH_3-4-i-C_3F_7	
1910	i-C_3H_7	H	H	3-N=CH-CH=CH-4	2-CH_3-4-i-C_3F_7	
1911	i-C_3H_7	H	H	3-OCH_2O-4	2-CH_3-4-i-C_3F_7	
1912	i-C_3H_7	H	H	3-OCH_2O-4	2-CH_3-4-C_2F_5	
1913	i-C_3H_7	H	H	3-OCH_2O-4	2-CH_3-4-OCF_3	
1914	i-C_3H_7	H	H	3-OCF_2O-4	2-CH_3-4-i-C_3F_7	
1915	i-C_3H_7	H	H	3-OCF_2O-4	2-CH_3-4-C_2F_5	
1916	i-C_3H_7	H	H	3-OCF_2O-4	2-CH_3-4-OCF_3	
1917	i-C_3H_7	H	H	3-OCH_2CH_2O-4	2-CH_3-4-i-C_3F_7	
1918	i-C_3H_7	H	H	3-OCF_2CF_2O-4	2-CH_3-4-i-C_3F_7	
1919	i-C_3H_7	H	H	3-$OCHFCF_2O$-4	2-CH_3-4-i-C_3F_7	
1920	i-C_3H_7	H	H	3-OCF_2CHFO-4	2-CH_3-4-i-C_3F_7	
1921	i-C_3H_7	H	H	3-OCH_2CH_2-4	2-CH_3-4-i-C_3F_7	
1922	i-C_3H_7	H	H	3-CH_2CH_2O-4	2-CH_3-4-i-C_3F_7	
1923	i-C_3H_7	H	H	3-OCF_2CF_2-4	2-CH_3-4-i-C_3F_7	
1924	i-C_3H_7	H	H	3-CF_2CF_2O-4	2-CH_3-4-i-C_3F_7	
1925	i-C_3H_7	H	H	3-$SOCH_3$	2-CH_3-4-i-C_3F_7	

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1926	i-C_3H_7	H	H	3-SO_2CH_3	2-CH_3-4-i-C_3F_7	
1927	i-C_3H_7	H	H	3-CF_3S	2-CH_3-4-i-C_3F_7	222-223
1928	i-C_3H_7	H	H	6-CF_3S	2-CH_3-4-i-C_3F_7	219-221
1929	t-C_4H_9	H	H	3-CF_3S	2-CH_3-4-i-C_3F_7	231
1930	t-C_4H_9	H	H	6-CF_3S	2-CH_3-4-i-C_3F_7	245-247
1931	t-C_4H_9	H	H	3-CF_3SO_2	2-CH_3-4-i-C_3F_7	
1932	t-C_4H_9	H	H	3-CF_3SO_2	2-CH_3-4-C_2F_5	
1933	t-C_4H_9	H	H	3-CF_3SO_2	2-CH_3-4-OCF_3	
1934	C_2H_5	C_2H_5	H	3-CF_3SO_2	2-CH_3-4-i-C_3F_7	
1935	C_2H_5	C_2H_5	H	3-$CONHCH_3$	2-CH_3-4-i-C_3F_7	
1936	C_2H_5	C_2H_5	H	3-$CON(CH_3)_2$	2-CH_3-4-i-C_3F_7	
1937	C_2H_5	C_2H_5	H	3-$COCH_3$	2-CH_3-4-i-C_3F_7	
1938	C_2H_5	C_2H_5	H	3-COC_2H_5	2-CH_3-4-i-C_3F_7	
1939	C_2H_5	C_2H_5	H	3-$C(CH_3)=NOCH_3$	2-CH_3-4-i-C_3F_7	
1940	C_2H_5	C_2H_5	H	3-$C(CH_3)=NO-C_2H_5$	2-CH_3-4-i-C_3F_7	
1941	i-C_3H_7	H	H	3-C≡CH	2-CH_3-4-C_2F_5	
1942	i-C_3H_7	H	H	3-C≡CH	2-CH_3-4-i-C_3F_7	
1943	i-C_3H_7	H	H	3-C≡C-t-C_4H_9	2-CH_3-4-C_2F_5	195-202
1944	i-C_3H_7	H	H	3-C≡C-t-C_4H_9	2-CH_3-4-i-C_3F_7	
1945	i-C_3H_7	H	H	3-C≡C-Ph	2-CH_3-4-C_2F_5	179-183
1946	i-C_3H_7	H	H	3-C≡C-Ph	2-CH_3-4-i-C_3F_7	

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1947	i-C_3H_7	H	H	3-C≡C-CF_3	2-CH_3-4-C_2F_5	
1948	i-C_3H_7	H	H	3-C≡C-CF_3	2-CH_3-4-i-C_3F_7	
1949	i-C_3H_7	H	H	3-C_2F_5	2-CH_3-4-C_2F_5	
1950	t-C_4H_9	H	H	3-C_2F_5	2-CH_3-4-C_2F_5	
1951	C_2H_5	C_2H_5	H	3-C_2F_5	2-CH_3-4-C_2F_5	
1952	i-C_3H_7	H	H	3-C_2F_5	2-CH_3-4-i-C_3F_7	
1953	t-C_4H_9	H	H	3-C_2F_5	2-CH_3-4-i-C_3F_7	
1954	C_2H_5	C_2H_5	H	3-C_2F_5	2-CH_3-4-i-C_3F_7	
1955	i-C_3H_7	SN-(n-C_4H_9)$_2$	H	3-I	2-CH_3-4-i-C_3F_7	
1956	i-C_3H_7	SO_2CH_3	H	3-I	2-CH_3-4-i-C_3F_7	
1957	i-C_3H_7	CN	H	3-I	2-CH_3-4-i-C_3F_7	
1958	i-C_3H_7	$COOCH_3$	H	3-I	2-CH_3-4-i-C_3F_7	
1959	i-C_3H_7	$COOC_2H_5$	H	3-I	2-CH_3-4-i-C_3F_7	
1960	i-C_3H_7	$COCH_3$	H	3-I	2-CH_3-4-i-C_3F_7	
1961	i-C_3H_7	COC_2H_5	H	3-I	2-CH_3-4-i-C_3F_7	
1962	i-C_3H_7	CO-Ph	H	3-I	2-CH_3-4-i-C_3F_7	
1963	i-C_3H_7	$NHCOCH_3$	H	3-I	2-CH_3-4-i-C_3F_7	

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1964	C_2H_5	C_2H_5	SN(n-C_4H_9)$_2$	3-I	2-CH_3-4-i-C_3F_7	
1965	C_2H_5	C_2H_5	SO_2CH_3	3-I	2-CH_3-4-i-C_3F_7	
1966	C_2H_5	C_2H_5	CN	3-I	2-CH_3-4-i-C_3F_7	
1967	C_2H_5	C_2H_5	$COOCH_3$	3-I	2-CH_3-4-i-C_3F_7	
1968	C_2H_5	C_2H_5	$COOC_2H_5$	3-I	2-CH_3-4-i-C_3F_7	
1969	C_2H_5	C_2H_5	$COCH_3$	3-I	2-CH_3-4-i-C_3F_7	
1970	C_2H_5	C_2H_5	COC_2H_5	3-I	2-CH_3-4-i-C_3F_7	Amorphous
1971	C_2H_5	C_2H_5	COPh	3-I	2-CH_3-4-i-C_3F_7	
1972	C_2H_5	C_2H_5	$NHCOCH_3$	3-I	2-CH_3-4-i-C_3F_7	
1973	$(CH_2)_2COO-CH_3$	H	H	3-I	2-CH_3-4-i-C_3F_7	
1974	$(CH_2)_2COO-CH_3$	H	H	3-I	2-CH_3-4-C_2F_5	
1975	$(CH_2)_2COO-C_2H_5$	H	H	3-I	2-CH_3-4-i-C_3F_7	133.2
1976	$(CH_2)_2COO-C_2H_5$	H	H	3-I	2-CH_3-4-C_2F_5	
1977	$(CH_2)_2COO-C_2H_5$	H	H	6-I	2-CH_3-4-C_2F_5	163.5
1978	$CH(CH_3)CH_2-COOCH_3$	H	H	3-I	2-CH_3-4-i-C_3F_7	

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1979	$CH(CH_3)CH_2COOC_2H_5$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	
1980	$CH(CH_3)CH_2COO\text{-}i\text{-}C_3H_7$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	
1981	$(CH_2)_2CONHCH_3$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	
1982	$(CH_2)_2CONHC_2H_5$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	
1983	$CH(CH_3)CH_2CONHCH_3$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	
1984	$CH(CH_3)CH_2CONHC_2H_5$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	
1985	$CH(CH_3)CH_2CONH\text{-}i\text{-}C_3H_7$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	
1986	$CH(CH_3)CH_2CON\text{-}(CH_3)_2$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	
1987	$CH(CH_3)CH_2CON\text{-}(C_2H_5)_2$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	
1988	$(CH_2)_2NHCOOCH_3$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	
1989	$(CH_2)_2NHCOOCH_3$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	
1990	$(CH_2)_2NHCOOC_2H_5$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}C_2F_5$	145
1991	$(CH_2)_2NHCOOC_2H_5$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}OCF_3$	210
1992	$CH(CH_3)CH_2NHCOOCH_3$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	
1993	$CH(CH_3)CH_2NHCOO\text{-}C_2H_5$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	
1994	$(CH_2)_2\ P(CH_3)_2$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	
1995	$CH(CH_3)P(C_2H_5)_2$	H	H	3-I	$2\text{-}CH_3\text{-}4\text{-}i\text{-}C_3F_7$	

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: °C
1996	$(CH_2)_2P(Ph)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
1997	$CH(CH_3)CH_2P(CH_3)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
1998	$CH(CH_3)CH_2P(C_2H_5)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
1999	$CH(CH_3)CH_2P(Ph)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2000	$CH(CH_3)(CH_2)_2P$ -$(CH_3)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2001	$CH(CH_3)(CH_2)_3P$ -$(CH_3)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2002	$(CH_2)_2PO(CH_3)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2003	$(CH_2)_2PO(OC_2H_5)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	Amorphous
2004	$CH(CH_3)CH_2PO(OCH_3)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2005	$(CH_2)_2OPO(OCH_3)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2006	$CH(CH_3)CH_2PS(OCH_3)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2007	$CH(CH_3)CH_2PS$ -$(OC_2H_5)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2008	$(CH_2)_2OPO(OC_2H_5)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2009	$CH(CH_3)CH_2OPO$ -$(OCH_3)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2010	$CH(CH_3)CH_2OPO$ -$(OC_2H_5)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2011	$(CH_2)_2OPS(OCH_3)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2012	$(CH_2)_2OPS(OC_2H_5)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	

Table 1 (Cont'd)

No	R^1	R^2	R^3	Xn	Ym	Physical Properties (melting point: ℃
2013	$CH(CH_3)CH_2OPS(OCH_3)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2014	$CH(CH_3)CH_2OPS(OC_2H_5)_2$	H	H	3-I	2-CH_3-4-i-C_3F_7	
2015	$CH(CH_3)$-2-Pyi-N-Oxide	H	H	3-I	2-CH_3-4-C_2F_5	198-205
2016	$CH(CH_3)$-2-Pyi-N-Oxide	H	H	3-I	2-CH_3-4-i-C_3F_7	208-210
2017	i-C_3H_7	H	H	3-I	2-CH_3-4-$C(CF_3)=NOCH_3$	
2018	i-C_3H_7	H	H	3-I	2-CH_3-4-$C(CF_3)=NOCH_2Ph$	
2019	i-C_3H_7	H	H	3-I	2-NCHCHCHCH-3-4-i-C_3F_7	180
2020	i-C_3H_7	H	H	3-I	2-n-C_3H_7-4-i-C_3F_7	225
2021	i-C_3H_7	H	H	3-I	2-O-(2-Pyi)-4-i-C_3F_7	158.3-159.8

The abbreviations in Table 1 stand for the following substituents:

Ph : phenyl group,

c- : alicyclic hydrocarbon group,

Pyi : pyridyl group,

Pym : pyrimidinyl group,

Fur : furyl group,

TetFur : tetrahydrofuryl group,

Thi : thienyl group,

Thz : thiazolyl group,

Naph : naphthyl group,

Oxa : oxazolyl group,

C* : asymmetric carbon atom

Table 2

No	R^1	R^2	R^3	Xn	Ym	Z^1	Z^2	Physical Properties (melting point: °C
S-1	i-C_3H_7	H	H	3-Cl	2-CH_3-4-CF_2CF_3	S	O	162-164
S-2	t-C_4H_9	H	H	3-Cl	2-CH_3-4-CF_2CF_3	S	O	141-143
S-3	c-C_3H_5	H	H	3-Cl	2-CH_3-4-CF_2CF_3	S	O	138-139
S-4	C_2H_5	C_2H_5	H	3-Cl	2-CH_3-4-CF_2CF_3	S	O	184-186
S-5	i-C_3H_7	H	H	H	2-CH_3-4-Cl	S	O	168-170
S-6	i-C_3H_7	H	H	H	2-CH_3-4-Cl	O	S	
S-7	i-C_3H_7	H	H	3-I	2-CH_3-4-i-C_3H_7	O	S	
S-8	i-C_3H_7	H	H	H	2-CH_3-4-i-C_3H_7	S	S	
S-9	i-C_3H_7	H	H	3-I	2-CH_3-4-i-C_3H_7	S	S	

The ^{1}H-NMR data of the compounds obtained as paste (physical properties) are given in Table 3 below.

Table 3

No.	^{1}H-NMR[$CDCl_3$/TMS、δ values (ppm)]
1122 1218	1.2-1.4(m.6H), 2.4-2.5(m.3H), 3.1-3.9(m.7H), 6.6-7.9(m.6H) 1.3(d.3H), 2.3(s.3H), 2.9-3.2(m.2H), 4.4(m.1H), 6.2(d.1H), 7.1-7.5(m.3H), 7.8(d.1H), 8.0(d.1H), 8.4(d.1H),8.5(s.1H).

Agricultural and horticultural insecticides containing the phthalic acid diamide derivative of the general formula (I) of the present invention as an active ingredient are suitable for controlling various insect pests such as agricultural insect pests, forest insect pests, horticultural insect pests, stored grain insect pests, sanitary insect pests, nematodes, etc., which are injurious to paddy rice, fruit trees, vegetables, other crops, flowers and ornamental plants, etc. They have a marked insecticidal effect, for example, on LEPIDOPTERA including summer fruit tortrix (Adoxophyes orana fasciata), smaller tea tortrix (Adoxophyes sp.), Manchurian fruit moth (Grapholita inopinata), oriental fruit moth (Grapholita molesta), soybean pod border (Leguminivora glycinivorella), mulberry leafroller (Olethreutes mori), tea leafroller (Caloptilia thevivora), Caloptilia sp. (Calopilia zachrysa), apple leafminer (Phyllonorycter ringoniella), pear barkminer (Spulerrina astaurota), common white (Piers rapae crucivora), tabacco budworm (Heliothis sp.), codling

moth (Laspey resia pomonella), diamondback moth (Plutella xylostella), apple fruit moth (Argyresthia conjugella), peach fruit moth (Carposina niponensis), rice stem borer (Chilo suppressalis), rice leafroller (Cnaphalocrocis medinalis), tabacco moth (Ephestia elutella), mulberry pyralid (Glyphodes pyloalis), yellow rice borer (Scirpophaga incertulas), rice skipper (Parnara guttata), rice armyworm (Pseudaletia separata), pink borer (Sesamia inferens), common cutworm (Spodoptera litura), beet armyworm (Spodoptera exigua), etc.; HEMIPTERA including aster leafhopper (Macrosteles fascifrons), green rice leafhopper (Nephotettix cincticeps), brown rice planthopper (Nilaparvata lugens), whitebacked rice planthopper (Sogatella furcifera), citrus psylla (Diaphorina citri), grape whitefly (Aleurolobus taonabae), sweetpotato whitefly (Bemisia tabaci), greenhouse whitefly (Trialeurodes vaporariorum), turnip aphid (Lipaphis erysimi), green peach aphid (Myzus persicae), Indian wax scale (Ceroplastes ceriferus), cottony citrus scale (Pulvinaria aurantii), camphor scale (Pseudaonidia duplex), San Jose scale (Comstockaspis perniciosa), arrowhead scale (Unaspis yanonensis), etc.; COLEOPTERA including soybean beetle (Anomala rufocuprea), Japanese beetle (Popillia japonica), tabacco beetle (Lasioderma serricorne), powderpost beetle (Lyctus brunneus), twenty-eight-spotted ladybird (Epilachna vigintiotopunctata), adzuki bean weevile (Callosobruchus chinensis), vegetable weevil (Listroderes costirostris), maize weevil (Sitophilus zeamais), boll weevil (Anthonomus

gradis gradis), rice water weevil (Lissorhoptrus oryzophilus), cucurbit leaf beetle (Aulacophora femoralis), rice leaf beetle (Oulema oryzae), striped flea beetle (Phyllotreta striolata), pine shoot beetle (Tomicus piniperda), Colorado potato beetle (Leptinotarsa decemlineata), Mexican bean beetle (Epilachna varivestis), corn rootworm (Diabrotica sp.), etc.; DIPTERA including melon fly (Dacus(Zeugodacus) cucurbitae), oriental fruit fly (Dacus(Bactrocera) dorsalis), rice leafminer (Agnomyza oryzae), onion maggot (Delia antiqua), seedcorn maggot (Delia platura), soybean pod gall midge (Asphondylia sp.), muscid fly (Musca domestica), house mosquito (Culex pipiens pipiens), etc.; and TYLENCHIDA including root-lesion nematode (Pratylenchus sp.), coffer root-lesion nematode (Pratylenchus coffeae), potato cyst nematode (Globodera rostochiensis), root-knot nematode (Meloidogyne sp.), citrus nematode (Tylenchulus semipenetrans), Aphelenchus sp. (Aphelenchus avenae), chrysanthemum foliar (Aphelenchoides ritzemabosi), etc.

The agricultural and horticultural insecticide containing the phthalic acid diamide derivative of the general formula (I) of the present invention as an active ingredient has a marked insecticidal effect on the above-exemplified insect pests, sanitary insect pests, and/or nematodes, which are injurious to paddy field crops, upland crops, fruit trees, vegetables, other crops, flowers and ornament plants, and the like. Therefore, the desired effect of the agricultural and horticultural insecticide of

the present invention can be obtained by applying the insecticide to the paddy field water, stalks and leaves of fruit trees, vegetables, other crops, flowers and ornament plants, soil, etc. at a season at which the insect pests, sanitary pests or nematodes are expected to appear, before their appearance or at the time when their appearance is confirmed.

In general, the agricultural and horticultural insecticide of the present invention is used after being prepared into conveniently usable forms according to an ordinary manner for preparation of agrochemicals.

That is, the phthalic acid diamide derivative of the general formula (I) and, optionally, an adjuvant are blended with a suitable inert carrier in a proper proportion and prepared into a suitable preparation form such as a suspension, emulsifiable concentrate, soluble concentrate, wettable powder, granules, dust or tablets through dissolution, dispersion, suspension, mixing, impregnation, adsorption or sticking.

The inert carrier used in this invention may be either solid or liquid. As the solid carrier, there can be exemplified soybean flour, cereal flour, wood flour, bark flour, saw dust, powdered tobacco stalks, powdered walnut shells, bran, powdered cellulose, extraction residues of vegetables, powdered synthetic polymers or resins, clays (e.g. kaolin, bentonite, and acid clay), talcs (e.g. talc and pyrophyllite), silica powders or flakes (e.g. diatomaceous earth, silica sand, mica and white carbon,

i.e. synthetic, high-dispersion silicic acid, also called finely divided hydrated silica or hydrated silicic acid, some of commercially available products contain calcium silicate as the major component), activated carbon, powdered sulfur, powdered pumice, calcined diatomaceous earth, ground brick, fly ash, sand, calcium carbonate powder, calcium phosphate powder and other inorganic or mineral powders, chemical fertilizers (e.g. ammonium sulfate, ammonium phosphate, ammonium nitrate, urea and ammonium chloride), and compost. These carriers may be used alone or as a mixture thereof.

The liquid carrier is that which itself has solubility or which is without such solubility but is capable of dispersing an active ingredient with the aid of an adjuvant. The following are typical examples of the liquid carrier and can be used alone or as a mixture thereof. Water; alcohols such as methanol, ethanol, isopropanol, butanol and ethylene glycol; ketones such as acetone, methyl ethyl ketone, methyl isobutyl ketone, diisobutyl ketone and cyclohexanone; ethers such as ethyl ether, dioxane, Cellosolve, dipropyl ether and tetrahydrofuran; aliphatic hydrocarbons such as kerosene and mineral oils; aromatic hydrocarbons such as benzene, toluene, xylene, solvent naphtha and alkylnaphthalenes; halogenated hydrocarbons such as dichloroethane, chloroform, carbon tetrachloride and chlorobenzene; esters such as ethyl acetate, diisopropyl phthalate, dibutyl phthalate and dioctyl phthalate; amides such as dimethylformamide,

diethylformamide and dimethylacetamide; nitriles such as acetonitrile; and dimethyl sulfoxide.

The following are typical examples of the adjuvant, which are used depending upon purposes and used alone or in combination in some cases, or need not to be used at all.

To emulsify, disperse, dissolve and/or wet an active ingredient, a surfactant is used. As the surfactant, there can be exemplified polyoxyethylene alkyl ethers, polyoxyethylene alkylaryl ethers, polyoxyethylene higher fatty acid esters, polyoxyethylene resinates, polyoxyethylene sorbitan mono-laurate, polyoxyethylene sorbitan monooleate, alkylarylsulfonates, naphthalene-sulfonic acid condensation products, ligninsulfonates and higher alcohol sulfate esters.

Further, to stabilize the dispersion of an active ingredient, tackify it and/or bind it, there may be used adjuvants such as casein, gelatin, starch, methyl cellulose, carboxymethyl cellulose, gum arabic, polyvinyl alcohols, turpentine, bran oil, bentonite and ligninsulfonates.

To improve the flowability of a solid product, there may be used adjuvants such as waxes, stearates and alkyl phosphates.

Adjuvants such as naphthalenesulfonic acid condensation products and polycondensates of phosphates may be used as a peptizer for dispersible products.

Adjuvants such as silicon oils may also be used

as a defoaming agent.

The content of the active ingredient may be varied as required. In dusts or granules, the suitable content thereof is from 0.01 to 50% by weight. In emulsifiable concentrates or flowable wettable powders, it is also from 0.01 to 50% by weight.

The agricultural and horticultural insecticide of the present invention is used to control a variety of insect pests in the following manner. That is, it is applied to a crop on which the insect pests are expected to appear or a site where the appearance of the insect pests is undesirable, as it is or after being properly diluted with or suspended in water or the like, in an amount effective for control of the insect pests.

The applying dosage of the agricultural and horticultural insecticide of the present invention is varied depending upon various factors such as a purpose, insect pests to be controlled, a growth state of a plant, tendency of insect pests appearance, weather, environmental conditions, a preparation form, an application method, an application site and an application time. It may be properly chosen in a range of 0.1 g to 10 kg (in terms of the active ingredient) per 10 ares depending upon purposes.

The agricultural and horticultural insecticide of the present invention may be used in admixture with other agricultural and horticultural disease or pest controllers in order to expand both spectrum of controllable diseases and insect pest species and the period of time when

effective applications are possible or to reduce the dosage.

Typical examples of the present invention are described below, but they should not be construed as limiting the scope of the invention.

EXAMPLES

Example 1

(1-1) Production of 3-chloro-N-[4-(1,1,2,2-tetrafluoroethoxy)-2-methylphenyl]phthalimide

In 10 ml of acetic acid were dissolved 0.55 g of 3-chlorophthalic anhydride and 0.67 g of 4-(1,1,2,2-tetrafluoroethoxy)-2-methylaniline, and the reaction was carried out with heating under reflux for 3 hours. After completion of the reaction, the solvent was distilled off under reduced pressure and the resulting residue was washed with an ether-hexane mixed solvent to obtain 1.1 g of the desired compound.

Physical property: m.p. 121 - 122℃.

Yield: 95%.

(1-2) Production of 3-chloro-N^1-[4-(1,1,2,2-tetrafluoroethoxy)-2-methylphenyl]-N^2-isopropylphthalic acid diamide (compound No. 141) and 6-chloro-N^1-[4-(1,1,2,2-tetrafluoroethoxy)-2-methylphenyl]-N^2-isopropylphthalic acid diamide (compound No. 239)

In 10 ml of dioxane was dissolved 1.1 g of 3-chloro-N-[4-(1,1,2,2-tetrafluoroethoxy)-2-methylphenyl]-

phthalimide, followed by adding thereto 0.5 g of isopropylamine, and the reaction was carried out at 80℃ for 3 hours. After completion of the reaction, the solvent was distilled off under reduced pressure and the resulting residue was purified by a silica gel column chromatography using a hexane/ethyl acetate (2/1) mixed solvent as an eluent, to obtain 0.4 g of the desired compound (compound No. 141) having an Rf value of 0.5 to 0.7 and 0.5 g of the other desired compound (compound No. 239) having an Rf value of 0.2 to 0.4.

Compound No. 141:

Physical property: m.p. 202 - 204℃.

Yield: 31%.

Compound No. 239:

Physical property: m.p. 199 - 201℃.

Yield: 39%.

Example 2

(2-1) Production of N-(4-trifluoromethoxyphenyl)-3-nitrophthalimide

In 50 ml of acetic acid were dissolved 5.97 g of 3-nitrophthalic anhydride and 5.31 g of 4-trifluoromethoxy-aniline, and the reaction was carried out with heating under reflux for 3 hours. After completion of the reaction, the solvent was distilled off under reduced pressure and the resulting residue was washed with an ether-hexane mixed solvent to obtain 10.2 g of the desired compound.

Physical property: m.p. 149 - 150°C.

Yield: 97%.

(2-2) Production of 3-amino-N-(4-trifluoromethoxyphenyl)phthalimide

In a pressure vessel were placed 10.0 g of N-(4-trifluoromethoxyphenyl)-3-nitrophthalimide, 100 ml of acetic acid and 0.5 g of 5% palladium carbon, and catalytic reduction with hydrogen was carried out at a hydrogen pressure of 5 kg/cm^2. After completion of the reaction, the catalyst was filtered off and the filtrate was concentrated under reduced pressure. The resulting residue was washed with an ether-hexane mixed solvent to obtain 9.0 g of the desired compound.

Physical property: m.p. 161 - 162°C.

Yield: 98%.

(2-3) Production of 3-bromo-N-(4-trifluoromethoxyphenyl)phthalimide

In 20 ml of acetic acid was dissolved 1.6 g of 3-amino-N-(4-trifluoromethoxyphenyl)phthalimide, and a solution of 0.35 g of sodium nitrite in 5 ml of concentrated sulfuric acid was added dropwise while maintaining the temperature at 15°C or lower. The resulting mixture was stirred at 15°C or lower for another 20 minutes to obtain a diazonium salt. The diazonium salt was slowly added to a mixture of a solution of 0.86 g of cuprous bromide in 50 ml of hydrobromic acid and 10 ml of toluene

which was maintained at 80°C. The resulting mixture was stirred until foaming ceased. After completion of the reaction, the organic layer was washed with an aqueous sodium thiosulfate solution and an aqueous sodium chloride solution, dried over anhydrous magnesium sulfate, and then distilled under reduced pressure to remove the solvent, and the resulting residue was purified by a silica gel chromatography to obtain 1.3 g of the desired compound.

Physical property: m.p. 117 - 118°C.

Yield: 67%.

(2-4) Production of 3-bromo-N^1-(4-trifluoromethoxyphenyl)-N^2-isopropylphthalic acid diamide (compound No. 262) and 6-bromo-N^1-(4-trifluoromethoxyphenyl)-N^2-isopropylphthalic acid diamide (compound No. 302)

From 1.3 g of 3-bromo-N-(4-trifluoromethoxyphenyl)phthalimide, 0.5 g of the desired compound (compound No. 262) and 0.7 g of the other desired compound (compound No. 302) were obtained in the same manner as in Example 1-2.

Compound No. 262:

Physical property: m.p. 208 - 210°C.

Yield: 33%.

Compound No. 302:

Physical property: m.p. 210 - 212°C.

Yield: 47%.

Example 3

(3-1) Production of N-(4-difluoromethoxy-2-methylphenyl)-3-nitrophthalimide

In 100 ml of acetic acid were dissolved 5.8 g of 3-nitrophthalic anhydride and 5.2 g of 4-difluoromethoxy-2-methylaniline, and the reaction was carried out with heating under reflux for 3 hours. After completion of the reaction, the solvent was distilled off under reduced pressure and the resulting residue was washed with an ether-hexane mixed solvent to obtain 10.2 g of the desired compound.

Physical property: m.p. 163 - 164℃.

Yield: 98%.

(3-2) Production of N^1-(4-difluoromethoxy-2-methylphenyl)-N^2-isopropyl-3-nitrophthalic acid diamide (compound No. 696)

In 100 ml of dioxane was dissolved 10 g of N-(4-difluoromethoxy-2-methylphenyl)-3-nitrophthalimide, followed by adding thereto 2.5 g of isopropylamine, and the reaction was carried out for 3 hours. After completion of the reaction, the solvent was distilled off under reduced pressure and the resulting residue was washed with ether to obtain 4.0 g of the desired compound.

Physical property: m.p. 148 - 149℃.

Yield: 86%.

(3-3) Production of 3-amino-N^1-(4-difluoromethoxy-2-methylphenyl)-N^2-isopropylphthalic acid diamide

In a pressure vessel were placed 5 g of N^1-(4-difluoromethoxy-2-methylphenyl)-N^2-isopropyl-3-nitrophthalic acid diamide, 50 ml of acetic acid and 0.25 g of 5% palladium carbon, and catalytic reduction with hydrogen was carried out at a hydrogen pressure of 5 kg/cm^2. After completion of the reaction, the catalyst was filtered off and the filtrate was concentrated under reduced pressure. The resulting residue was washed with an ether-hexane mixed solvent to obtain 4.0 g of the desired compound.

Physical property: m.p. 148 - 149℃.

Yield: 86%.

(3-4) Production of N^1-(4-difluoromethoxy-2-methylphenyl)-3-iodo-N^2-isopropylphthalic acid diamide (compound No. 387)

In 20 ml of acetic acid was dissolved 1.89 g of 3-amino-N^1-(4-difluoromethoxy-2-methylphenyl)-N^2-isopropylphthalic acid diamide, and 1.5 g of concentrated sulfuric acid was added under ice-cooling. While maintaining the resulting solution at 15℃ or lower, a solution of 0.35 g of sodium nitrite in 0.5 ml of water was added dropwise. The resulting solution was stirred at 15℃ or lower for another 20 minutes to obtain a diazonium salt. The diazonium salt was slowly added to a mixture of 50 ml of an aqueous solution containing 1.0 g of potassium iodide and 50 ml of chloroform which was maintained at 40℃. The resulting

mixture was stirred until foaming ceased. After completion of the reaction, the organic layer was washed with an aqueous sodium thiosulfate solution and an aqueous sodium chloride solution, dried over anhydrous magnesium sulfate, and then distilled under reduced pressure to remove the solvent, and the resulting residue was purified by a silica gel chromatography to obtain 0.8 g of the desired compound.

Physical property: m.p. 207 - 209℃.

Yield: 33%.

Example 4

(4-1) Production of 3-iodo-2-N-isopropyl-phthalamic acid

A solution of 0.67 g of isopropylamine in 5 ml of acetonitrile was added dropwise to a solution of 1.37 g of 3-iodophthalic anhydride in 10 ml of acetonitrile under ice-cooling, and the reaction was carried out with stirring at room temperature for another 5 hours. After completion of the reaction, the crystals formed in the reaction solution were collected by filtration and washed with a small volume of acetonitrile to obtain 1.45 g of the desired compound.

Yield: 87%.

^{1}H-NMR [$CDCl_3$/TMS, δ values (ppm)]

1.23(6H, d), 4.35(1H, m), 5.80(1H, d), 6.85(1H, broad), 7.07(1H, t), 7.93(1H, d), 7.96(1H, d).

(4-2) Production of 6-iodo-N-isopropyl-phthalic acid isoimide

In 10 ml of toluene was dissolved 0.45 g of 3-iodo-2-N-isopropyl-phthalamic acid, followed by adding thereto 0.85 g of trifluoroacetic anhydride, and the reaction was carried out with stirring for 30 minutes. After completion of the reaction, the solvent was distilled off under reduced pressure to obtain 0.43 g of the desired compound as a crude product. The obtained desired compound was used in the subsequent reaction without purification.

Physical property: m.p. 87.5 - 88.5℃.

(4-3) Production of 3-iodo-N^1-(4-pentafluoroethyl-2-methylphenyl)-N^2-isopropyl-phthalic acid diamide (compound No. 372)

In 10 ml of tetrahydrofuran was dissolved 0.43 g of the 6-iodo-N-isopropyl-phthalic acid isoimide obtained in 4-2, followed by adding thereto 0.30 g of 4-pentafluoroethyl-2-methylaniline, and the reaction was carried out with stirring for 1 hour. After completion of the reaction, the solvent was removed from the reaction solution by distillation under reduced pressure, and the resulting residue was washed with ether-n-hexane to obtain 0.70 g of the desired compound.

Physical property: m.p. 195 - 196℃.

Yield: 95%.

Example 5

(5-1) Production of ethyl 6-nitro-N-(4-chloro-2-methylphenyl)-phthalamate

In 30 ml of tetrahydrofuran was dissolved 1.29 g of 3-nitro-2-ethoxycarbonylbenzoyl chloride, followed by adding thereto 0.71 g of 4-chloro-2-methylaniline and 0.56 g of triethylamine, and the reaction was carried out with stirring for 30 minutes. After completion of the reaction, the reaction solution containing the desired compound was poured into water and the desired compound was extracted with ethyl acetate. The extracted solution was dried over anhydrous magnesium sulfate and distilled under reduced pressure to remove the solvent, and the resulting residue was purified by a silica gel column chromatography to obtain 1.7 g of the desired compound.

Physical property: m.p. 164 - 165℃.

Yield: 94%.

(5-2) Production of 3-nitro-N^1-(4-chloro-2-methylphenyl)-N^2-isopropyl-phthalic acid diamide (compound No. 664)

In 20 ml of dioxane was dissolved 1.7 g of ethyl 6-nitro-N-(4-chloro-2-methylphenyl)-phthalamate, followed by adding thereto 1.5 g of isopropylamine, and the reaction was carried out with stirring at 80℃ for 1 hour. After completion of the reaction, the solvent was removed from the reaction solution containing the desired compound, by distillation under reduced pressure, and the resulting

residue was purified by a silica gel column chromatography to obtain 1.5 g of the desired compound.

Physical property: m.p. 202 - 204℃.

Yield: 85%.

Example 6

(6-1) Production of N-isopropyl-3,4-dichlorophthalamic acid

In 30 ml of tetrahydrofuran was dissolved 2.32 g of N-isopropyl-3,4-dichlorobenzamide, and 21 ml of s-BuLi (0.96 M/L) was slowly added while maintaining the temperature at -70℃. The resulting mixture was stirred at -70℃ for 30 minutes, after which the cooling bath was removed. An excess of carbon dioxide was introduced into the reaction solution, and the thus treated solution was stirred at room temperature for 30 minutes to carry out the reaction.

After completion of the reaction, the reaction solution was poured into water and acidified with diluted hydrochloric acid, and the desired compound was extracted with ethyl acetate. The extracted solution was dried over anhydrous magnesium sulfate and distilled under reduced pressure to remove the solvent, and the crystals thus obtained were washed with an ether-hexane mixed solvent to obtain 2.4 g of the desired compound.

Physical property: m.p. 155 - 156℃.

Yield: 86.9%.

(6-2) Production of N-isopropyl-3,4-dichlorophthalic acid isoimide

In 10 ml of toluene was dissolved 0.41 g of N-isopropyl-3,4-dichlorophthalamic acid, followed by adding thereto 0.42 g of trifluoroacetic anhydride, and the reaction was carried out with stirring at room temperature for 30 minutes. After completion of the reaction, the solvent was distilled off under reduced pressure to obtain 0.39 g of the desired compound as a crude product. The obtained desired compound was used in the subsequent reaction without purification.

(6-3) Production of 3,4-dichloro-N^1-(4-pentafluoroethyl-2-methylphenyl)-N^2-isopropylphthalic acid diamide (compound No. 1222)

In 10 ml of acetonitrile was dissolved 0.39 g of N-isopropyl-3,4-dichlorophthalic acid isoimide, followed by adding thereto 0.34 g of 4-pentafluoroethyl-2-methyl-aniline, and the reaction was carried out with stirring for 2 hours. After completion of the reaction, the reaction solution was maintained at 0℃ for 10 minutes and the crystals precipitated were collected by filtration and washed with hexane to obtain 0.61 g of the desired compound.

Physical property: m.p. 208 - 209℃.

Yield: 84.1%.

Example 7

Production of 3-chloro-2-isopropylamino-thiocarbonyl-N-(pentafluoroethyl-2-methylphenyl)benzamide (compound No. S-1)

In 20 ml of tetrahydrofuran was dissolved 1.06 g of N-(pentafluoroethyl-2-methylphenyl)-3-chlorobenzamide, and 7 ml of s-BuLi (0.96 M/L) was slowly added while maintaining the temperature at -70℃. The resulting mixture was stirred at -70℃ for 30 minutes, after which the cooling bath was removed. A solution of 0.33 g of isopropyl isothiocyanate in 5 ml of tetrahydrofuran was poured into the reaction solution, and the resulting solution was stirred at room temperature for 30 minutes to carry out the reaction.

After completion of the reaction, the reaction solution was poured into water and acidified with diluted hydrochloric acid, and the desired compound was extracted with ethyl acetate. The extracted solution was dried over anhydrous magnesium sulfate and distilled under reduced pressure to remove the solvent, and the crystals thus obtained were washed with an ether-hexane mixed solvent to obtain 1.2 g of the desired compound.

Physical property: m.p. 162 - 164℃.

Yield: 86%.

Typical preparation examples and test examples of the present invention are described below but they should not be construed as limiting the scope of the invention.

In the preparation examples, parts are all by weight.

Formulation Example 1

Each compound listed in Table 1	50 parts
Xylene	40 parts
Mixture of polyoxyethylene nonylphenyl ether and calcium alkylbenzenesulfonate	10 parts

An emulsifiable concentrate was prepared by mixing uniformly the above ingredients to effect dissolution.

Formulation Example 2

Each compound listed in Table 1	3 parts
Clay powder	82 parts
Diatomaceous earth powder	15 parts

A dust was prepared by mixing uniformly and grinding the above ingredients.

Formulation Example 3

Each compound listed in Table 1	5 parts
Mixed powder of bentonite and clay	90 parts
Calcium lignin sulfonate	5 parts

Granules were prepared by mixing the above ingredients uniformly, and kneading the resulting mixture together with a suitable amount of water, followed by granulation and drying.

Formulation Example 4

Each compound listed in Table 1	20 parts
Mixture of kaolin and synthetic high-dispersion silicic acid	75 parts
Mixture of polyoxyethylene nonylphenyl ether and calcium alkylbenzenesulfonate	5 parts

A wettable powder was prepared by mixing uniformly and grinding the above ingredients.

Test Example 1

Insecticidal effect on diamondback moth (Plutella xylostella)

Adult diamondback moths were released and allowed to oviposit on a Chinese cabbage seedling. Two days after the release, the seedling having eggs deposited thereon was immersed for about 30 seconds in a liquid chemical prepared by diluting a preparation containing each compound listed in Table 1 as an active ingredient to adjust the concentration to 500 ppm. After air-drying, it was allowed to stand in a room thermostated at 25℃. Six days after the immersion, the hatched insects were counted. The mortality was calculated according to the following equation and the insecticidal effect was judged according to the criterion shown below. The test was carried out with triplicate groups of 10 insects.

$$\text{Corrected mortality (\%)} = \frac{\left[\begin{array}{l}\text{Number of}\\ \text{hatched insects}\\ \text{in untreated group}\end{array}\right] - \left[\begin{array}{l}\text{Number of}\\ \text{hatched insects}\\ \text{in treated group}\end{array}\right]}{\left[\begin{array}{l}\text{Number of}\\ \text{hatched insects}\\ \text{in untreated group}\end{array}\right]} \times 100$$

Criterion:

Effect	Mortality(%)
A	100
B	99 - 90
C	89 - 80
D	79 - 50

The results obtained are shown in Table 4.

Test Example 2

Insecticidal effect on common cutworm (Spodoptera Litura)

A piece of cabbage leaf (cultivar; Shikidori) was immersed for about 30 seconds in a liquid chemical prepared by diluting a preparation containing each compound listed in Table 1 as an active ingredient to adjust the concentration to 500 ppm. After air-drying, it was placed in a plastic Petri dish with a diameter of 9 cm and inoculated with second-instar larvae of common cutworm, after which the dish was closed and then allowed to stand in a room thermostated at 25℃. Eight days after the inoculation, the dead and alive were counted. The mortality was calculated according to the following equation and the insecticidal effect was judged according to the criterion shown in Test

Example 1. The test was carried out with triplicate groups of 10 insects.

$$\text{Corrected mortality (\%)} = \frac{\left[\begin{array}{l}\text{Number of}\\ \text{alive larvae in}\\ \text{untreated group}\end{array}\right] - \left[\begin{array}{l}\text{Number of}\\ \text{alive larvae in}\\ \text{treated group}\end{array}\right]}{\left[\begin{array}{l}\text{Number of}\\ \text{alive larvae in}\\ \text{untreated group}\end{array}\right]} \times 100$$

The results obtained are shown in Table 4.

Test Example 3

Insecticidal effect on rice leafroller (Cnaphalocrocis medinalis)

The lamina of a rice plant at the 6 to 8 leaf stage was immersed for about 30 seconds in a liquid chemical prepared by diluting a preparation containing each compound listed in Table 1 as an active ingredient to adjust the concentration to 500 ppm. After air-drying, the lamina was placed in a plastic Petri dish with a diameter of 9 cm whose bottom had been covered with a wetted filter paper. The lamina was inoculated with third-instar larvae of rice leafroller, after which the dish was allowed to stand in a room thermostated at 25°C and having a humidity of 70%. Four days after the inoculation, the dead and alive were counted and the insecticidal effect was judged according to the criterion shown in Test Example 1. The test was carried out with triplicate groups of 10 insects.

The results obtained are shown in Table 4.

Table 4

No	Test Example 1	Test Example 2	Test Example 3
1	D	D	A
2	A	C	
3	C	A	
4	A		D
7	A		
8	A	A	A
9	A		A
10	A	D	D
11	A	C	C
12	A	D	
13	D		D
14	A		
15	A		A
16	A		
17	A		D
18	D		A
20	A		

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
22	A	D	
23	A		D
24	A		D
25	A		A
26	A		D
27	A	A	C
28			A
29	A	B	A
30	A	A	A
31	A		
32	A		
33	A		
34	A	C	
37	A		
41	A		A
42	A	D	A
43	B	D	
44			A
45	A		A
46	A		B
47	A	D	A
48	A	B	A
49	A	A	A
50	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
51	A		A
52	A	A	A
53	A		A
55	A	B	A
56	A	A	A
58	A	A	A
59	A		
60	A	A	A
61	A	B	A
62	A	A	A
63	A	B	A
64	A	B	A
65	A	A	A
66	A	A	B
67	A	A	A
68	A		
69	A		A
70	A		A
71			D
73	A		
74	A		
75	A		A
76	C		B
77	A	C	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
78	A	A	A
79	A	A	D
81			A
83	A	A	A
84	A		
86	B		B
87	A		A
88	A		
89	A	B	A
90	A	A	B
91	A	A	A
92	A		
93	A	A	A
98	A		C
99	A		A
100	A	A	A
101	A		
102	A	D	A
103	A	C	A
109	A	A	C
110	A		A
111	A	C	B
112	A	A	A
113	A	B	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
114	A	A	A
115	A	C	A
116	A	D	A
117	A	A	A
118	A	A	A
119	A	A	A
120	A	D	A
121	A	A	A
122	A	A	A
123	A		A
124	A	A	A
125	A	B	A
126	A	A	A
127	A	A	A
128	A	D	A
129	A	A	A
130	A	A	A
132	A	A	A
133	A	A	A
134	A		A
135	A	A	A
136	A	A	A
137	A		A
138	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
139	A	A	A
140	A	A	A
141	A	A	A
142	A	A	B
143	A	A	A
144	A	A	A
145	A	A	A
146	A	A	A
147	A	C	
148	A	A	A
149	A	A	A
150	A	A	A
151	A		
152	A	A	A
153	A		D
157	A	A	A
158	A	A	A
159	A	A	A
161	A	D	A
162	A	A	B
163	A	A	A
164	A	A	
165	A	B	C
167	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
168	A		
169	A	D	
170	A	D	B
171	A		D
172	A	A	D
173	A	D	D
174	A		
175	A		
176	A	D	A
177	A	A	A
178	A		A
179	A		
180	A	A	A
181		A	
183	A	B	
185	A		
186	D		
187	A		D
188	D		D
189	A		
190	A		
191	A		A
192	A		
193	A	D	

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
194	A		
195	A		
196	A		D
197	A	A	A
198	A	C	A
199	A		
200	A		A
201	A	B	A
202	A		
203	A		
206	A		A
207	A		
208	A		
209	A		B
210	A		D
211	A		A
212	A	D	A
213	A	A	A
214	A	A	A
215	A	D	
216	A		A
217	A		A
218	A		C
219	A	D	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
220	A		A
221	A	A	A
222	A	B	A
223	A	A	A
225	A	B	A
226	A		A
227	A		
228		B	A
229	A	D	A
230	A	C	A
231		B	A
232	A		A
233	A		
234	A		A
235	A		A
236	A	A	A
237	A		A
238	A		A
239	A	A	A
240	A		
241	A	B	A
242	A	B	A
243	A	A	B
244	A	C	

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
245	A	D	
246	A	B	B
248	A	C	
249	A	D	A
250	A		D
251	A		A
252	A		
253	A	A	C
254	A	A	
255	A		A
256	A		
257	A		B
258	A		A
259	A		D
261	A	A	D
262	A	A	D
263	A		A
264	—	D	A
265	A		
266	A	A	A
267	A	A	A
268	A	A	A
269	A	A	A
270	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
271	A	A	A
272	A	A	A
273	A	D	D
274	A	A	A
275	A	D	A
276	A	A	A
277	A	A	A
278	A	A	A
279	A	A	A
281	A	A	A
282	A	A	A
283	A	A	A
284	A	A	A
285	A	D	A
286	A	A	A
287	A	A	A
288	A	A	A
289	A	A	A
290	A	A	A
291	A	A	A
292	A	A	A
293	A	A	A
294	A	A	A
295	D		

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
296	A	A	A
297	A	A	B
298	A	A	A
299	A	A	A
300	A		A
301	A	A	D
302	A		D
303	A		D
304	A		
305	A	A	A
306	A	A	A
307	A		D
308	A		
309	A	A	
310	A		
311	A		D
312	A	A	A
313	A	A	A
314	A		A
315	A		A
316	A	A	A
318	A	B	A
319	A	B	B
320	A		D

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
321	A	A	
322	A		B
323	A	C	A
324	A		A
325	A	A	A
326	A		A
327	A		A
328	A	A	A
329	A	A	A
330	A		A
332	A		A
333	A		D
334	A	C	C
335	A		B
336	A		D
337	A		A
338	A	B	A
339	A	B	A
340	A		A
341	A		A
342	A		
343	A		
345	A	B	A
346	A	C	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
347	A	B	C
348	A		A
349			A
350	A	A	A
351	A	A	A
352			A
353	A	A	A
354	A	A	A
355	A	C	A
356	A	A	A
360	A	D	A
361	A	A	A
362	A	A	A
363	A	A	A
364	A	A	D
365	A	A	A
366	A	A	A
367	A	A	A
368	A	A	A
369	A	A	A
370	A	A	A
371	A	A	A
372	A	A	A
373	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
374	A	A	A
375	A	A	A
376	A		A
377	A		A
378	A	D	A
379	A	A	A
380	A	A	A
381	A	A	A
382	A	B	A
383	A		A
384	A		C
385	A	B	A
386	A	A	A
387	A	A	A
388	A	A	B
389	A	A	A
390	A	A	A
391	A	A	A
392	A	A	A
393	A	A	A
394	A	A	A
395	A	A	A
396	A	A	A
397	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
398	A		
399	A	A	A
400	A	D	A
402	A		
403	A	B	A
404	A	A	A
406	A	A	A
407	A	A	A
408	A	B	A
409	A	A	A
410	A	A	A
411	A		A
412	A		C
413	A		C
414	A		A
415			A
416	A	A	A
417	A	A	A
418			A
419	A	A	A
420	A		D
421	A	B	A
422	A		
424	A	A	

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
427	A		D
428	A		
429	A	D	
430	A	D	D
431	A	A	
432	A		A
433	A		A
434	A		
435	A	B	A
436	A	B	A
437	A	C	A
438	A	B	A
439	A	A	A
440	A	C	B
441	A		B
442	A		
443	A		D
444	A		A
445		B	A
446	A	A	A
447	A	B	C
448	A		A
449	A		
450	A		C

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
451	A	A	
452	A	A	A
453	A	D	A
454	A	A	A
455	A	B	A
456	A		A
457	A	A	B
458	A		
459	A		
460	A	B	
461	A		
462	A		
463	A		
464	A		A
465	A		
466	A		A
467	A		A
468	A	A	B
469	A	A	D
470	A	C	C
471	A	A	A
472	A		B
473	A	A	A
474	A	B	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
475	A		D
476	A	A	A
477	A		C
478	A		
479	A		A
480	A	B	A
488	A	A	A
489	A	A	A
490	A	A	A
491	A	A	A
492	A	A	A
493	A	A	A
494	A		A
495	A	A	A
496	A	A	A
498	A	A	A
499	A	A	A
500	A	B	A
501	A	A	A
502	A	A	A
503	A	B	A
504	A	A	A
505	A	A	A
506	A		

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
507	A	B	A
508	A	B	A
509	A	A	A
510	A	B	A
511	A	A	A
512	A	A	A
513	A	A	A
514	A	A	A
515	A		C
516	A	A	A
517	A	A	A
518	A		B
519	A	A	A
520	A		
521	A	A	A
522	A	D	A
523	A	A	A
524	A	A	A
526	A	A	
527	A	A	A
528	A		A
529	A	D	A
530	A		D
531	A		A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
532	A		A
533	A	A	A
534	A		A
535	A	A	
536			A
537	A		
538	A	A	A
539	A		
540	A		
543	A		A
544	A		A
545	A		A
546	A		A
547	A	A	D
548	A	A	A
549	A	A	D
550	A	C	A
551	A		A
552	A		B
553	A	C	A
554	A		A
555	A		B
557	A	C	B
558	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
559	A		
560	A		
561	A	C	A
562	A		A
563	A		A
564	A		B
565	A		A
566	A		B
567	A	D	D
568	A	C	A
569	A	A	A
570	A	A	
571	A	C	
573	A		
575	A		A
576	A		C
577	A		A
579	A	A	A
580	A		A
581	A	B	A
582	A		A
584	A	D	
585	A		A
586	A		D

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
587	A		
588	A		
589	A		A
590	A		
591	A	D	
592	A		
593	A		
594	A		
595	A	A	A
596	D		D
597	B		
598	A		
599	A	D	A
600	A		
601	A		
602	A		A
603	B		C
604	A		D
605			C
606	A	D	A
607	A	A	A
608	A		
609	A	B	A
610	A	A	C

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
611	A		A
612	A		D
613	A		
614	A		
615	A		
616	A		D
617	A	A	A
618	A	A	A
619	A	A	A
621	A		
622	A		
623	A		A
624	A		
625	A	D	D
626	A		
628	A	B	A
633	A	D	
634	A		D
635	A	D	
636	A	D	A
637	A		
638	B		
639	A		
640	A		

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
641	D	D	
642	A		
643	A		A
644	A	A	
645	A		
646	A	D	
647	A		B
648	A	D	A
649	A		C
650	A		
652	A		
653	A		
654		D	
656	A		A
657	D		
658	A		
659	A		
660	A		A
661	B		D
662	A		
663	A	A	D
664	A	A	
665	A	A	B
666	A		D

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
667	A	A	A
668	A		
669	A	D	A
670	A		D
671	A		D
672	A		
673	A	D	D
674	A	D	A
675	A	A	A
676	A	C	A
677	A		
678	A		
679	A		A
680	A		D
681	A	A	A
682	A		A
683	A	A	A
684	A	A	A
686	A	A	A
687	A	D	D
688	A		A
689	A	D	A
690	A		A
691	A	D	C

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
692	A	D	
693	A	A	
694	A		A
695	A	A	A
696	A	A	A
697	A		A
698	A	B	A
699	A	A	D
700	A	A	A
701	A	A	A
703	A	A	A
704	A		A
705	A	D	A
706	A	A	
708	D		
709	A	A	
710	A	C	A
711	A	C	A
712	A	A	A
713	A	B	D
714	A	A	A
715	A	A	A
716	A	A	A
717	A		A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
718	A		A
719	A	D	
720	A		
721	A		
722	A		A
723	D		D
724	A		B
725	A	A	
727	A	B	A
728	A		A
729	A		A
732	A		
733	A		
735			D
737	A		
738	D		
740	A		A
741	A	A	A
742	A		
743	D		
744	C		
745	D		

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
749	A		
750	A		A
751	A		A
752	A		
753	A	A	D
755	A		A
758			A
759			D
765			A
766	A		
767	A	C	A
768	A	B	A
769	A		D
770	A	A	A
771	A		C
772	A		A
773	A		A
774	A		A
776	B		D
777	A		D
778	A		A
780	A	A	A
781	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
782	A		A
783	A	A	A
785		A	
788	C		C
790			A
791	A		A
793	A		
795	A	B	A
796	A		
797	A		C
798			A
799	A		A
800			C
801	A	A	D
802	D		
803	A		A
808	A		
819	A	B	A
821	A		A
822	D		D
824	A		
825	A		

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
826	A		A
827	A		
830	C		
831	D	D	
832	A		
833	A		D
835	A		
836	A		A
837	A		
838	A	C	A
839	A		C
840	A		D
841	A	D	
842	A	A	D
845	A		
846	A		
847		D	
848	A		
849	A	B	A
850	A		A
851	A	D	A
852	A		D
854	A		
855	A		

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
856	A		D
858	C	A	
859	D		
860	A		
861	A		
862	A	D	D
863	A		B
864	A		
865	A		
866	D		
867	A		C
869	A	D	
870	A		
871	A		
872	A		C
874	A	C	A
875	A		
878	C		
879	A		A
880		D	
881	A	D	
888	D		

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
889	A		A
890	A	A	A
891	A	A	A
892	A		A
893	A	A	A
894	A	A	A
895	A	A	A
901	A	D	A
902	A		
903	A	A	A
904	A		
905	A	A	A
906	A	D	A
907	A	A	A
908	A	D	A
909	A	A	A
910			A
911	A		D
912	A		
913	A		
914	A		
915	A	A	A
916	A		
917	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
918	A		
919	A		
920	A		
924	A		
925	A		A
927	A	A	A
928	A		A
929	A	A	A
930	A	A	A
931	A	A	A
932	A	A	A
933	A		A
934	A	A	A
935	A	A	A
936	A	A	A
937	A	A	A
938	A	A	
939	A	A	A
940	A	A	A
941	A	A	A
942	A	A	A
943	A	C	A
944	A	A	A
945	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
946	A		A
947	A	A	A
949	A	A	A
950			C
951	A	A	A
952	A		A
953	A	A	A
954	A		A
955	A	A	A
956	A		A
957	A	A	A
958	A		A
959	A		A
965	A	C	
966	A		B
971	A	A	A
972		A	
973	A	A	A
974	A	A	A
975	A		A
976	A	A	A
977	A	A	A
978	A	C	A
979	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
980	A	A	A
981	A	A	A
982	A		C
983	A	A	A
984	A		
985	A	A	A
986	A		A
987	A	A	A
988	A		
989	A	A	A
990	A		A
991	A	A	A
992	A		
993	A		A
995	A		A
996	A	A	A
997	A	A	A
998	A	A	A
999	A		A
1000	A	D	A
1001	A	A	A
1002	A	A	A
1003	A	A	A
1004	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1005	A	A	A
1006	A		
1007	A	A	A
1008	A		A
1009	A	A	A
1010	A		A
1011	A	A	A
1013	A	A	A
1014	A		A
1015	A	D	A
1016			A
1017	A	A	A
1018	A	D	A
1019	A	A	A
1020	A	A	A
1021	A		A
1022	A	A	A
1023	A	A	A
1024	A	A	A
1025	A		
1026	A		A
1027			A
1028	A	A	A
1031	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1032	A		A
1033	A	A	A
1034	A		
1035	A	A	A
1036	A		A
1037	A	A	A
1038	A	A	A
1039	A	A	A
1040	A	A	A
1041	A	A	A
1042	A	A	A
1043	A		A
1044	A	A	A
1045	A	A	A
1046	A	A	A
1047	A		A
1048	A		A
1049	A	A	A
1050	A	A	A
1051	A	A	A
1052	A	A	
1053	A	A	A
1054	A	A	A
1055	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1056	A	A	A
1057	A		A
1058	A	A	A
1059	A		
1060	A	A	A
1061	A	A	A
1062	A	A	A
1063			A
1064	A		A
1065	A		
1066	A	C	A
1067	A	A	A
1068	A	A	A
1069	A	A	A
1070	A	A	A
1071	A	C	A
1072			A
1073	A	A	A
1074	A	A	A
1075	A	A	A
1076	A		A
1077	A		A
1078	A	A	A
1079	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1080	A	A	A
1081	A	A	A
1082	A		
1083	A		
1086	A		A
1087	A	A	A
1088	A		A
1089	A		A
1099	A		A
1100	A	C	A
1101	A	C	A
1102	A	A	A
1103	A		A
1104	A	A	A
1105	A	A	A
1106	A		A
1107	A		A
1108	A		A
1109	A		A
1110	A	C	A
1111	A		A
1112	A	A	A
1113	A	A	A
1114	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1115	A	A	A
1116	A	A	A
1117	A	A	A
1118	A	A	A
1119	A	A	A
1120	A	A	A
1121	A	A	A
1122	A	A	A
1123	A	A	A
1124	A	A	A
1125	A	A	A
1126	A	A	A
1127	A	A	A
1128	A	A	A
1129	A	A	A
1130	A	A	A
1131	A	A	A
1132	A		A
1133	A		A
1134	A		A
1135	A		A
1136	A		A
1137	A		
1138			A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1139	A		
1140			A
1141	A	A	A
1142	A	A	A
1143	A	C	A
1144	A	A	A
1145	A		A
1146	A	C	A
1147	A	A	A
1148	A	A	A
1149	A		A
1150	A	A	A
1151	A	A	A
1152	A	A	A
1153	A	A	A
1154	A	C	A
1155	A		A
1156	A	A	A
1157	A		A
1158	A	D	A
1159	A	A	A
1160	A	A	A
1161	A	D	A
1162	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1163	A	A	A
1164	A	A	A
1165	A	A	A
1166	A	A	A
1167	A	A	A
1168	A	A	A
1169	A	A	A
1173	A	A	A
1174	A	A	A
1175	A		
1178	A		
1179	A	A	—
1180	A		—
1181	A		—
1182	A		—
1183	A	A	—
1184	A	A	—
1185	A	C	—
1186	A	A	—
1187	A	A	—
1188	A	A	—
1189	A	A	—
1190	A	A	A
1191	A	A	A

Table 4 (Cont'd)

No.	Test Example 1	Test Example 2	Test Example 3
1192	A	A	A
1193	A	A	A
1202	A	A	A
1203	A	D	A
1204	A	A	A
1205	A		A
1206	A	A	A
1207	A	A	A
1208	A		A
1209	A	D	A
1210	A	A	A
1211	A	A	A
1212	A	A	A
1221	A	A	A
1222	A	A	A
1223	A	A	A
1224			B
1225			A
1226			A
1227	A	A	A
1228	A	A	A
1229	A	A	A
1230	A	A	A
1231	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1232	A	A	A
1233	A	A	–
1234	A	A	–
1235	A	D	–
1236	A	A	–
1237	A	A	–
1238	A		–
1245	A	A	–
1246	A	A	A
1247	C		
1248	A	A	A
1249	A		
1250	A	A	A
1251	A	A	A
1256	A	A	–
1257	A	A	–
1258	A	A	–
1259	A		–
1260	A		–
1261	A	A	–
1262	A	A	A
1263	A	A	A
1264	A	A	A
1266	A		A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1277	A	A	A
1278	A	A	A
1280	A	A	A
1281	A		A
1283	A	—	—
1284	A	—	A
1285	A	—	A
1287	A	A	A
1288	A		
1291	A		
1293			A
1294	A	A	A
1295	A	A	A
1296	A	A	A
1297	A	A	A
1298	A	A	A
1299	A	A	A
1300	A	A	A
1301	A		A
1303	A	A	A
1304	A		A
1305	A	A	A
1306			A
1307	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1308			C
1309	A	A	A
1310			B
1311	A	A	A
1312	A		A
1313	A	A	A
1314	A	A	A
1315	A	A	A
1316	A	A	A
1317	A	C	A
1318	A		A
1319	A	—	—
1321	A	—	A
1322	A		
1323	A		A
1325	A		A
1327	A		
1328	A		
1330	A	A	A
1331	A		A
1332	A		
1333	A		A
1335	A	C	A
1337	A		A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1338	A		
1339	A		A
1340	A		A
1341	A		
1342	A		
1343	A		A
1345	A		
1346	A		
1347	A		
1348	A		
1349	A		
1350			A
1351	A		A
1352	A		A
1353	A	A	A
1355	A	A	A
1356	A		
1358	A		C
1360	A		C
1361			A
1362	A	A	A
1363	A		
1364	A	A	A
1365	A		

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1366	A	A	A
1367	A		
1368	A		
1370	A		A
1372	A		
1373	A		
1374	A		
1376	A		
1379	A		
1381	A		C
1382	A	A	A
1383	A	A	A
1384	A	A	A
1385	A	A	A
1386	A	A	A
1387	A	A	A
1388	A	D	A
1389	A	A	A
1390	A		A
1392	A		A
1393	A		A
1394	A		A
1395	A		
1398	A		

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1399	A	A	A
1400	A	A	A
1401	A		
1402	A	A	A
1404	A	C	A
1406	A	A	A
1409	A		A
1410	A		A
1411	A		A
1412	A		
1414	A	A	A
1415	A		A
1416			A
1417	A	A	A
1418	A	A	A
1419	A		A
1420	A		A
1421	A		
1423	A		
1424		A	A
1427	A	A	A
1428	A	A	A
1429	A	A	A
1430	A	D	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1431	A		
1432			A
1434	A		
1436	A	A	A
1438	A	A	A
1439	A		C
1440	A		
1441	A		A
1442	A		
1443	A		
1445	A	A	A
1446	A		
1447	A	A	A
1448	A	A	A
1449	A	A	A
1450	A	A	A
1451	A		
1452	A	A	A
1453	A		
1454	A	A	A
1456	A		A
1457	A		A
1458	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1459	A	A	
1460	A	C	A
1461	A		A
1464	A	A	A
1465	A		A
1466	A	A	A
1467	A	A	A
1468	A	C	A
1469	A		
1470	A		A
1472	A	A	A
1473	A	A	A
1474	A	A	A
1475	A	A	A
1476	A		
1478	A	A	A
1479	A	A	A
1480			A
1481	A	A	A
1482	A	A	A
1484	A	A	A
1485	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1486	A	A	
1487	A	A	
1488	A		A
1489	A	A	A
1490	A		A
1491	A	A	A
1492	A		A
1493	A		A
1494	A	A	A
1495	A	A	A
1496	A	A	A
1497	A	A	A
1498	A	A	A
1499	A	A	A
1500	A	A	A
1501	A	A	A
1502	A	A	A
1503	A	C	A
1504	A	A	A
1505	A	A	A
1506	A	A	A
1507	A	A	A
1508	A	C	A
1509	A	C	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1510	A		A
1511	A		
1512	A	A	A
1513	A		
1514	A		A
1515	A		
1516	A	A	A
1517	A		A
1518	A		
1519	A		A
1520			A
1521	A		
1522	A	A	A
1523	A		A
1524	A	A	A
1525	A	A	A
1526	A	A	A
1527	A		A
1528	A		A
1529	A		A
1530	A		A
1531	A	A	A
1532	A	A	A
1533	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1534	A	A	A
1535	A	A	A
1536	A	A	A
1537	A	A	A
1538	A	A	A
1539	A	A	A
1540	A	A	A
1541	A	A	A
1542	A	D	A
1543	A	A	A
1544	A	A	A
1545	A	D	A
1546	A	C	A
1547	A		A
1548	A		A
1549	A	D	A
1550	A	A	A
1551	A	D	A
1552	A	A	A
1553	A		A
1554	A	A	
1555	A		A
1556	A	A	A
1557	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1558	A	C	A
1559	A	A	A
1560	A	A	A
1561	A	A	A
1562	A	A	A
1563	A	A	A
1565	A	A	A
1566	A	A	A
1567	A	A	A
1568	A	A	A
1569	A	A	A
1570			A
1571	A	A	A
1572	A	A	A
1573	A	A	A
1574	A	A	A
1575	A		A
1576	A	D	A
1577	A		
1578	A		A
1579	A		
1580	A	A	A
1581	A	A	A
1582	A		A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1583	A		A
1584	A		A
1585	A	A	A
1586	A	C	A
1587	A	A	A
1588	A		A
1589	A		A
1590	A	A	A
1594	A	A	–
1595	A	A	–
1596	A	A	–
1597	A	A	–
1598	A	A	–
1599	A	A	–
1600	A	A	–
1601	A	A	–
1602	A	A	A
1603	A	A	A
1604	A	A	A
1605	A	C	–
1606	A	A	–
1607	A	A	–
1608	A	A	–
1609	A	A	–

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1610	A	A	–
1611	A		–
1612	A	A	–
1613	A	A	–
1614	A	C	A
1615	A	A	A
1617	A		A
1618	A	C	A
1619	A	A	–
1620	A		A
1622	A	A	A
1623	A	C	A
1624	A	D	A
1625	A	A	A
1626	A		A
1627	A	A	A
1628	A	A	A
1629	A	A	A
1632	A		A
1633	A	A	A
1634	A	A	A
1635	A	A	A
1636	A	D	A
1637	A	A	A

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1638	A	A	A
1639	A	A	A
1640	A	A	A
1641	A		A
1642	A	A	A
1643	A		A
1644	A	A	A
1645	A	A	A
1646	A	A	A
1647	A	A	A
1648	A	A	A
1649	A	A	A
1650	A	A	A
1651	A	A	A
1652	A	A	A
1653	A	A	A
1654	A	A	A
1655	A	A	A
1656	A	A	A
1658	A		
1659	A		A
1660	A	A	—
1661	A		—
1662	A	A	—

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1663	A	A	–
1664	A	A	–
1665	A	A	–
1666	A	A	–
1667	A	A	–
1668	A	A	–
1669	A	A	–
1670	A	A	–
1671	A	A	–
1672	A	A	–
1673	A		–
1674	A	A	–
1679	A	A	A
1680	A	A	A
1681	A	A	A
1682	A	A	–
1683	A		–
1684	A	A	–
1685	A	A	–
1686	A	A	–
1689	A	A	–
1690	A	A	–
1691	A	A	–
1692	A		–

Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1693	A	A	–
1694	A		–
1695	A	A	–
1696	A	A	–
1697	A	A	–
1698	A		–
1699	A	A	–
1700	A	D	–
1714	A	A	A
1715	A	A	A
1716	A	A	A
1717	A	A	A
1722	A	A	A
1723	A	A	A
1726	A		A
1727	A		A
1732	A	A	A
1733	A	A	A
1737	A	C	A
1742	A		A
1743	A		A
1747	A	C	A
1748	A		A
1750	A		A

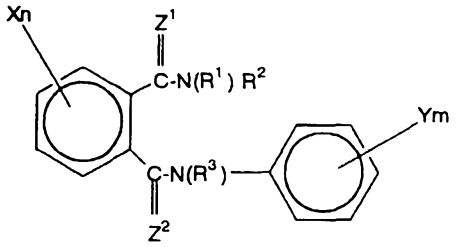
Table 4 (Cont'd)

No	Test Example 1	Test Example 2	Test Example 3
1752	A		A
1763	A		A
1764	A	A	A
1765	A	A	A
1766	A	A	A
1767	A		
1768	A		A
1770	A	–	A
1772	A	–	A
1773	A	A	A
1774	A	–	A
1775	A	–	A
1776	A	–	A
1777	A	A	A
1778	A	–	A
1799	A	A	A
1800	A	A	A
1801	A	A	A
1802	A		
1803	A	A	A
1804	A		
1805	A		

In Table 4, "-" means that test is not conducted.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A phthalic acid diamide derivative represented by the general formula (I),



(I)

wherein R^1, R^2 and R^3 may be the same or different, and are each a hydrogen atom, a cyano group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_3-C_6 cycloalkenyl group, a halo-C_3-C_6 cycloalkenyl group or a group of the formula $-A^1-Q_\ell$ (wherein A^1 is -O-, -S-, $-SO_2-$, -C(=O)-, a group of the formula $-N(R^4)-$ (wherein R^4 is a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, or a substituted phenylcarbonyl group having at least one substituent which may be the same or different, and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different), a C_1-C_8 alkylene group,

a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group;

(1) when A^1 is -O- or a group of the formula -N(R^4)- (wherein R^4 is the same as defined above), then Q is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkyl sulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl-C_1-C_4 alkyl group or a substituted phenyl-C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and

a di-C_1-C_6 alkylamino group which may be the same or different;

(2) when A^1 is -S-, $-SO_2-$ or -C(=O)-, then Q is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a C_1-C_6 alkoxy group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a C_1-C_6 alkoxycarbonylamino group, a C_1-C_6 alkoxycarbonyl-C_1-C_6 alkylamino group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkyl-sulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenylamino group, a substituted phenylamino group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-

C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which means pyridyl group, pyridine-N-oxide group, pyrimidinyl group, furyl group, tetrahydrofuryl group, thienyl group, tetrahydrothienyl group, tetrahydropyranyl group, tetrahydrothiopyranyl group, oxazolyl group, isoxazolyl group, oxadiazolyl group, thiazolyl group, isothiazolyl group, thiadiazolyl group, imidazolyl group, triazolyl group or a pyrazolyl group), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6

alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different,

(3) when A^1 is a C_1-C_8 alkylene group, a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group, then Q is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_1-C_6 alkyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a diphenylphosphino group, a diphenylphosphono group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a

naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-Z^3-R^5$ (wherein Z^3 is -O-, -S-, -SO-, $-SO_2-$ or a group of the formula $-N(R^6)-$ (wherein R^6 is a hydrogen atom, a C_1-C_6 alkylcarbonyl group,

a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, a substituted phenylcarbonyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl C_1-C_4 alkoxycarbonyl group, or a substituted phenyl C_1-C_4 alkoxycarbonyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different); and

R^5 is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl

group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkylcarbonyl group, a halo C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl C_1-C_4 alkyl group, a substituted phenyl C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a

substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different);

ℓ is an integer of 1 to 4); further,

R^1 and R^2 may form a 4 to 7 membered ring by combining to each other, in which the ring may contain the

same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen atom;

X may be the same or different, and is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituents which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a

di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^2-R^7$ (wherein A^2 is -O-, -S-, -SO-, $-SO_2-$, -C(=O)-, $-C(=NOR^8)-$ (wherein R^8 is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a phenyl-C_1-C_4 alkyl group, or a substituted phenyl-C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group,

a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different), a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group;

(1) when A^2 is -O-, -S-, -SO- or -SO_2-, then R^7 is a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo C_3-C_6 cycloalkyl group, a C_3-C_6 cycloalkenyl group, a halo-C_3-C_6 cycloalkenyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at

least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituents which may be the same or different and are selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^3-R^9$ (wherein A^3 is $-C(=O)-$, $-SO_2-$, a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_3-C_6 alkynylene group, or a halo-C_3-C_6 alkynylene

group,

(i) when A^3 is -C(=O)- or $-SO_2-$, then R^9 is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a

heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different,

(ii) when A^3 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_3-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^9 is a hydrogen atom, a halogen atom, a cyano group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6

alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^4-R^{10}$ (wherein A^4 is -O-, -S-, -SO-, $-SO_2-$, -C(=O)-, or a group of the formula $-N(R^{11})-$ (wherein R^{11} is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6

alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different); and

R^{10} is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_3-C_6 cycloalkenyl group, a halo-C_3-C_6 cycloalkenyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl

group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group,

a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different));

(2) when A^2 is -C(=O)- or a group of the formula -C(=NOR^8)- (wherein R^8 is the same as defined above), then R^7 is a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenylamino group, a substituted phenylamino group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl

group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having one or more substituents which may be the same or different and are selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group,

a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different,

(3) when A^2 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^7 is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a

C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^5-R^{12}$ (wherein A^5 is -O-, -S-, -SO-, $-SO_2-$ or a group of the formula $-N(R^{13})-$ (wherein R^{13} is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl

group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituents which may be the same or different and are selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkyl-

sulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different); and R^{12} is a hydrogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or

different, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituents which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^6-R^{14}$ (wherein A^6 is $-C(=O)-$, $-SO_2-$, a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group;

(i) when A^6 is $-C(=O)-$ or $-SO_2-$, then R^{14} is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6

alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group

which may be the same or different;

(ii) when A^6 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^{14} is a hydrogen atom, a halogen atom, a cyano group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and are selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenoxy group, a substituted phenoxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6

alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenylthio group, a substituted phenylthio group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6- alkyl-sulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a

C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different)));

n is an integer of 1 to 4;

further, X may form a condensed ring (which means naphthalene, tetrahydronaphthalene, indene, indane, quinoline, quinazoline, chroman, isochroman, indole, indoline, benzodioxane, benzodioxole, benzofuran, dihydrobenzofuran, benzothiophene, dihydrobenzothiophene, benzoxazole, benzothiazole, benzimidazole or indazole), by combining together with the adjacent carbon atoms in the phenyl ring, and said condensed ring may have at least one substituents, which may be the same or different, and selected from the group consisting of a halogen atom, a

cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group,

a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), and a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different;

Y is the same or different, and is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a

halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-

C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^2-R^7$ (wherein A^2 and R^7 are the same as defined above);

m is an integer of 1 to 5;

further, Y may form a condensed ring (the condensed ring is the same as defined above), by combining together with the adjacent carbon atoms in the phenyl ring, said condensed ring may have at least one substituents, which may be the same or different, and selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy

group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), and a substituted heterocyclic group (wherein said heterocyclic group is the same as defined above) having at lease one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-

C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different;

Z^1 and Z^2 each represents an oxygen atom or a sulfur atom; provided that,

(1) when X, R^1 and R^3 are hydrogen atoms at the same time; m is an integer of 2; Y at 2-position is a fluorine atom and Y at 3-position is a chlorine atom; then R^2 is not ethyl group, isopropyl group, cyclohexyl group, 2-propenyl group, methylthiopropyl group and α-methylbenzyl group,

(2) when X and R^3 are hydrogen atoms at the same time; m is an integer of 2; Y at 2-position is a fluorine atom and Y at 3-position is a chlorine atom; then the 4 to 7 membered ring by combining R^1 and R^2 to each other, in which the ring may contain the same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen atom is not morpholino group,

(3) when X, R^1 and R^3 are hydrogen atoms at the same time; and R^2 is 1,2,2-trimethylpropyl group; then Y is not a hydrogen atom, 4-hydroxy group or 2-ethoxy group,

(4)when X, R^1 and R^3 are hydrogen atoms at the same time; R^2 is 2,2-dimethylpropyl group; and m is an integer of 1; then Y is not 2-ethoxy group, and

(5) when X, R^1 and R^3 are hydrogen atoms at the same time; and R^2 is tert-butyl group; and m is an integer of 1; then Y is not 4-chlorine atom, 2-nitro group, 4-nitro group, 3-methoxy group or 4-methoxy group; m is an integer of 2; then Y is not 2,6-dimethyl groups,

(6) when X, R^1 and R^3 are hydrogen atom at the same time; and R^2 is benzyl group; and m is an integer of 1; then Y is not 4-methyl group, and m is an integer of 2; then Y is not 3, 4-dichloro groups,

(7) when X and R^3 are hydrogen atoms at the same time; m is an integer of 1; Y is 4-difluoromethoxy group; then R^1 and R^2 are not formed $-CH_2CH_2-O-CH_2CH_2-$ by combining to each other,

(8) R^1 and R^2 are not hydrogen atoms at the same time,

(9) when Z^1 and Z^2 are oxygen atoms at the same time; X is

chlorine atom; n is an integer of 4; Y is 2,6-dinitro-3-chloro-4-trifluromethyl groups; then R^1, R^2 and R^3 are not hydrogen atoms at the same time.

2. The phthalic acid diamide derivative according to Claim 1, wherein R^1, R^2 and R^3 may be the same or different, and are each a hydrogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, or a group of the formula $-A^1-Q_\ell$ (wherein A^1 is a C_1-C_8 alkylene group, a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group; and Q is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_1-C_6 alkyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a diphenylphosphino group, a diphenylphosphono group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which means pyridyl group, pyridine-N-oxide group, pyrimidinyl group, furyl group, tetrahydrofuryl group, thienyl group, tetrahydrothienyl group, tetrahydropyranyl group, tetrahydrothiopyranyl group, oxazolyl group, isoxazolyl group, oxadiazolyl group, thiazolyl group, isothiazolyl group, thiadiazolyl group, imidazolyl group, triazolyl group or pyrazolyl group), a substituted heterocyclic group (wherein the heterocyclic

group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-Z^3-R^5$ (wherein Z^3 is -O-, -S-, -SO-, $-SO_2-$ or a group of the formula $-N(R^6)-$ (wherein R^6 is a hydrogen atom, a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, a substituted phenylcarbonyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkoxycarbonyl group, or a substituted phenyl C_1-C_4 alkoxycarbonyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6

alkylsulfonyl group); and

R^5 is a hydrogen atom, a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkylcarbonyl group, a halo C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkyl-sulfonyl group, a phenyl C_1-C_4 alkyl group, a substituted phenyl C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a

halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group); and ℓ is an integer of 1 to 4);

R^1 and R^2 may form a 4 to 7 membered ring by combining to each other, in which the ring may contain the same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen atom;

X may be the same or different, and is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituents which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio

group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^2-R^7$ (wherein A^2 is -O-, -S-, -SO-, $-SO_2-$, -C(=O)-, $-C(=NOR^8)-$ (wherein R^8 is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a phenyl-C_1-C_4 alkyl group, or a substituted phenyl-C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group), a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group;

(1) when A^2 is -O-, -S-, -SO- or $-SO_2-$, then R^7 is a halo-C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkenyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group

and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^3-R^9$ (wherein A^3 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_3-C_6 alkenylene group, a halo-C_3-C_6 alkenylene group, a C_3-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group; R^9 is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^4-R^{10}$ (wherein A^4 is -O-, -S-, -SO-, $-SO_2-$ or -C(=O)-, and R^{10} is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl

group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group));

(2) when A^2 is -C(=O)- or a group of the formula -C(=NOR^8)- (wherein R^8 is the same as defined the above), then R^7 is a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a

C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenylamino group, a substituted phenylamino group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group,

(3) when A^2 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^7 is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy-

carbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkyl-sulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^5-R^{12}$ (wherein A^5 is -O-, -S-, -SO- or $-SO_2-$; and R^{12} is a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl

group, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^6-R^{14}$ (wherein A^6 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group, or a halo-C_3-C_6 alkynylene group; and

R^{14} is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenoxy group, a substituted phenoxy group having

at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenylthio group, a substituted phenylthio group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6- alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic ring is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group)));

n is an integer of 1 to 4;

further, X may form a condensed ring (which means naphthalene, tetrahydronaphthalene, indene, indane,

quinoline, quinazoline, chroman, isochroman, indole, indoline, benzodioxane, benzodioxole, benzofuran, dihydrobenzofuran, benzothiophene, dihydrobenzothiophene, benzoxazole, benzothiazole, benzimidazole or indazole), by combining together with the adjacent carbon atoms in the phenyl ring, said condensed ring may have at least one substituent, which may be the same or different, and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), and a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group,

a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group;

Y is the same or different, and is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^2-R^7$ (wherein A^2 and R^7 are the same as defined above);

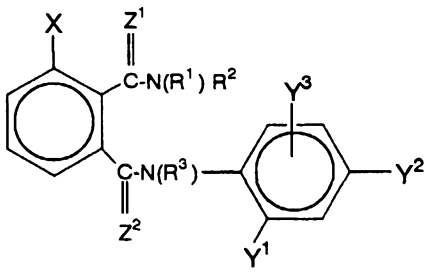
m is an integer of 1 to 5;

further, Y may form a condensed ring (the same as defined above), by combining together with the adjacent

carbon atoms in the phenyl ring, said condensed ring may have at least one substituent, which may be the same or different, and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), and a substituted heterocyclic group (wherein said heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkyl-sulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group; and

Z^1 and Z^2 are each represents an oxygen atom or a sulfur atom.

3. The phthalic acid diamide derivative according to Claim 2, represented by the general formula (I-1),



(I-1)

{wherein, R^1, R^2 and R^3 may be the same or different, and are each a hydrogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group or a group of the formula $-A^1-Q_\ell$ (wherein, A^1 is a C_1-C_8 alkylene group, a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group; Q is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_1-C_6 alkyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a diphenylphosphino group, a diphenylphosphono group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which means pyridyl group,

pyridine-N-oxide group, pyrimidinyl group, furyl group, tetrahydrofuryl group, thienyl group, tetrahydrothienyl group, tetrahydropyranyl group, tetrahydrothiopyranyl group, oxazolyl group, isoxazolyl group, oxadiazolyl group, thiazolyl group, isothiazolyl group, thiadiazolyl group, imidazolyl group, triazolyl group or pyrazolyl group), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-Z^3-R^5$ (wherein Z^3 is -O-, -S-, -SO-, $-SO_2-$ or a group of the formula $-N(R^6)-$ (wherein R^6 is a hydrogen atom, a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, a substituted phenylcarbonyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkoxycarbonyl group, or a substituted phenyl C_1-C_4 alkoxycarbonyl

group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group); and R^5 is a hydrogen atom, a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkylcarbonyl group, a halo C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkyl group, a substituted phenyl C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a

C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic ring is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group); and ℓ is an integer of 1 to 4); further,

R^1 and R^2 may form a 4 to 7 membered ring by combining to each other, in which the ring may contain the same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen atom;

X is a hydrogen atom or a nitro group;

Y^1 and Y^3 may be the same or different and are each a hydrogen atom, a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a phenoxy group, a substituted phenoxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl

group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a pyridyloxy group, a substituted pyridyloxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group;

Y^2 is a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^2-R^7$ (wherein A^2 is -O-, -S-, -SO-, $-SO_2-$, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group and, (1) when A^2 is -O-, -S-, -SO- or $-SO_2-$, then R^7 is a halo-C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkenyl group, a

substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic ring is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^3-R^9$ (wherein A^3 is a halo-C_1-C_6 alkylene group, a halo-C_3-C_6 alkenylene group, a C_3-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group; and R^9 is a hydrogen atom, a halogen atom, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group or a group of the formula $-A^4-R^{10}$ (wherein A^4 is -O-, -S- or $-SO_2-$; and R^{10} is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent

which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic ring is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group));

(2) when A^2 is a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^7 is a hydrogen atom, a halogen atom, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^5-R^{12}$ (wherein A^5 is -O-, -S-, -SO- or $-SO_2-$; and R^{12} is a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a

halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group; or a group of the formula $-A^6-R^{14}$ (wherein A^6 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group; and R^{14} is a hydrogen atom, a halogen atom, a halo-C_3-C_6 cycloalkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenoxy group, a substituted phenoxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a

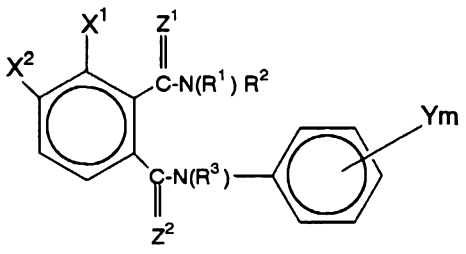
phenylthio group, a substituted phenylthio group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6-alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group))); further,

Y^1 and Y^2 may form a condensed ring (which means naphthalene, tetrahydronaphthalene, indene, indane, quinoline, quinazoline, chroman, isochroman, indole, indoline, benzodioxane, benzodioxole, benzofuran, dihydrobenzofuran, benzothiophene, dihydrobenzothiophene, benzoxazole, benzothiazole, benzimidazole or indazole) by combining to each other together with the adjacent Y^3, said condensed ring may have at least one substituent, which is the same or different, selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group,

a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), and a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group; and

Z^1 and Z^2 are each an oxygen atom or a sulfur atom}.

4. The phthalic acid diamide derivative according to Claim 2, represented by the general formula (I-2),



(I-2)

{wherein, R^1, R^2 and R^3 may be the same or different, and are each a hydrogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group or a group of the formula $-A^1-Q_\ell$ (wherein, A^1 is a C_1-C_8 alkylene group, a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group; Q is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_1-C_6 alkyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a diphenylphosphino group, a diphenylphosphono group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which means pyridyl group, pyridine-N-oxide group, pyrimidinyl group, furyl group, tetrahydrofuryl group, thienyl group, tetrahydrothienyl group, tetrahydropyranyl group, tetrahydrothiopyranyl group, oxazolyl group, isoxazolyl group, oxadiazolyl group, thiazolyl group, isothiazolyl group, thiadiazolyl group, imidazolyl group, triazolyl group or pyrazolyl group), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one

substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-Z^3-R^5$ (wherein Z^3 is -O-, -S-, -SO-, $-SO_2-$ or a group of the formula $-N(R^6)-$ (wherein R^6 is a hydrogen atom, a C_1-C_6 alkylcarbonyl group a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, a substituted phenylcarbonyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkoxycarbonyl group, or a substituted phenyl C_1-C_4 alkoxycarbonyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group); and

R^5 is a hydrogen atom, a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group and a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkyl group, a substituted phenyl C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6

alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group); and ℓ is an integer of 1 to 4); further,

R^1 and R^2 may form a 4 to 7 membered ring by combining to each other, in which the ring may contain the same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen atom;

X^1 and X^2 may be the same or different and are each a halogen atom, a cyano group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group; further, X^1 and X^2 may form a condensed ring (which means naphthalene, tetrahydronaphthalene, indene, indane, quinoline, quinazoline, chroman, isochroman, indole, indoline, benzodioxane, benzodioxole, benzofuran, dihydrobenzofuran, benzothiophene, dihydrobenzothiophene, benzoxazole, benzothiazole, benzimidazole or indazole) by combining to each other, and said condensed ring may have at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkyl

sulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), and a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group;

Y is the same or different, and are each a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio

group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of $-A^2-R^7$ (wherein A^2 is -O-, -S-, -SO-, $-SO_2-$, -C(=O)-, $-C(=NOR^8)-$ (wherein R^8 is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a phenyl-C_1-C_4 alkyl group, or a substituted phenyl-C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group), a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group;

(1) when A^2 is -O-, -S-, -SO- or $-SO_2-$, then R^7 is a halo-C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkenyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^3-R^9$ (wherein A^3 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_3-C_6 alkenylene group, a halo-C_3-C_6 alkenylene group, a C_3-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group; R^9 is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen

atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^4-R^{10}$ (wherein A^4 is -O-, -S-, -SO-, $-SO_2-$ or -C(=O)-, and R^{10} is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group));

(2) when A^2 is -C(=O)- or a group of the formula $-C(=NOR^8)-$

(wherein R^8 is the same as defined the above), then R^7 is a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenylamino group, a substituted phenylamino group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6

alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group,

(3) when A^2 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^7 is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^5-R^{12}$ (wherein A^5 is -O-, -S-, -SO- or

$-SO_2-$; and R^{12} is a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkyl-sulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^6-R^{14}$ (wherein A^6 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group, or a halo-C_3-C_6 alkynylene group; and

R^{14} is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-

C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenoxy group, a substituted phenoxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkyl-sulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenylthio group, a substituted phenylthio group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkyl-sulfonyl group and a halo-C_1-C_6- alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic ring is the same as defined above) having at least one substituent which may be the same or different

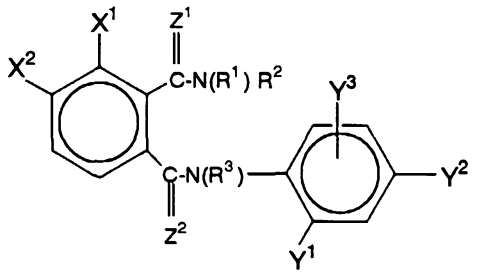
and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group))); and m is an integer of 1 to 5;

further, Y may form a condensed ring (which is the same as defined above) by combining together with the adjacent carbon atoms in the phenyl ring, said condensed ring may have at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), and a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent

which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group;

Z^1 and Z^2 are each an oxygen atom or a sulfur atom}.

5. The phthalic acid diamide derivative according to Claim 4, represented by the general formula (I-3),



(I-3)

{wherein, R^1, R^2 and R^3 may be the same or different, and are each a hydrogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group or a group of the formula $-A^1-Q_\ell$ (wherein, A^1 is a C_1-C_8 alkylene group, a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group; Q is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_1-C_6 alkyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a diphenylphosphino group, a diphenyl-

phosphono group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which means pyridyl group, pyridine-N-oxide group, pyrimidinyl group, furyl group, tetrahydrofuryl group, thienyl group, tetrahydrothienyl group, tetrahydropyranyl group, tetrahydrothiopyranyl group, oxazolyl group, isoxazolyl group, oxadiazolyl group, thiazolyl group, isothiazolyl group, thiadiazolyl group, imidazolyl group, triazolyl group or pyrazolyl group), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-Z^3-R^5$ (wherein Z^3 is -O-, -S-, -SO-, $-SO_2-$ or a group of the formula $-N(R^6)-$ (wherein R^6 is a hydrogen atom, a C_1-C_6 alkylcarbonyl group a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, a

substituted phenylcarbonyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkoxycarbonyl group, or a substituted phenyl C_1-C_4 alkoxycarbonyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group,); and

R^5 is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group,

a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkyl group, a substituted phenyl C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkyl-sulfonyl group and a halo-C_1-C_6 alkylsulfonyl group); and ℓ is an integer of 1 to 4); further,

R^1 and R^2 may form a 4 to 7 membered ring by combining to each other, in which the ring may contain the same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen atom;

X^1 and X^2 may be the same or different and are

each a halogen atom, a cyano group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group; further, X^1 and X^2 may form a condensed ring (which means naphthalene, tetrahydronaphthalene, indene, indane, quinoline, quinazoline, chroman, isochroman, indole, indoline, benzodioxane, benzodioxole, benzofuran, dihydrobenzofuran, benzothiophene, dihydrobenzothiophene, benzoxazole, benzothiazole, benzimidazole or indazole) by combining to each other, and said condensed ring may have at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), and a substituted

heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group;

Y^1 and Y^3 may be the same or different, and are each a hydrogen atom, a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a phenoxy group, a substituted phenoxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a pyridyloxy group, or a substituted pyridyloxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group,

Y^2 is a hydrogen atom, a halogen atom, a halo-C_3-

C_6 cycloalkyl group or a group of the formula $-A^2-R^7$ (wherein A^2 -O-, -S-, -SO-, $-SO_2-$, a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group, or a halo-C_3-C_6 alkynylene group, and

(1) when A^2 is -O-, -S-, -SO- or $-SO_2-$, then R^7 is a halo-C_3-C_6 cycloalkyl group, a substituted phenyl group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a substituted pyridyloxy group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^3-R^9$ (wherein A^3 is a halo-C_1-C_6 alkylene group, or a halo-C_3-C_6 alkenylene group; and R^9 is a hydrogen atom, a halogen atom, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^4-R^{10}$ (wherein A^4 is -O-, -S-, -SO- or $-SO_2-$; R^{10} is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group,

a halo-C_3-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, or a substituted phenyl group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group)), (2) when A^2 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group, a halo-C_3-C_6 alkynylene group, then R^7 is a hydrogen atom, a halogen atom, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^5-R^{12}$ (wherein A^5 is -O-, -S-, -SO- or $-SO_2-$; and R^{12} is a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^6-R^{14}$ (wherein A^6 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group; and R^{14} is a hydrogen atom, a

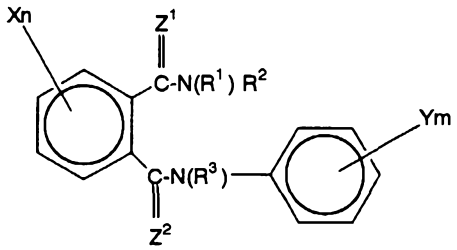
halogen atom, a halo-C_3-C_6 cycloalkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenoxy group, a substituted phenoxy group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenylthio group, or a substituted phenylthio group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group));

further, Y^1 and Y^2 may form a condensed ring (the condensed ring is the same as defined above) by combining to each other together with Y^3, and said condensed ring may have at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6

alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, and a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group;

Z^1 and Z^2 are each an oxygen atom or a sulfur atom}.

6. An agricultural and horticultural insecticides, which is characterized by containing, as the effective ingredient, a phthalic acid diamide derivative represented by the general formula (I),



(I)

wherein R^1, R^2 and R^3 may be the same or different, and are each a hydrogen atom, a cyano group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_3-C_6 cycloalkenyl group, a halo-C_3-C_6 cycloalkenyl group or a group of the formula $-A^1-Q_\ell$ (wherein A^1 is -O-, -S-, $-SO_2-$, -C(=O)-, a group of the formula $-N(R^4)-$ (wherein R^4 is a C_1-C_6 alkyl-

carbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, or a substituted phenylcarbonyl group having at least one substituent which may be the same or different, and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different), a C_1-C_8 alkylene group, a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group;

(1) when A^1 is -O- or a group of the formula -N(R^4)- (wherein R^4 is the same as defined above), then Q is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl

group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkyl sulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl-C_1-C_4 alkyl group or a substituted phenyl-C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different;

(2) when A^1 is -S-, $-SO_2-$ or -C(=O)-, then Q is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a C_1-C_6 alkoxy group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a C_1-C_6 alkoxycarbonylamino group, a C_1-C_6 alkoxycarbonyl-C_1-C_6 alkylamino group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6

alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenylamino group, a substituted phenylamino group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkyl-

sulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which means pyridyl group, pyridine-N-oxide group, pyrimidinyl group, furyl group, tetrahydrofuryl group, thienyl group, tetrahydrothienyl group, tetrahydropyranyl group, tetrahydrothiopyranyl group, oxazolyl group, isoxazolyl group, oxadiazolyl group, thiazolyl group, isothiazolyl group, thiadiazolyl group, imidazolyl group, triazolyl group or a pyrazolyl group), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different,

(3) when A^1 is a C_1-C_8 alkylene group, a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group, then Q is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_1-C_6 alkyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different,

a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a diphenylphosphino group, a diphenylphosphono group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the

same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-Z^3-R^5$ (wherein Z^3 is -O-, -S-, -SO-, $-SO_2-$ or a group of the formula $-N(R^6)-$ (wherein R^6 is a hydrogen atom, a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, a substituted phenylcarbonyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl C_1-C_4 alkoxycarbonyl group, or a substituted phenyl

C_1-C_4 alkoxycarbonyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different); and

R^5 is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkylcarbonyl group, a halo C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a

di-C_1-C_6 alkylamino group which may be the same or different, a phenyl C_1-C_4 alkyl group, a substituted phenyl C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at

least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different);

ℓ is an integer of 1 to 4); further,

R^1 and R^2 may form a 4 to 7 membered ring by combining to each other, in which the ring may contain the same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen atom;

X may be the same or different, and is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituents which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkyl-

sulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6

alkylamino group which may be the same or different, or a group of the formula $-A^2-R^7$ (wherein A^2 is -O-, -S-, -SO-, $-SO_2-$, -C(=O)-, $-C(=NOR^8)-$ (wherein R^8 is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a phenyl-C_1-C_4 alkyl group, or a substituted phenyl-C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different), a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group;

(1) when A^2 is -O-, -S-, -SO- or $-SO_2-$, then R^7 is a hydrogen atom, a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_3-C_6 cycloalkenyl group, a halo-C_3-C_6 cycloalkenyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-

C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituents which may

be the same or different and are selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^3-R^9$ (wherein A^3 is -C(=O)-, $-SO_2-$, a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_3-C_6 alkynylene group, or a halo-C_3-C_6 alkynylene group,

(i) when A^3 is -C(=O)- or $-SO_2-$, then R^9 is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-

C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different,

(ii) when A^3 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_3-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^9 is a hydrogen atom, a halogen atom, a cyano group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^4-R^{10}$ (wherein A^4 is -O-, -S-, -SO-, $-SO_2-$, -C(=O)-, or a group of the formula $-N(R^{11})-$ (wherein R^{11} is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6

alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6

alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different); and

R^{10} is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_3-C_6 cycloalkenyl group, a halo-C_3-C_6 cycloalkenyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-

C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different));

(2) when A^2 is -C(=O)- or a group of the formula -C(=NOR^8)- (wherein R^8 is the same as defined above), then R^7 is a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a

cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenylamino group, a substituted phenylamino group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having one or more substituents which may be the same or different and are selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a

halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different,

(3) when A^2 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^7 is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a

halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-

C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^5-R^{12}$ (wherein A^5 is -O-, -S-, -SO-, $-SO_2-$ or a group of the formula $-N(R^{13})-$ (wherein R^{13} is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group,

a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituents which may be the same or different and are selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different); and R^{12} is a hydrogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a

C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituents which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the

formula $-A^6-R^{14}$ (wherein A^6 is $-C(=O)-$, $-SO_2-$, a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group;

(i) when A^6 is $-C(=O)-$ or $-SO_2-$, then R^{14} is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6

alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different;

(ii) when A^6 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^{14} is a hydrogen atom, a halogen atom, a cyano group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and are

selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenoxy group, a substituted phenoxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a phenylthio group, a substituted phenylthio group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy

group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6- alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-

C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different)));

n is an integer of 1 to 4;

further, X may form a condensed ring (which means naphthalene, tetrahydronaphthalene, indene, indane, quinoline, quinazoline, chroman, isochroman, indole, indoline, benzodioxane, benzodioxole, benzofuran, dihydrobenzofuran, benzothiophene, dihydrobenzothiophene, benzoxazole, benzothiazole, benzimidazole or indazole), by combining together with the adjacent carbon atoms in the phenyl ring, and said condensed ring may have at least one substituents, which may be the same or different, and selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl

group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), and a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkyl-

sulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different;

Y is the same or different, and is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a

C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, or a group of the formula $-A^2-R^7$ (wherein A^2 and R^7 are the same as defined above);

m is an integer of 1 to 5;

further, Y may form a condensed ring (the condensed ring is the same as defined above), by combining together with the adjacent carbon atoms in the phenyl ring, said condensed ring may have at least one substituents, which may be the same or different, and selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6

alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a naphthyl group, a substituted naphthyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-

C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different, a heterocyclic group (which is the same as defined above), and a substituted heterocyclic group (wherein said heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a cyano group, a nitro group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_2-C_6 alkynyl group, a halo-C_2-C_6 alkynyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a mono-C_1-C_6 alkylamino group and a di-C_1-C_6 alkylamino group which may be the same or different;

Z^1 and Z^2 each represents an oxygen atom or a sulfur atom; provided that,

(1) when Z^1 and Z^2 are oxygen atoms at the same time; X is chlorine atom; n is an integer of 4; Y is 2,6-dinitro-3-chloro-4-trifluoromethyl groups; then R^1, R^2 and R^3 are not hydrogen atoms at the same time.

7. The agricultural and horticultural insecticides according to Claim 6,

wherein R^1, R^2 and R^3 may be the same or different, and are each a hydrogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, or a group of the formula -A^1-Q, (wherein A^1 is a C_1-C_8 alkylene group, a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group; and Q is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_1-C_6 alkyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a di-C_1-C_6

alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a diphenylphosphino group, a diphenylphosphono group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which means pyridyl group, pyridine-N-oxide group, pyrimidinyl group, furyl group, tetrahydrofuryl group, thienyl group, tetrahydrothienyl group, tetrahydropyranyl group, tetrahydrothiopyranyl group, oxazolyl group, isoxazolyl group, oxadiazolyl group, thiazolyl group, isothiazolyl group, thiadiazolyl group, imidazolyl group, triazolyl group or pyrazolyl group), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-Z^3-R^5$ (wherein Z^3 is -O-, -S-, -SO-, $-SO_2-$ or a

group of the formula $-N(R^6)-$ (wherein R^6 is a hydrogen atom, a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, a substituted phenylcarbonyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkoxycarbonyl group, or a substituted phenyl C_1-C_4 alkoxycarbonyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group,); and

R^5 is a hydrogen atom, a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkylcarbonyl group, a halo C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group

consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkyl group, a substituted phenyl C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group); and ℓ is an integer of 1 to 4);

R^1 and R^2 may form a 4 to 7 membered ring by combining to each other, in which the ring may contain the same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen

atom;

X may be the same or different, and is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituents which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^2-R^7$ (wherein A^2 is -O-, -S-, -SO-, $-SO_2-$, -C(=O)-, $-C(=NOR^8)-$ (wherein R^8 is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a phenyl-C_1-C_4 alkyl group, or a substituted phenyl-C_1-C_4 alkyl group having at least one substituent, in the

phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group), a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group;

(1) when A^2 is -O-, -S-, -SO- or -SO_2-, then R^7 is a halo-C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkenyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl

group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^3-R^9$ (wherein A^3 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_3-C_6 alkenylene group, a halo-C_3-C_6 alkenylene group, a C_3-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group; R^9 is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^4-R^{10}$ (wherein A^4 is -O-, -S-, -SO-, $-SO_2-$ or -C(=O)-, and R^{10} is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the

above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group));

(2) when A^2 is -C(=O)- or a group of the formula -C(=NOR^8)- (wherein R^8 is the same as defined the above), then R^7 is a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenylamino group, a substituted phenylamino group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy

group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group,

(3) when A^2 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^7 is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined

the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^5-R^{12}$ (wherein A^5 is -O-, -S-, -SO- or $-SO_2-$; and R^{12} is a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkyl-

sulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^6-R^{14}$ (wherein A^6 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group, or a halo-C_3-C_6 alkynylene group; and

R^{14} is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenoxy group, a substituted phenoxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenylthio group, a substituted phenylthio group having at least one substituent which may be the same or different

and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkyl-sulfonyl group and a halo-C_1-C_6- alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic ring is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkyl-sulfonyl group and a halo-C_1-C_6 alkylsulfonyl group)));

n is an integer of 1 to 4;

further, X may form a condensed ring (which means naphthalene, tetrahydronaphthalene, indene, indane, quinoline, quinazoline, chroman, isochroman, indole, indoline, benzodioxane, benzodioxole, benzofuran, dihydrobenzofuran, benzothiophene, dihydrobenzothiophene, benzoxazole, benzothiazole, benzimidazole or indazole), by combining together with the adjacent carbon atoms in the phenyl ring, said condensed ring may have at least one substituent, which may be the same or different, and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy

group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), and a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group;

Y is the same or different, and is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group,

a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^2-R^7$ (wherein A^2 and R^7 are the same as defined above);

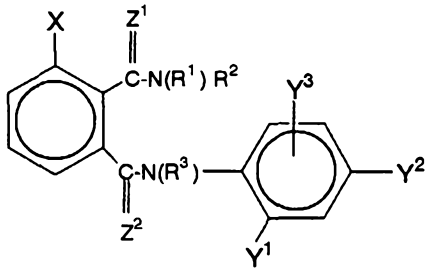
m is an integer of 1 to 5;

further, Y may form a condensed ring (the same as defined above), by combining together with the adjacent carbon atoms in the phenyl ring, said condensed ring may have at least one substituent, which may be the same or different, and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least

one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), and a substituted heterocyclic group (wherein said heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group; and

Z^1 and Z^2 are each represents an oxygen atom or a sulfur atom.

8. The agricultural and horticultural insecticides according to Claim 7, containing as the effective ingredient, a phthalic acid diamide derivative represented by the general formula (I-1),



(I-1)

{wherein, R^1, R^2 and R^3 may be the same or different, and are each a hydrogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group or a group of the formula $-A^1-Q_\ell$ (wherein, A^1 is a C_1-C_8 alkylene group, a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group; Q is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_1-C_6 alkyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a diphenylphosphino group, a diphenylphosphono group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which means pyridyl group, pyridine-N-oxide group, pyrimidinyl group, furyl group, tetrahydrofuryl group, thienyl group, tetrahydrothienyl group, tetrahydropyranyl group, tetrahydrothiopyranyl group, oxazolyl group, isoxazolyl group, oxadiazolyl group, thiazolyl group, isothiazolyl group, thiadiazolyl group, imidazolyl group, triazolyl group or pyrazolyl group), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one

substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-Z^3-R^5$ (wherein Z^3 is -O-, -S-, -SO-, $-SO_2-$ or a group of the formula $-N(R^6)-$ (wherein R^6 is a hydrogen atom, a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, a substituted phenylcarbonyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkoxycarbonyl group, or a substituted phenyl C_1-C_4 alkoxycarbonyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group); and R^5 is a hydrogen atom, a C_1-C_6

alkyl group, a halo C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkylcarbonyl group, a halo C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkyl group, a substituted phenyl C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic ring is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio

group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group); and ℓ is an integer of 1 to 4); further,

R^1 and R^2 may form a 4 to 7 membered ring by combining to each other, in which the ring may contain the same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen atom;

X is a hydrogen atom or a nitro group;

Y^1 and Y^3 may be the same or different and are each a hydrogen atom, a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a phenoxy group, a substituted phenoxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a pyridyloxy group, a substituted pyridyloxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group;

Y^2 is a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^2-R^7$ (wherein A^2 is -O-, -S-, -SO-, $-SO_2-$, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group and, (1) when A^2 is -O-, -S-, -SO- or $-SO_2-$, then R^7 is a halo-C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic ring is the same as defined

above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^3-R^9$ (wherein A^3 is a halo-C_1-C_6 alkylene group, a halo-C_3-C_6 alkenylene group, a C_3-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group; and R^9 is a hydrogen atom, a halogen atom, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group or a group of the formula $-A^4-R^{10}$ (wherein A^4 is -O-, -S- or $-SO_2-$; and R^{10} is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic ring is the same as defined above) having at least one substituent which may be the

same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group)); (2) when A^2 is a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^7 is a hydrogen atom, a halogen atom, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^5-R^{12}$ (wherein A^5 is -O-, -S-, -SO- or $-SO_2-$; and R^{12} is a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio

group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group; or a group of the formula $-A^6-R^{14}$ (wherein A^6 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group; and R^{14} is a hydrogen atom, a halogen atom, a halo-C_3-C_6 cycloalkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenoxy group, a substituted phenoxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenylthio group, a substituted phenylthio group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6-alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic group is the

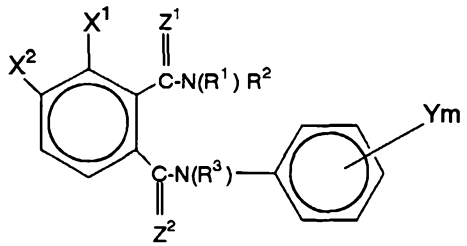
same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group))); further,

Y^1 and Y^2 may form a condensed ring (which means naphthalene, tetrahydronaphthalene, indene, indane, quinoline, quinazoline, chroman, isochroman, indole, indoline, benzodioxane, benzodioxole, benzofuran, dihydrobenzofuran, benzothiophene, dihydrobenzothiophene, benzoxazole, benzothiazole, benzimidazole or indazole) by combining to each other together with the adjacent Y^3, said condensed ring may have at least one substituent, which is the same or different, selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group

(which is the same as defined the above), and a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group; and

Z^1 and Z^2 are each an oxygen atom or a sulfur atom}.

9. The agricultural and horticultural insecticides according to Claim 7, containing as the active ingredient, a phthalic acid diamide derivative represented by the general formula (I-2),



(I-2)

{wherein, R^1, R^2 and R^3 may be the same or different, and are each a hydrogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group or a group of the formula $-A^1-Q_\ell$ (wherein, A^1 is a C_1-C_8 alkylene group, a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group; Q is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_1-C_6

alkyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a diphenylphosphino group, a diphenylphosphono group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which means pyridyl group, pyridine-N-oxide group, pyrimidinyl group, furyl group, tetrahydrofuryl group, thienyl group, tetrahydrothienyl group, tetrahydropyranyl group, tetrahydrothiopyranyl group, oxazolyl group, isoxazolyl group, oxadiazolyl group, thiazolyl group, isothiazolyl group, thiadiazolyl group, imidazolyl group, triazolyl group or pyrazolyl group), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group

and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-Z^3-R^5$ (wherein Z^3 is -O-, -S-, -SO-, $-SO_2-$ or a group of the formula $-N(R^6)-$ (wherein R^6 is a hydrogen atom, a C_1-C_6 alkylcarbonyl group a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, a substituted phenylcarbonyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkoxycarbonyl group, or a substituted phenyl C_1-C_4 alkoxycarbonyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group); and

R^5 is a hydrogen atom, a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group and a C_1-C_6 alkoxycarbonyl group, a phenyl group, a

substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkyl group, a substituted phenyl C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group); and ℓ is an integer of 1 to 4); further,

R^1 and R^2 may form a 4 to 7 membered ring by

combining to each other, in which the ring may contain the same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen atom;

X^1 and X^2 may be the same or different and are each a halogen atom, a cyano group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group; further, X^1 and X^2 may form a condensed ring (which means naphthalene, tetrahydronaphthalene, indene, indane, quinoline, quinazoline, chroman, isochroman, indole, indoline, benzodioxane, benzodioxole, benzofuran, dihydrobenzofuran, benzothiophene, dihydrobenzothiophene, benzoxazole, benzothiazole, benzimidazole or indazole) by combining to each other, and said condensed ring may have at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkyl sulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy

group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), and a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group;

Y is the same or different, and are each a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the

same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of $-A^2-R^7$ (wherein A^2 is -O-, -S-, -SO-, $-SO_2-$, -C(=O)-, $-C(=NOR^8)-$ (wherein R^8 is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a phenyl-C_1-C_4 alkyl group, or a substituted phenyl-C_1-C_4 alkyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group), a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group; (1) when A^2 is -O-, -S-, -SO- or $-SO_2-$, then R^7 is a halo-C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkenyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy

group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^3-R^9$ (wherein A^3 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_3-C_6 alkenylene group, a halo-C_3-C_6 alkenylene group, a C_3-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group; R^9 is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^4-R^{10}$ (wherein A^4 is -O-, -S-, -SO-,

$-SO_2-$ or $-C(=O)-$, and R^{10} is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkyl-sulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkyl-sulfonyl group and a halo-C_1-C_6 alkylsulfonyl group));

(2) when A^2 is $-C(=O)-$ or a group of the formula $-C(=NOR^8)-$ (wherein R^8 is the same as defined the above), then R^7 is a C_1-C_6 alkyl group, a halo C_1-C_6 alkyl group, a C_2-C_6 alkenyl group, a halo-C_2-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a mono-C_1-C_6 alkylamino group, a di-C_1-C_6 alkylamino group which may be the same or different, a

phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenylamino group, a substituted phenylamino group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined the above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group,

(3) when A^2 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group,

a C_2-C_6 alkynylene group or a halo-C_3-C_6 alkynylene group, then R^7 is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^5-R^{12}$ (wherein A^5 is -O-, -S-, -SO- or $-SO_2-$; and R^{12} is a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6

alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^6-R^{14}$ (wherein A^6 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group, or a halo-C_3-C_6 alkynylene group; and

R^{14} is a hydrogen atom, a halogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6

alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenoxy group, a substituted phenoxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenylthio group, a substituted phenylthio group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6- alkylsulfonyl group, a heterocyclic group (which is the same as defined the above), or a substituted heterocyclic group (wherein the heterocyclic ring is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group))); and

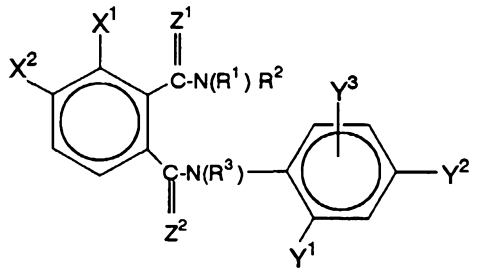
m is an integer of 1 to 5;

further, Y may form a condensed ring (which is the same as defined above) by combining together with the adjacent carbon atoms in the phenyl ring, said condensed ring may have at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), and a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkyl-sulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6

alkylsulfonyl group;

Z^1 and Z^2 are each an oxygen atom or a sulfur atom}.

10. The agricultural and horticultural insecticides according to Claim 9, containing as the effective ingredient, a phthalic acid diamide derivative represented by the general formula (I-3),



(I-3)

{wherein, R^1, R^2 and R^3 may be the same or different, and are each a hydrogen atom, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group or a group of the formula $-A^1-Q_\ell$ (wherein, A^1 is a C_1-C_8 alkylene group, a C_3-C_6 alkenylene group or a C_3-C_6 alkynylene group; Q is a hydrogen atom, a halogen atom, a cyano group, a nitro group, a halo-C_1-C_6 alkyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkoxycarbonyl group, a di-C_1-C_6 alkoxyphosphoryl group which may be the same or different, a di-C_1-C_6 alkoxythiophosphoryl group which may be the same or different, a diphenylphosphino group, a diphenyl-phosphono group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group,

a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which means pyridyl group, pyridine-N-oxide group, pyrimidinyl group, furyl group, tetrahydrofuryl group, thienyl group, tetrahydrothienyl group, tetrahydropyranyl group, tetrahydrothiopyranyl group, oxazolyl group, isoxazolyl group, oxadiazolyl group, thiazolyl group, isothiazolyl group, thiadiazolyl group, imidazolyl group, triazolyl group or pyrazolyl group), a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-Z^3-R^5$ (wherein Z^3 is -O-, -S-, -SO-, $-SO_2-$ or a group of the formula $-N(R^6)-$ (wherein R^6 is a hydrogen atom, a C_1-C_6 alkylcarbonyl group a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenylcarbonyl group, a substituted phenylcarbonyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy

group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkoxycarbonyl group, or a substituted phenyl C_1-C_4 alkoxycarbonyl group having at least one substituent, in the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group); and

R^5 is a hydrogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 alkynyl group, a halo-C_3-C_6 alkynyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a C_1-C_6 alkylcarbonyl group, a halo-C_1-C_6 alkylcarbonyl group, a C_1-C_6 alkoxycarbonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenyl C_1-C_4 alkyl group, a substituted phenyl C_1-C_4 alkyl group having at least one substituent, in

the phenyl ring, which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), or a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group); and ℓ is an integer of 1 to 4); further,

R^1 and R^2 may form a 4 to 7 membered ring by combining to each other, in which the ring may contain the same or different 1 to 3 hetero atoms selected from the group consisting of oxygen atom, sulfur atom and nitrogen atom;

X^1 and X^2 may be the same or different and are each a halogen atom, a cyano group, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkyl-

sulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group; further, X^1 and X^2 may form a condensed ring (which means naphthalene, tetrahydronaphthalene, indene, indane, quinoline, quinazoline, chroman, isochroman, indole, indoline, benzodioxane, benzodioxole, benzofuran, dihydrobenzofuran, benzothiophene, dihydrobenzothiophene, benzoxazole, benzothiazole, benzimidazole or indazole) by combining to each other, and said condensed ring may have at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a heterocyclic group (which is the same as defined above), and a substituted heterocyclic group (wherein the heterocyclic group is the same as defined above) having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a

halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group;

Y^1 and Y^3 may be the same or different, and are each a hydrogen atom, a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a phenoxy group, a substituted phenoxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group, a pyridyloxy group, or a substituted pyridyloxy group having at least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group,

Y^2 is a hydrogen atom, a halogen atom, a halo-C_3-C_6 cycloalkyl group or a group of the formula $-A^2-R^7$ (wherein A^2 -O-, -S-, -SO-, $-SO_2-$, a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group, or a halo-

C_3-C_6 alkynylene group, and

(1) when A^2 is -O-, -S-, -SO- or $-SO_2-$, then R^7 is a halo-C_3-C_6 cycloalkyl group, a substituted phenyl group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a substituted pyridyloxy group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^3-R^9$ (wherein A^3 is a halo-C_1-C_6 alkylene group, or a halo-C_3-C_6 alkenylene group; and R^9 is a hydrogen atom, a halogen atom, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^4-R^{10}$ (wherein A^4 is -O-, -S-, -SO- or $-SO_2-$; R^{10} is a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_3-C_6 alkenyl group, a halo-C_3-C_6 alkenyl group, a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, or a substituted phenyl group having at least one substituent, which is the same or different and is selected from the group consisting

of a halogen atom a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group)), (2) when A^2 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group, a C_2-C_6 alkynylene group, a halo-C_3-C_6 alkynylene group, then R^7 is a hydrogen atom, a halogen atom, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^5-R^{12}$ (wherein A^5 is -O-, -S-, -SO- or $-SO_2-$; and R^{12} is a C_3-C_6 cycloalkyl group, a halo-C_3-C_6 cycloalkyl group, a phenyl group, a substituted phenyl group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, or a group of the formula $-A^6-R^{14}$ (wherein A^6 is a C_1-C_6 alkylene group, a halo-C_1-C_6 alkylene group, a C_2-C_6 alkenylene group, a halo-C_2-C_6 alkenylene group; and R^{14} is a hydrogen atom, a halogen atom, a halo-C_3-C_6 cycloalkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, a substituted phenyl group having at least

one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenoxy group, a substituted phenoxy group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group, a phenylthio group, or a substituted phenylthio group having at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a halo-C_1-C_6 alkyl group, a halo-C_1-C_6 alkoxy group, a halo-C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylsulfinyl group and a halo-C_1-C_6 alkylsulfonyl group));

further, Y^1 and Y^2 may form a condensed ring (the condensed ring is the same as defined above) by combining to each other together with Y^3, and said condensed ring may have at least one substituent, which is the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group, a halo-C_1-C_6 alkylsulfonyl group, a phenyl group, and a substituted phenyl group having at

least one substituent which may be the same or different and is selected from the group consisting of a halogen atom, a C_1-C_6 alkyl group, a halo-C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a halo-C_1-C_6 alkoxy group, a C_1-C_6 alkylthio group, a halo-C_1-C_6 alkylthio group, a C_1-C_6 alkylsulfinyl group, a halo-C_1-C_6 alkylsulfinyl group, a C_1-C_6 alkylsulfonyl group and a halo-C_1-C_6 alkylsulfonyl group;

Z^1 and Z^2 are each an oxygen atom or a sulfur atom}.

11. A method for controlling undesirable insect pests for a useful crop, characterized by treating an objective crop with an effective amount of the agricultural and horticultural insecticides as claimed in any one of Claims 6 to 10.

12. A phthalic acid diamide, agricultural and horticultural insecticides containing it and methods of controlling insect pests involving it substantially as hereinbefore described with reference to any one of the Examples.

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