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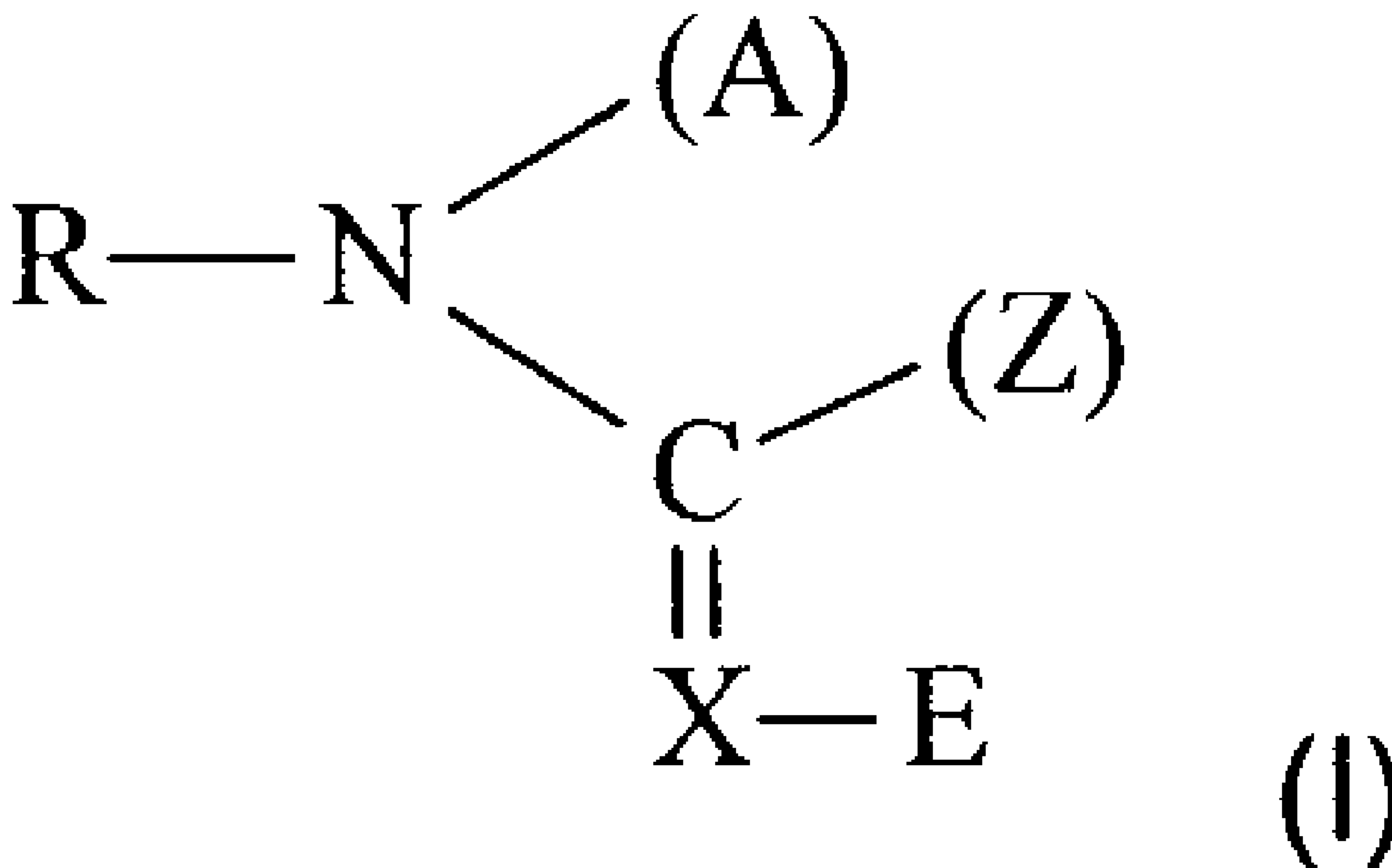
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...

(54) Titre : PESTICIDES

(54) Title: PESTICIDE



(57) **Abrégé/Abstract:**

The present invention concerns pesticides which contain compounds of the general formula (I), (see formula I) in which X stands for =CH- or =N-, E stands for an electron-attracting group, R stands for optionally substituted heteroarylalkyl, A stands for hydrogen, alkyl or for a bifunctional group which is linked to the Z group, and Z stands for alkyl, -NH- alkyl, -N(alkyl)₂ or for a bifunctional group which is linked to the A group, in a mixture with fungicidal substances, with the exception of cyclopropylcarboxamide derivatives and azolymethyl-cycloalkanes.



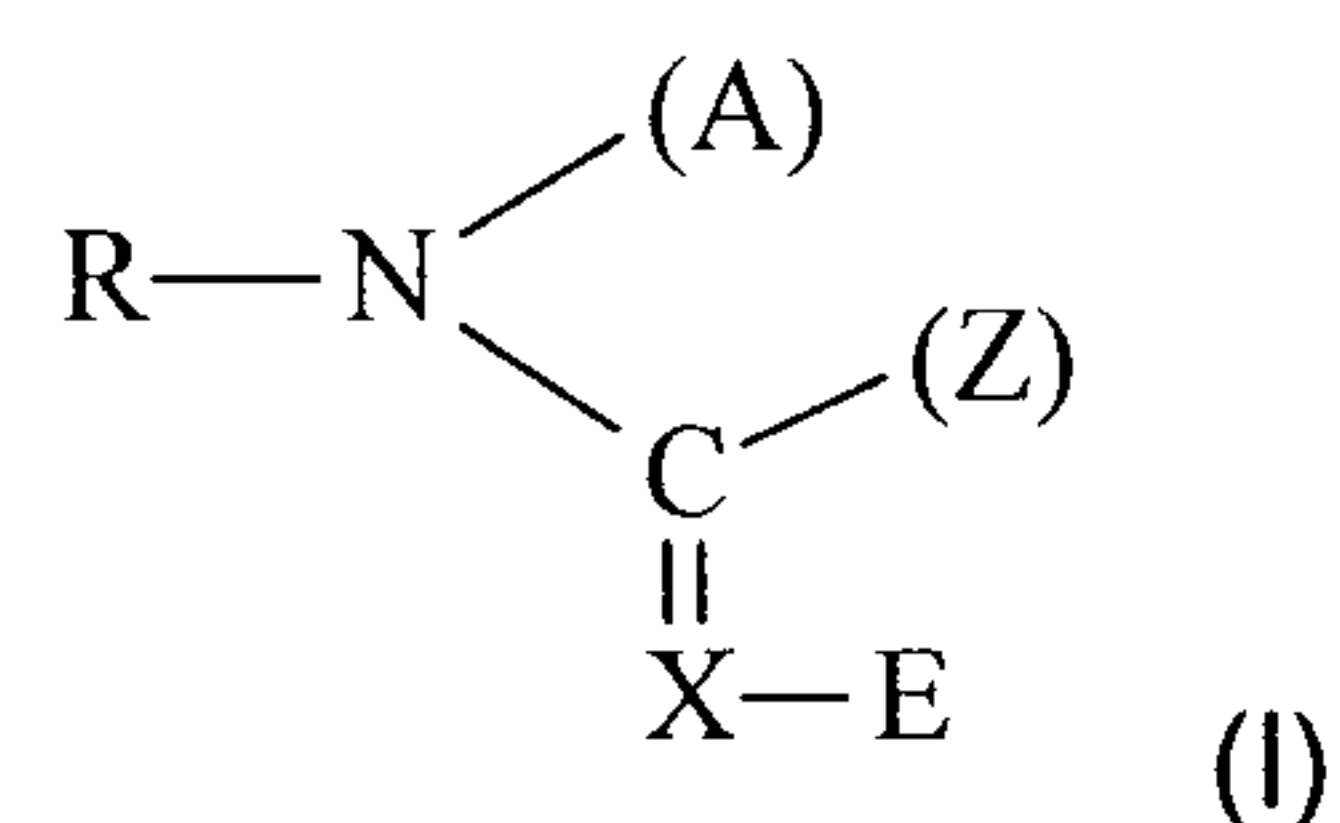
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(74) **Agent:** FETHERSTONHAUGH & CO.

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ABSTRACT

The present invention concerns pesticides which contain compounds of the general formula (I),



- 5 in which X stands for =CH- or =N-, E stands for an electron-attracting group, R stands for optionally substituted heteroarylalkyl, A stands for hydrogen, alkyl or for a bifunctional group which is linked to the Z group, and Z stands for alkyl, -NH-alkyl, -N(alkyl)₂ or for a bifunctional group which is linked to the A group, in a mixture with fungicidal substances, with the exception of cyclopropylcarboxamide derivatives and
- 10 azolylmethyl-cycloalkanes.

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PESTICIDE

This is a second divisional application of copending application 2,636,785, filed August 13, 2008, which is a divisional application of patent 2,195,964, filed July 17, 1995 and issued May 5, 2009.

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The present invention relates to pest control compositions which contain an active compound combination of certain agonists or antagonists of the nicotinic acetylcholine receptors of insects together with fungicides, their preparation and their use for the control of plant pests.

Agonists or antagonists of the nicotinic acetylcholine receptors of insects are known, for example from the following publications:

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European Published Specifications No. 464 830, 428 941, 425 978, 386 565, 383 091, 375 907, 364 844, 315 826, 259 738, 254 859, 235 725, 212 600, 192 060, 163 855, 154 178, 136 636, 303 570, 302 833, 306 696, 189 972, 455 000, 135 956, 471 372, 302 389; German Published Specifications No. 3 639 877, 3 712 307; Japanese Published Specifications No. 03 220 176, 02 207 083, 63 307 857, 63 287 764, 03 246 283, 04 9371, 03 279 359, 03 255 072; US Patent Specifications No. 5 034 524, 4 948 798, 4 918 798, 4 918 086, 5 039 686, 5 034 404; PCT Applications No. WO 91/17 659, 91/4965; French Application No. 2 611 114; Brazilian Application No. 88 03 621.

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Fungicidal active compounds, such as azole derivatives, aryl benzyl ethers, benzamides, morpholine compounds and other heterocycles are known (cf. K.H. Büchel "Pflanzenschutz und Schädlingsbekämpfung [Crop protection and pest control]", pages 140 to 153, Georg Thieme-Verlag, Stuttgart 1977, EP-OS (European Published Specification) 0 040 345, DE-OS (German Published Specification) 3 324 010, DE-OS (German Published Specification) 2 201 063, EP-OS (European Published Specification) 0 112 284, EP-OS (European Published Specification) 0 304 758, and DD-PS (German Democratic Republic Patent Specification) 140 412).

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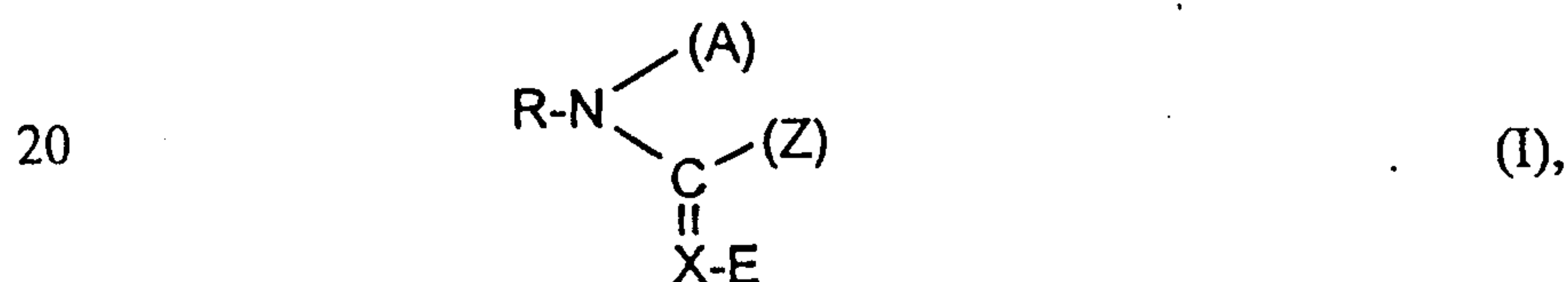
Mixtures of certain nitromethylene derivatives with fungicidal active compounds and their use as compositions for the control of pests in crop protection are already known (US-P-4 731 385; JP-OS (Japanese Published Specifications) 63-68507, 63/68505, 63/72 608, 63/72 609, 63/72 610). Mixtures of certain open-chain nitromethylenes and
 5 nitroguanidines with fungicides are already known (JP-OS (Japanese Published Specification) 30 47 106; US-P 5 181 587).

Mixtures of cyclopropylcarboxamides with certain nitromethylenene or nitroguanidine derivatives are already known (JP-OS (Japanese Published Specification) 3 271 207;

Mixtures of inter alia imidacloprid- and fungicidal active compounds for use in material
 10 protection and against termites, but not for use against plant-damaging pests, are already known (EP-OS (European Published Specification) (Nit 259)). Mixtures of imidacloprid and azolylmethylcycloalkanes, in particular triticonazole, are known from EP-OS (European Published Specification) 545 834.

However, nothing is yet known about nitroguanidine derivatives and fungicides other
 15 than cyclopropylcarboxamides and triticonazole influencing each other so favourably in over action that, while being well tolerated by plants, they can be used with outstanding effect as compositions for the control of plant pests.

The present invention relates to plant pest control compositions which contain compounds of the the general formula (I)



in which

X represents -CH= or =N-,

E represents an electron-withdrawing radical, in particular nitro or cyano,

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R represents optionally substituted hetarylalkyl,

A represents hydrogen, alkyl, or a bifunctional group which is linked to the radical Z,

5 Z represents alkyl, -NH, alkyl, -N(alkyl)₂ or a bifunctional group which is linked to the radical A,

in mixtures with fungicidal active compounds, excluding cyclopropylcarboxamide derivatives and azolymethylcycloalkanes.

Preferably, the invention relates to plant pest control compositions which contain compounds of the formula (I) in which the radicals have the following meaning:

10 X represents =CH- or =N-,

E represents NO₂ or CN,

R represents hetarylmethyl, hetarylethyl having up to 6 ring atoms and N, O, S, in particular N, as heteroatoms.

15 In particular there may be mentioned thienyl, furyl, thiazolyl, imidazolyl, pyridyl, which are optionally substituted.

Preferred examples of substituents are:

20 alkyl having preferably 1 to 4, in particular 1 or 2 carbon atoms, such as methyl, ethyl, n- and i-propyl and n-, i- and t-butyl; alkoxy having preferably 1 to 4, in particular 1 or 2 carbon atoms, such as methoxy, ethoxy, n- and i-propyloxy and n-, i- and t-butyloxy; alkylthio having preferably 1 to 4, in particular 1 or 2 carbon atoms, such as methylthio, ethylthio, n- and i-propylthio and n-, i- and t-butylthio; haloalkyl having preferably 1 to 4, in particular 1 or 2 carbon atoms and preferably 1 to 5, in particular 1 to 3 halogen atoms, wherein the halogen atoms are identical or different and wherein the halogen

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atoms are preferably fluorine, chlorine or bromine, in particular fluorine, such as trifluoromethyl; hydroxyl; halogen, preferably fluorine, chlorine, bromine and iodine, in particular fluorine, chlorine and bromine; cyano; nitro; amino; monoalkyl- and dialkylamino having preferably 1 to 4, in particular 1 or 2 carbon atoms per alkyl group, such as methylamino, methylethylamino, n- and i-propylamino and methyl-n-butylamino;

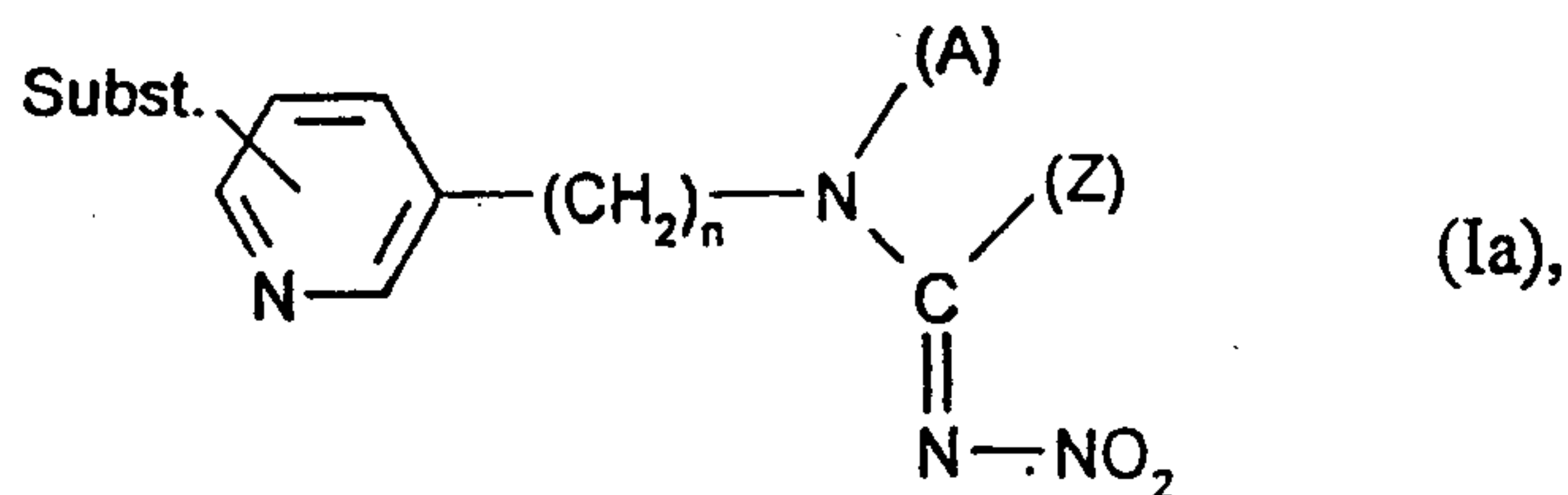
A represents hydrogen, C₁₋₄alkyl, in particular methyl or ethyl,

Z represents C₁₋₄alkyl, in particular ethyl or methyl, -NH(C₁₋₄alkyl), -N(C₁₋₄alkyl) or

A and Z, form together with the atoms to which they are bonded, form a saturated or unsaturated heterocyclic ring. The heterocyclic ring may contain a further 1 or 2 identical or different heteroatoms and/or heterogroups. Preferably, heteroatoms are oxygen or nitrogen and heterogroups are N-alkyl, the alkyl of the N-alkyl group containing preferably 1 to 4, in particular 1 or 2 carbon atoms. Examples of alkyl include methyl, ethyl, n- and i-propyl and n-, i- and t-butyl. The heterocyclic ring contains 5 to 7, preferably 5 or 6 ring members.

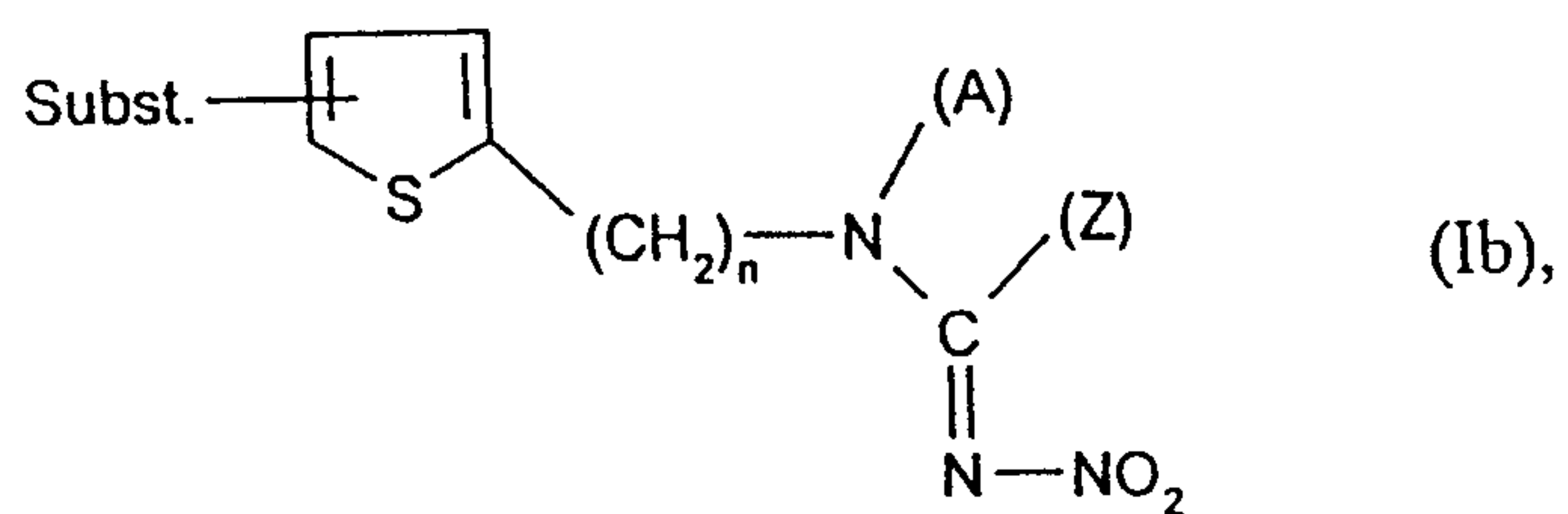
Examples of the heterocyclic ring include pyrrolidine, piperidine, thiazolidine, piperazine, imidazolidine, hexamethyleneimine, hexahydro-1,3,5-triazine, morpholine, which may optionally be substituted, preferably by methyl.

Most preferred are compounds of the general formulae (I) and (Ib)



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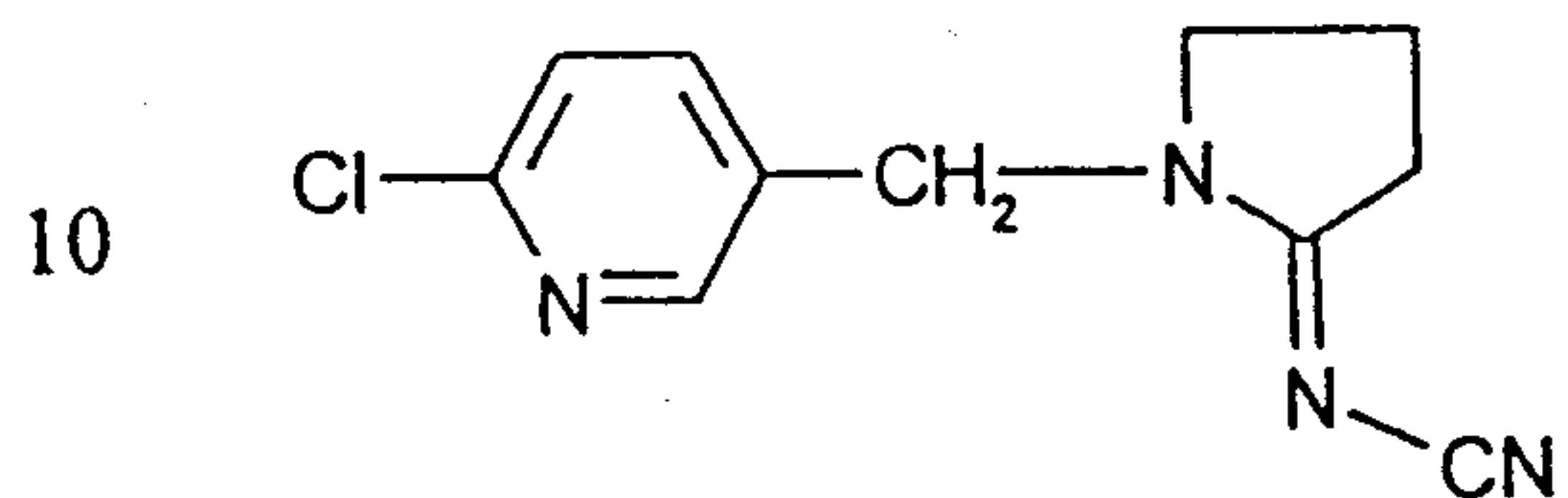
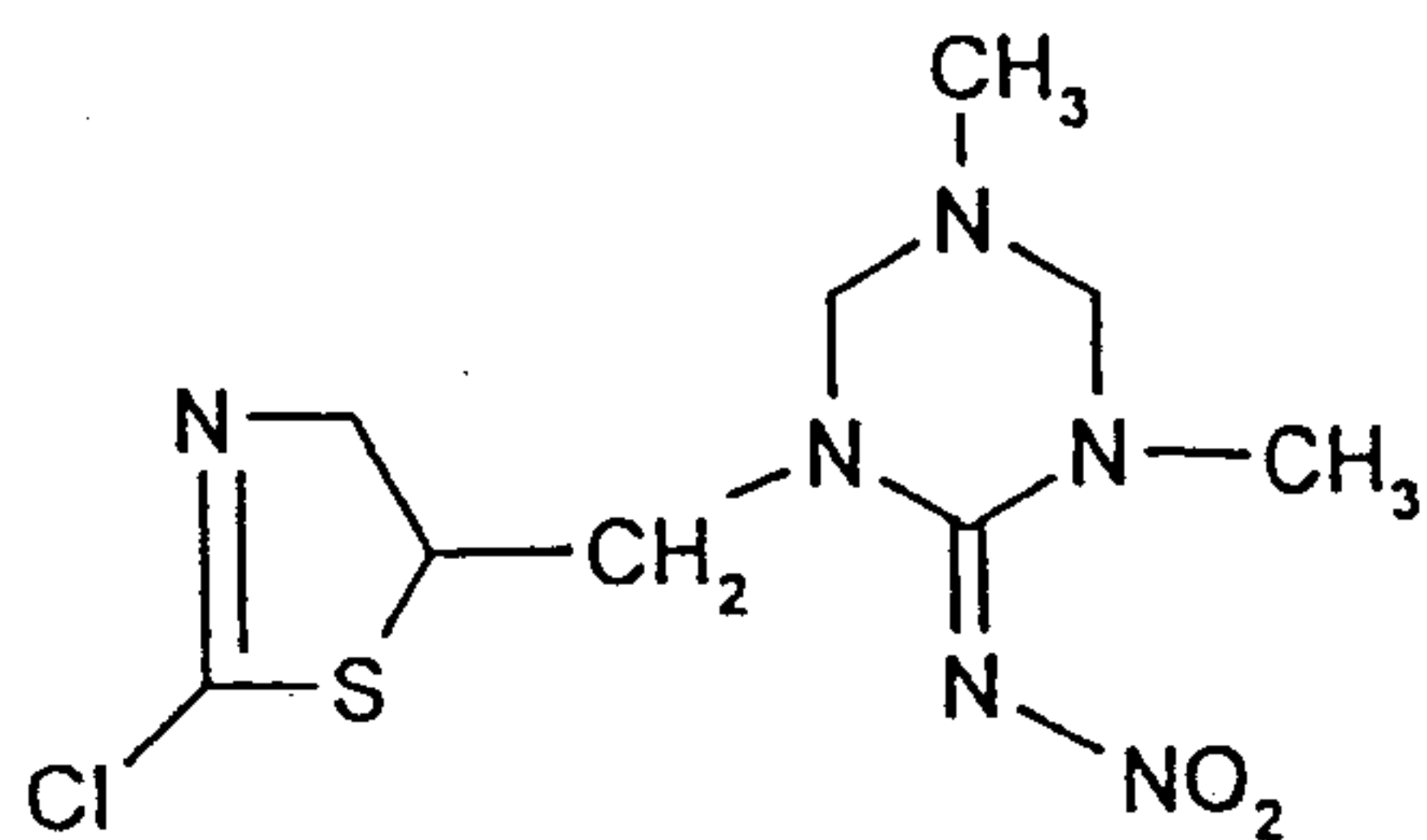
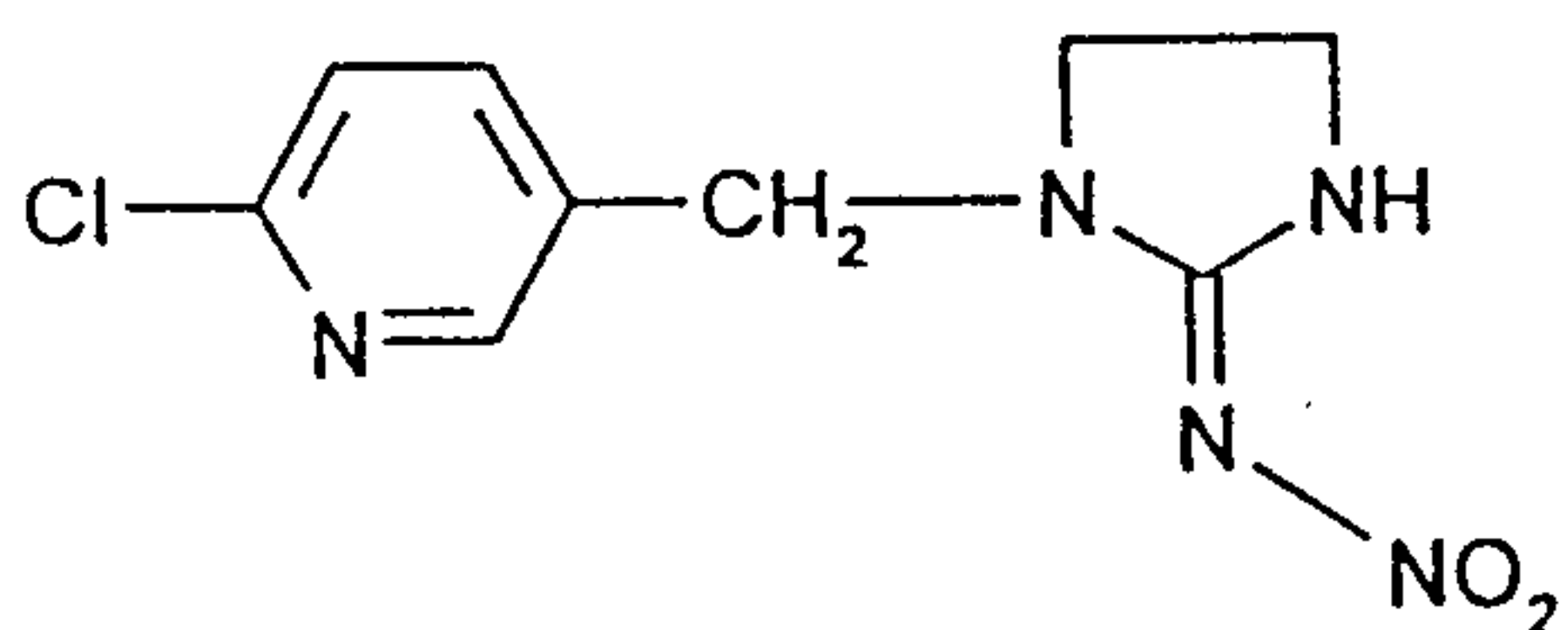
in which

n represents 1 or 2,

Subst. represents one of the abovementioned substituents, in particular halogen,
5 especially chlorine,

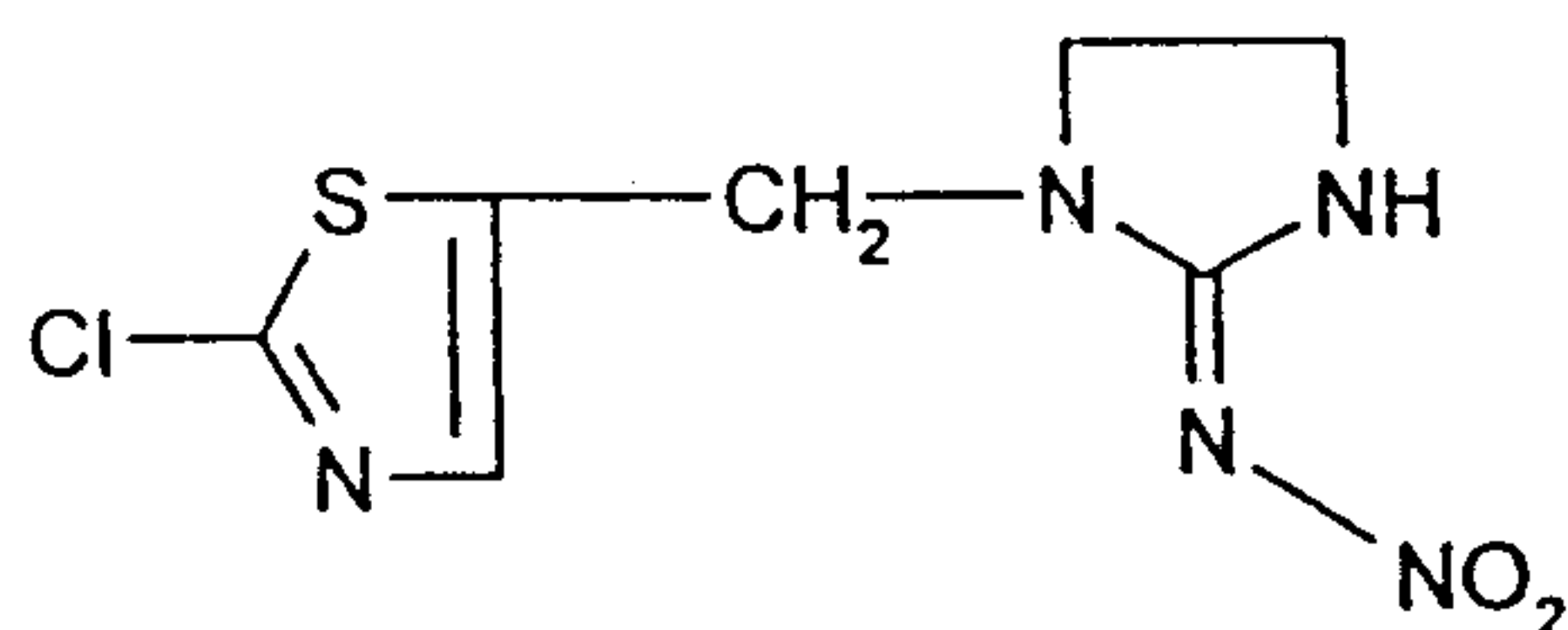
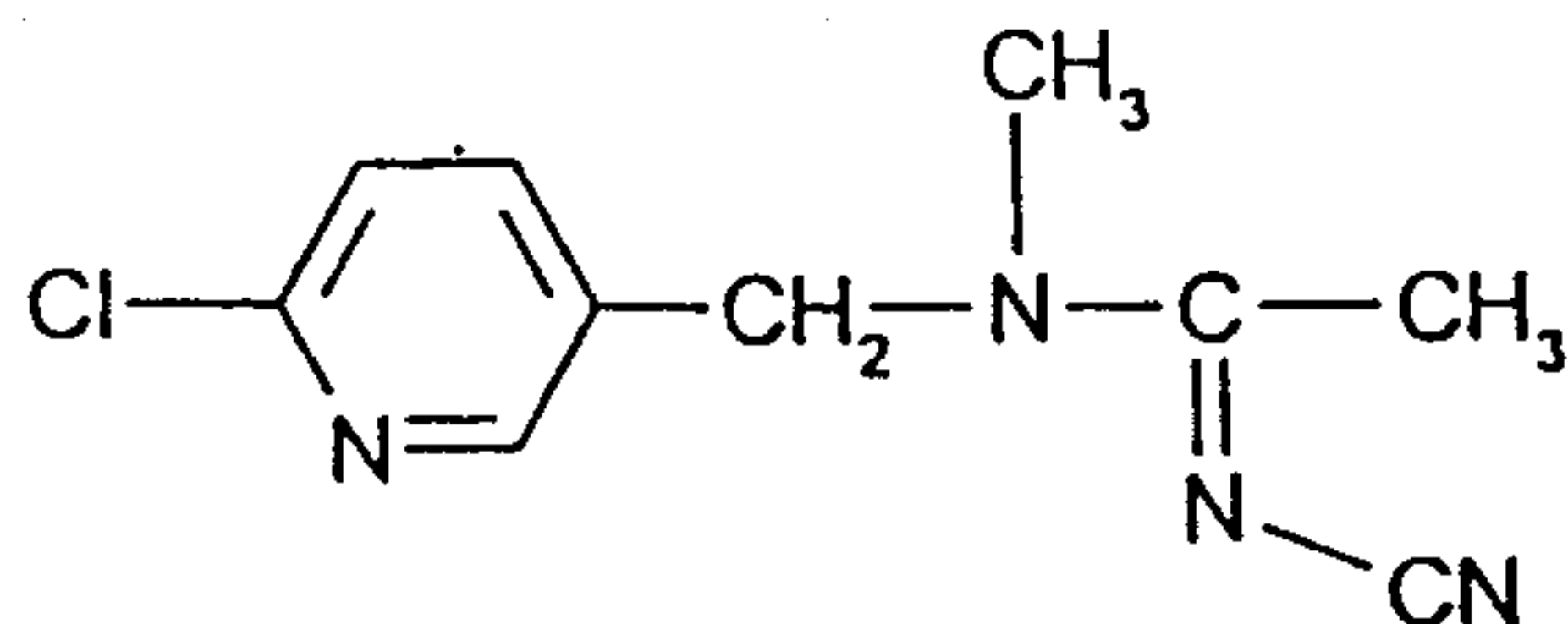
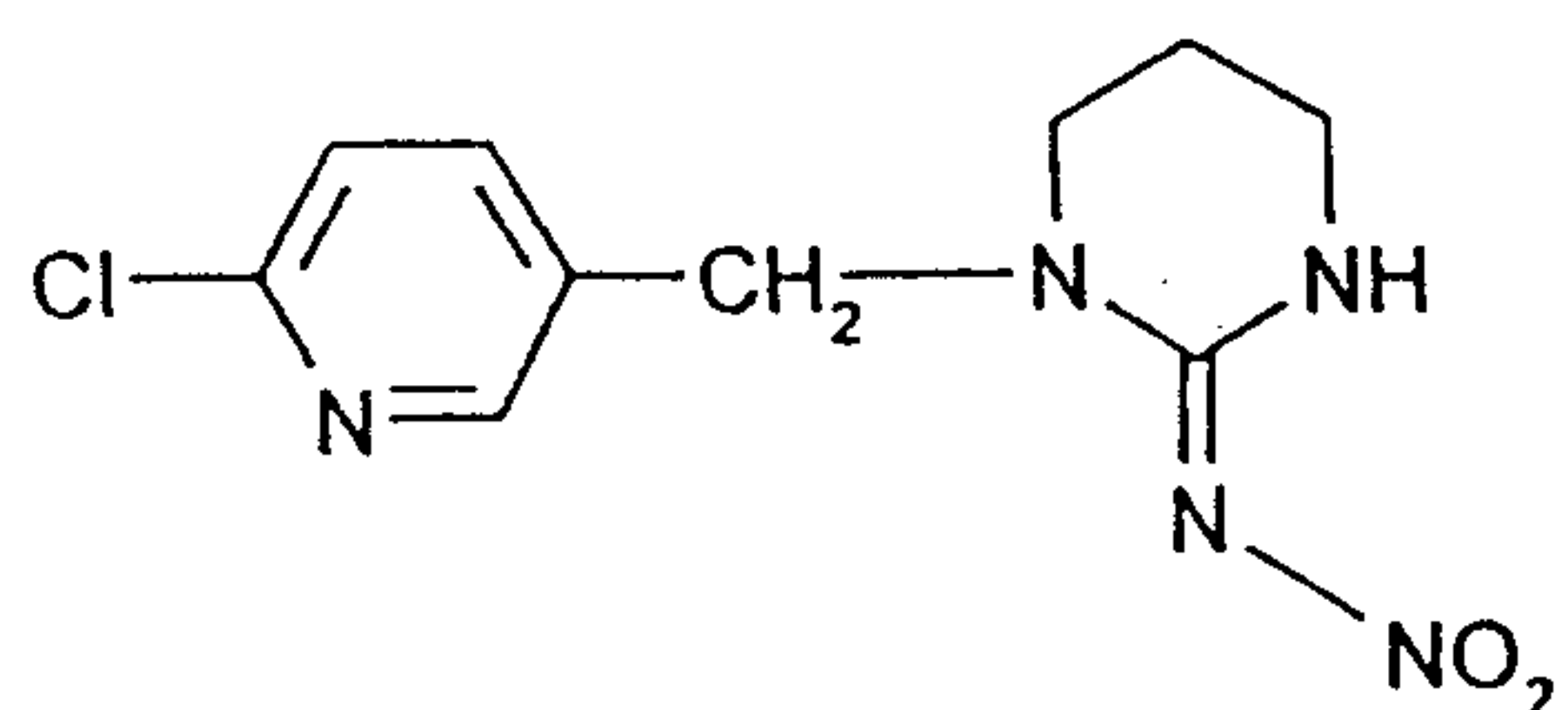
A and Z have the abovementioned preferred meanings,

Specifically, the following compounds may be mentioned:



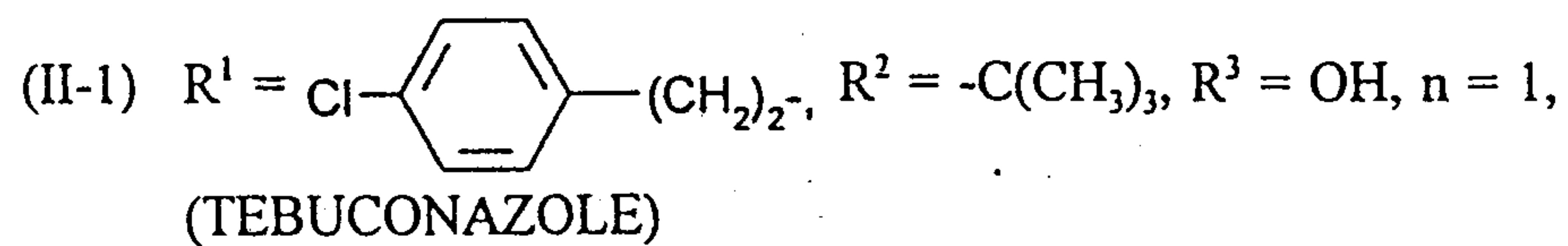
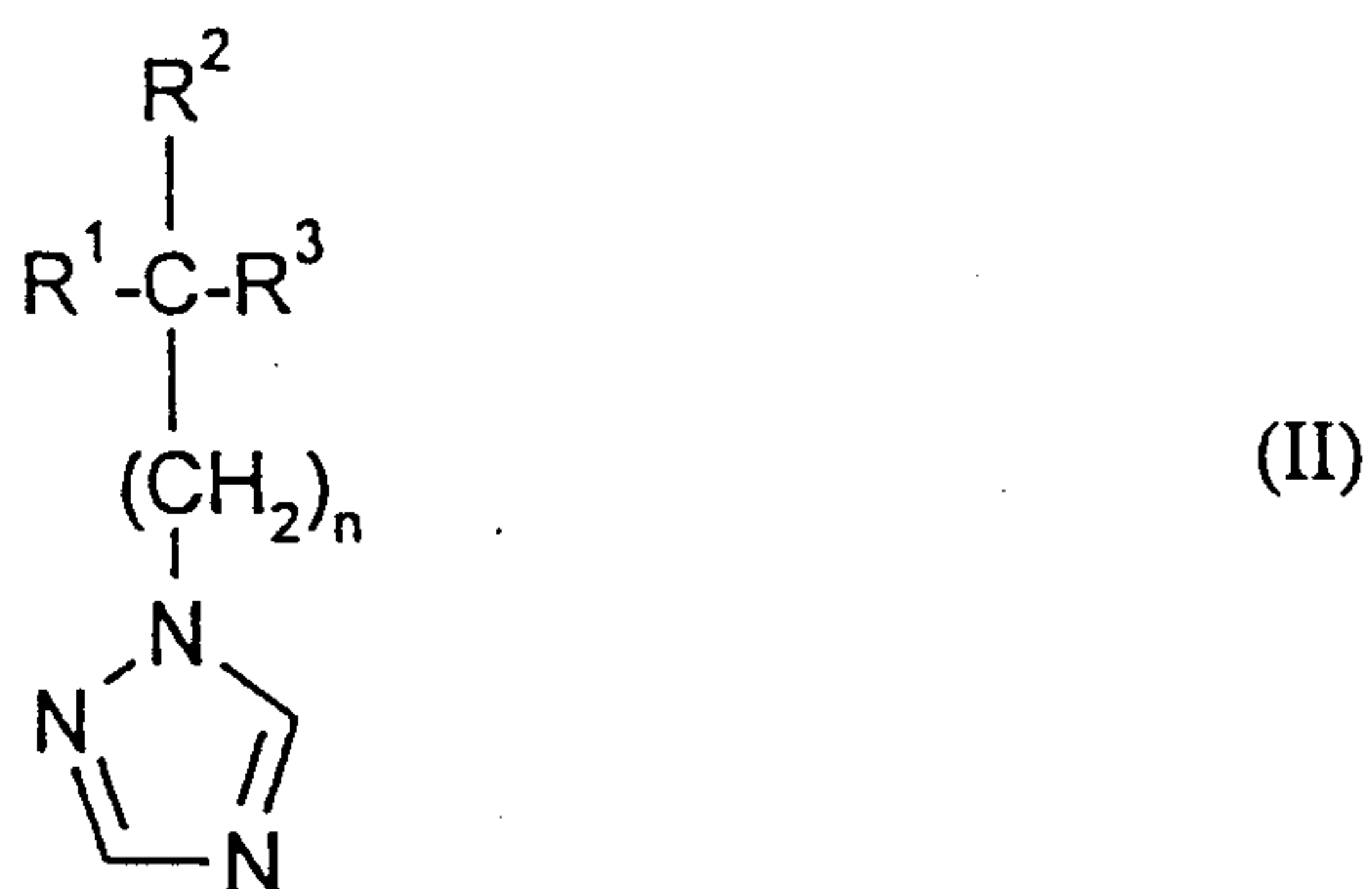
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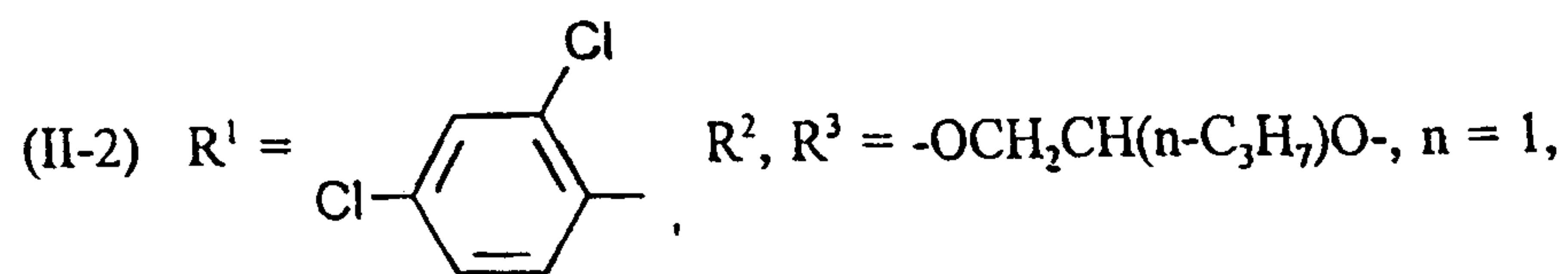
Fungicides in the novel compositions for the control of plant pests are for example:

5 (1) Azole derivatives of the formula

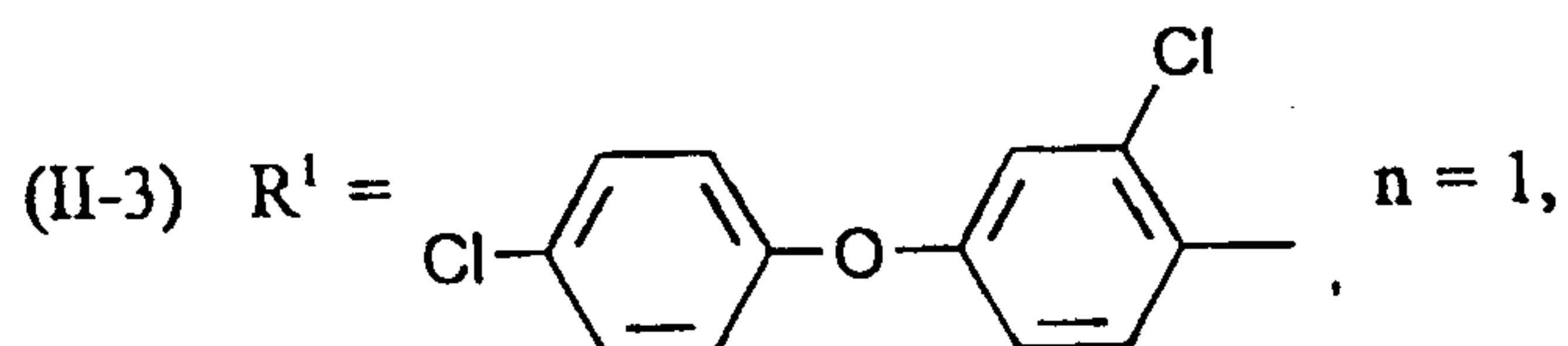


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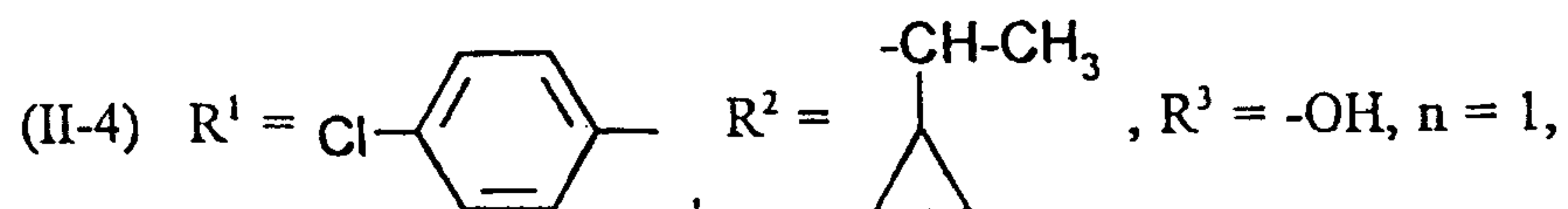


(PROPICONAZOLE)

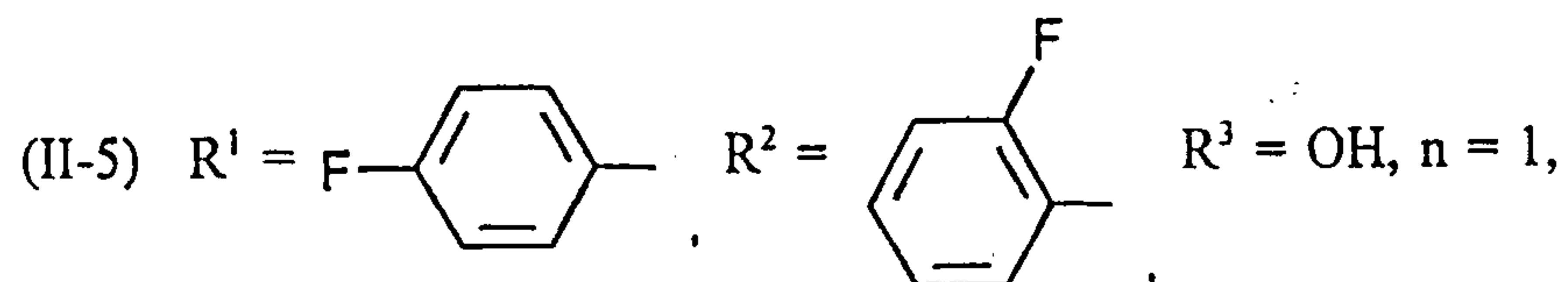


(DIFENCONAZOLE)

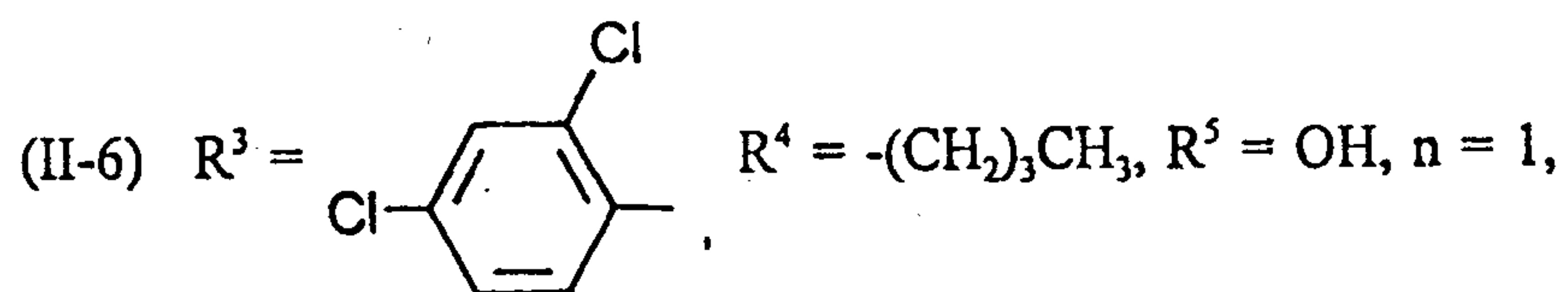
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(CYPROCONAZOLE)



(FLUTRIAFOL)

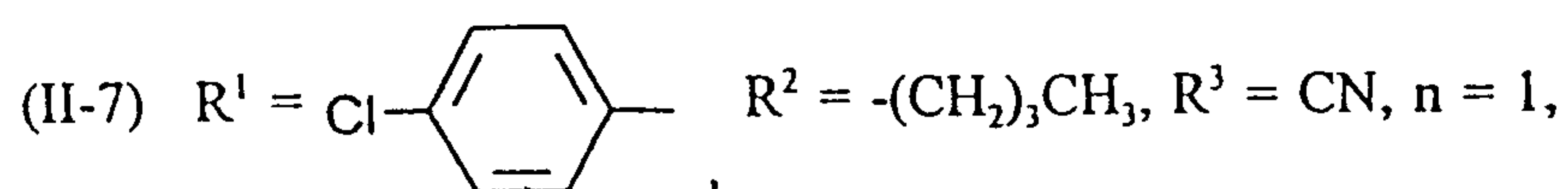


(HEXAICONAZOLE)

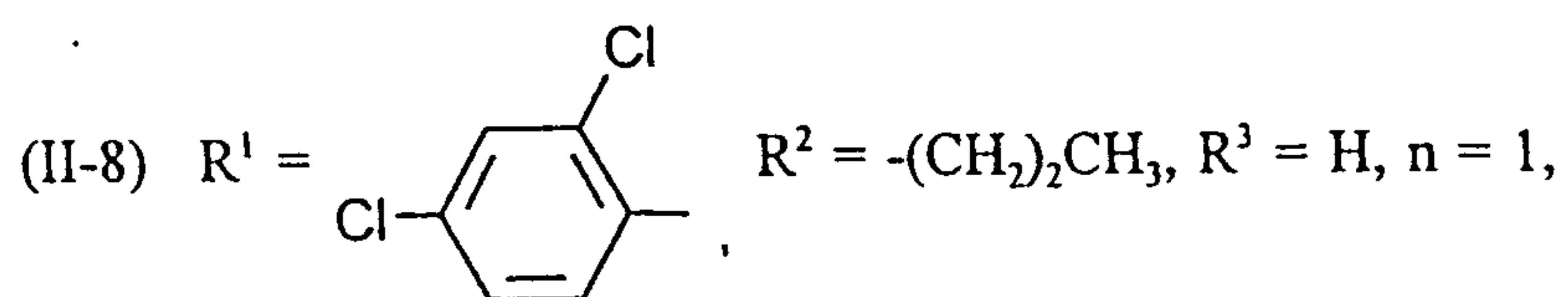
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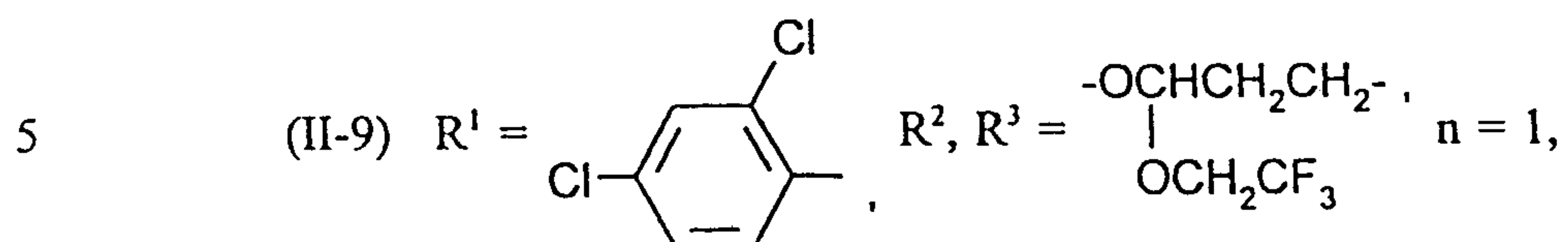
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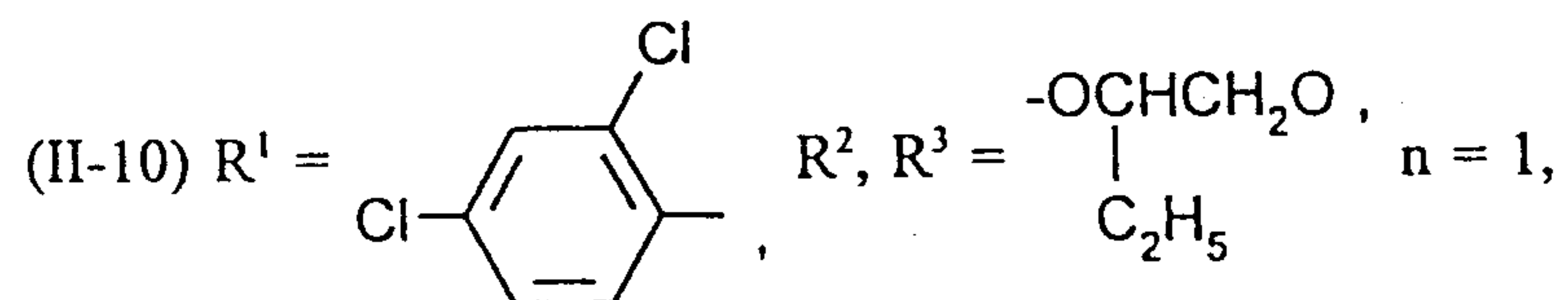
(MYCLOBUTANIL)



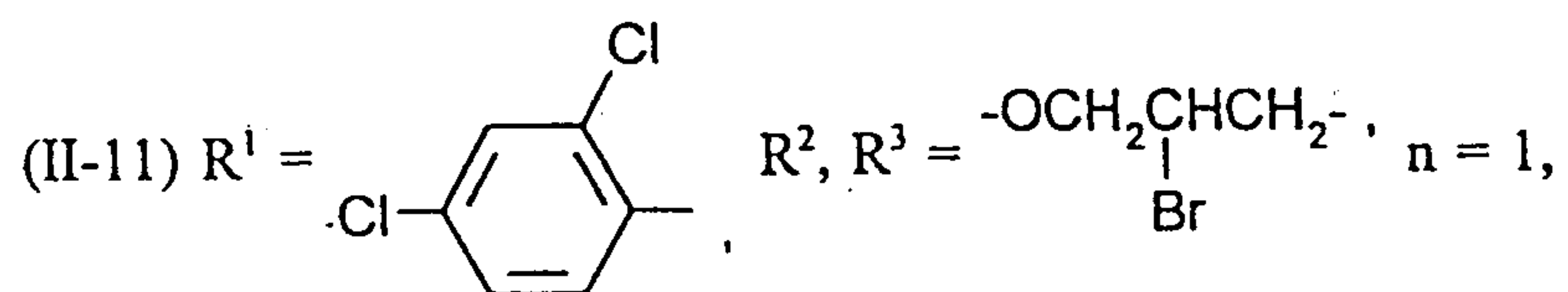
(PENCONAZOLE)



(FURCONAZOLE)

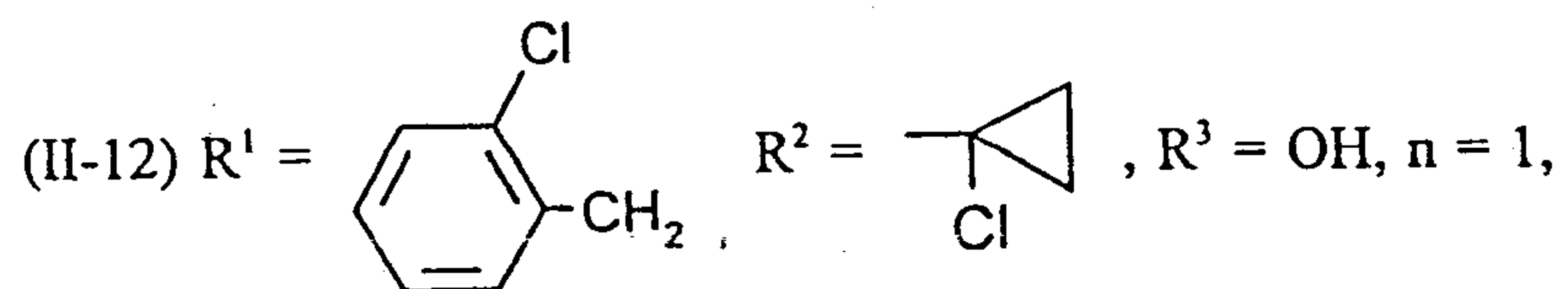


(ETACONAZOLE)



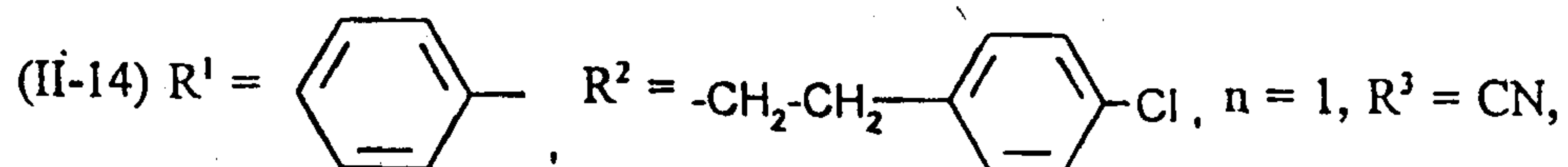
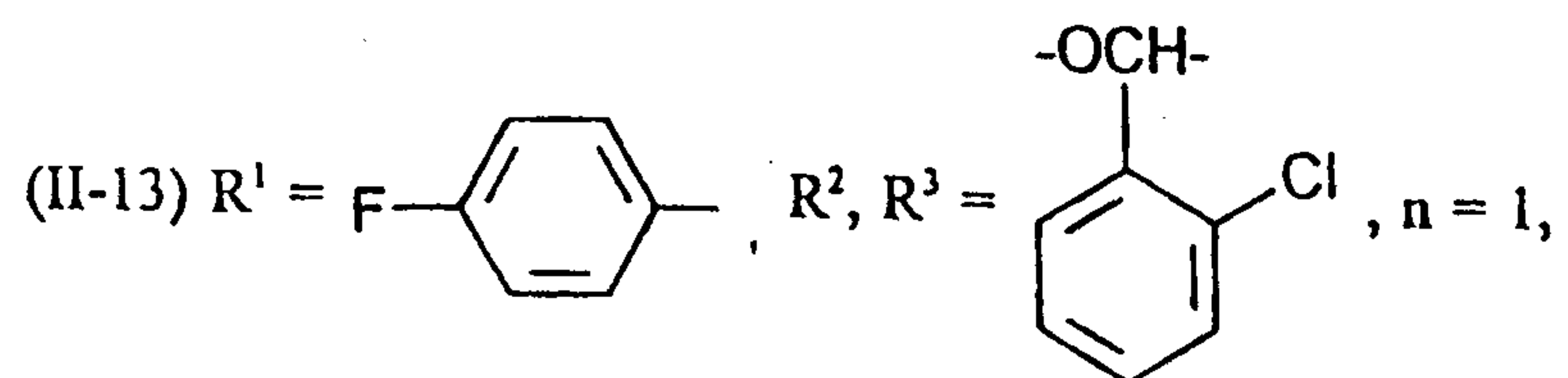
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(BROMUCONAZOLE)

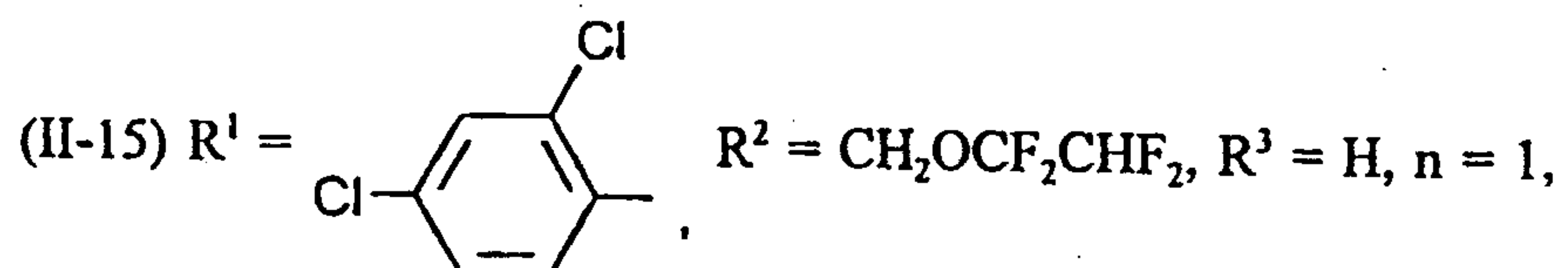


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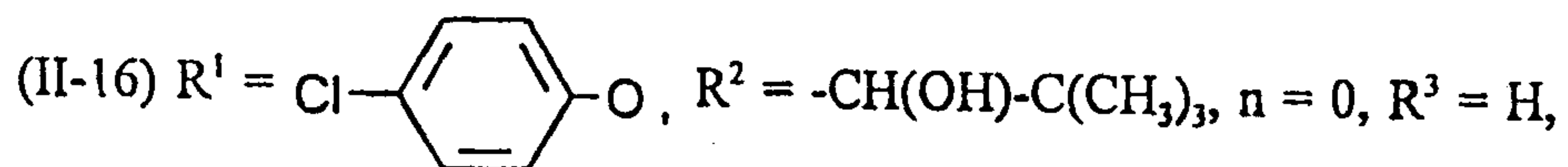


(FENBUCONAZOLE)

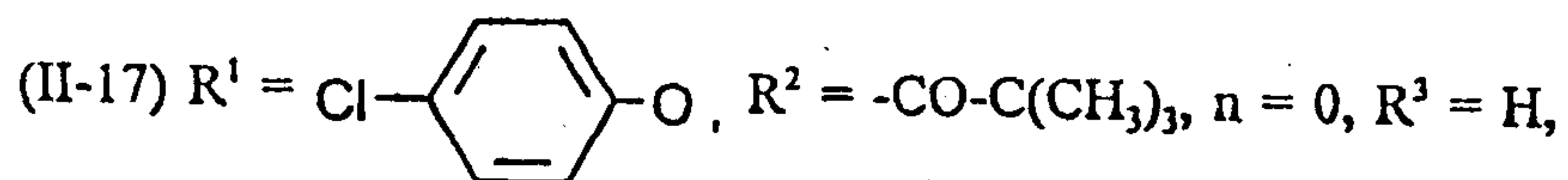


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(TETRACONAZOLE)

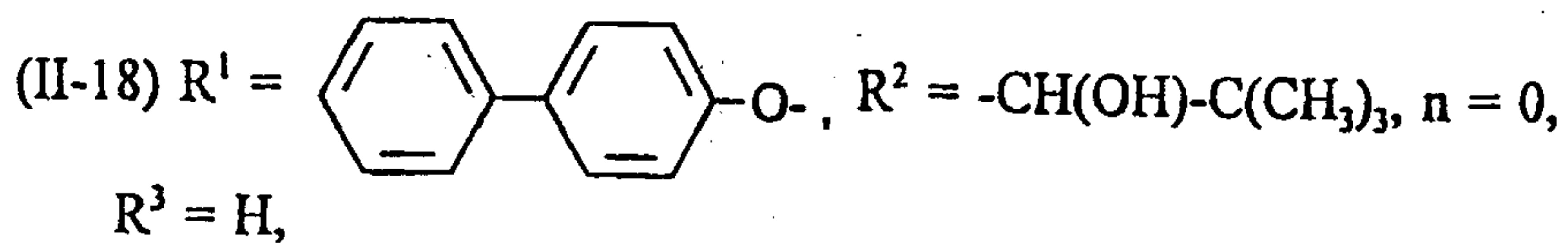


(TRIADIMENOL)



(TRIADIMEFON)

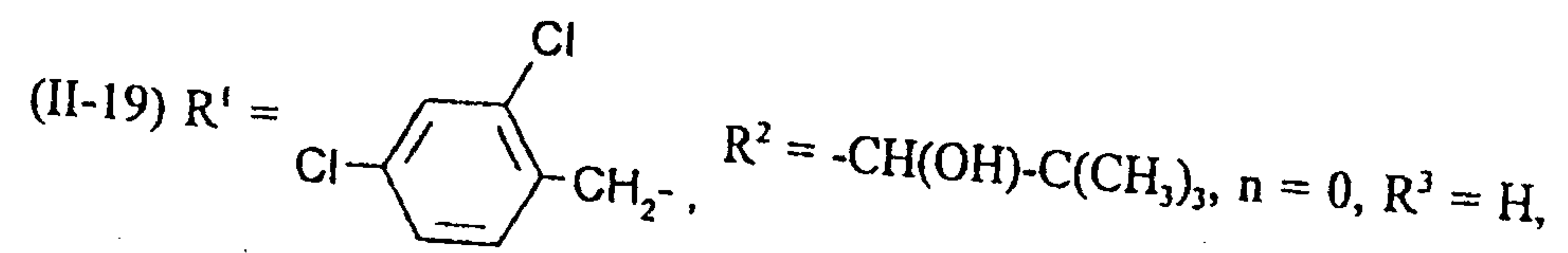
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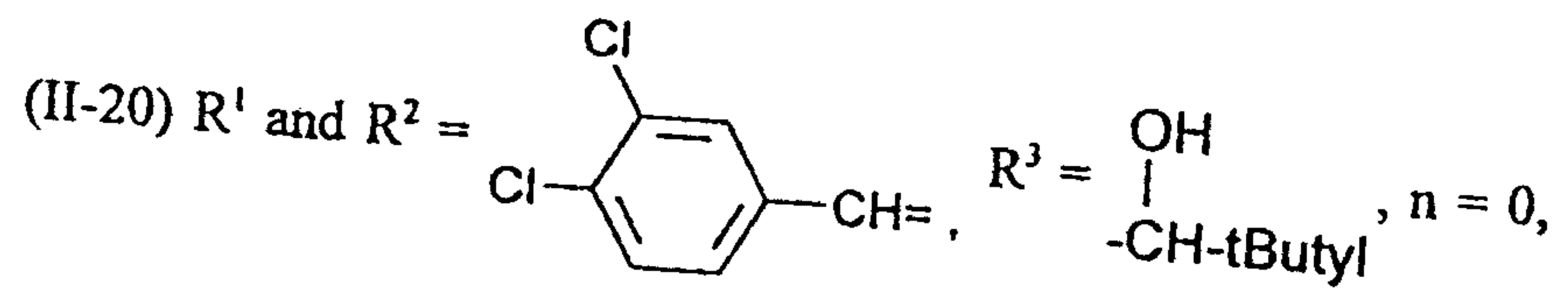
(BITERTANOL)

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(DICLOBUTRAZOL)

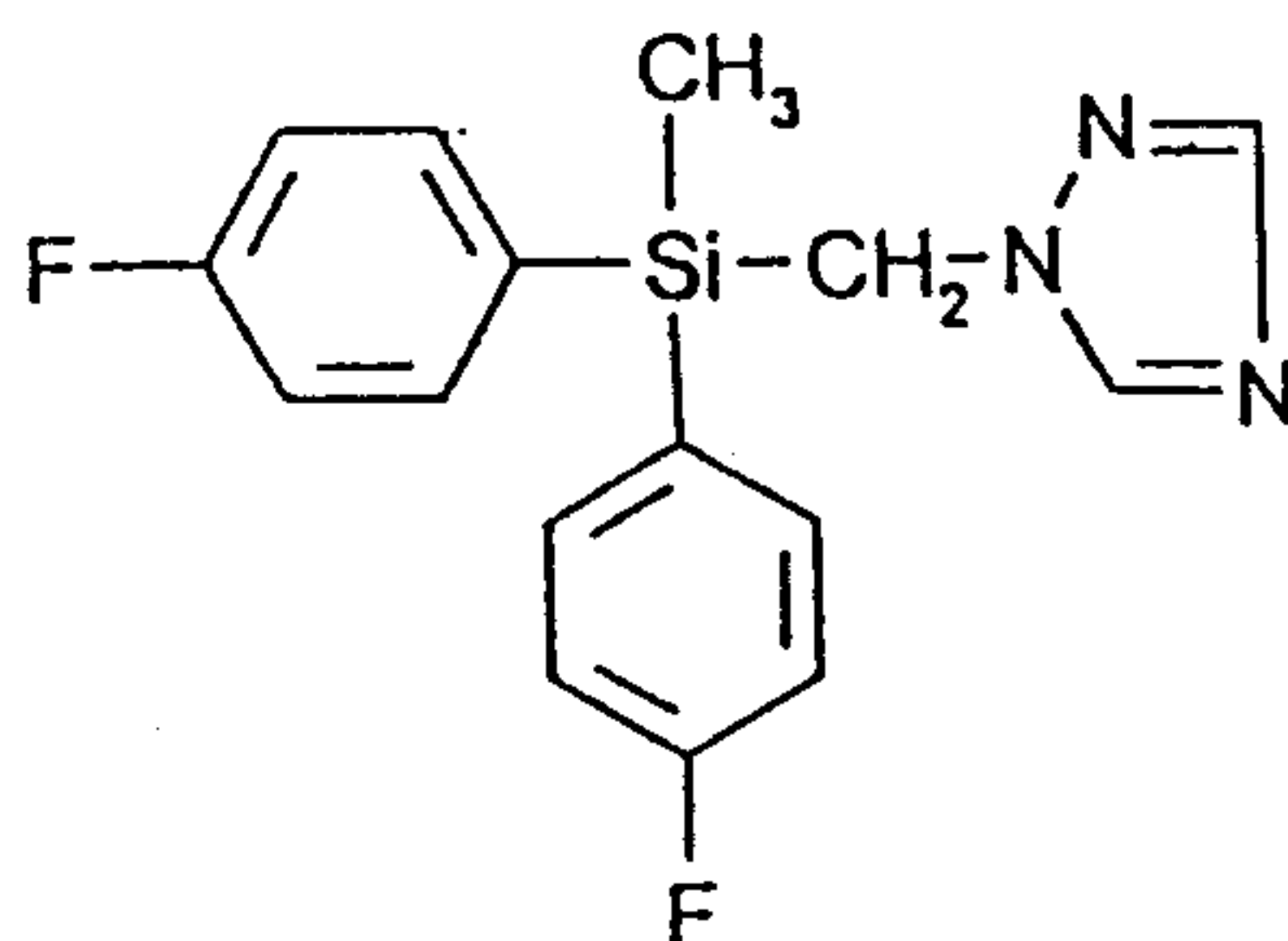


(DINICONAZOLE)

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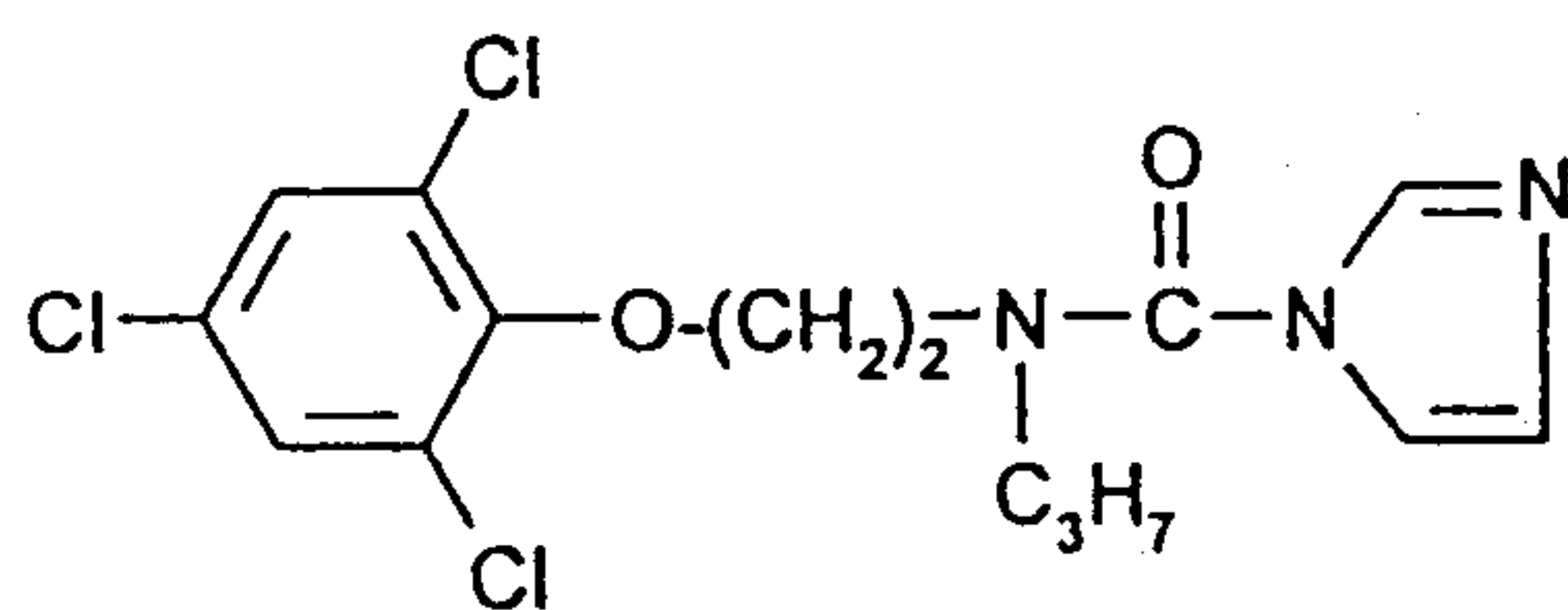
(2) Azole derivatives of the formula



(III)

(FLUSILAZOLE)

(3) The azole derivative of the formula



(IV)

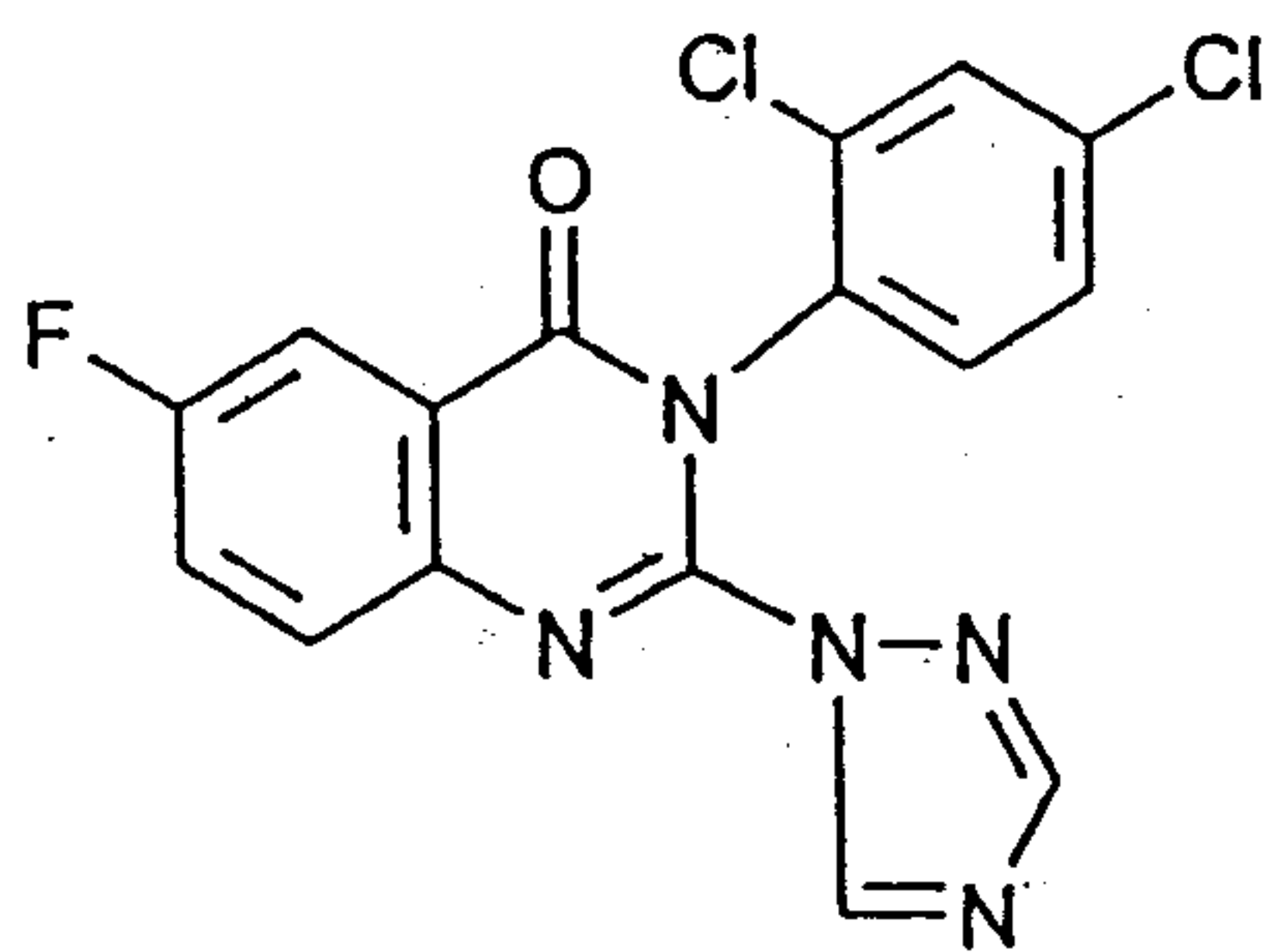
(PROCHLORAZ)

(4) The compound

 S_x

(V)

(5) Azole derivative of the formula



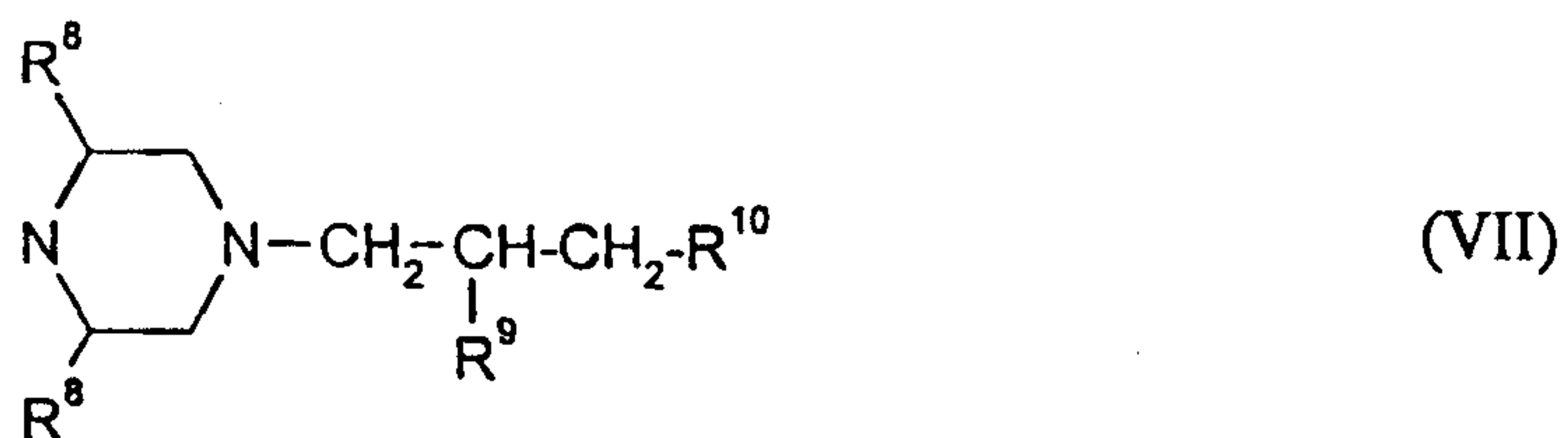
(VI)

(FLUQUINCONAZOLE)

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(6) Heterocycles of the formula



(VII-1) $X = 0$, $R^8 = \text{CH}_3$, $R^9 = \text{H}$, $R^{10} = \text{C}_{10}\text{H}_{21}$
(TRIDEMORPH)

5

(VII-2) $X = 0$, $R^8 = \text{CH}_3$, $R^9 = \text{H}$, $R^{10} = \text{C}_9\text{H}_{19}$
(ALDIMORPH)

(VII-3) $X = 0$, $R^8 = \text{CH}_3$, $R^9 = \text{CH}_3$, $R^{10} =$

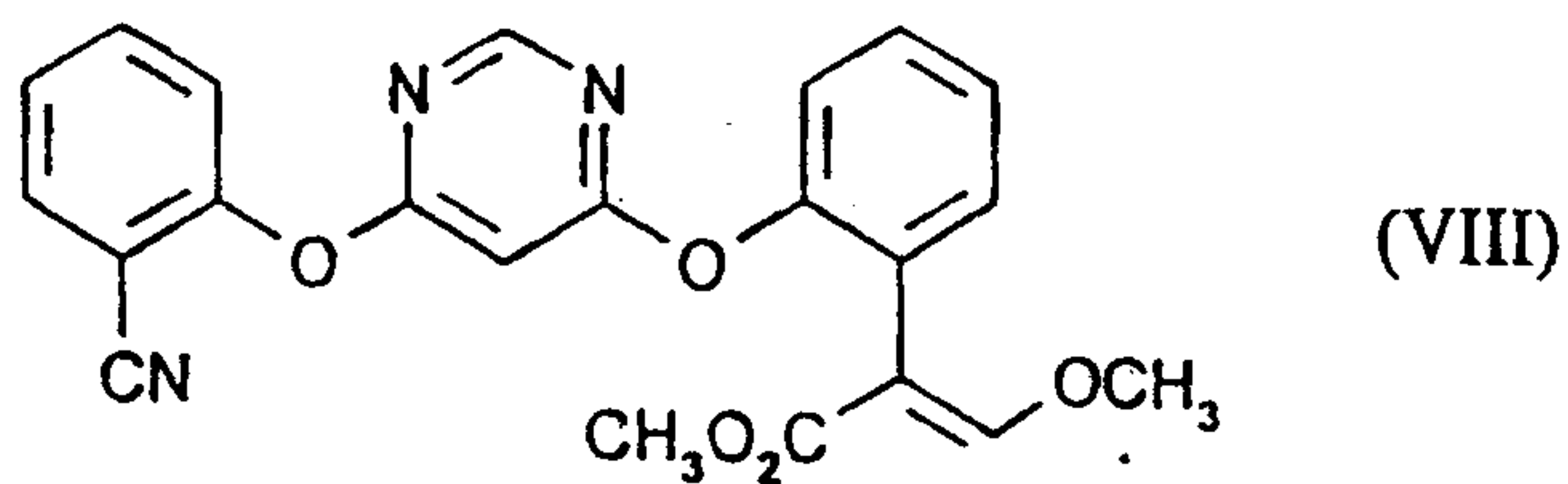
(FENPROPIMORPH)

(VII-4) $X = \text{CH}_2$, $R^8 = \text{H}$, $R^9 = \text{CH}_3$, $R^{10} =$

(FENPROPIDIN)

10

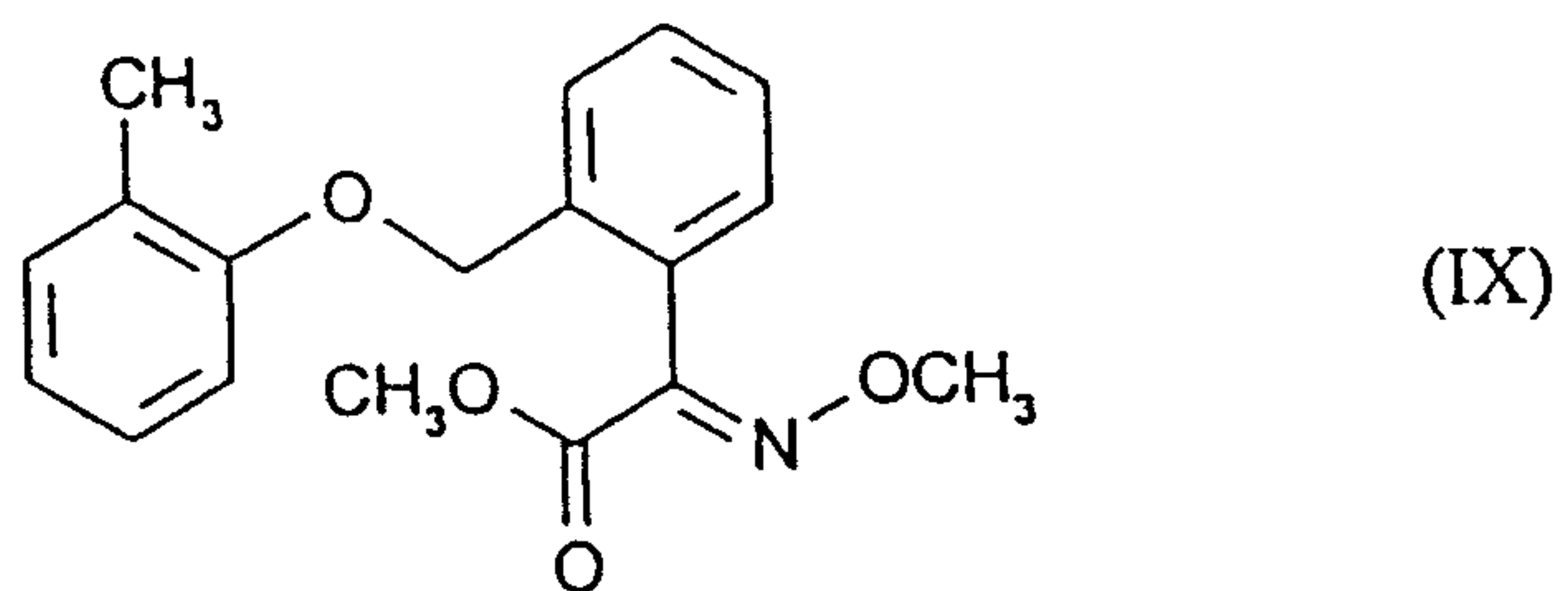
(7) Compound of the formula



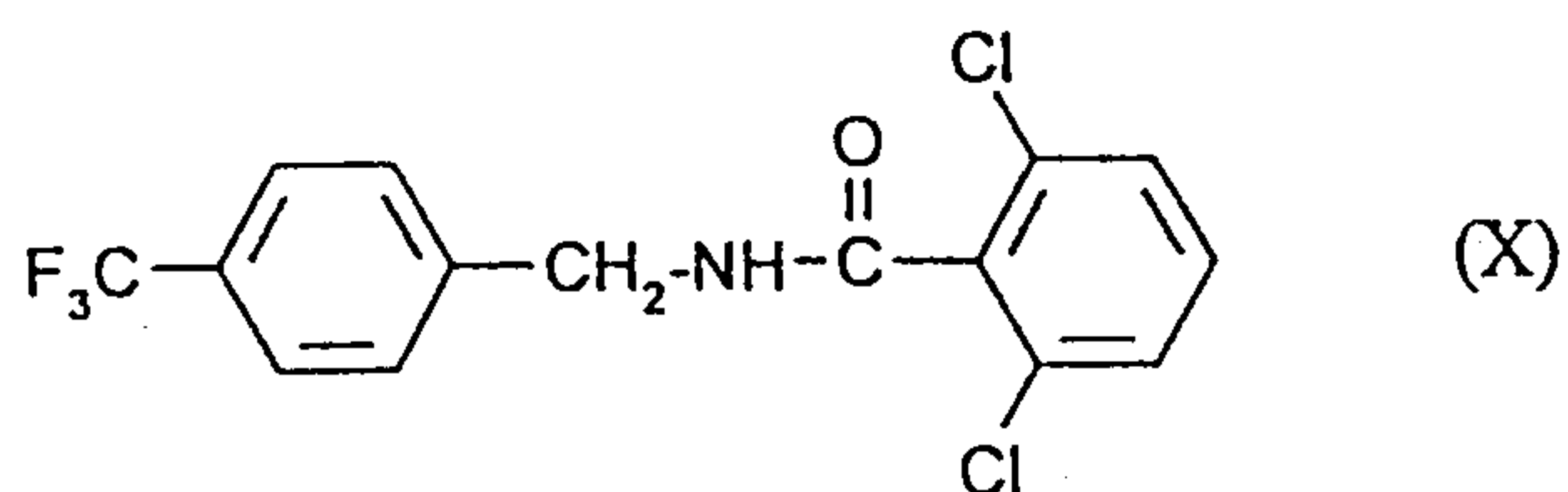
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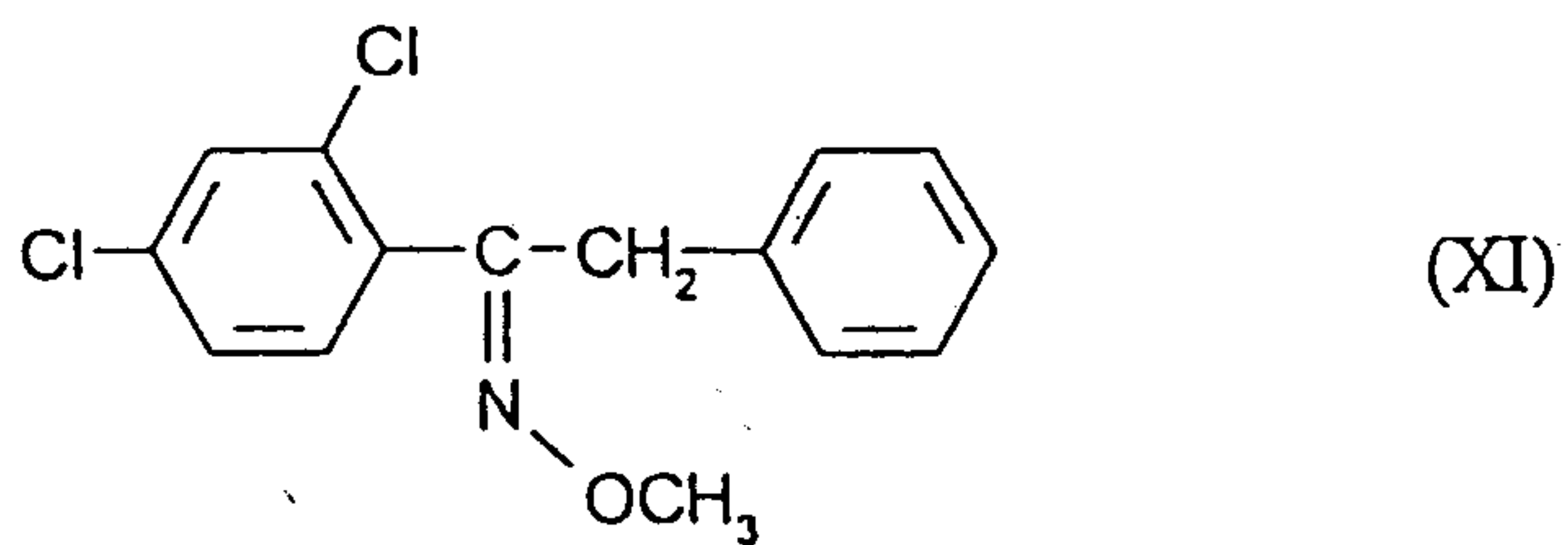
(8) Compound of the formula



9) Compound of the formula

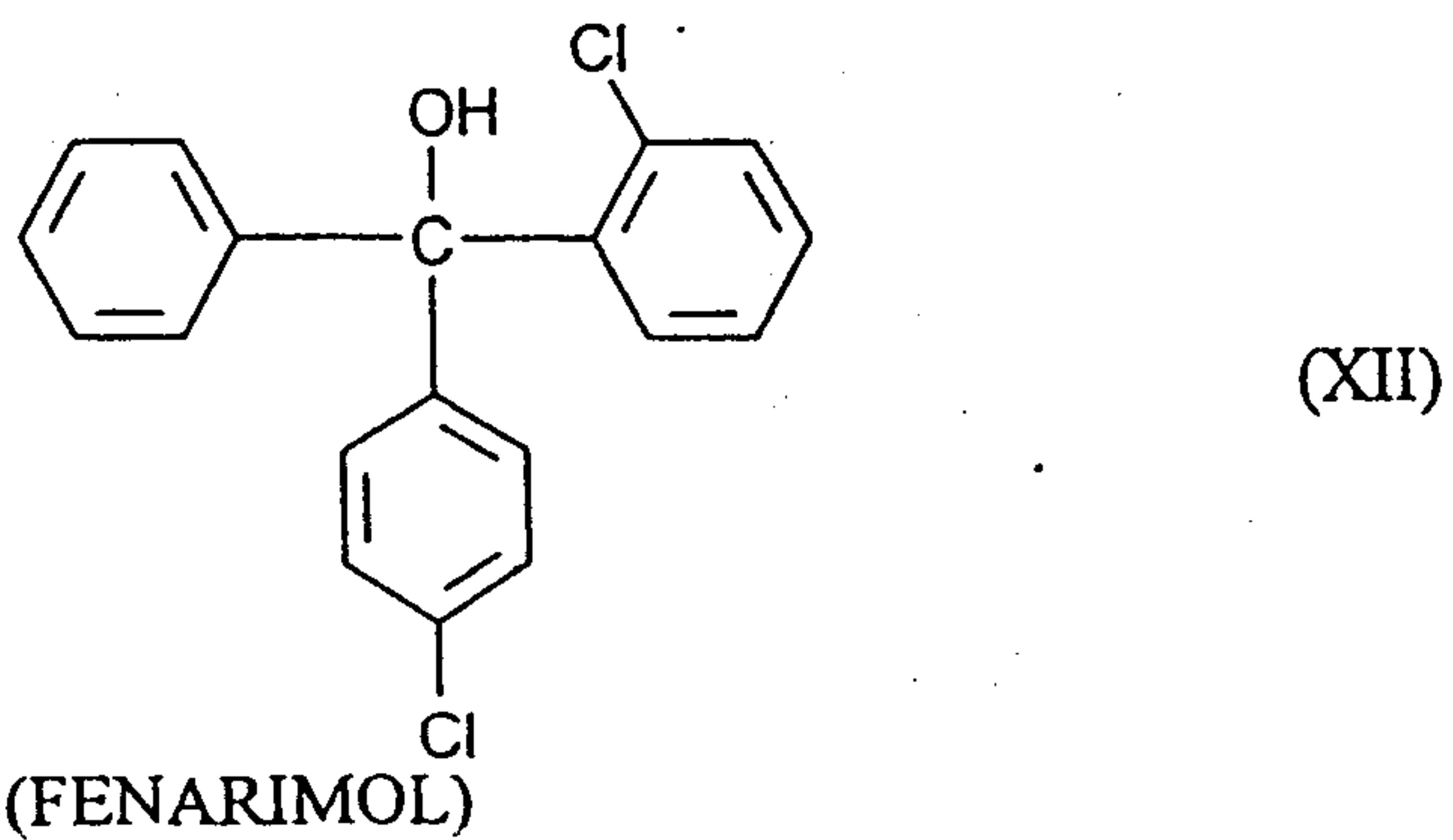


5 (10) Compound of the formula



(PYRIFENOX)

(11) Compound of the formula

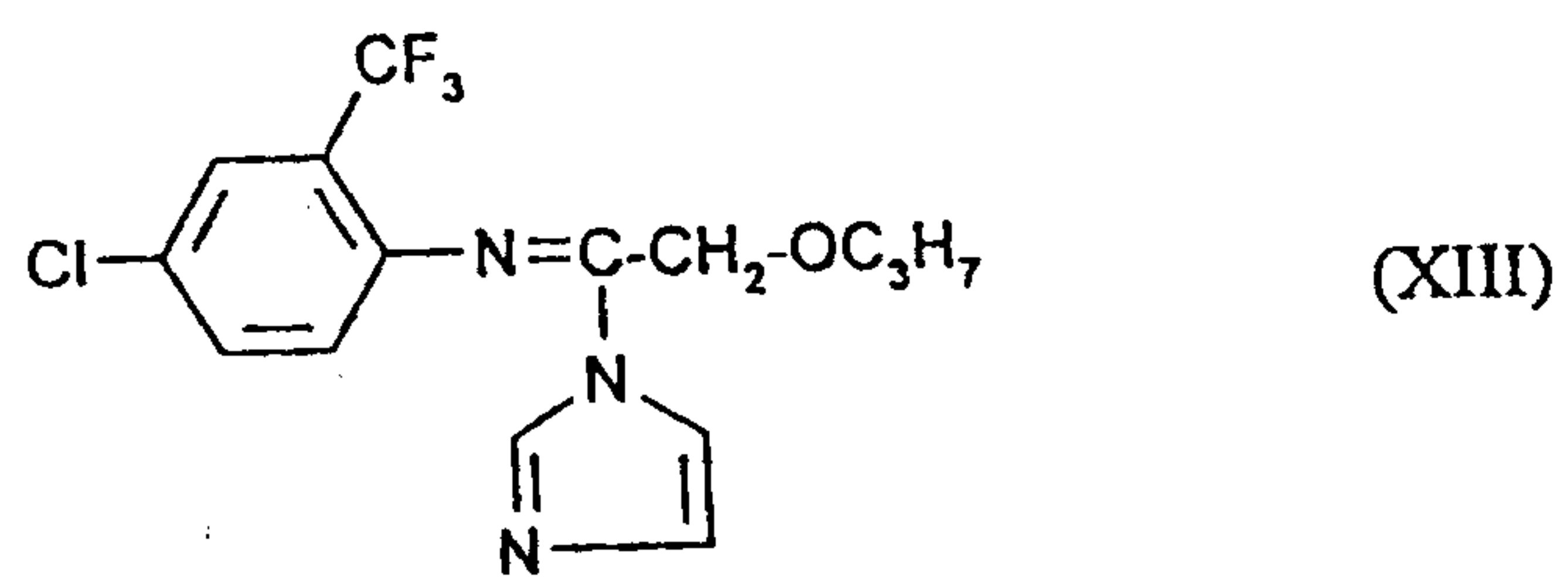


(FENARIMOL)

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(12) Compound of the formula



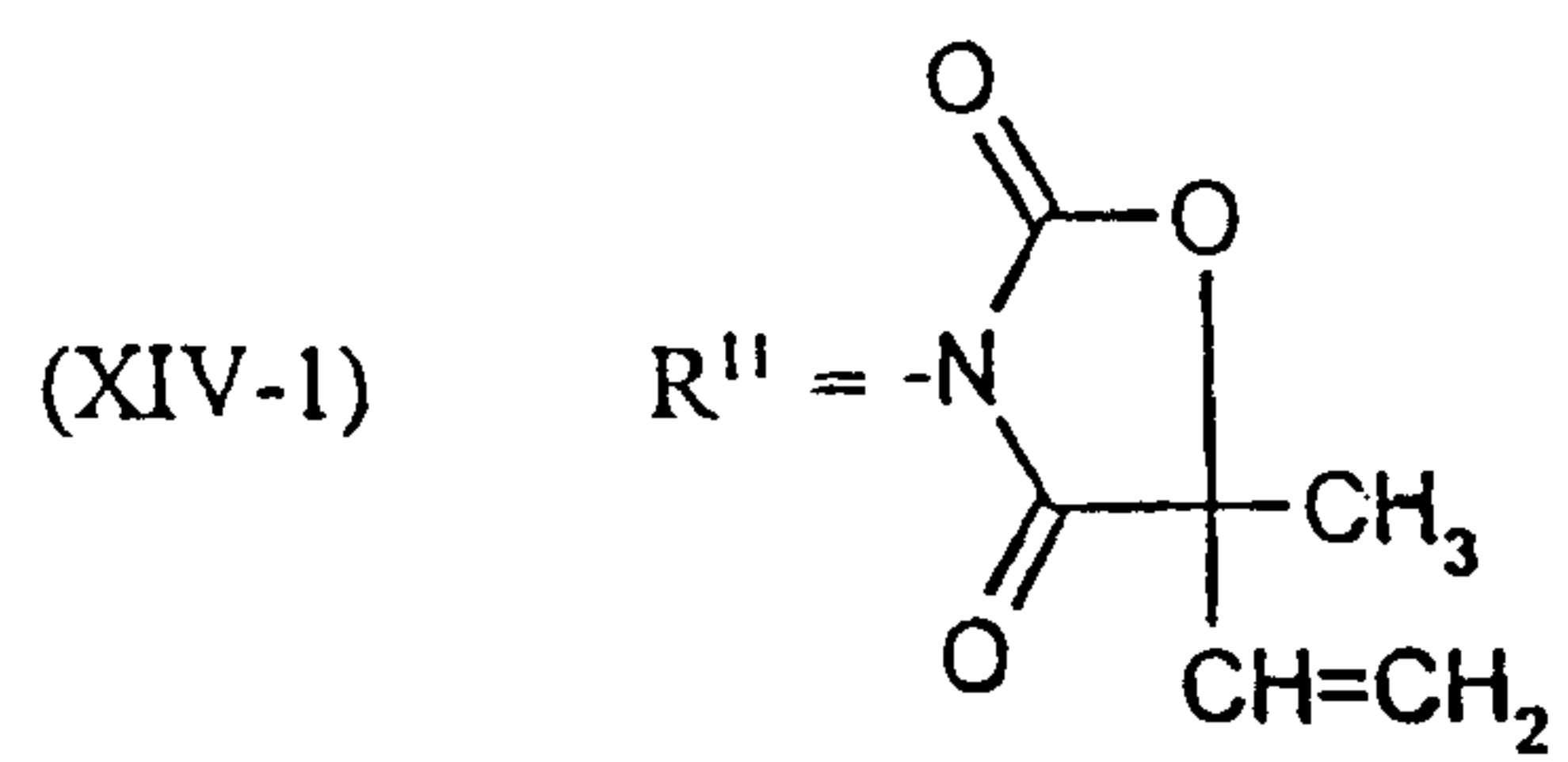
(TRIFLUMIZOLE)

(13) Compounds of the formula

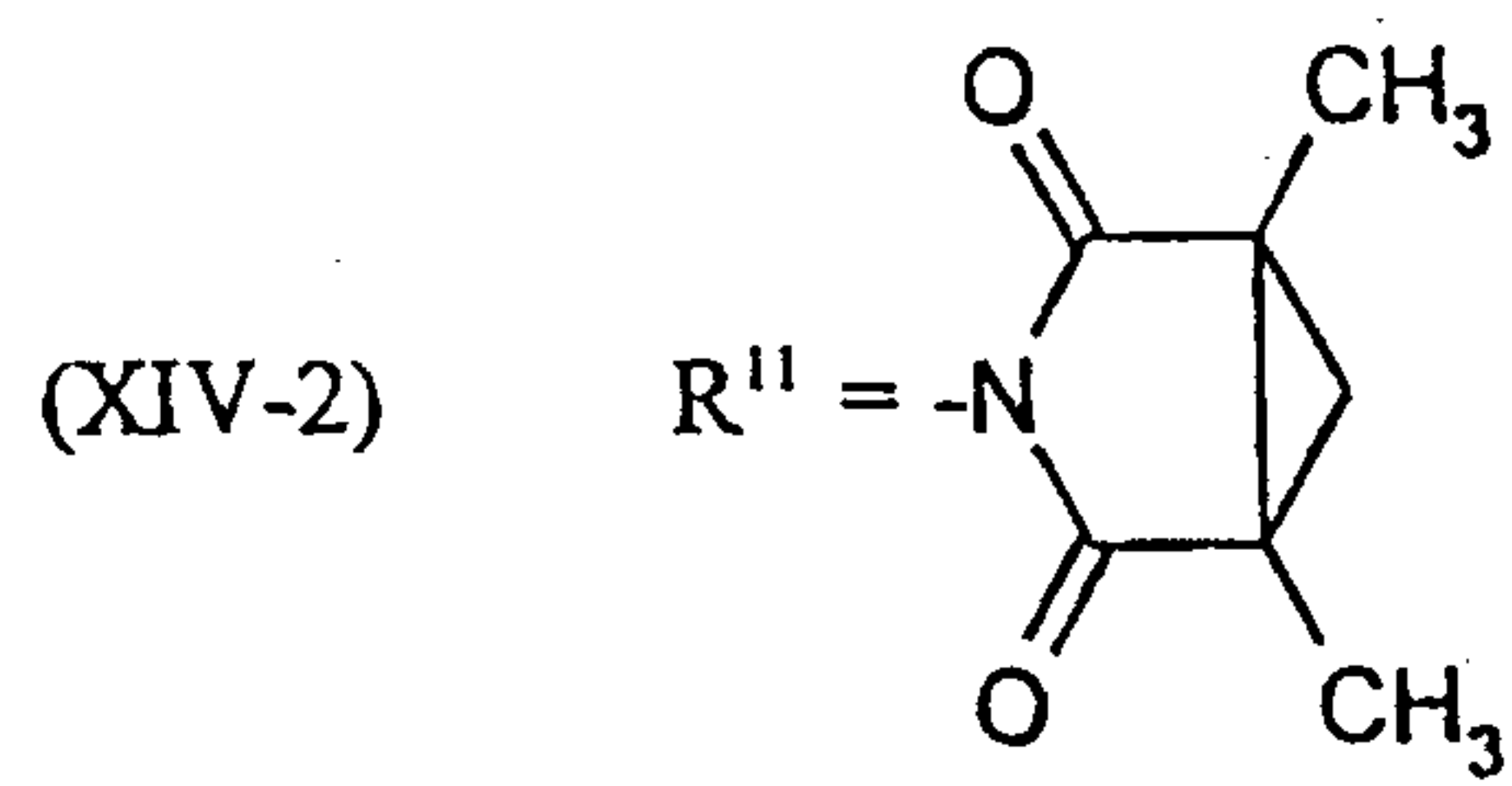


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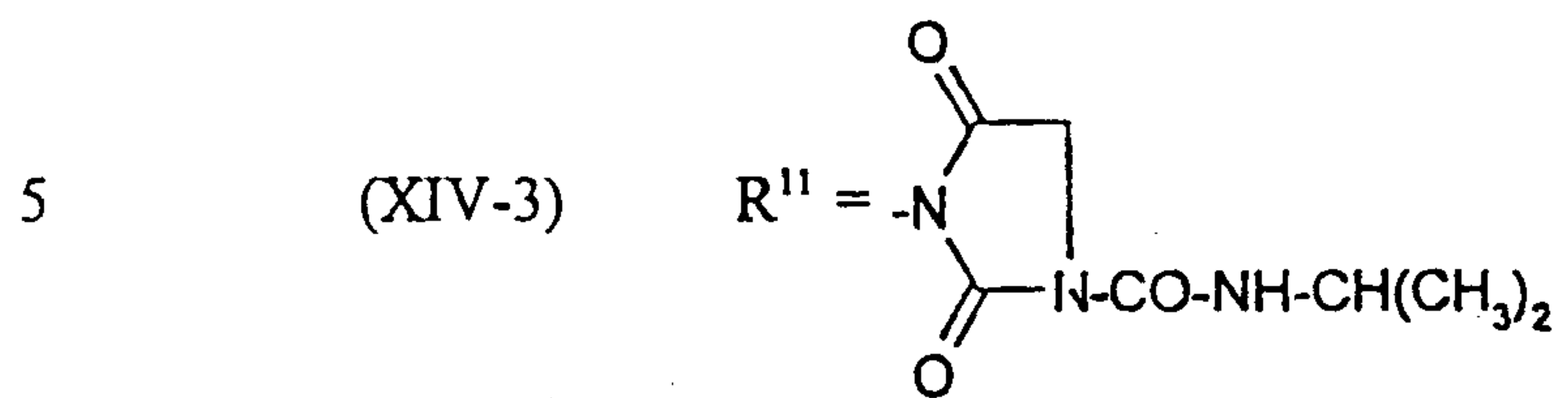
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(VINCLOZOLIN)



(PROCYMIDONE)

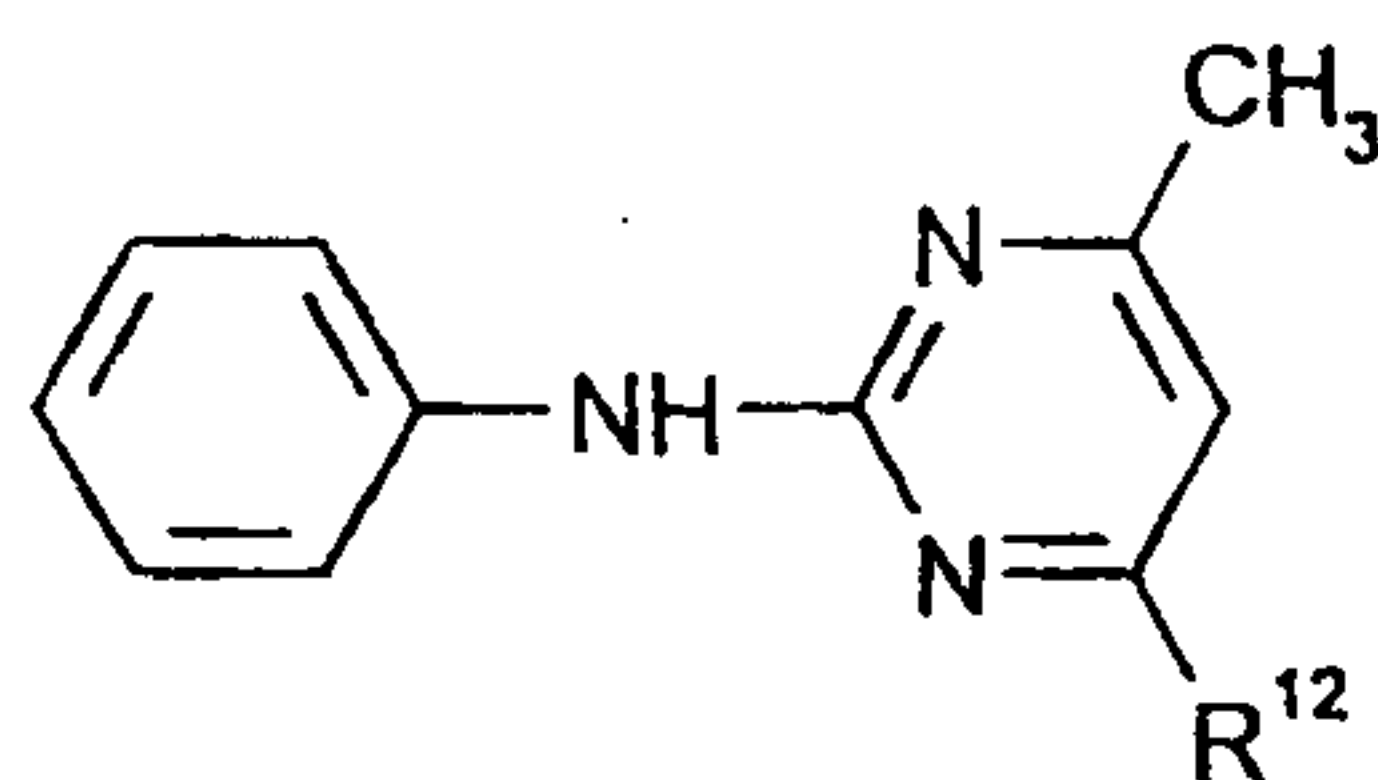


(IPRODIONE)

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(14) Compounds of the formula



(XV)

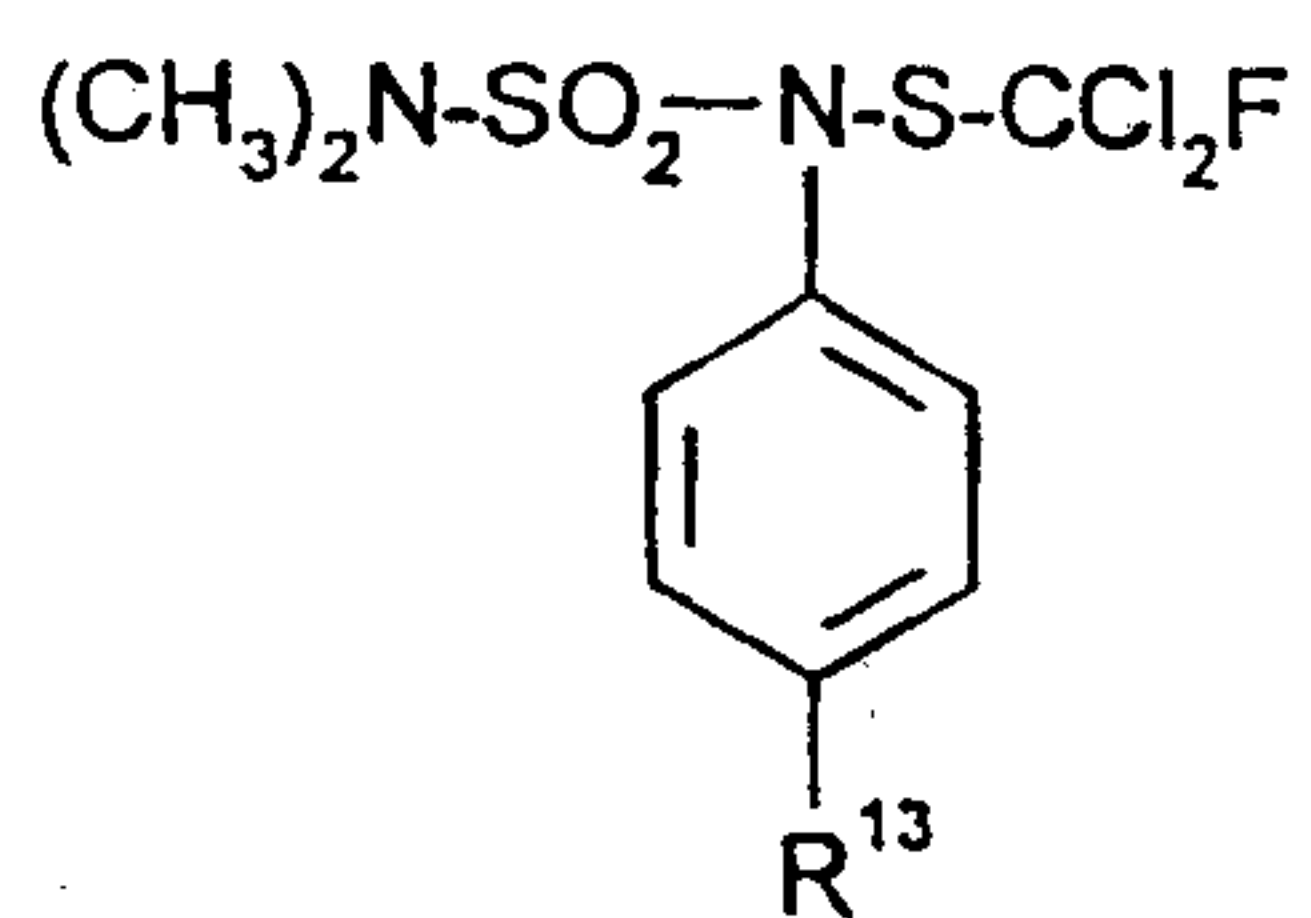
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(XV-1) $R^{12} = CH_3$
(PYRIMETHANIL)

(XV-2) $R^{12} = C \equiv C-CH_3$
(MEPANIPYRIM)

10

(15) Compounds of the formula



(XVI)

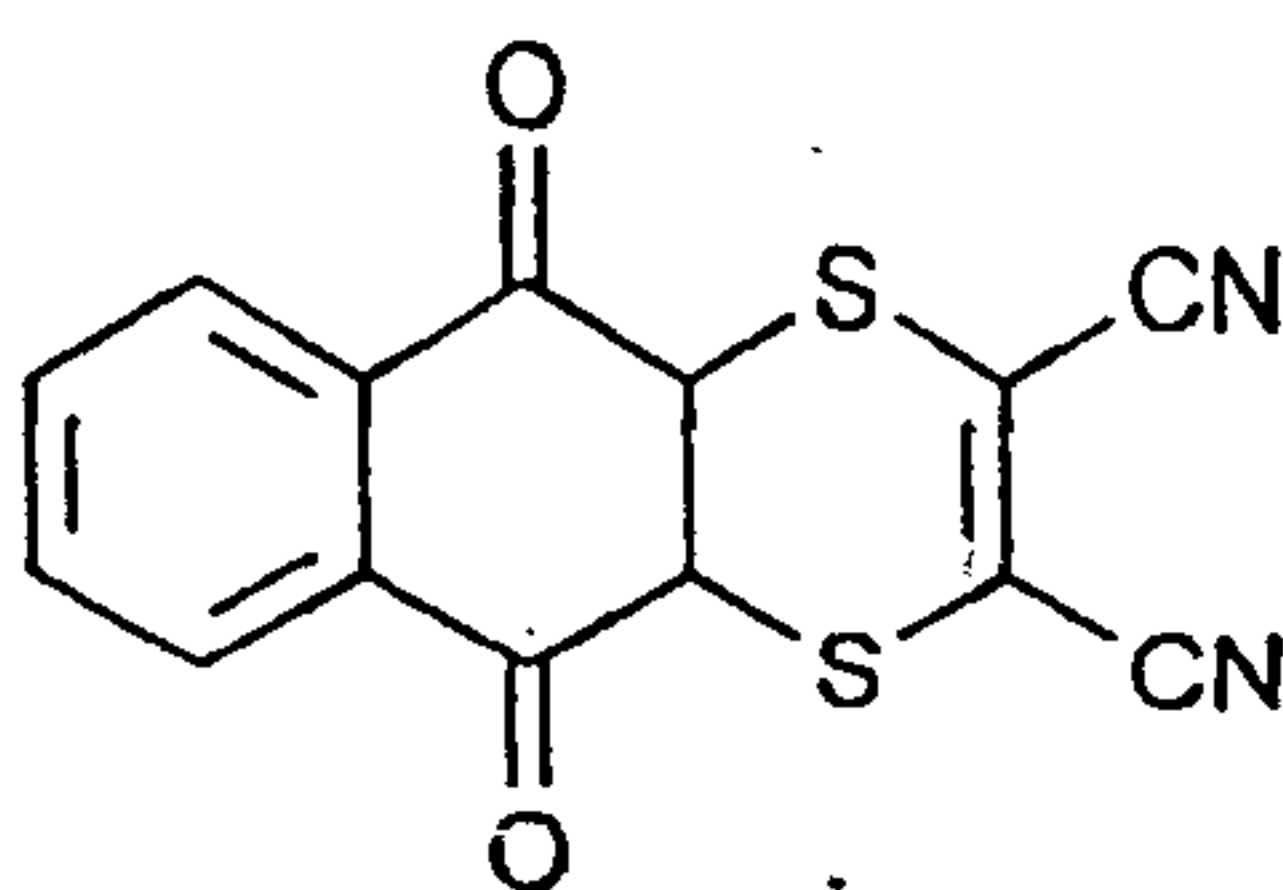
15

(XVI-1) $R^{13} = H$
(DICHLORFLUANID)

(XVI-2) $R^{13} = CH_3$
(TOLYLFLUANID)

20

(16) Compound of the formula



(XVII)

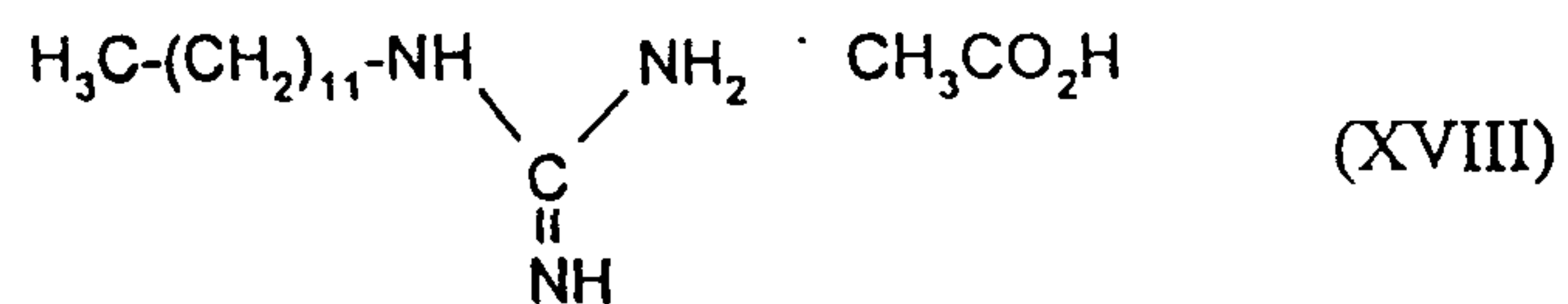
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(DITHIANON)

(17) Compound of the formula

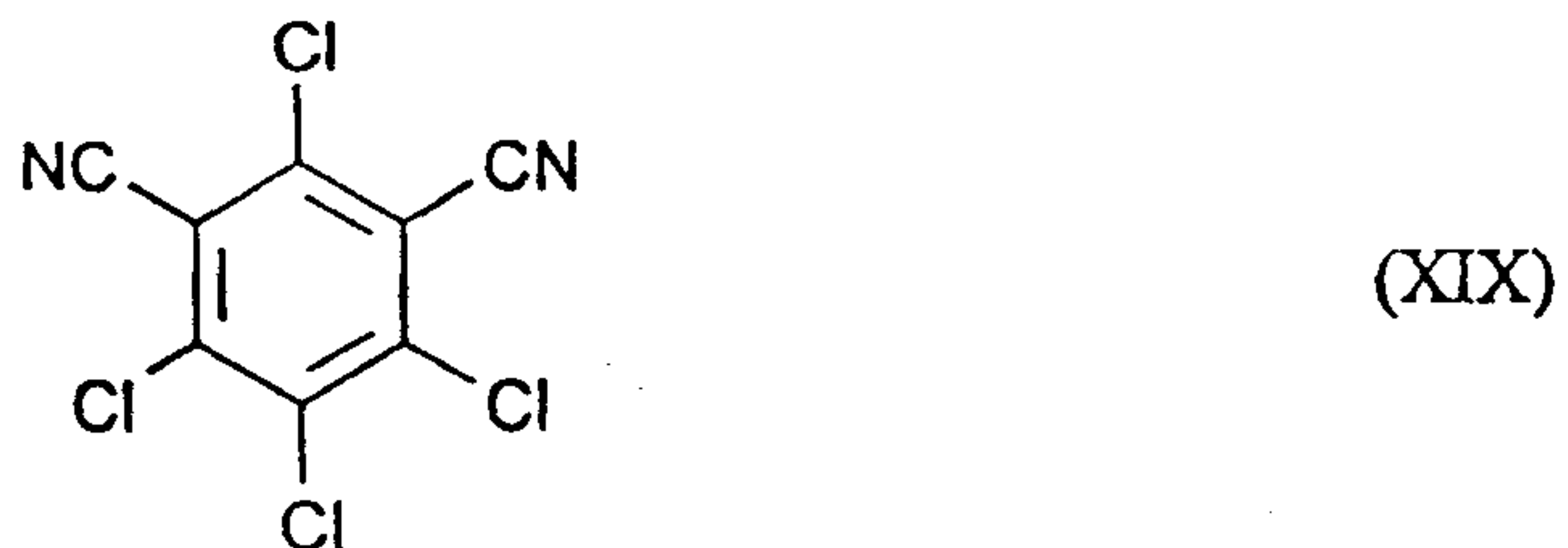
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(DODINE)

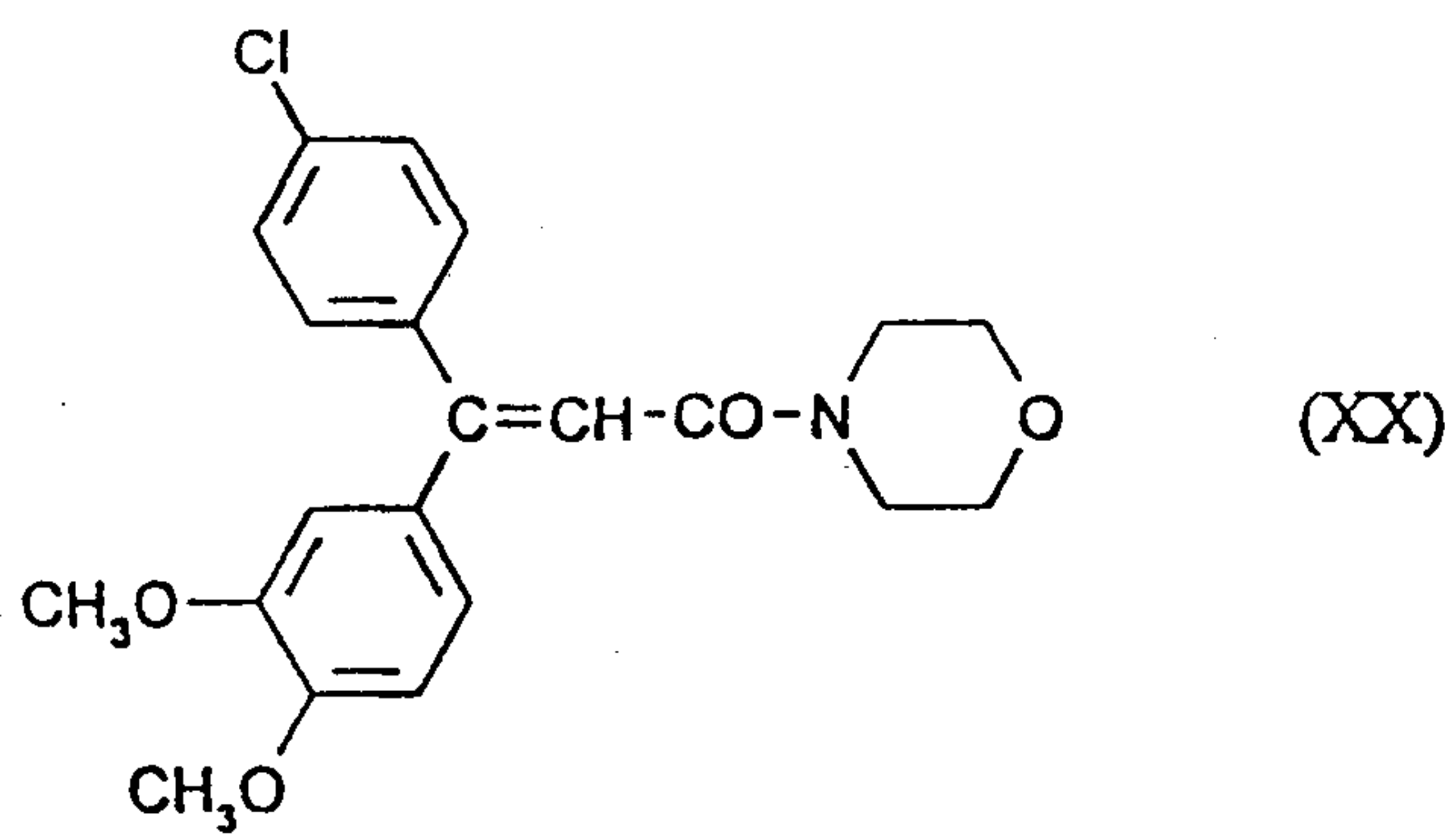
(18) Compound of the formula

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(CHLOROTHALONIL)

15 (19) Compound of the formula



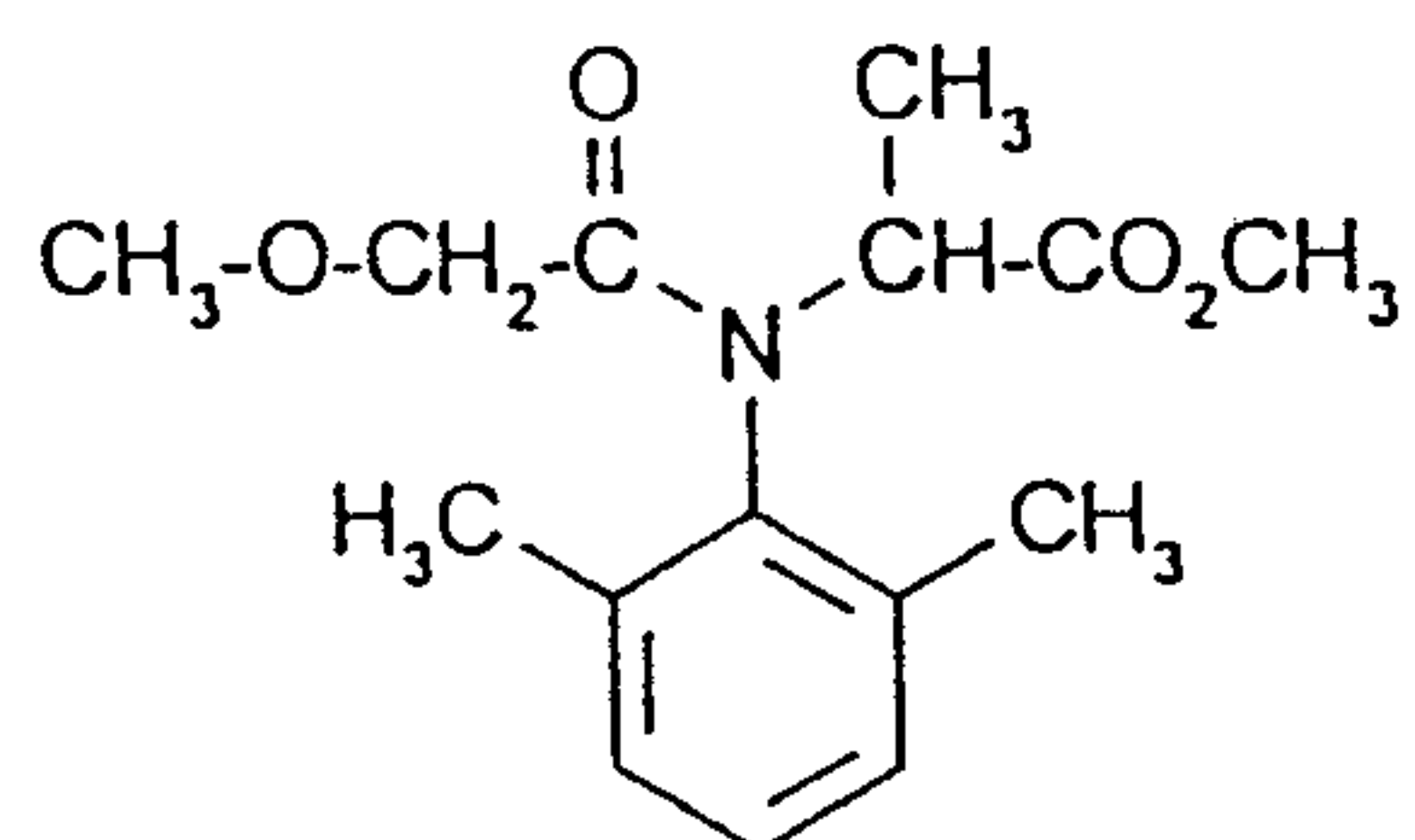
(DIMETHOMORPH)

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(20) Compound of the formula

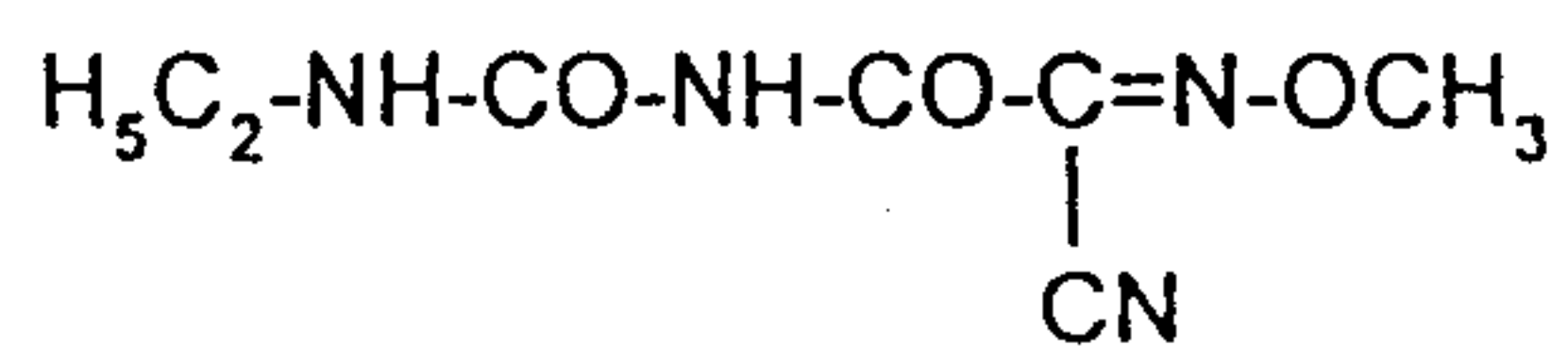


(XXI)

5

(METALAXYL)

(21) Compound of the formula

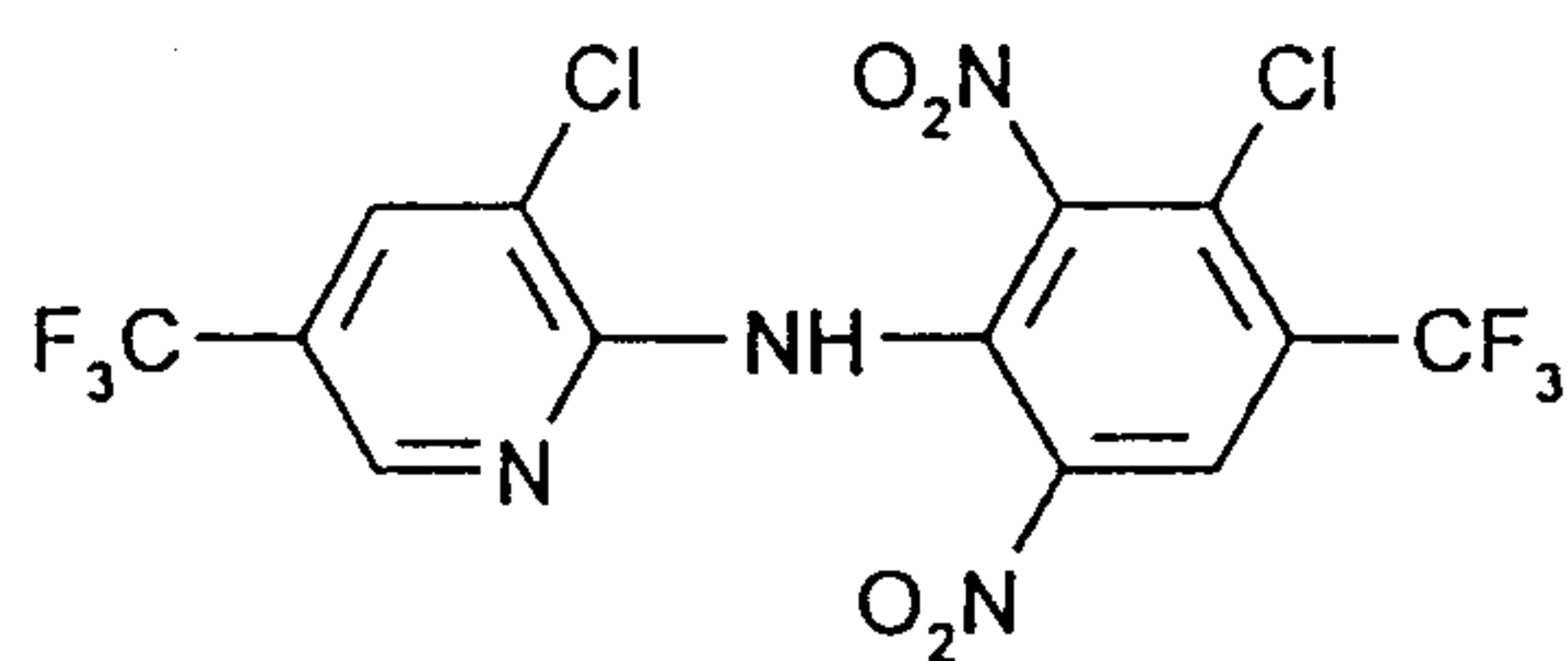


(XXII)

10

(CYMOXANILE)

(22) Compound of the formula



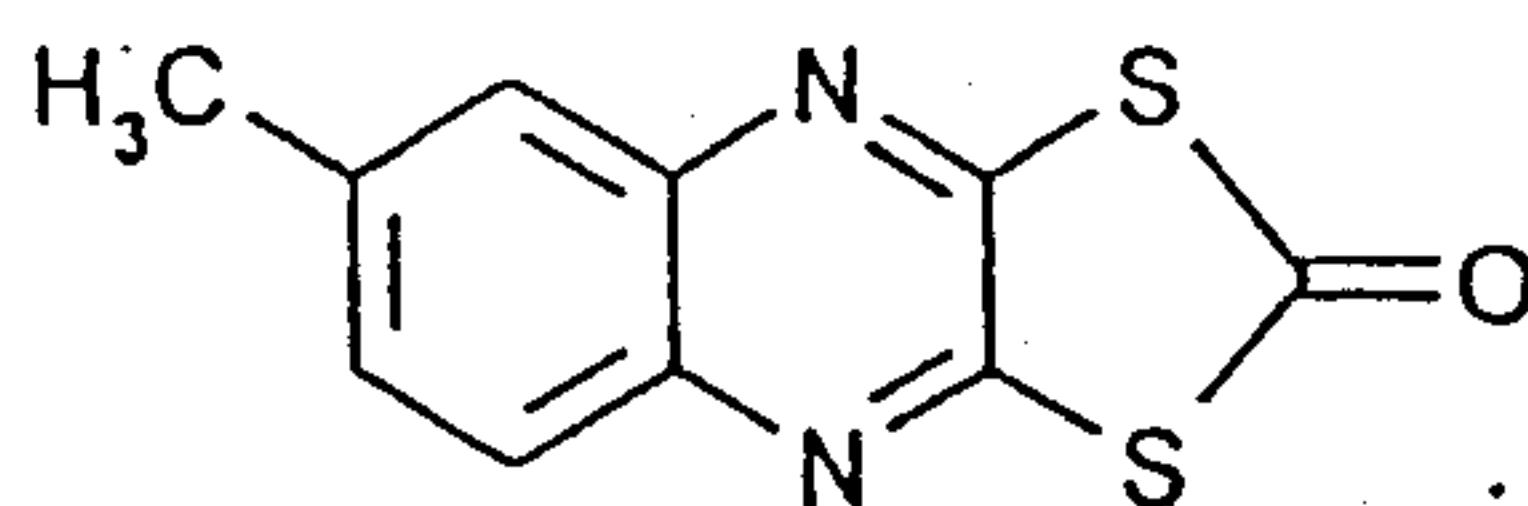
(XXIII)

15

(FLUAZINAM)

(23) Compound of the formula

20

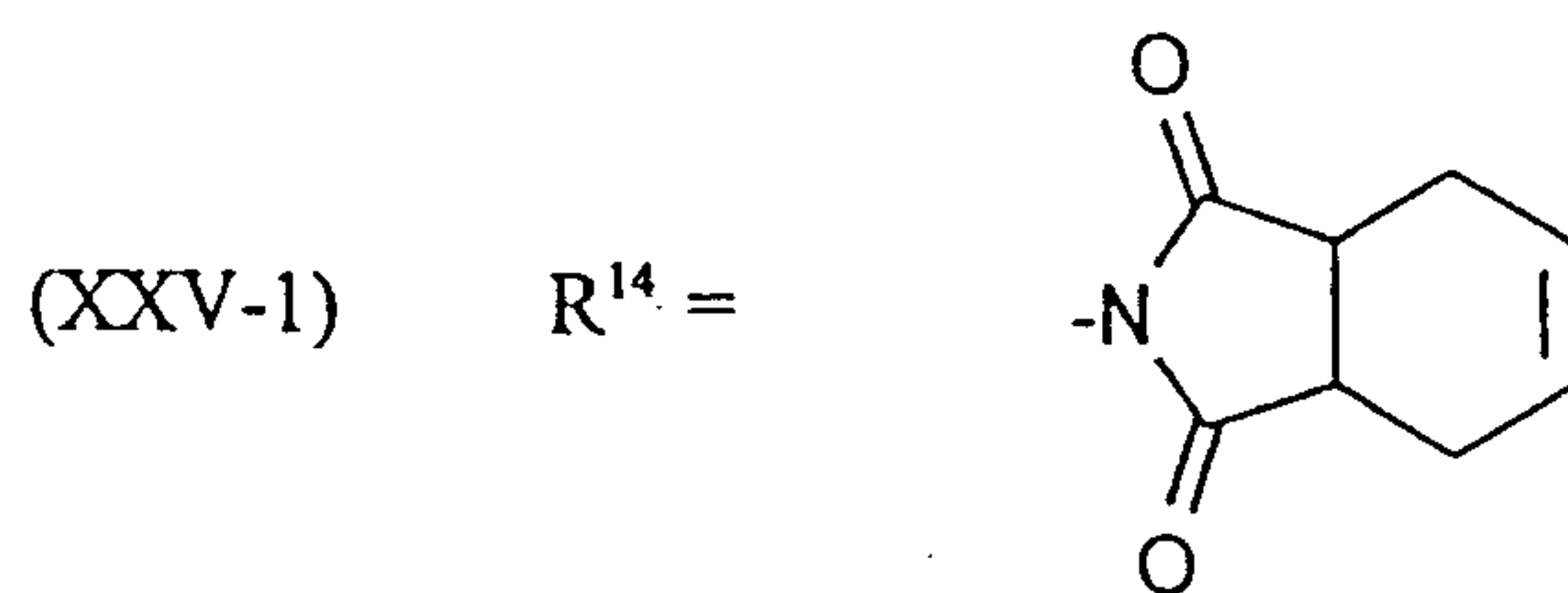


(XXIV)

(24) Compounds of the formula

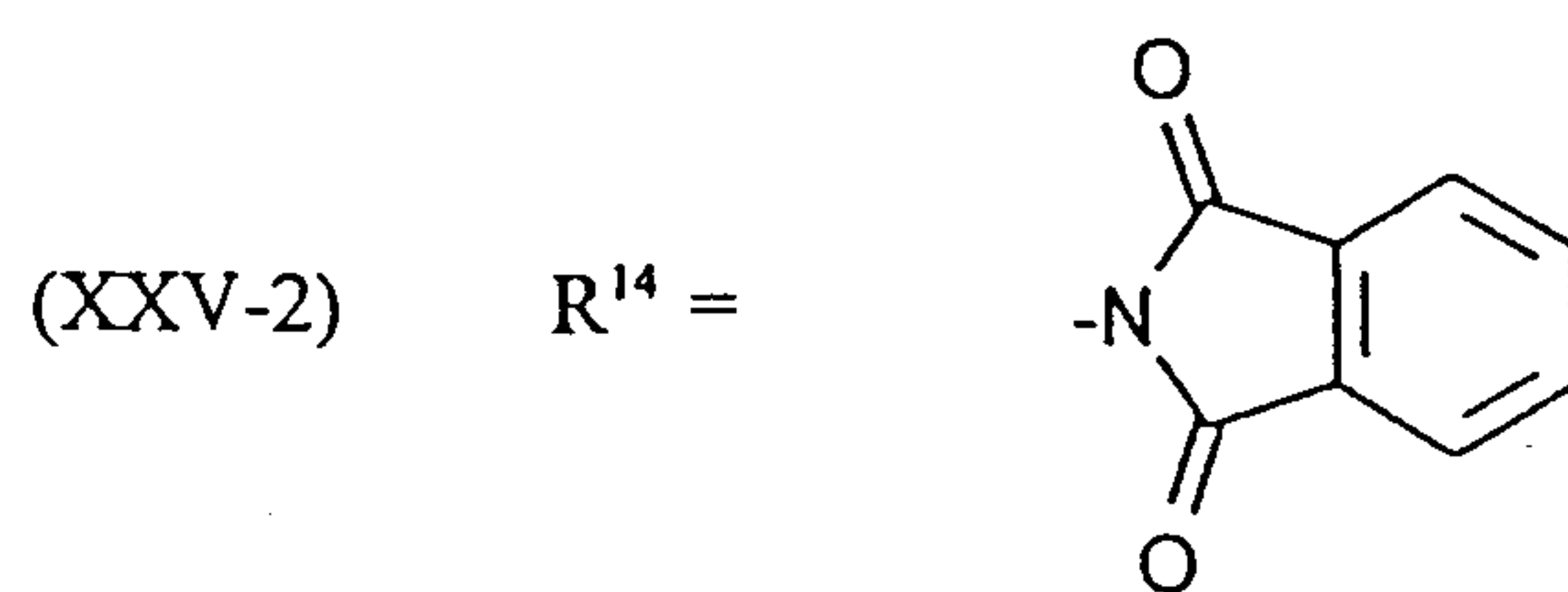
30517-82G

- 19 -



5

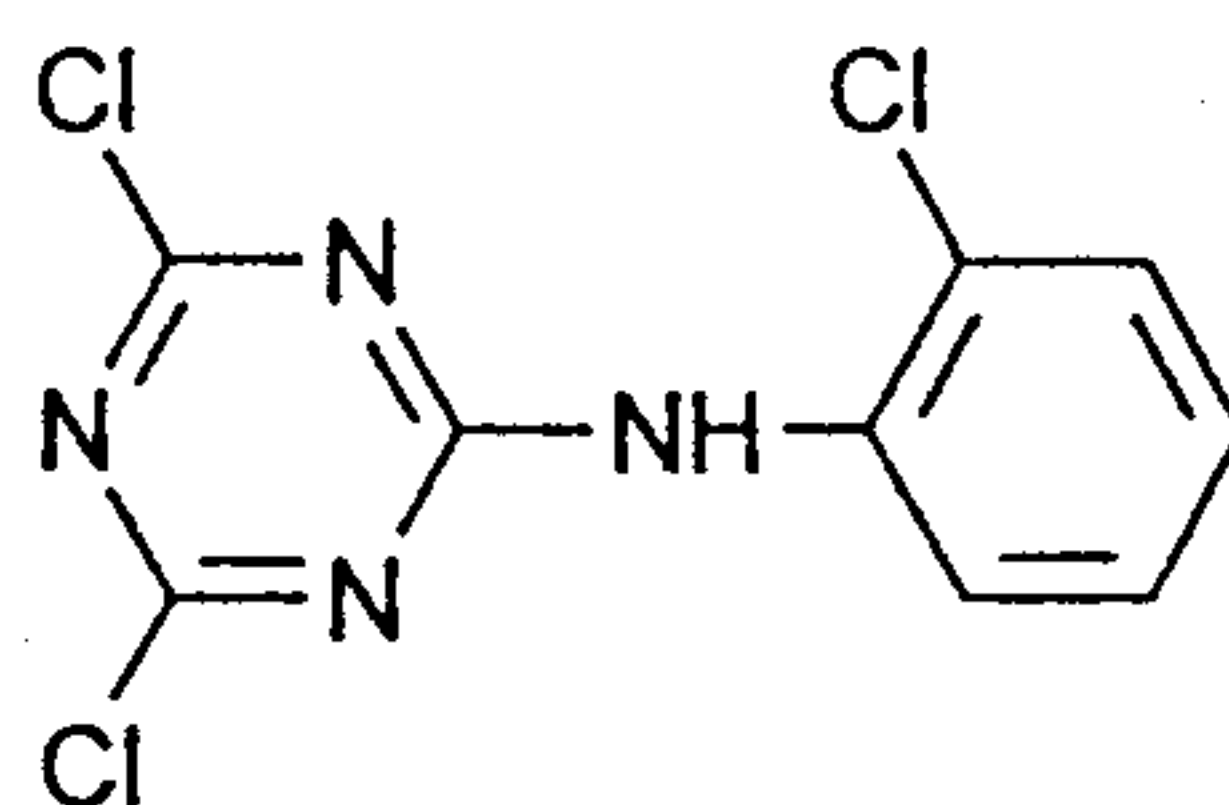
(CAPTAN)



(FOLPET)

10

(25) Compound of the formula

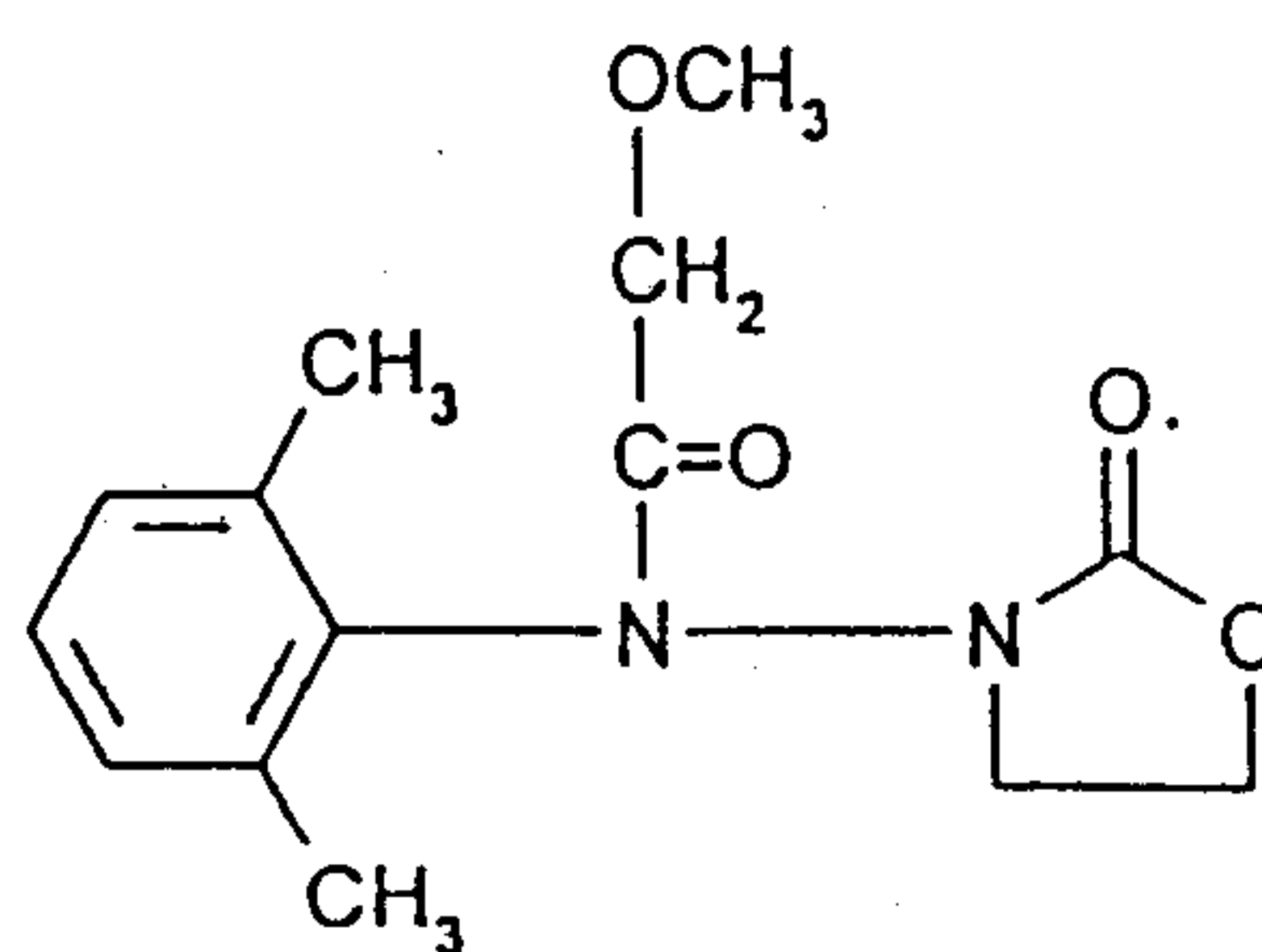


(XXVI)

15

(ANILAZIN)

(26) Compound of the formula



(XXVII)

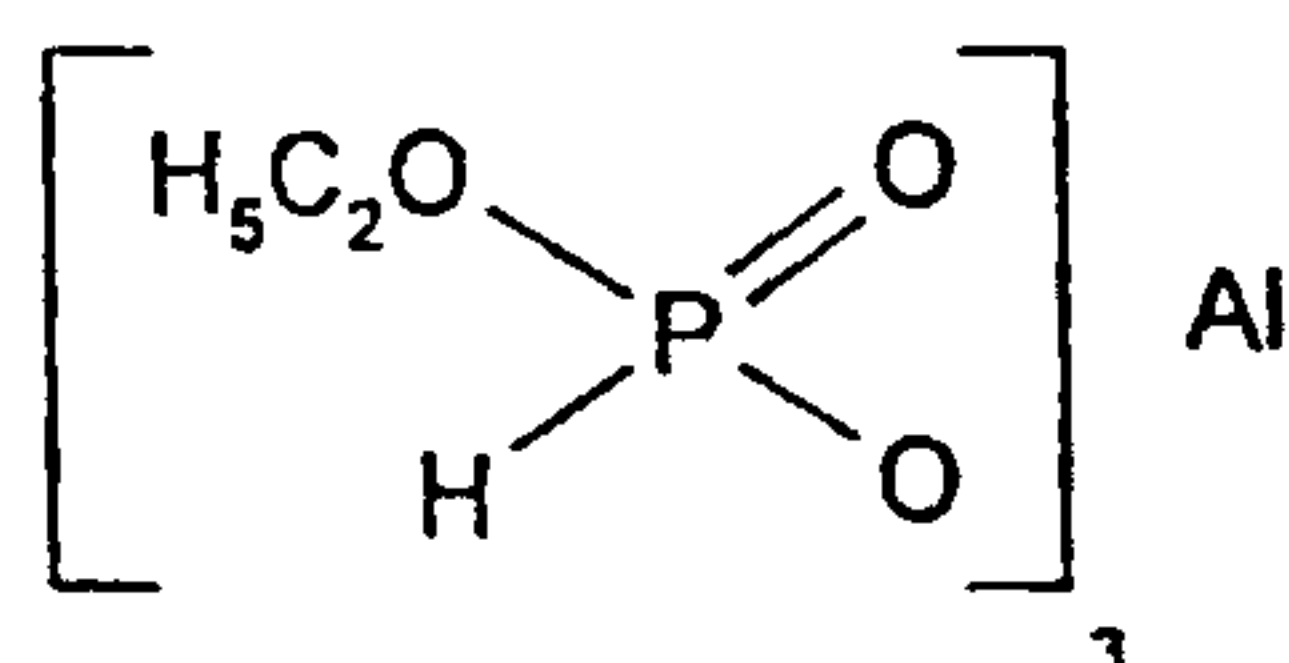
30517-82G

- 20 -

(OXADIXYL)

(27) Compound of the formula

5

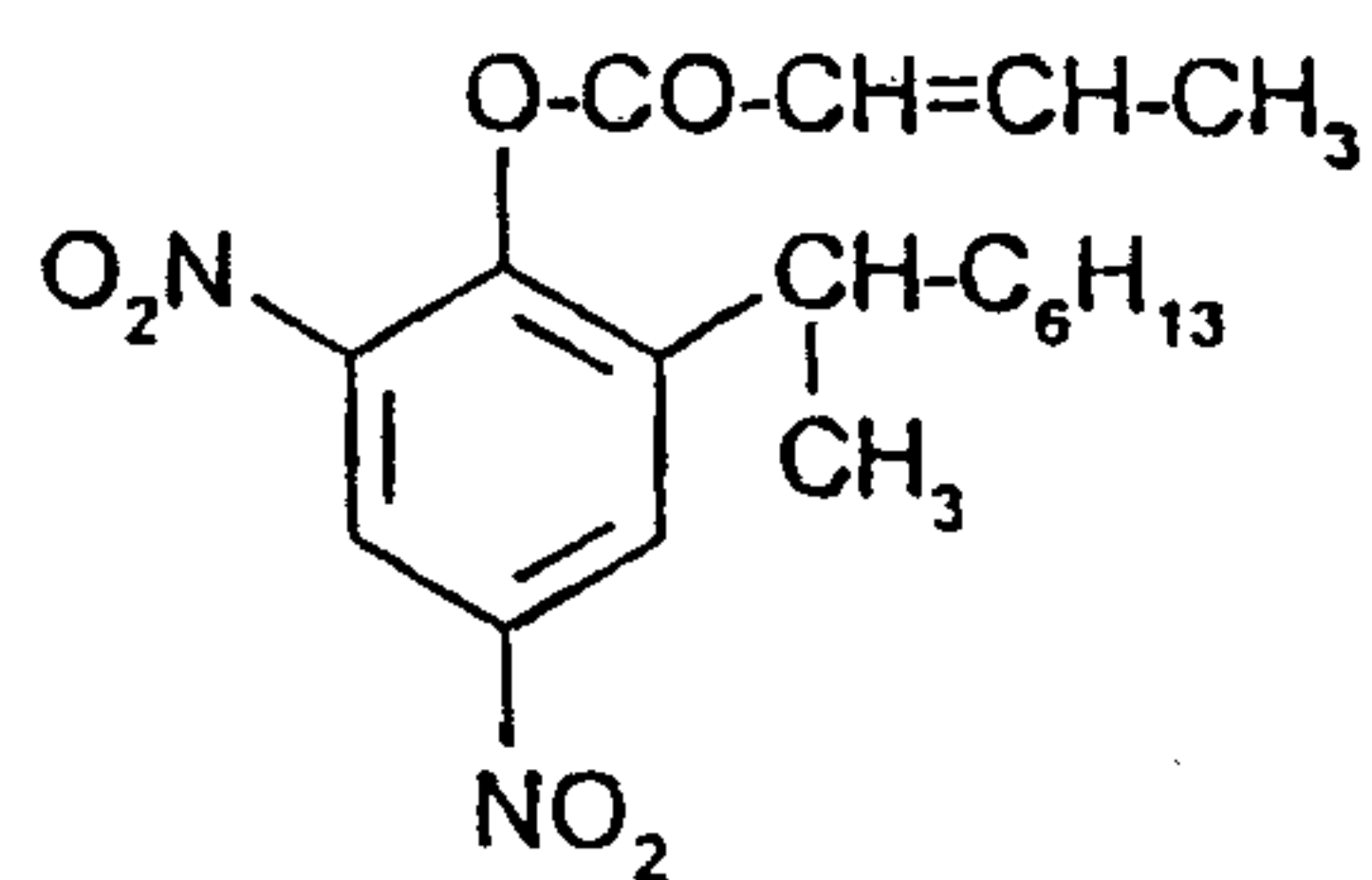


(XXVIII)

(FOSETYL AL)

(28) Compound of the formula

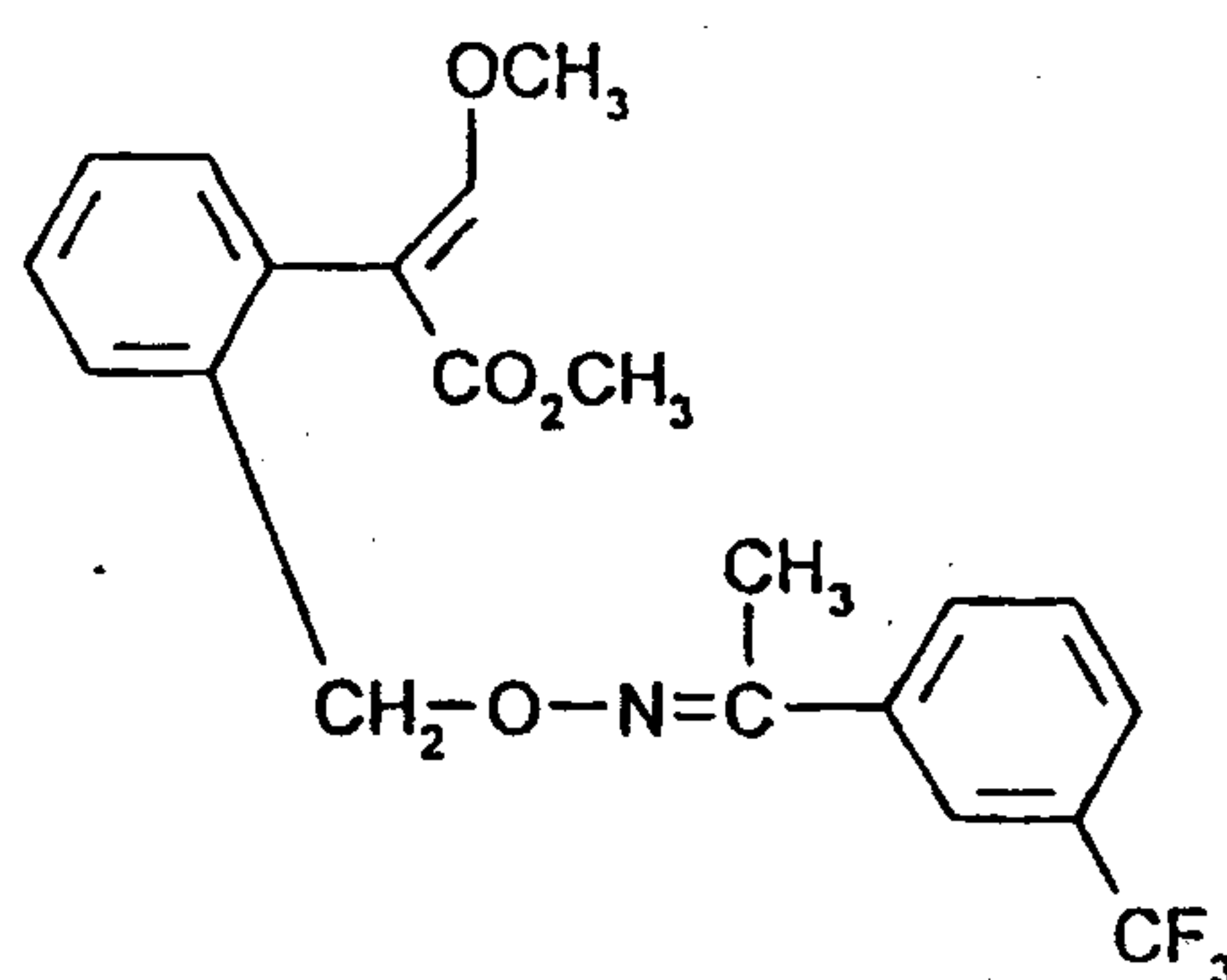
10



(XXIX)

(DINOCAP)

15 (29) Compound of the formula

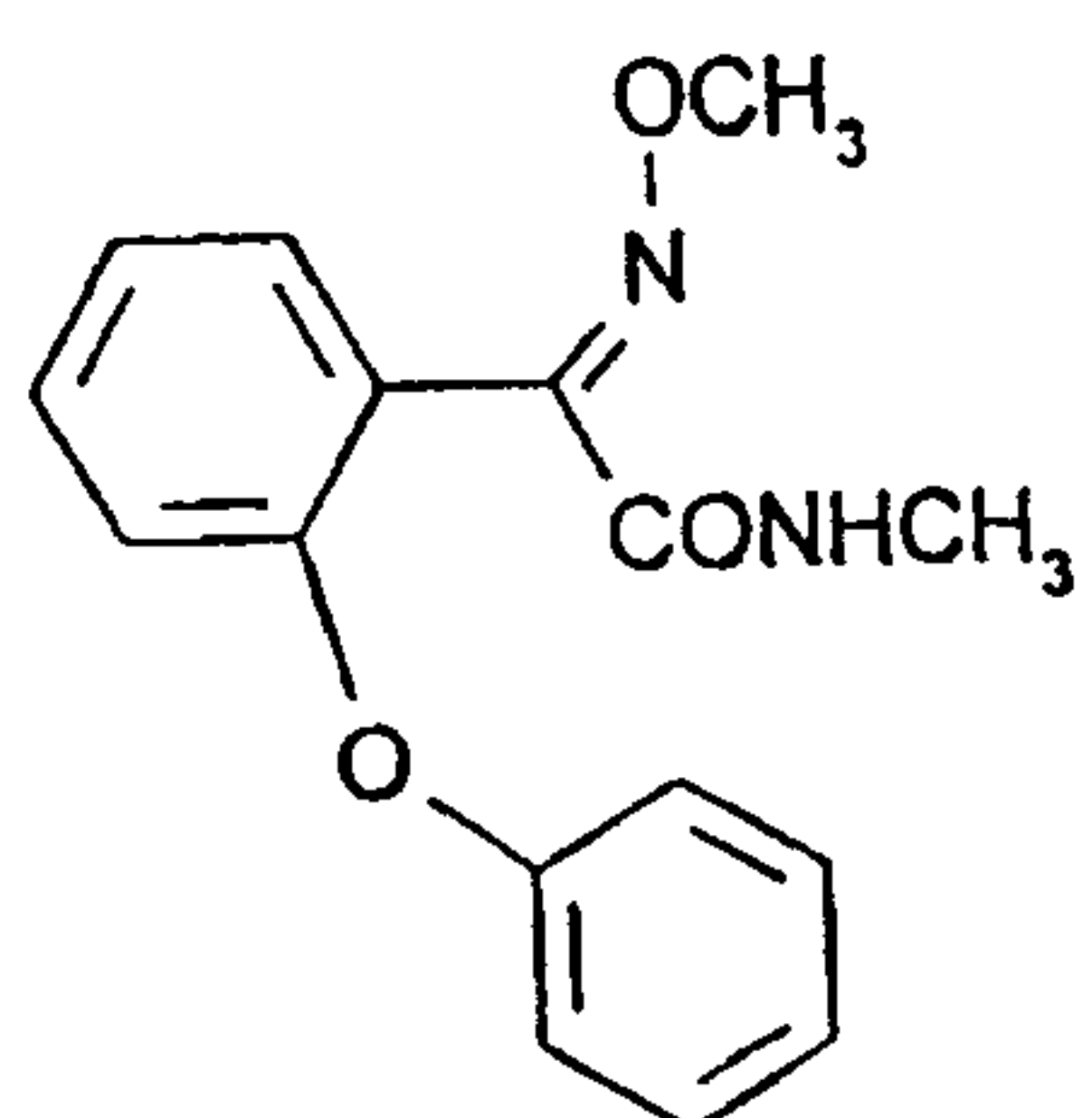


(XXX)

30517-82G

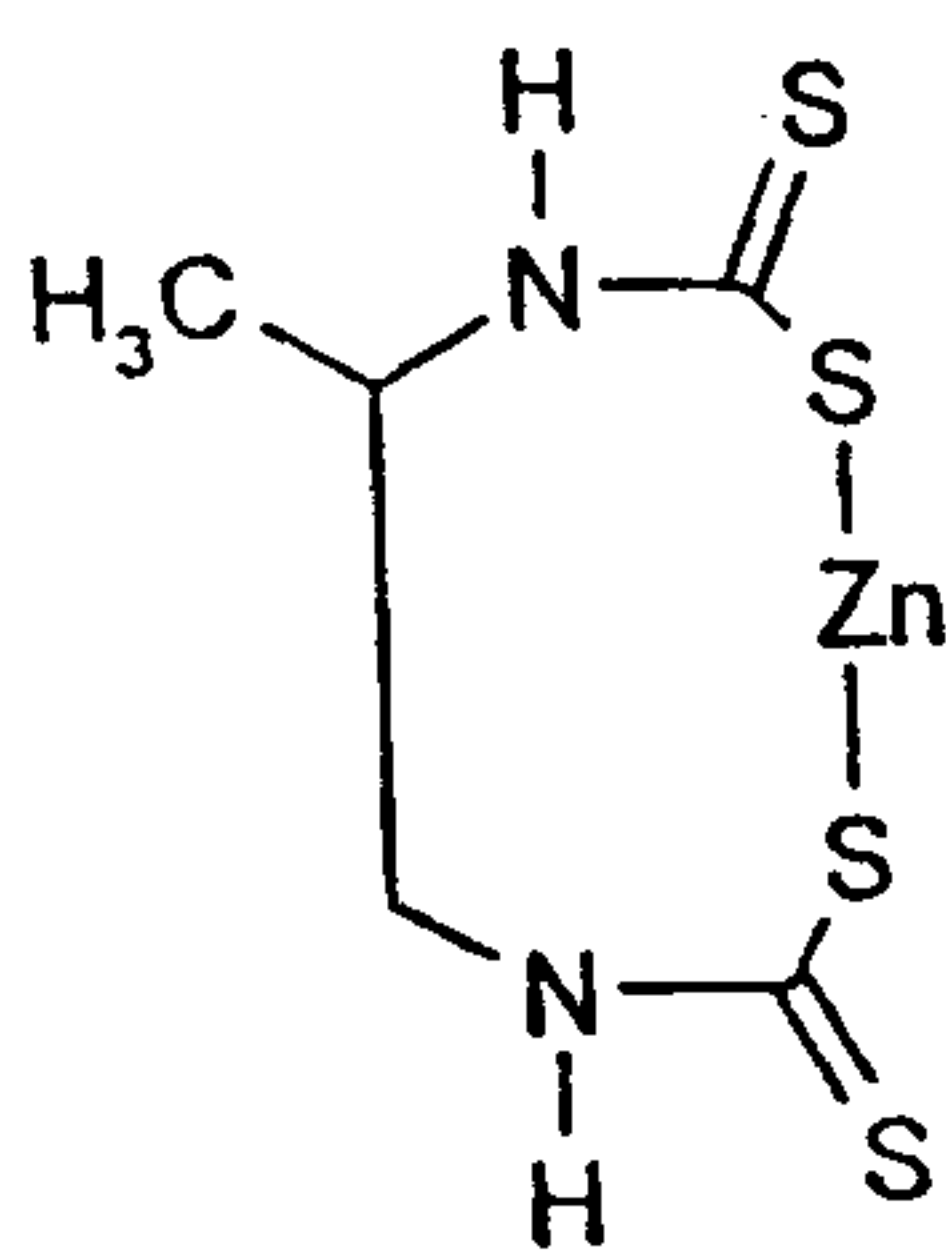
- 21 -

(30) Compound of the formula



(XXXI)

5 (31) Compound of the formula

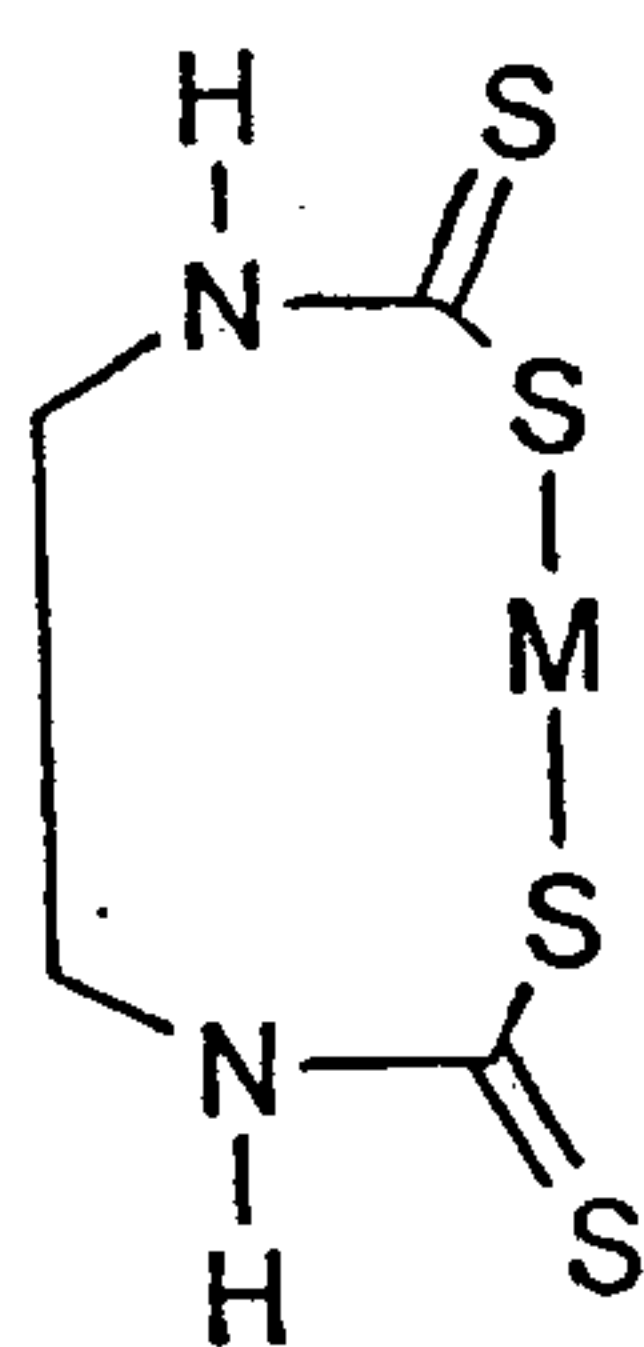


(XXXII)

(ANTRACOL)

10

(32) Compounds of the formula



(XXXIII)

15

(XXXIII-1) M = Zn
(ZINEB)

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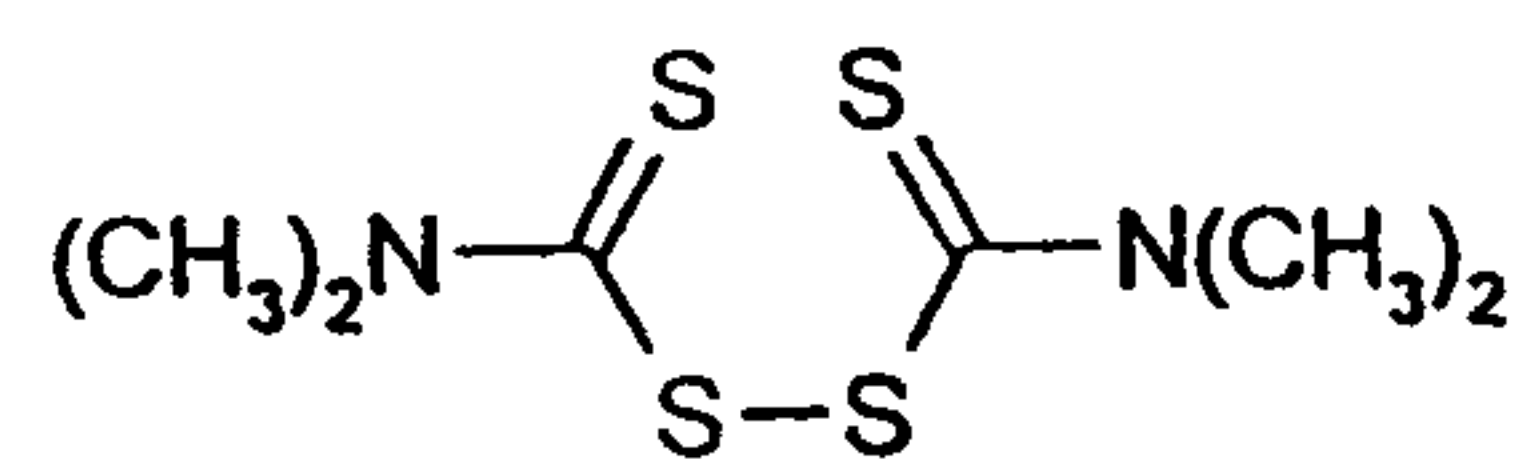
- 22 -

(XXXIII-2) M = Mn

(MANEB)

(XXXIII-3) M=Mn/Zn (Mancozeb)

5 (33) Compound of the formula

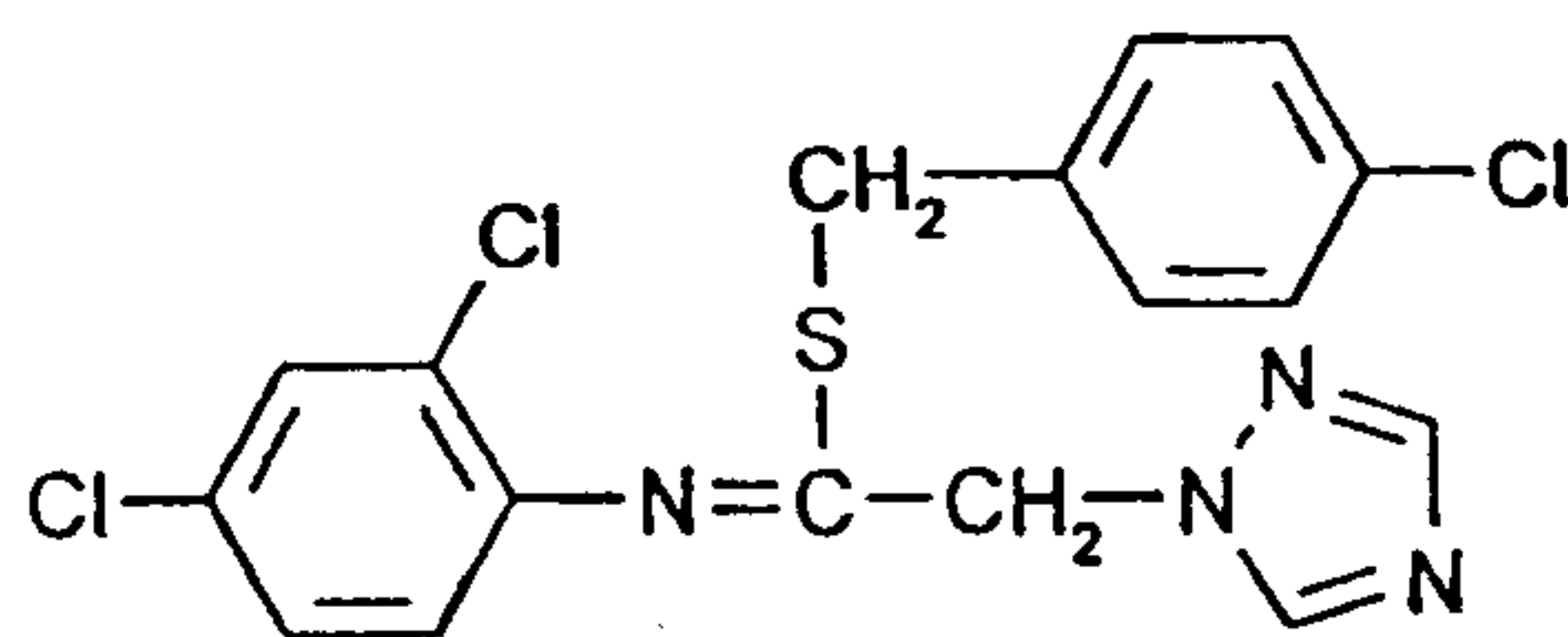


(XXXIV)

(THIRAM)

10

(34) Compound of the formula

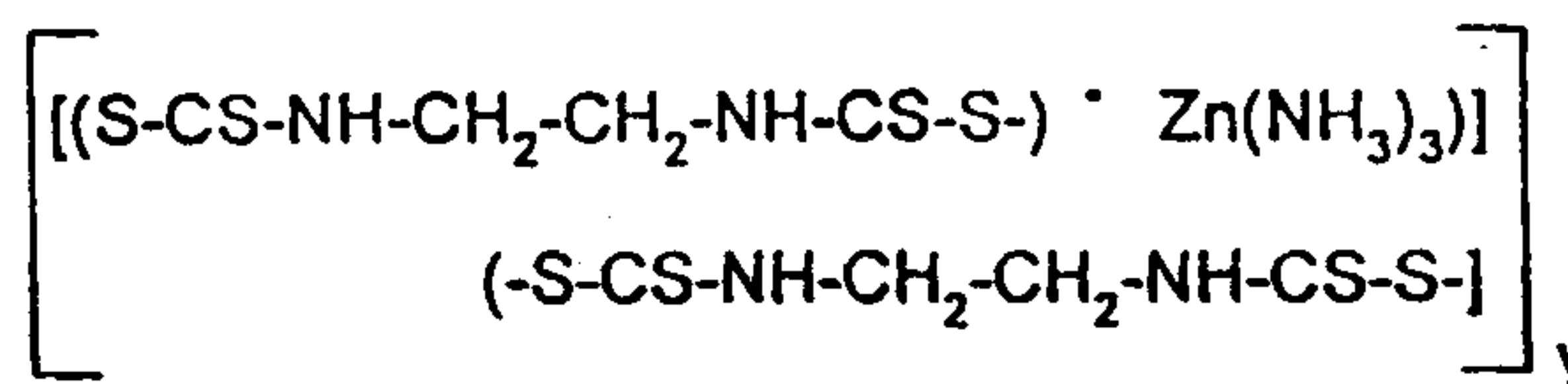


(XXXV)

15

(TYMIBENCONAZOLE)

(35) Compound of the formula



(XXXVI)

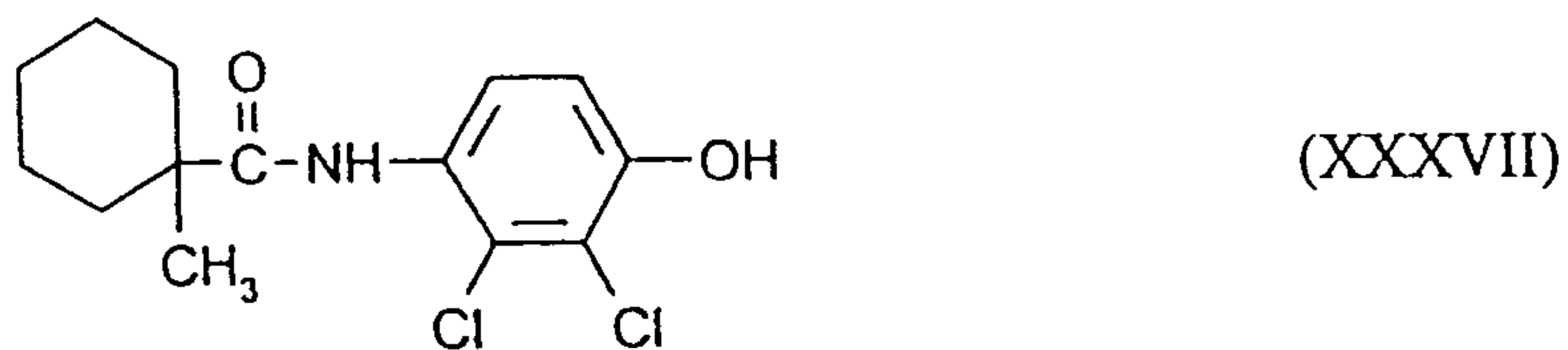
20

(METIRAM)

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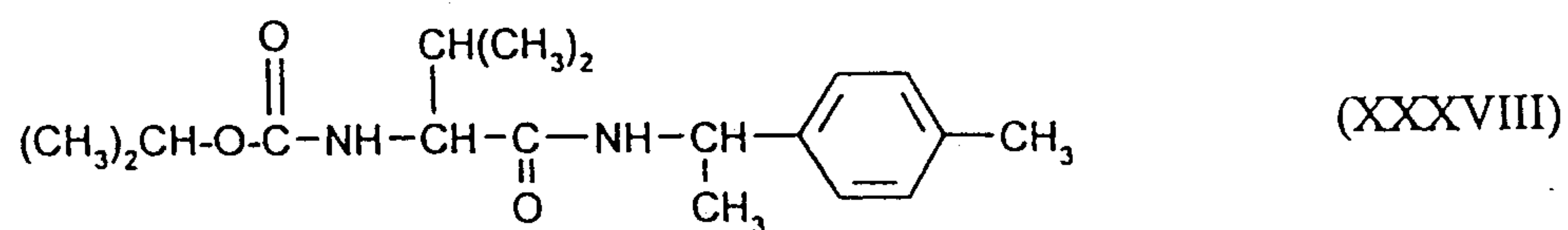
- 23 -

(36) Compound of the formula



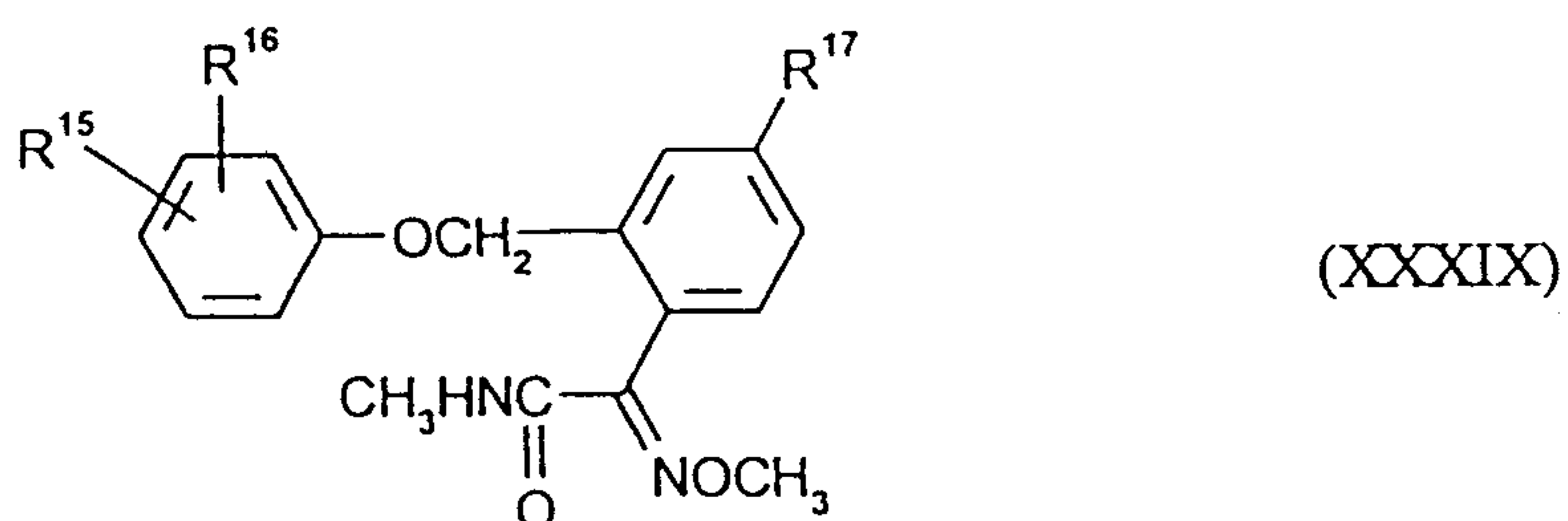
(37) Compound of the formula

5



(38) Compounds of the formula

10



in which

R^{15} and R^{16} , independently of each other, represent hydrogen, halogen, methyl or phenyl, and

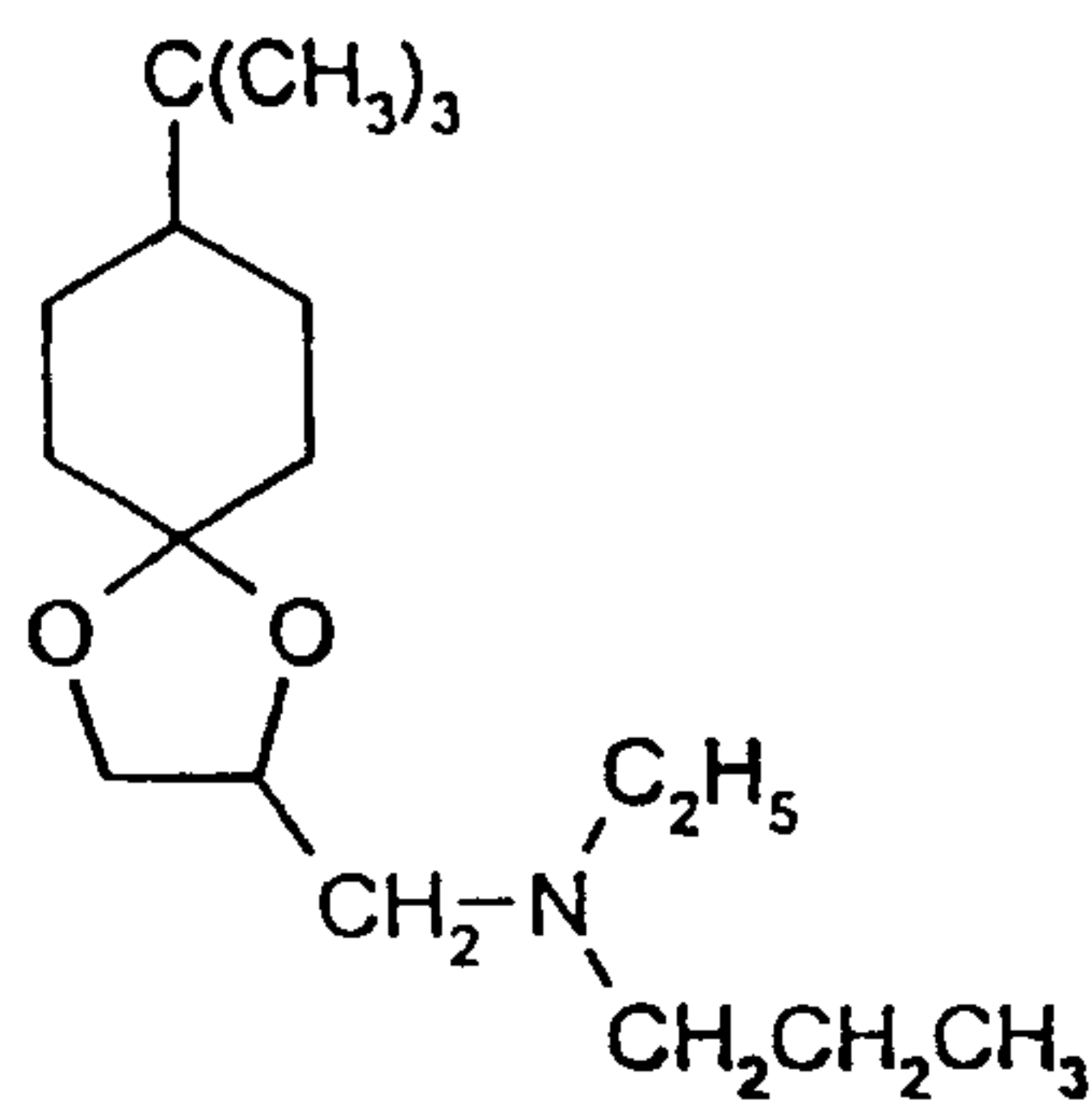
R^{17} represents hydrogen or methyl,

15

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- (39) 8-^tButyl-2-(N-ethyl-N-n-propylamino)-methyl-1,4-dioxaspiro[4.5]decane of the formula



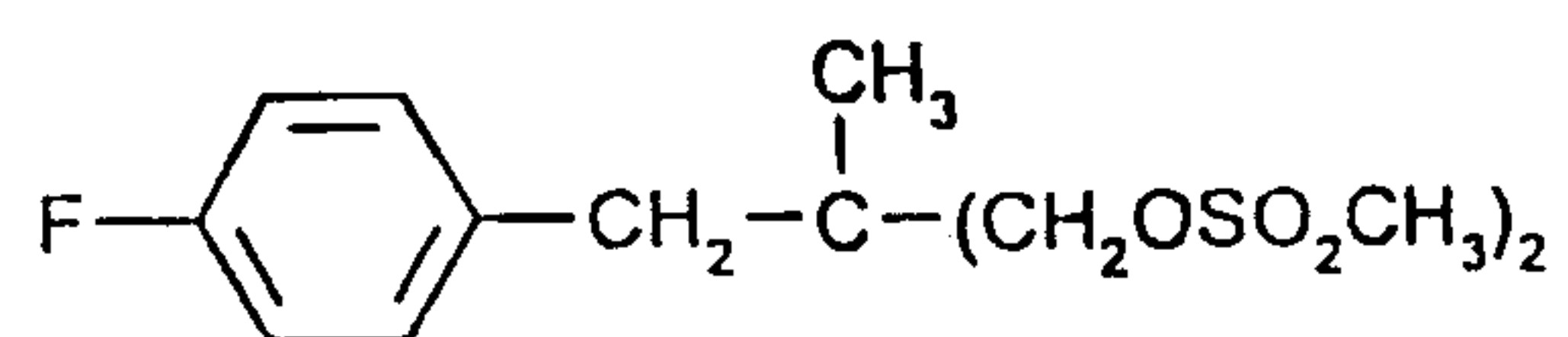
(XL)

5

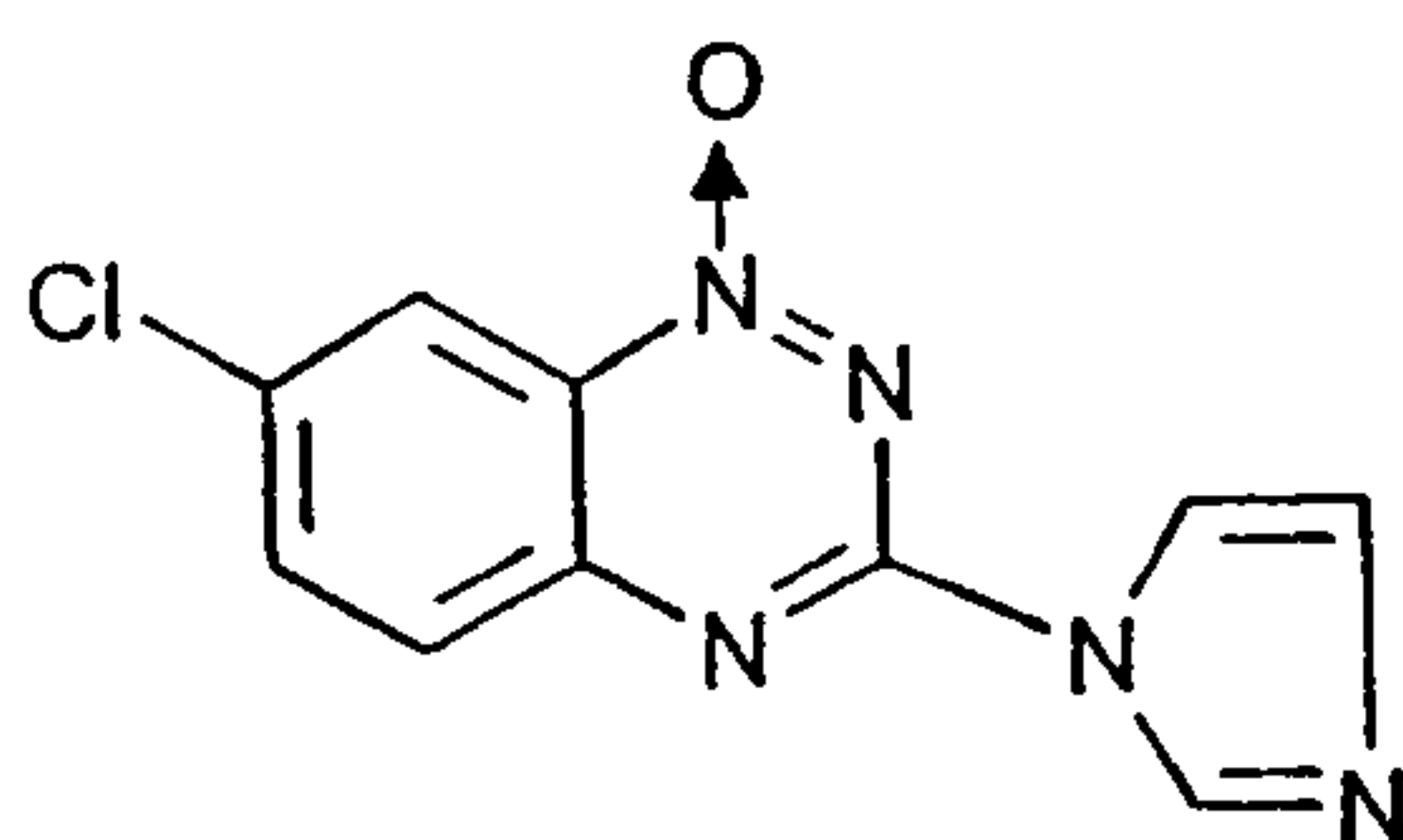
30517-82G

- 25 -

(40) Compound of the formula

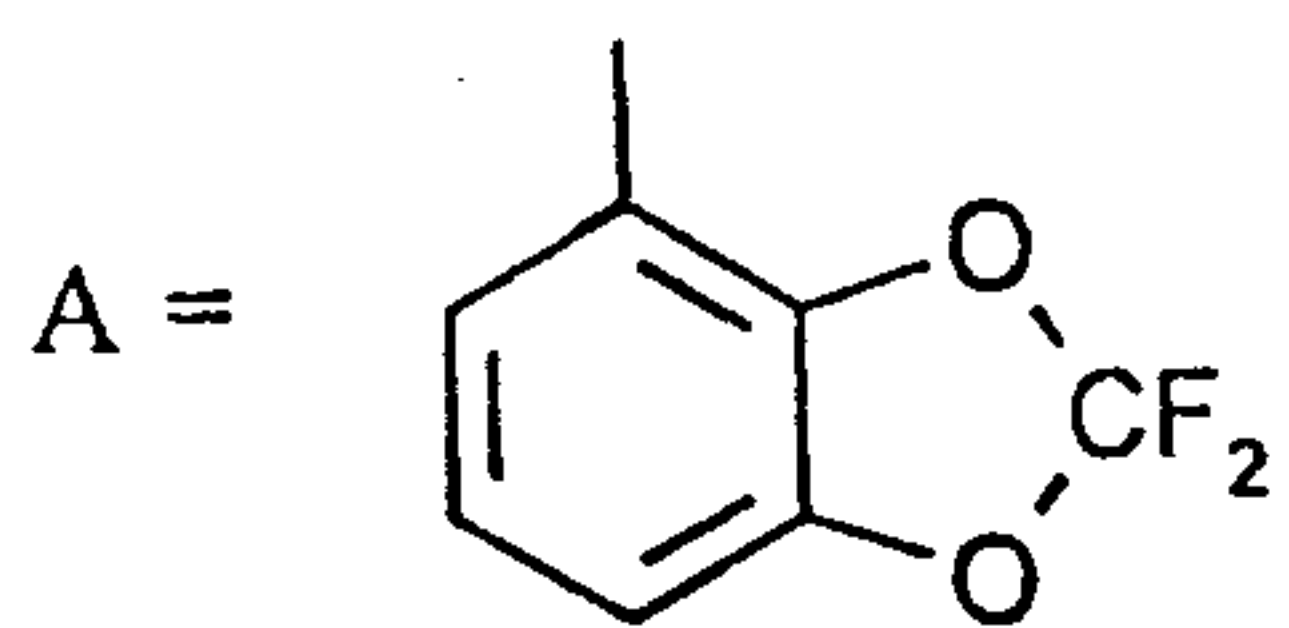
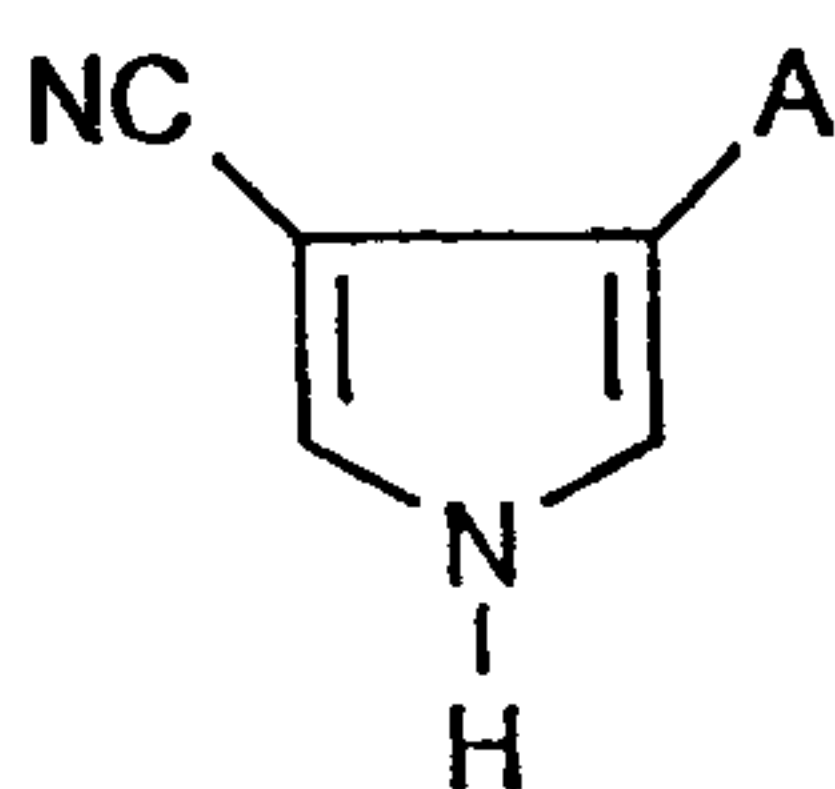


5 (41) Compound of the formula



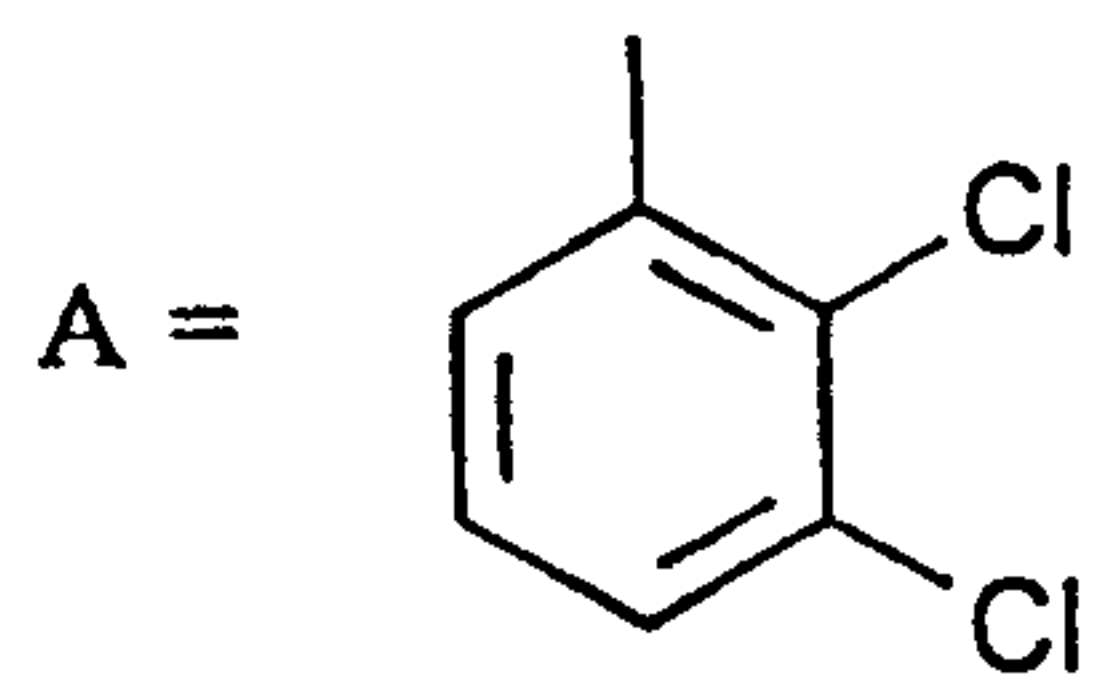
(42) Compound of the formula

10

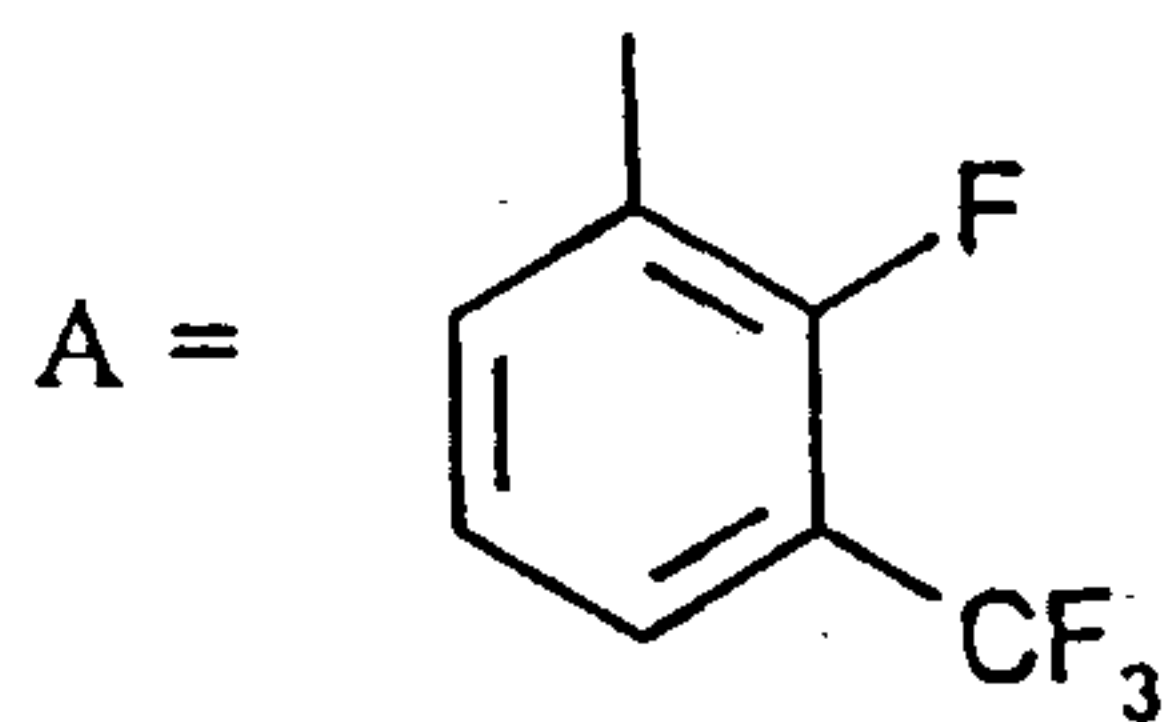


Fludioxonil

15



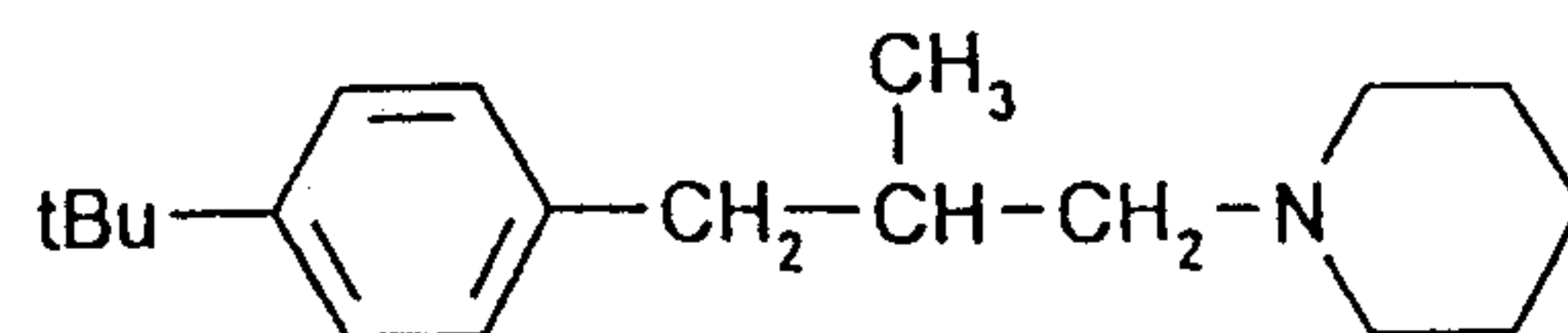
Fenpiclonil



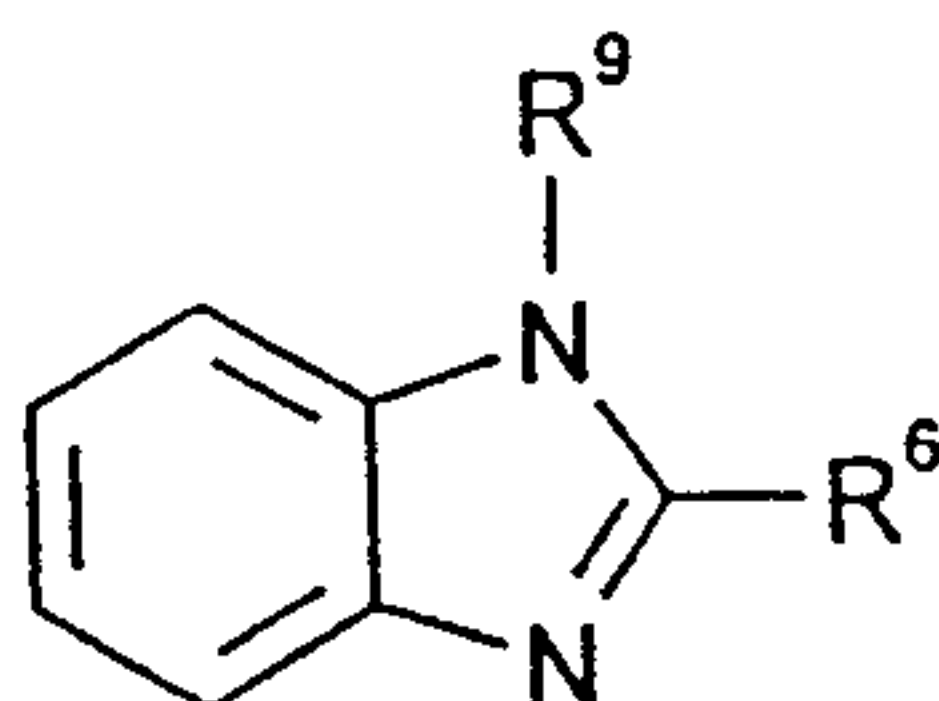
30517-82G

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(43) Compound of the formula

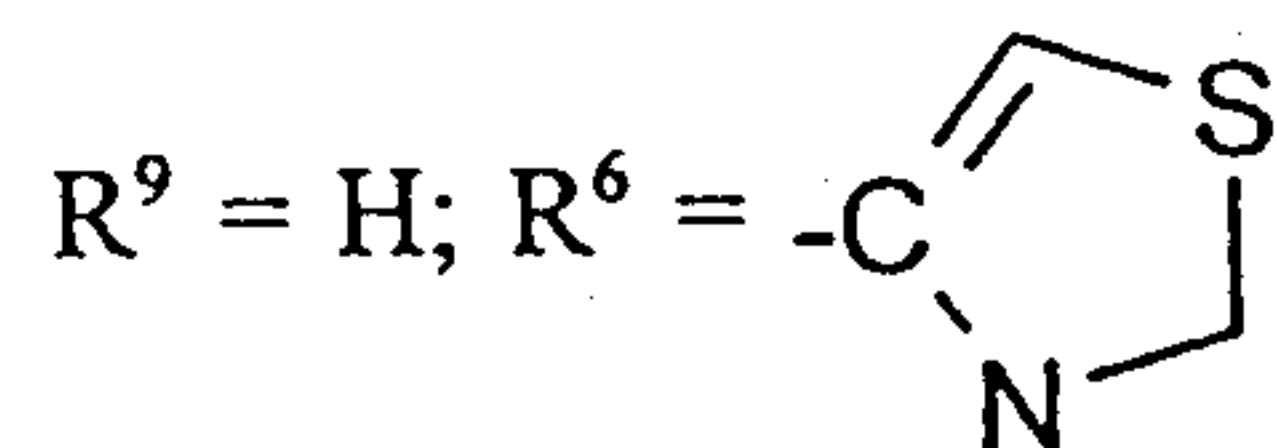


5 (44) Benzimidazole of the formula

 $R^9 = \text{CONHtBu}; R^6 = -\text{NHCOOMe}$

Benomyl

10

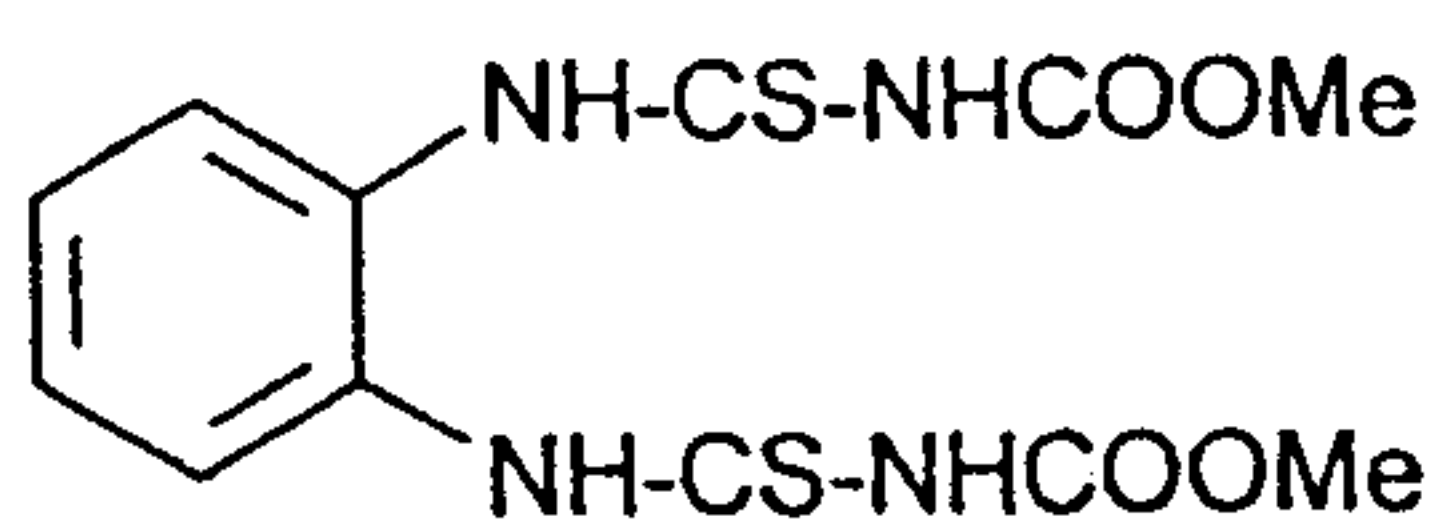
 $R^9 = \text{H}; R^6 = -\text{C}$

Thiabendazole

 $R^9 = \text{H}; R^6 = -\text{NHCOOMe}$

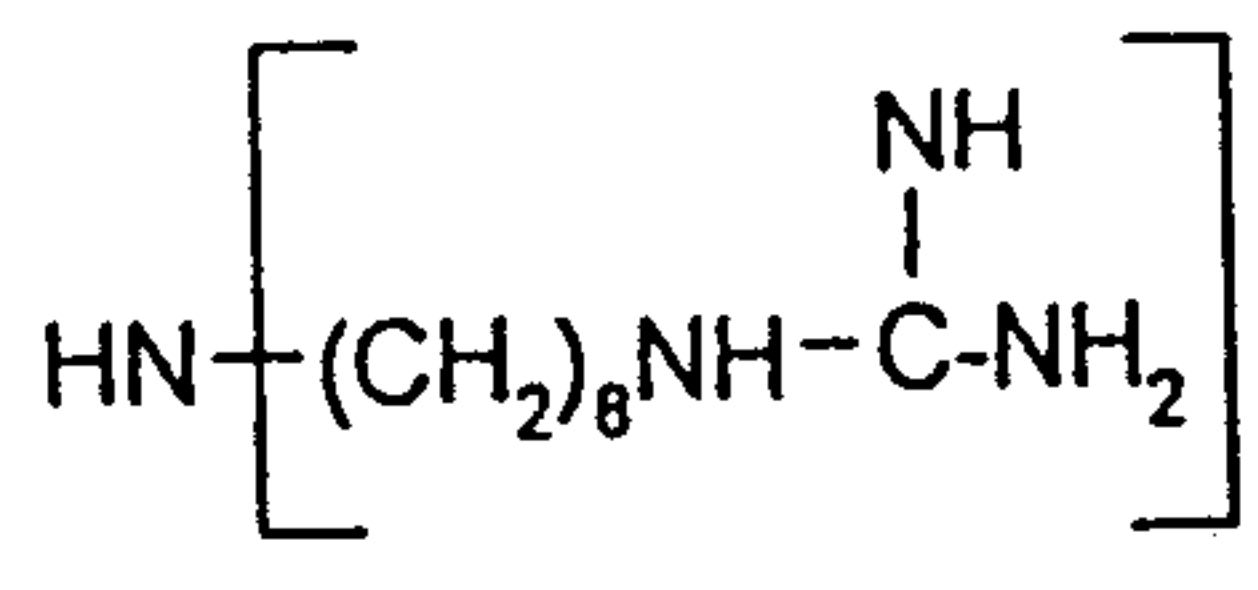
Carbendazin

15 (45) Compound of the formula



(46) Compound of the formula

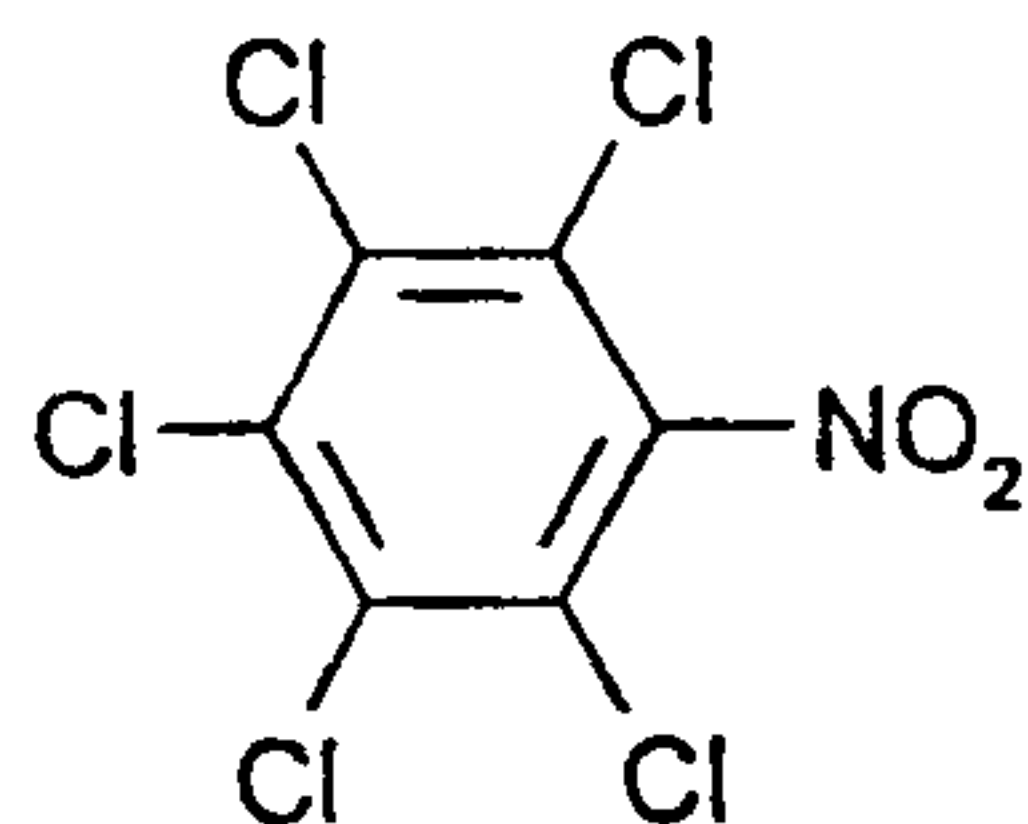
20



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(47) Compound of the formula



5 The active compounds of the formula (I) are known for example from EP-OS (European Published Specification) 192 060.

The fungicidal active compounds are also known.

10 In the following publications, for example, there are described:

(1) Compounds of the formula (II)

DE-OS (German Published Specification) 2 201 063
15 DE-OS (German Published Specification) 2 324 010
DE-OS (German Published Specification) 2 737 489
DE-OS (German Published Specification) 3 018 866
DE-OS (German Published Specification) 2 551 560
EP 47 594
20 DE 2 735 872

(2) Compound of the formula (III)

EP 68 813
US 4 496 551

25

(3) Compound of the formula (IV)

DE-OS (German Published Specification) 2 429 523
DE-OS (German Published Specification) 2 856 974
US 4 108 411

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- (6) Compounds of the formula (VII)
DL 140 041
- (7) Compound of the formula (VIII)
5 EP 382 375
- (8) Compound of the formula (IX)
EP 515 901
- 10 (9) Compound of the formula (X)
EP 314 422
- (10) Compound of the formula (XI)
EP 49 854
- 15 (11) Compound of the formula (XII)
DE-OS (German Published Specification) 1 770 288
US 3 869 456
- 20 (13) Compounds of the formula (XIV)
DE 2 207 576
US 3 903 090
US 3 755 350
US 3 823 240
- 25 (14) Compounds of the formula (XV)
EP 270 111
- (19) Compound of the formula (XX)
30 EP 219 756

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(34) Compound of the formula (XXXV)

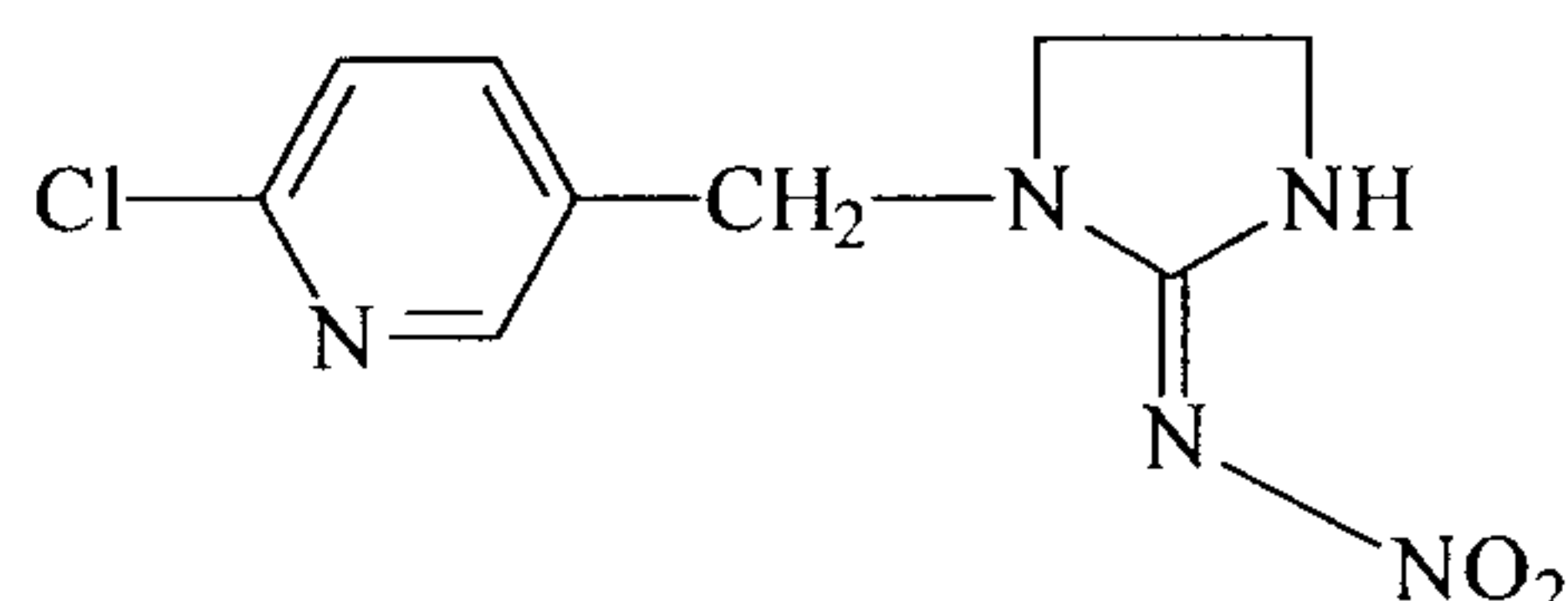
US 4 512 989

(38) Compounds of the formula (XXXIX)

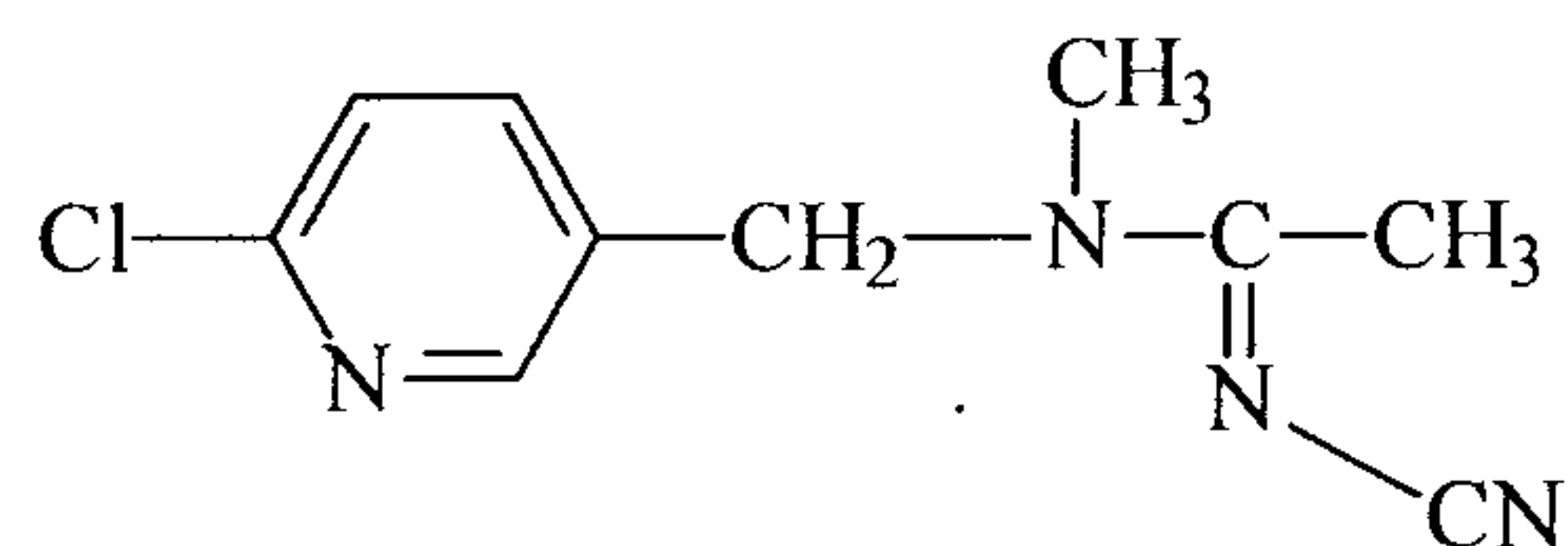
EP 398 692

5 Compounds of groups (15), (16), (17), (18), (23), (34), (25), (28), (31), (32), (33) and (38) to (47) are described for example in K.H. Büchel, "Pflanzenschutz und Schädlingsbekämpfung [Crop protection and pest control]", pages 121-153, Georg Thieme-Verlag, Stuttgart, 1977. The compound of group (39) is known from EP-OS (European Published Specification) 281 842.

10 According to one aspect of the present invention, there is provided a composition which contains a compound selected from the group consisting of (A):



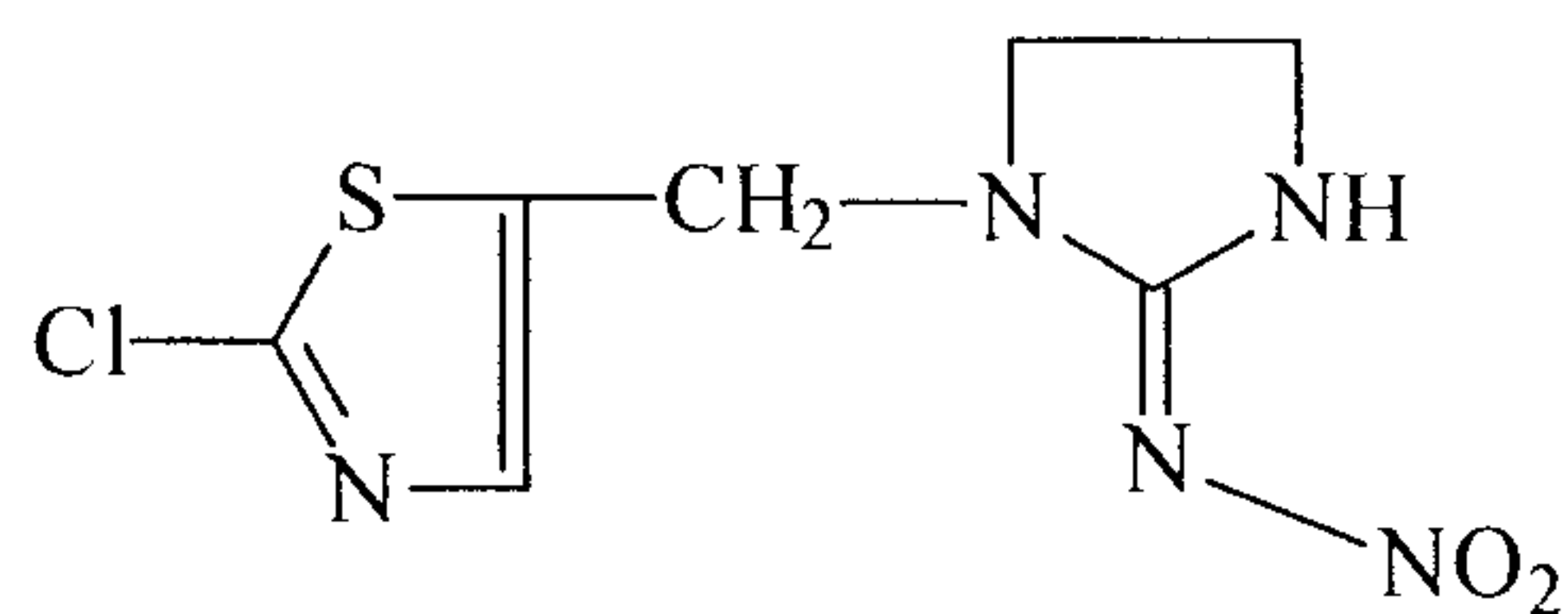
15 (IMIDACLOPRID),



(ACETAMIPRID), and

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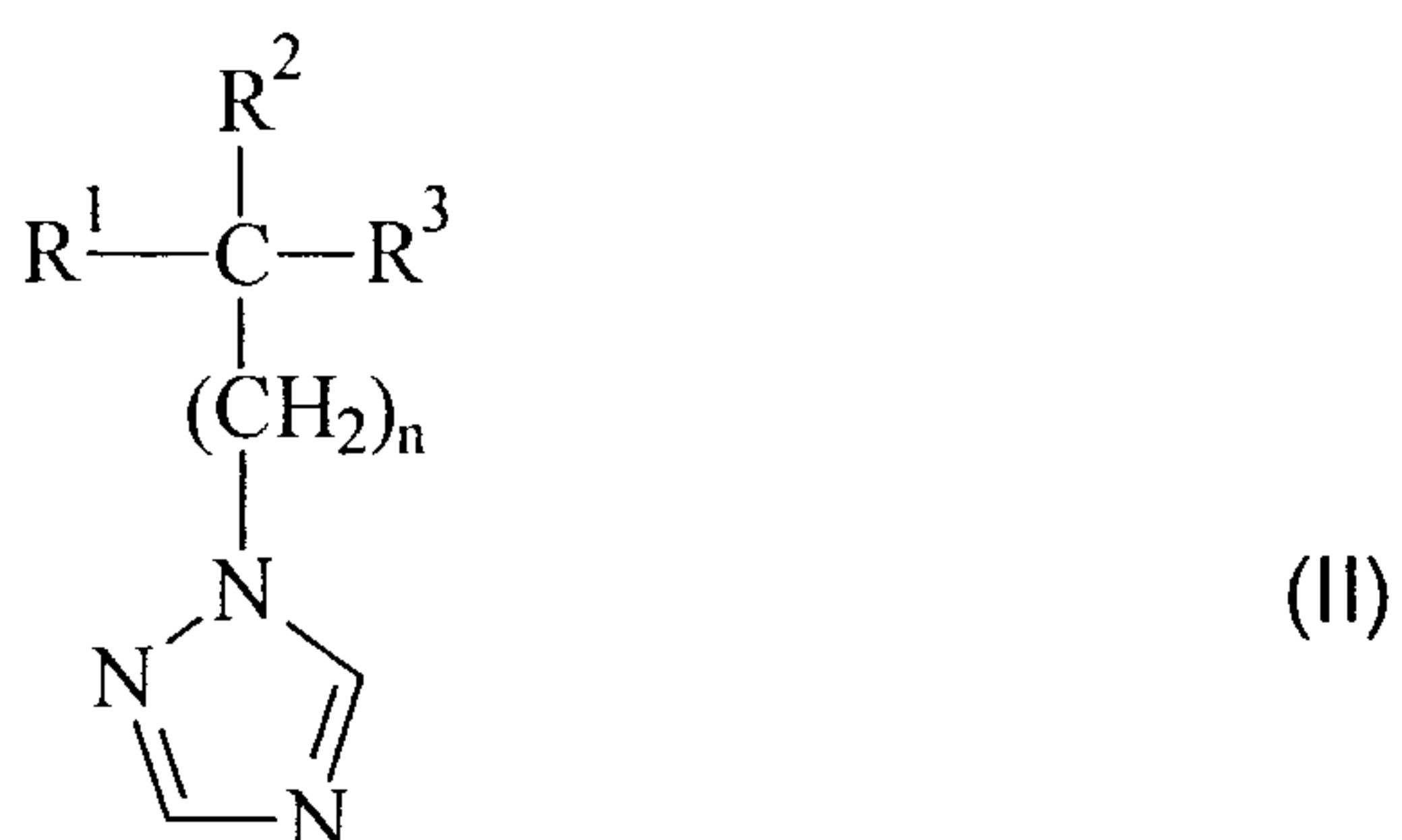
- 29a -



(IMIDACLOTHIZ);

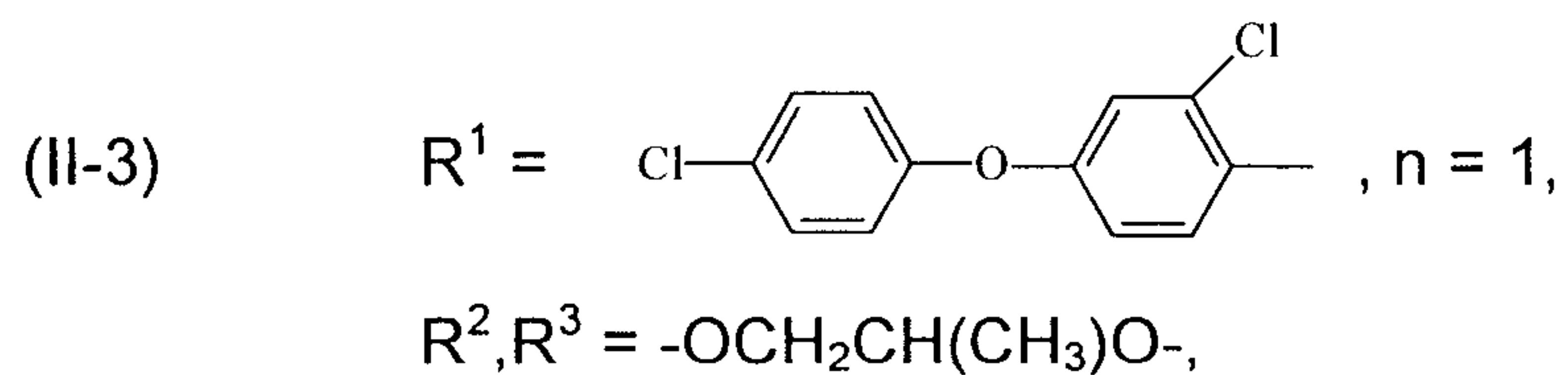
5 and a compound selected from the group consisting of (B):

(1) an azole derivative of the general formula (II)



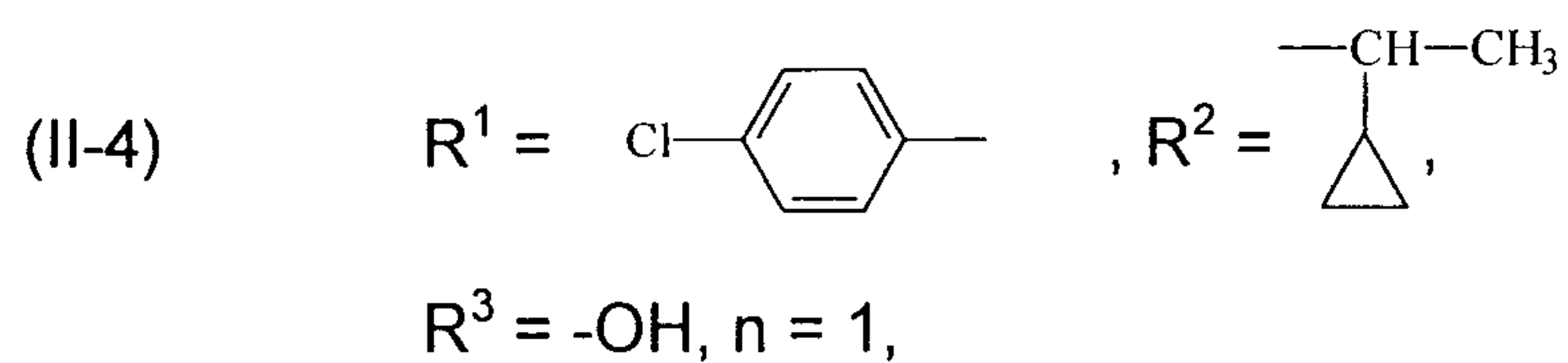
10

wherein:



15

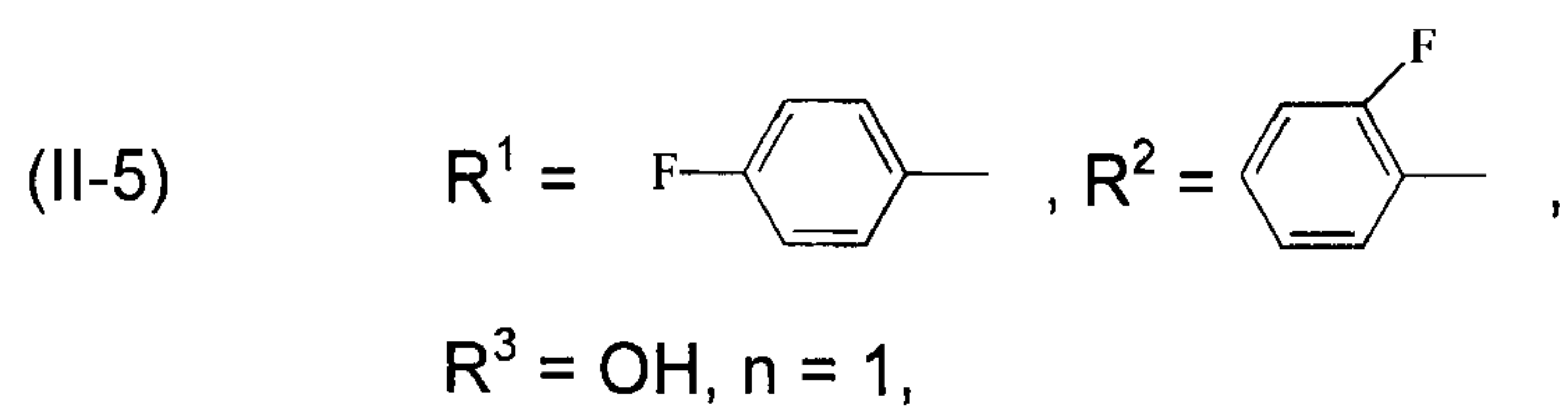
(DIFENCONAZOLE),



(CYPROCONAZOLE),

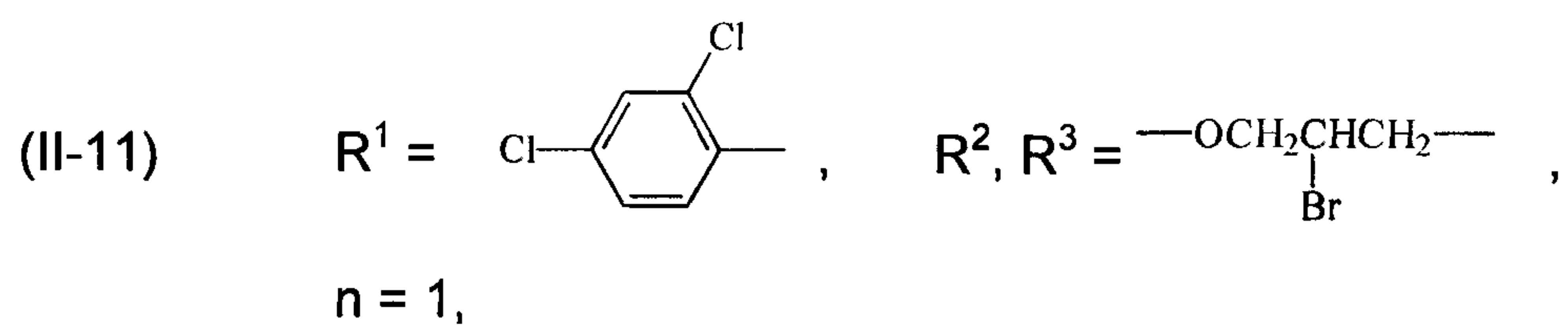
30517-82G

- 29b -



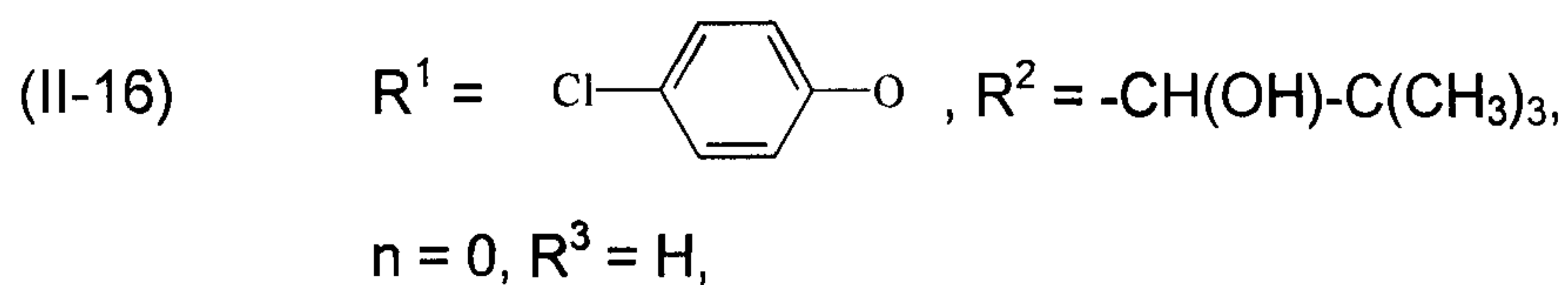
(FLUIRIAFOL),

5



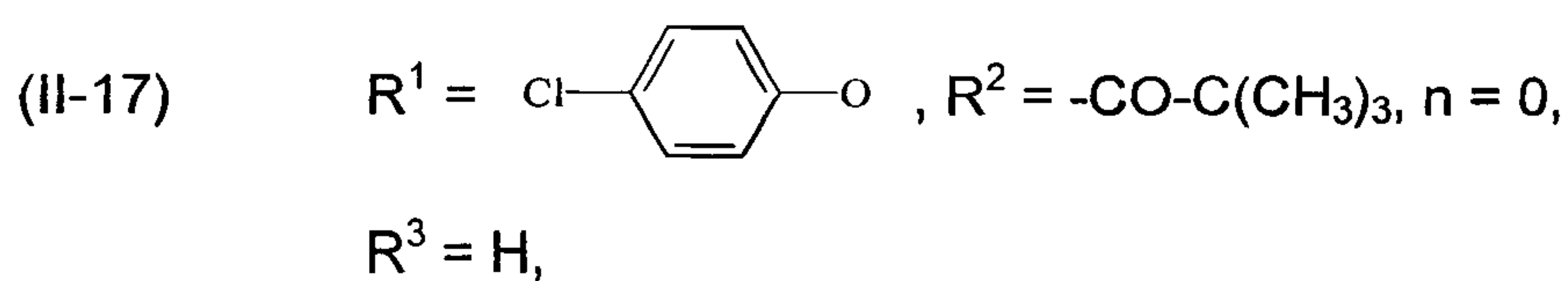
(BROMUCONAZOLE),

10

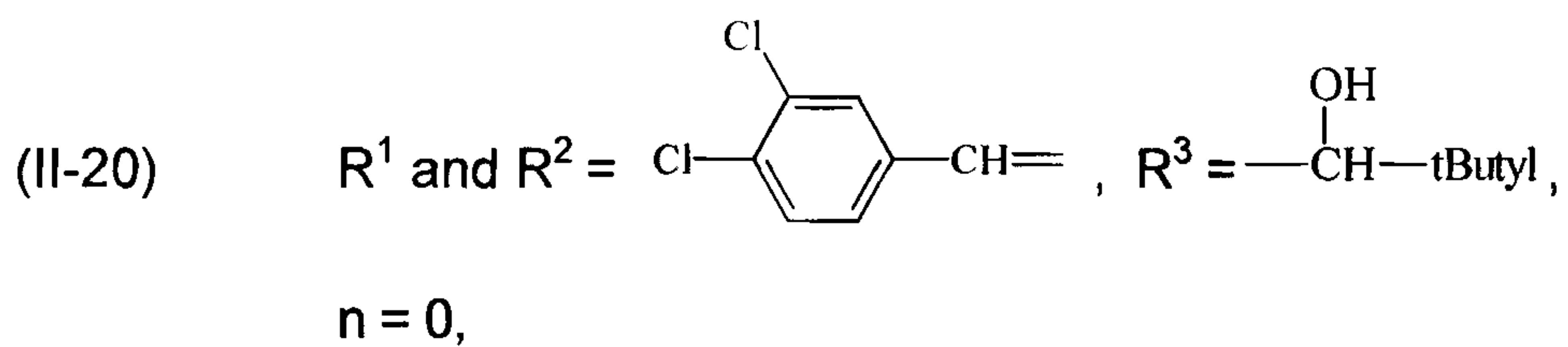


(TRIADIMENOL),

15



(TRIADIMEFON),



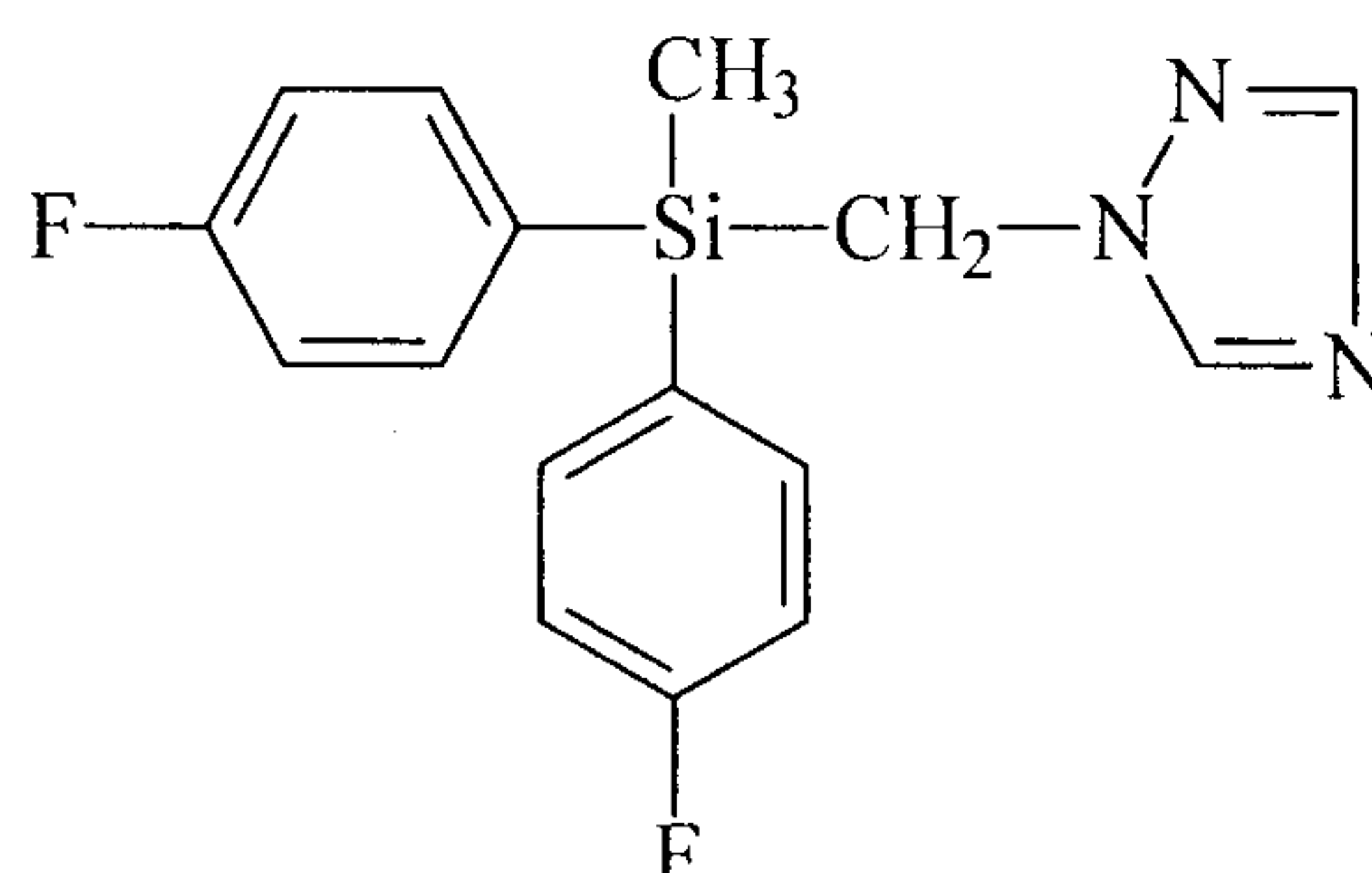
20

(DINICONAZOLE),

30517-82G

- 29c -

(2) the azole derivative of the formula (III):



(III)

5

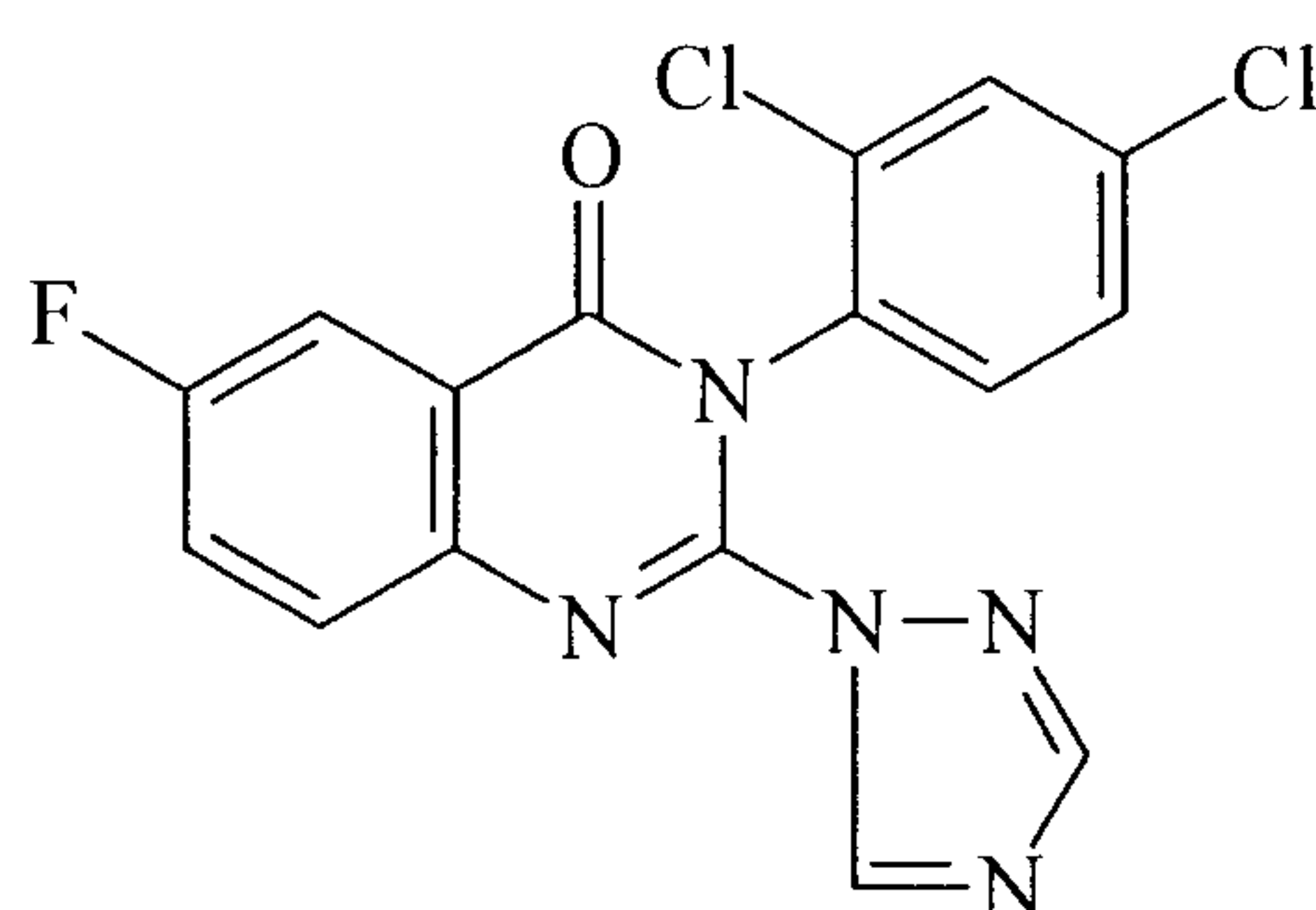
(FLUSILAZOLE),

(4) the compound

 S_x ,

(V)

(5) the azole derivative of the formula (VI):

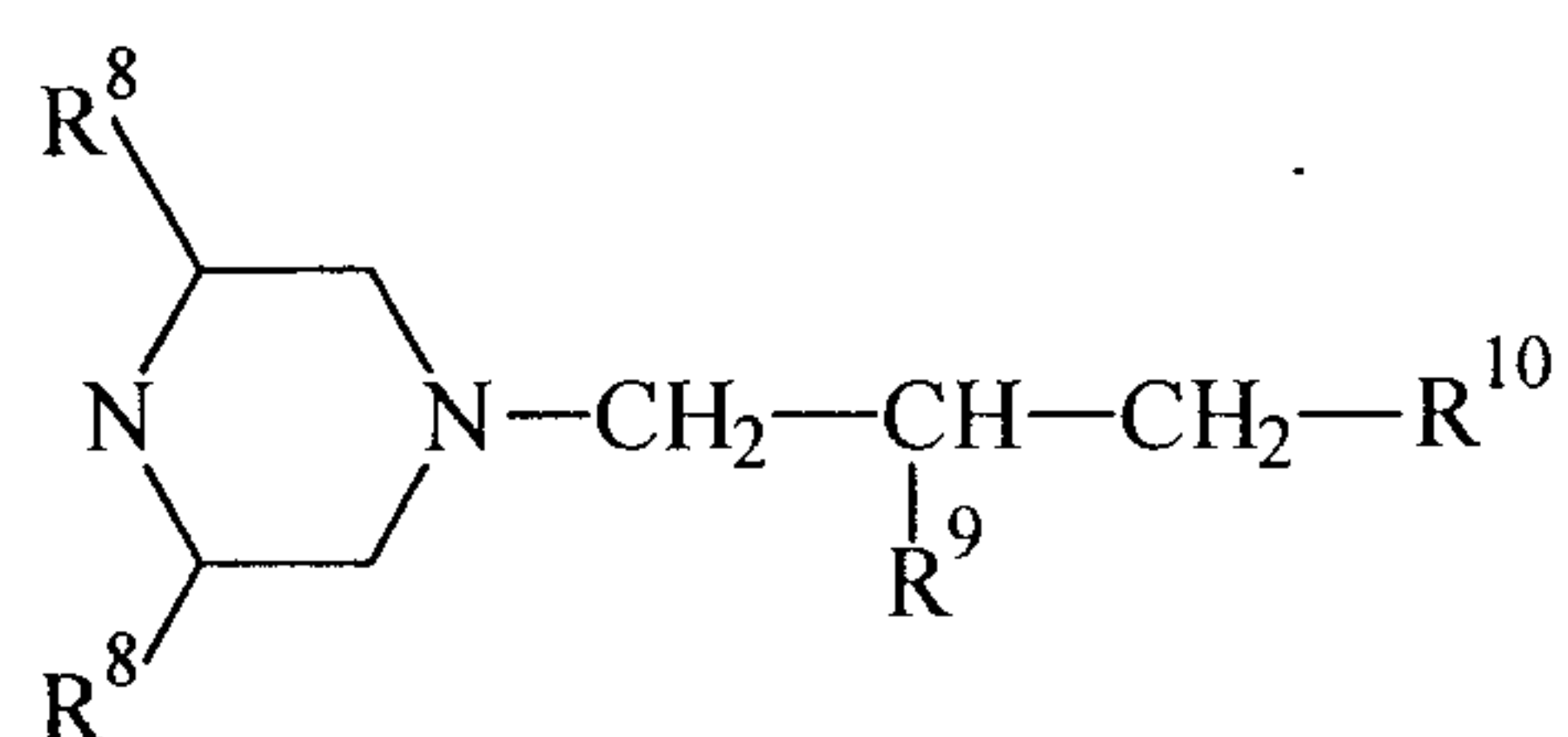


(VI)

10

(FLUQUINCONAZOLE),

15 (6) a heterocycle of the general formula (VII):

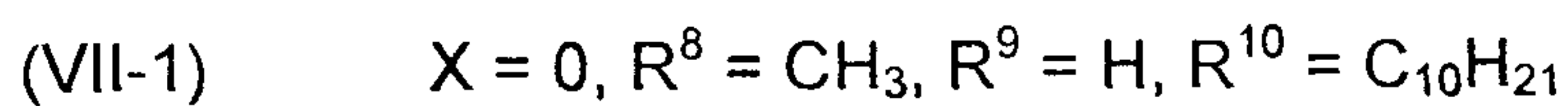


(VII)

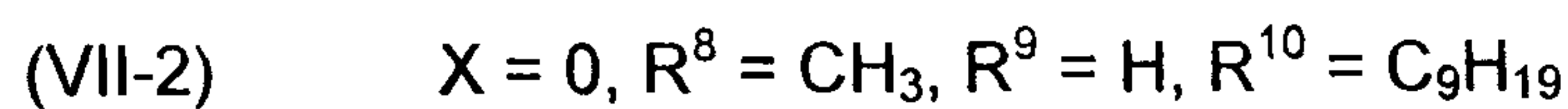
wherein:

30517-82G

- 29d -

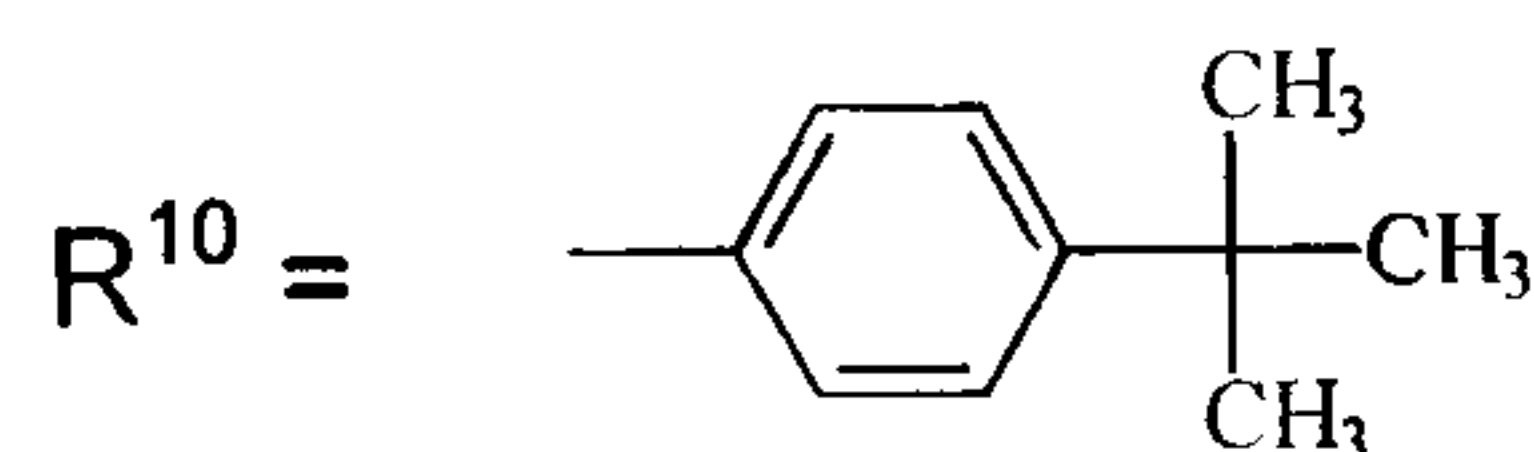


(IRIDEMORPH),

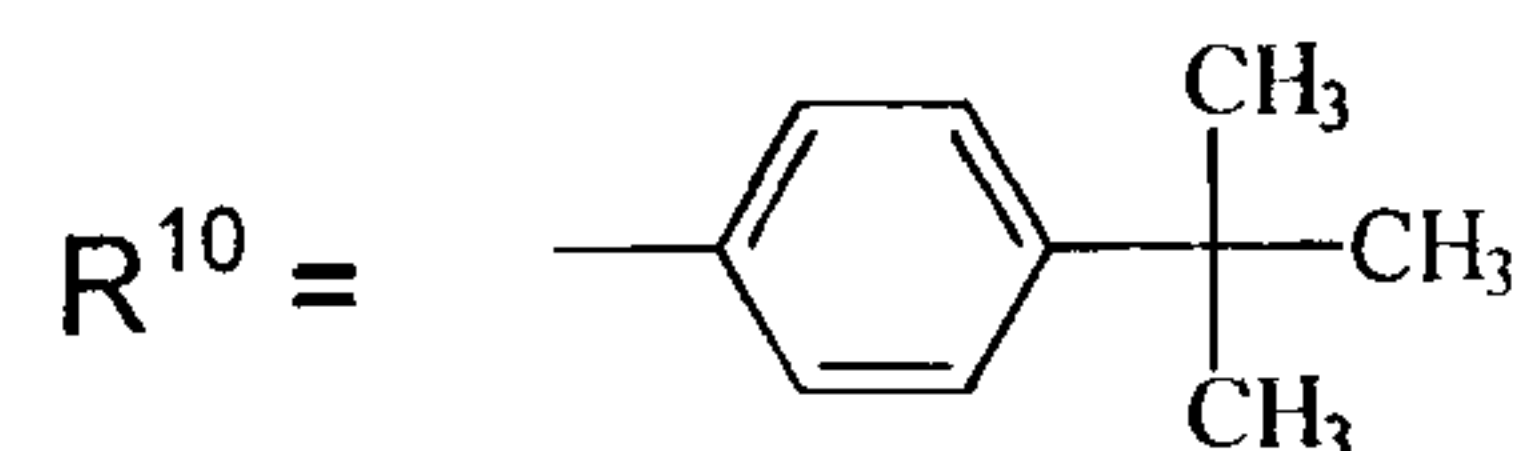
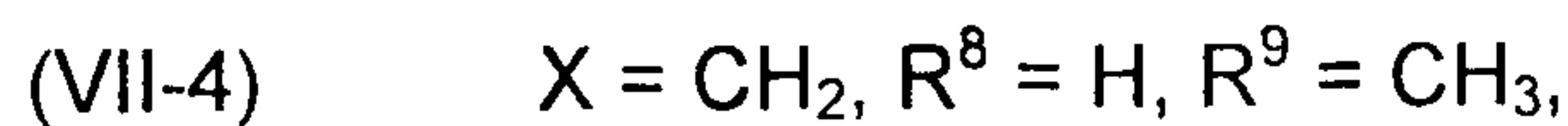


(ALDIMORPH),

5



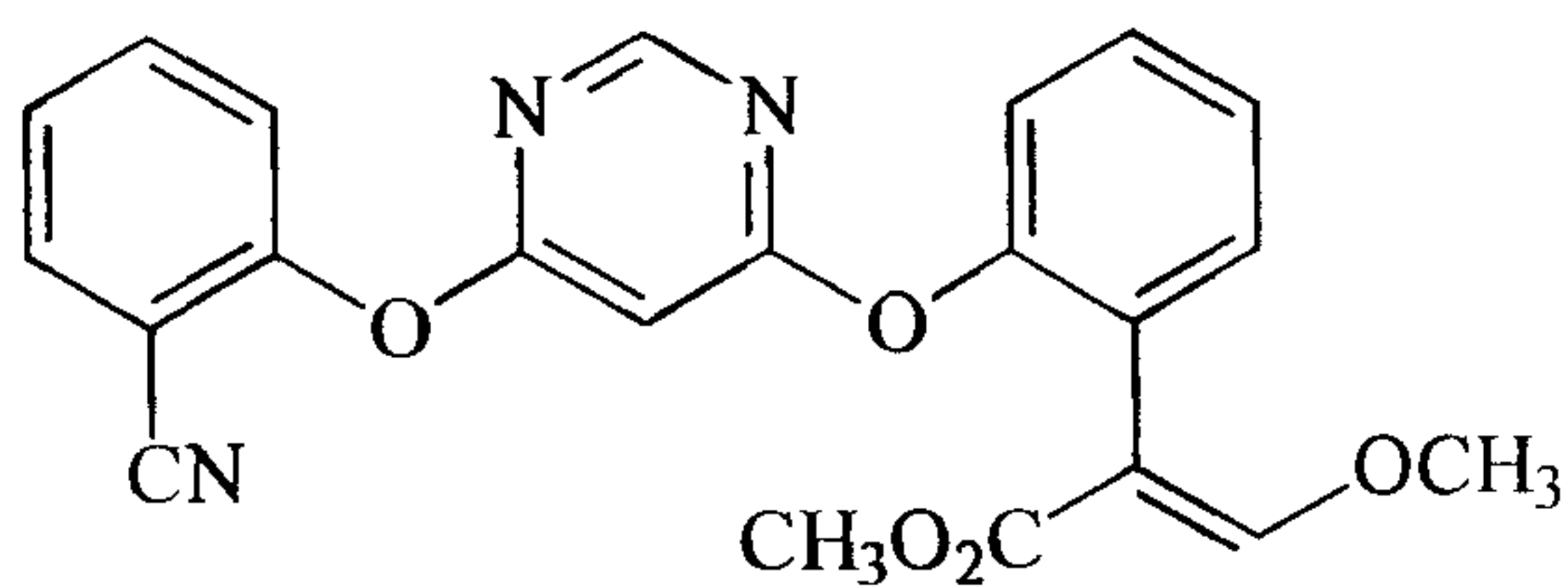
(FENPROPIMORPH),



(FENPROPIDIN),

10

(7) the compound of the formula:

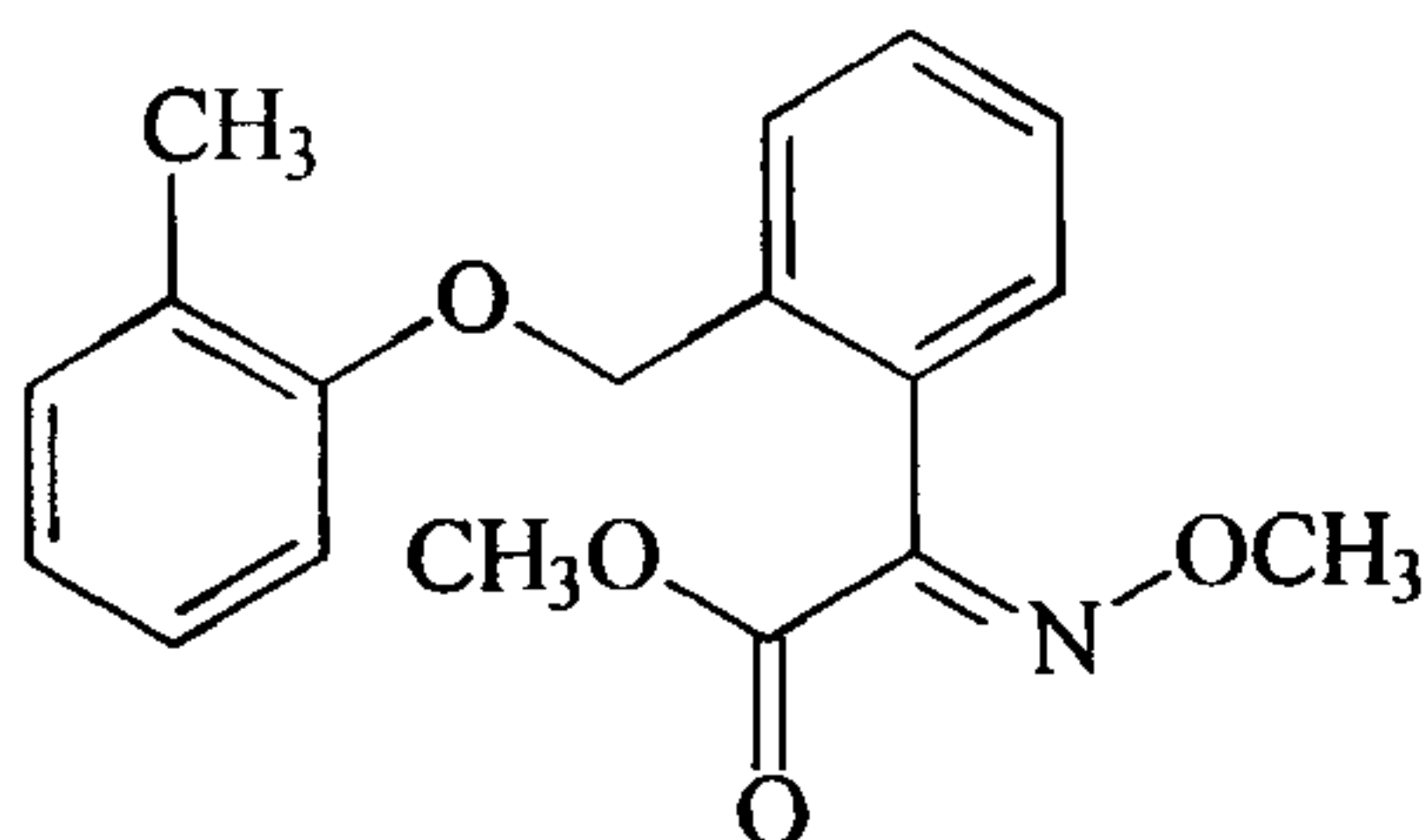


(VIII)

15

(AZOXYSTROBIN),

(8) the compound of the formula:



(IX)

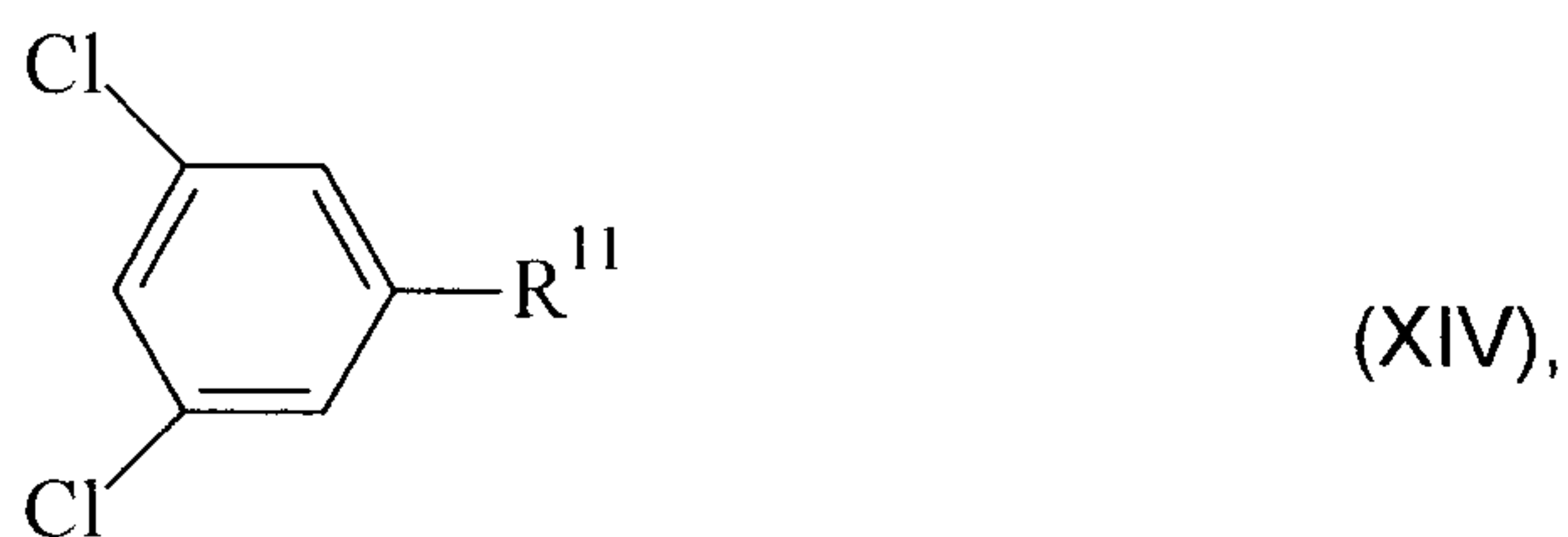
20

(KRESOXIM-METHYL),

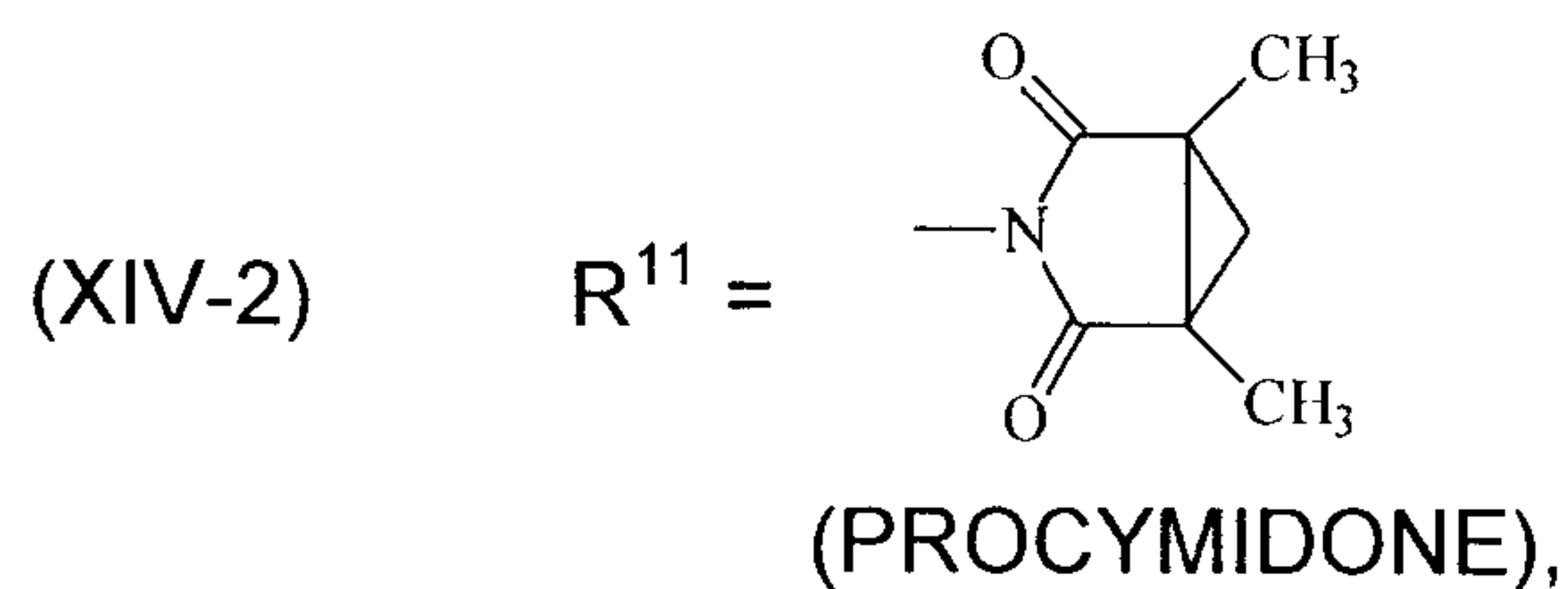
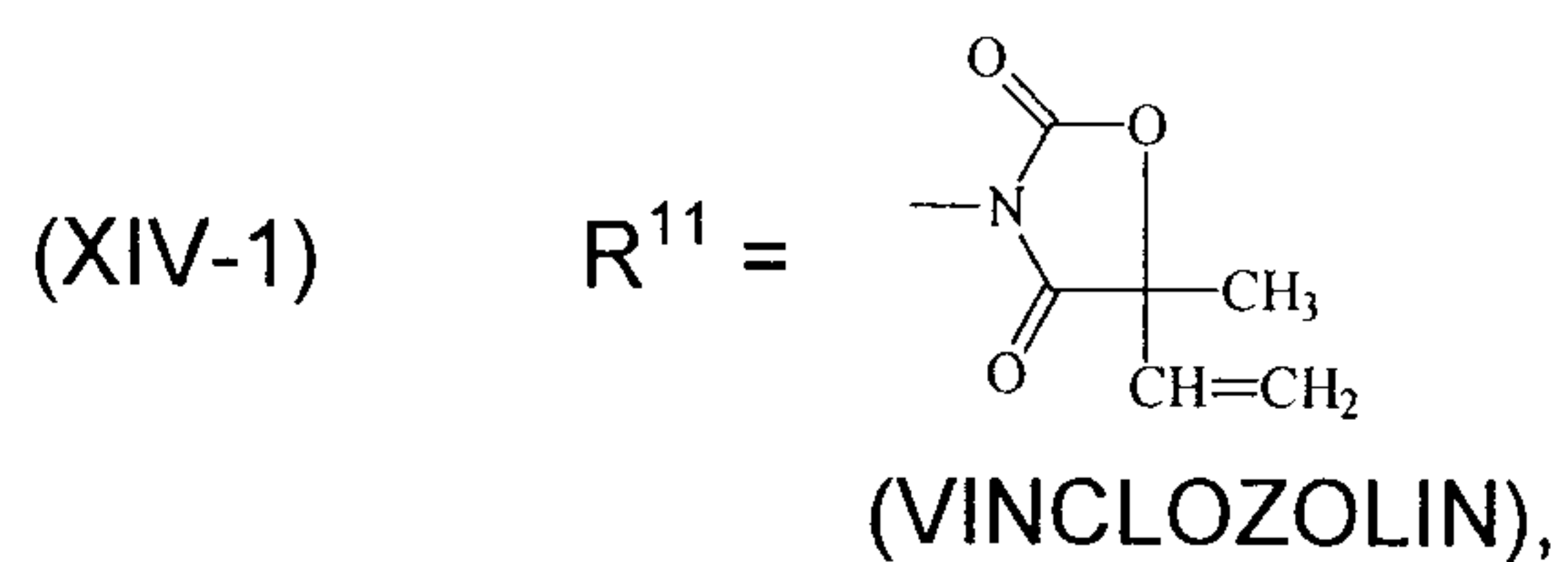
30517-82G

- 29e -

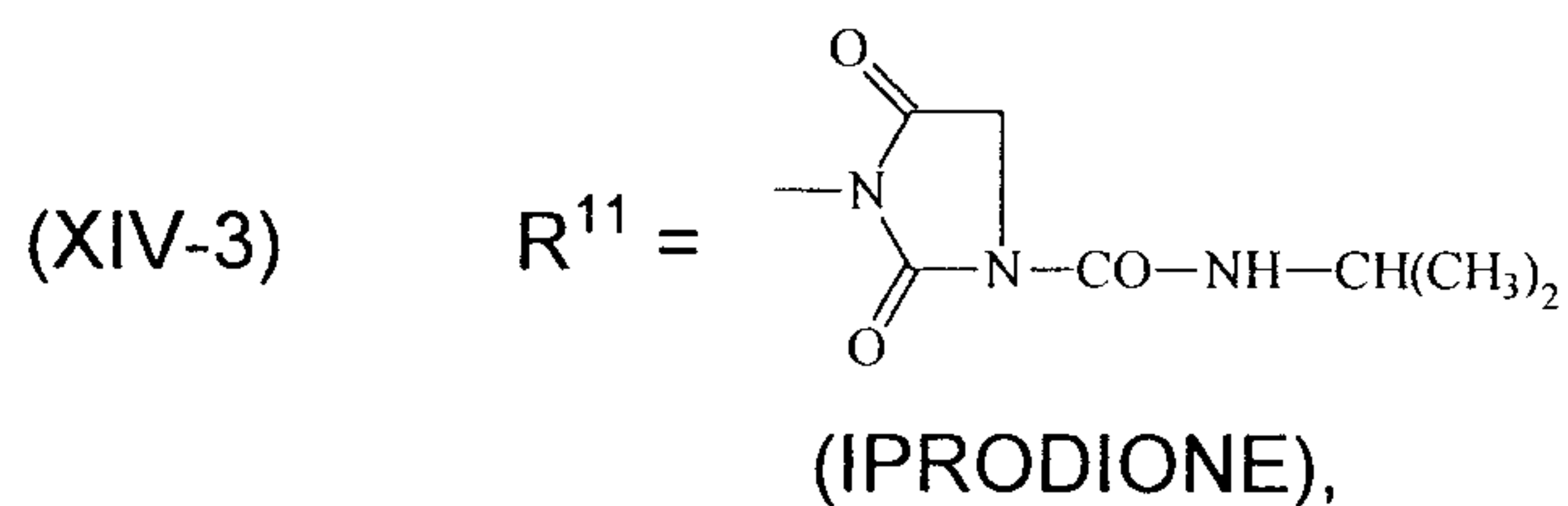
(13) a compound of the general formula (XIV):



5 wherein:

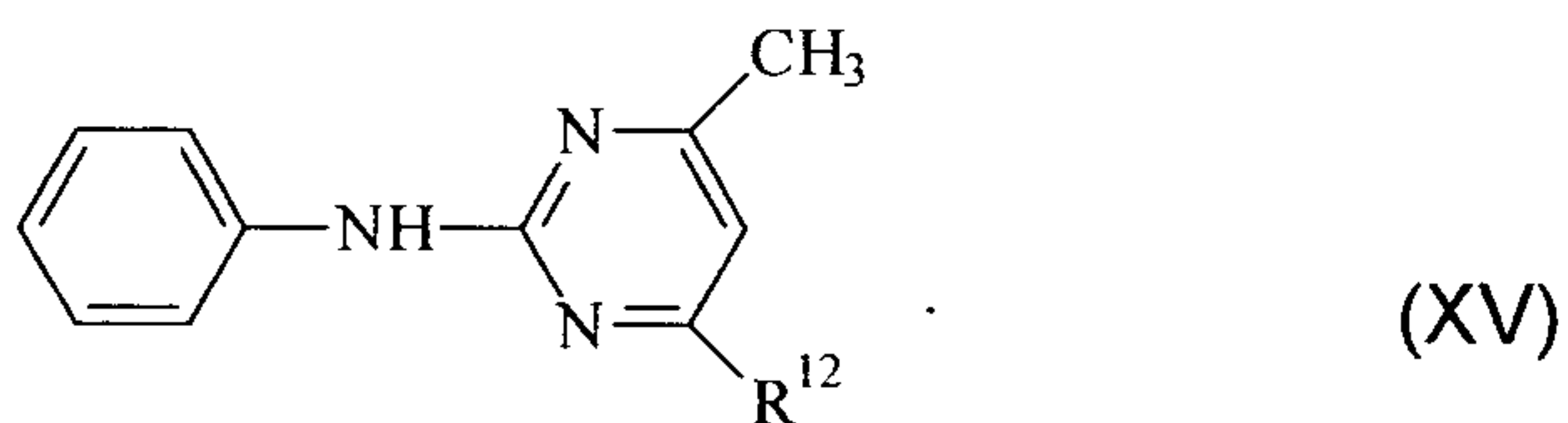


10

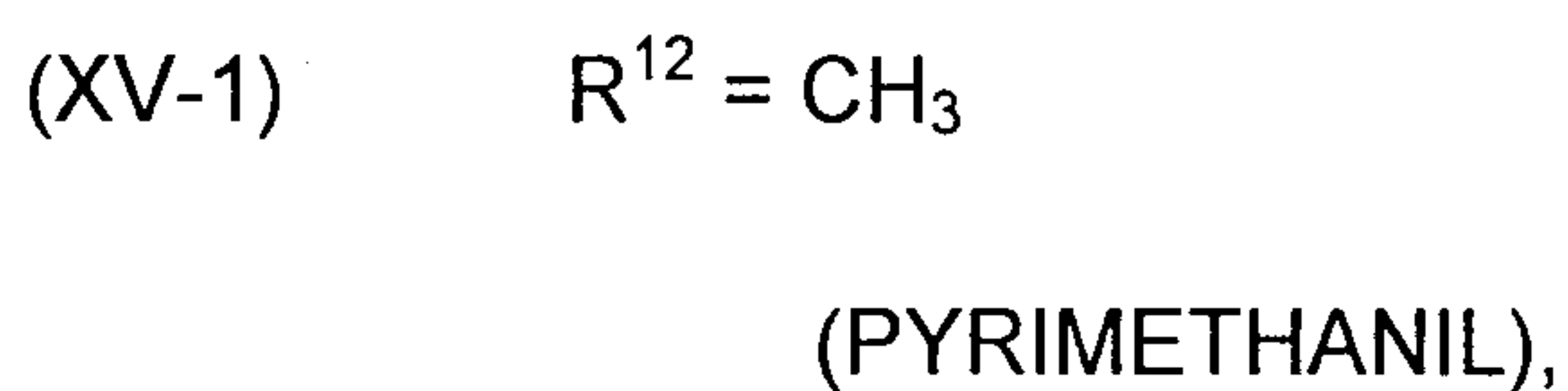


(14) a compound of the general formula (XV):

15



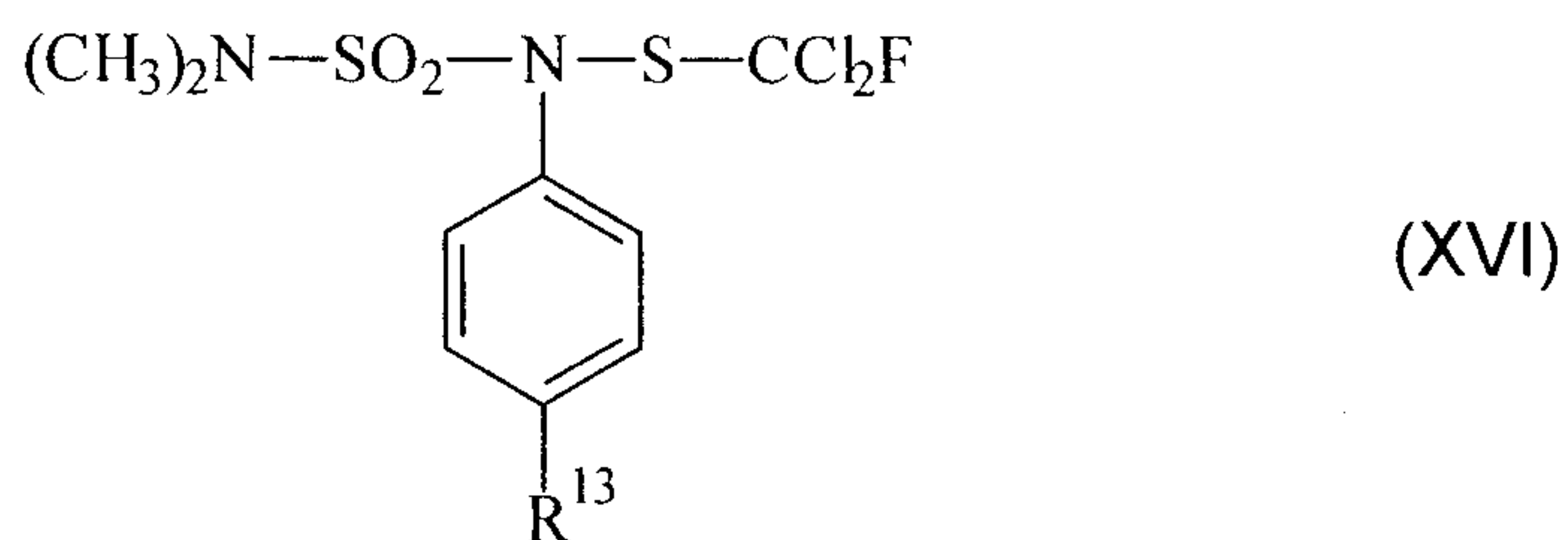
wherein:



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- 29f -

(15) a compound of the general formula (XVI):



5 wherein:

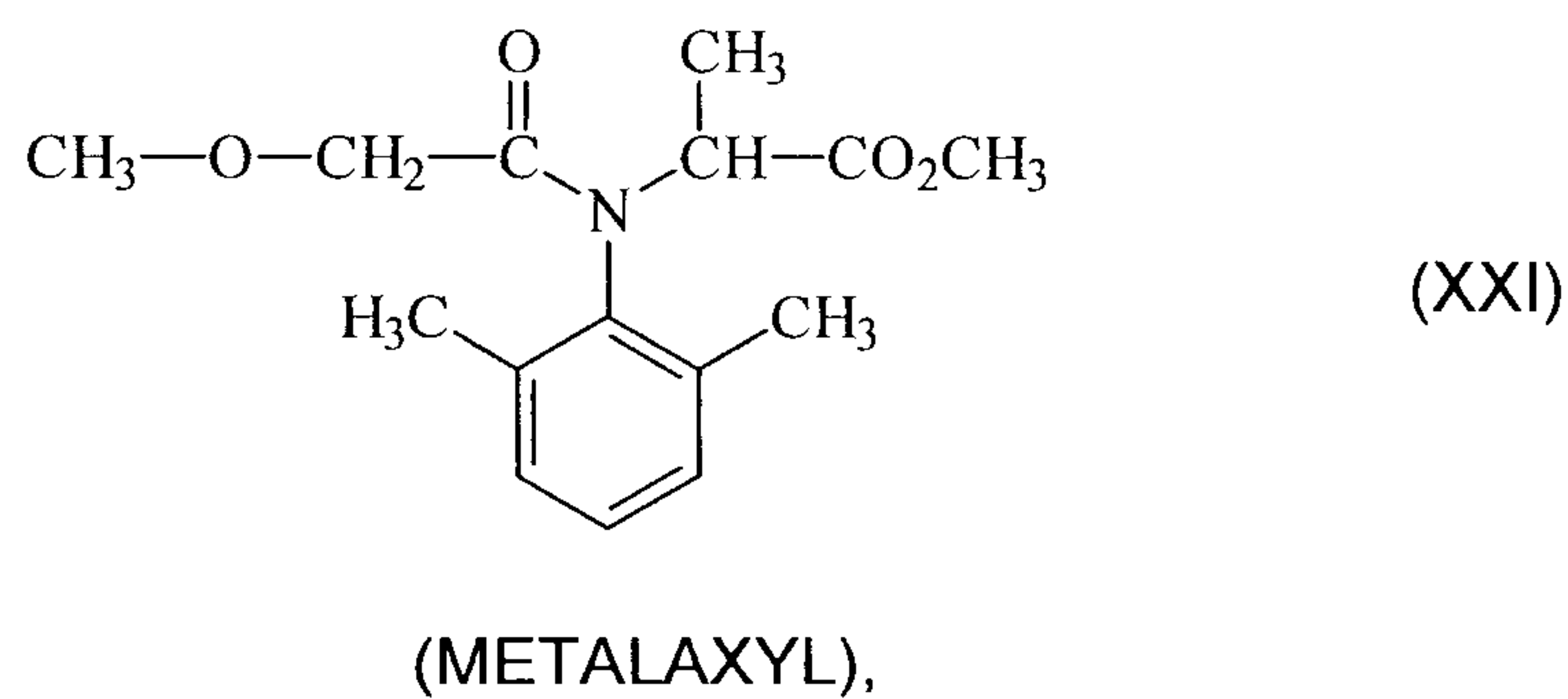


(DICHLORFLUANID),

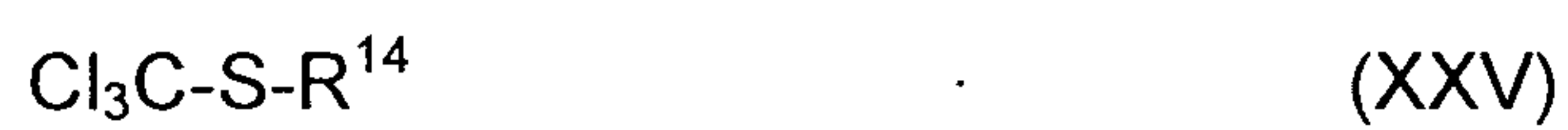


(TOLYLFLUANID),

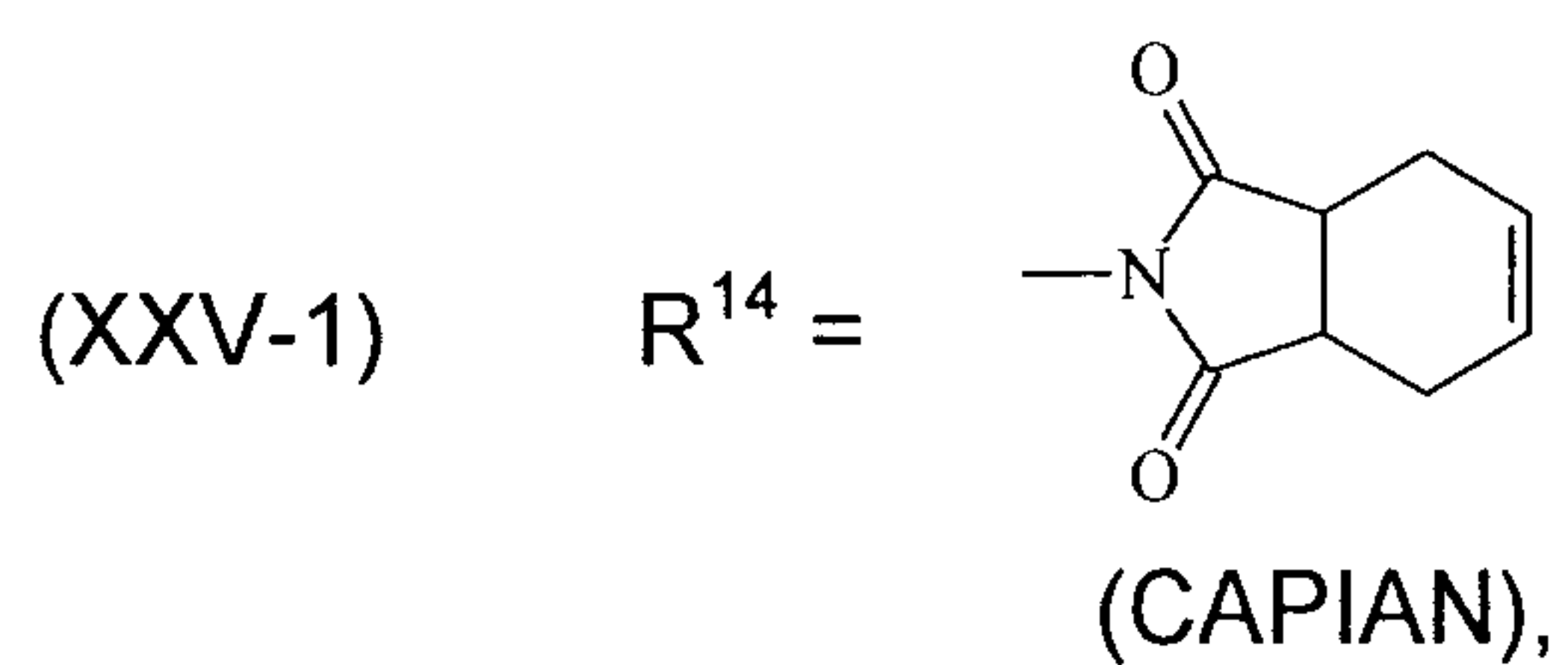
10 (20) the compound of the formula (XXI):



15 (24) a compound of the general formula (XXV):

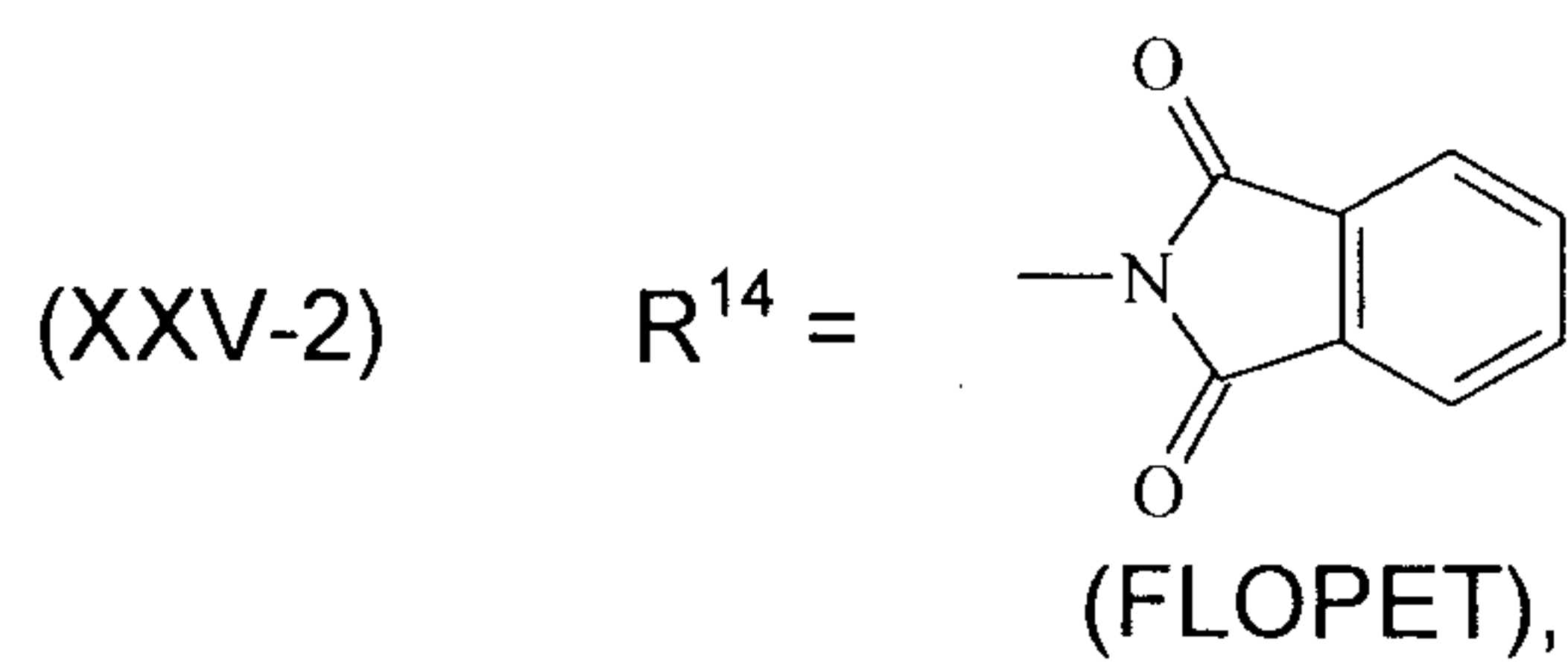


wherein:

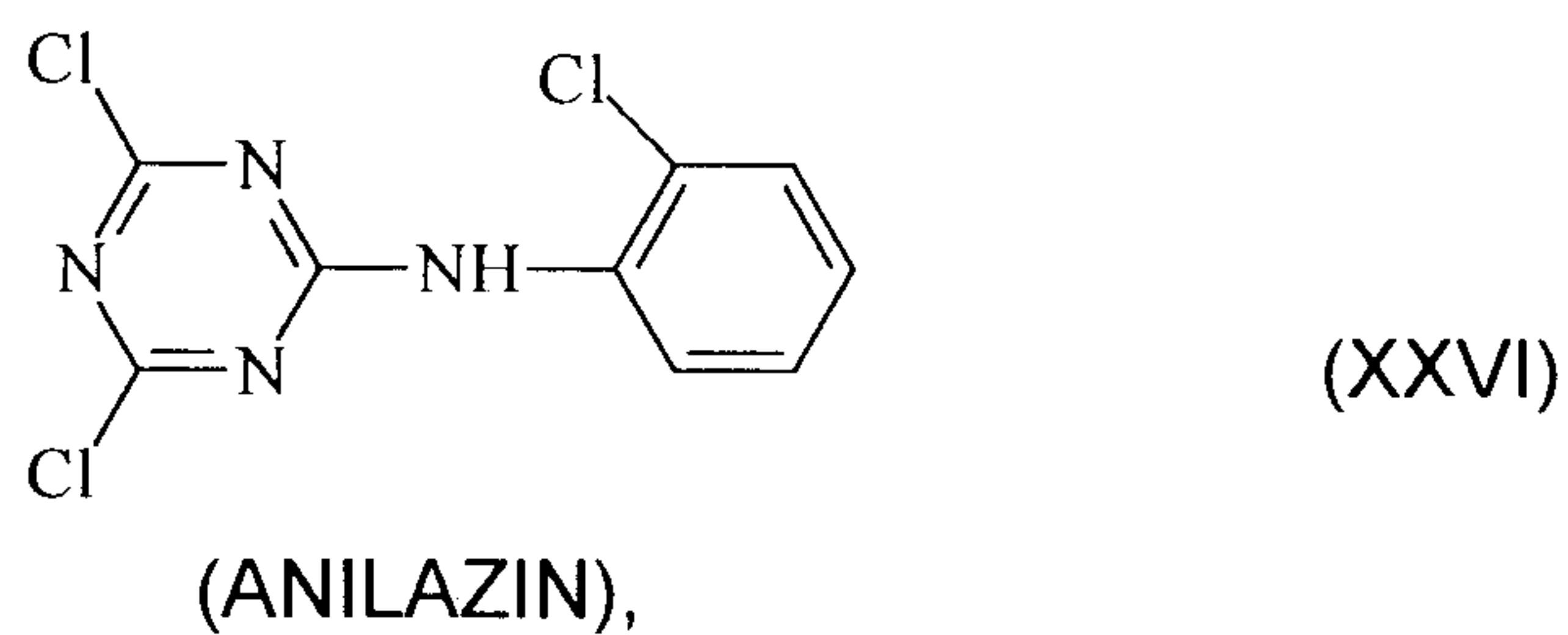


30517-82G

- 29g -

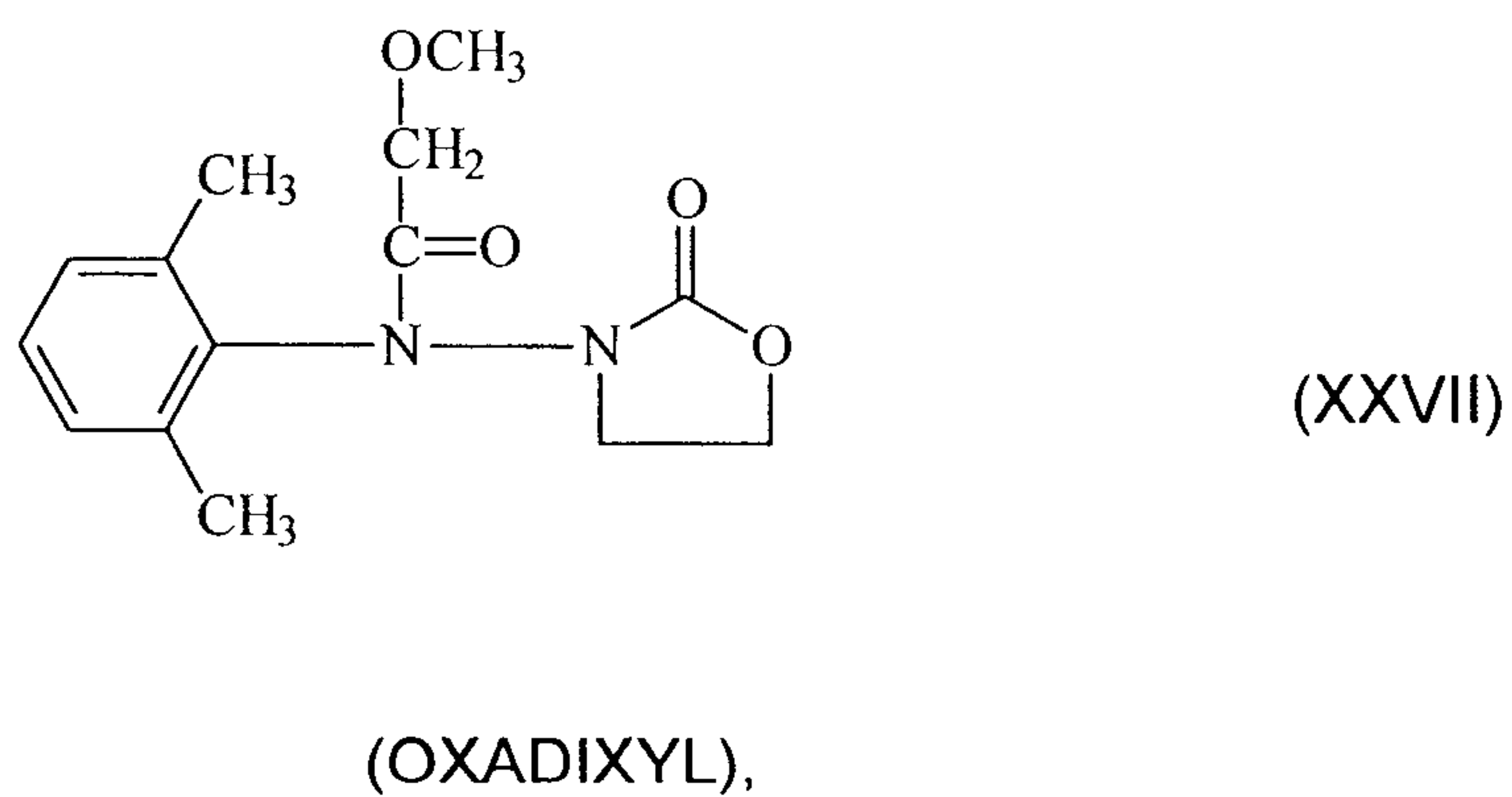


5 (25) the compound of the formula (XXVI):

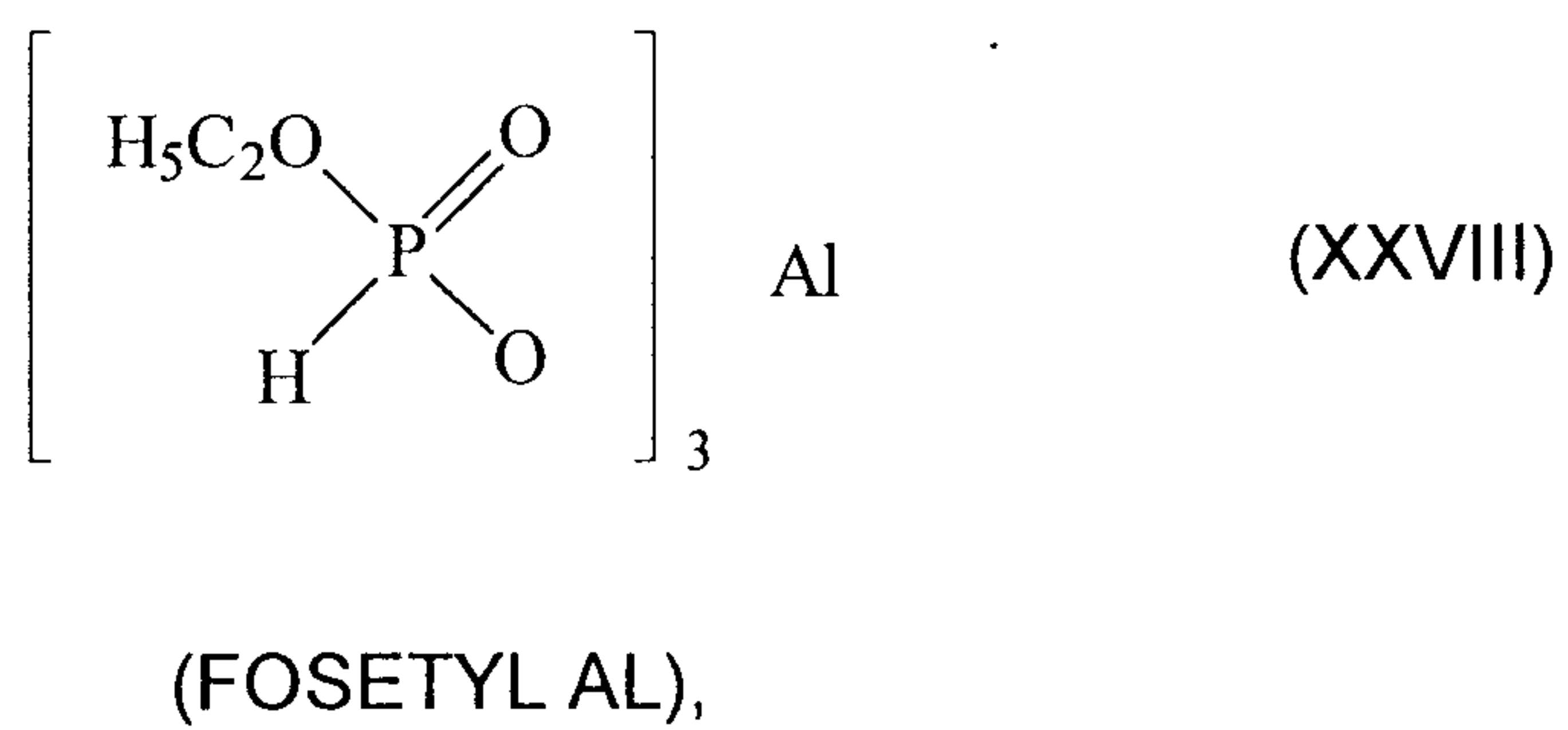


(26) the compound of the formula (XXVII):

10



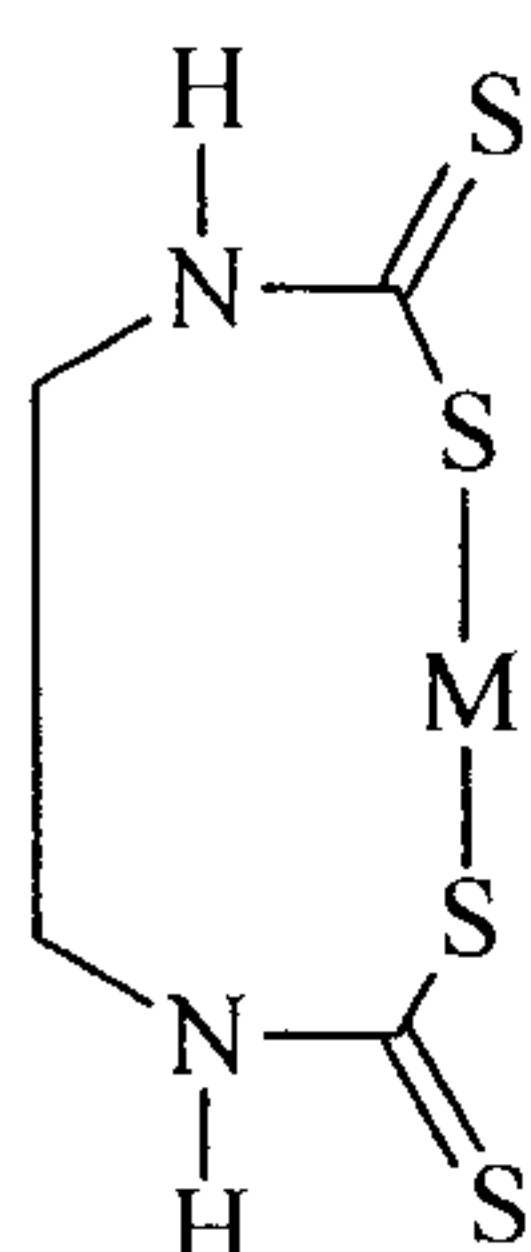
15 (27) the compound of the formula (XXVIII):



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- 29h -

(32) a compound of the general formula (XXXIII):



(XXXIII)

5

wherein:

(XXXIII-1) M = Zn

(ZINEB),

(XXXIII-2) M = Mn

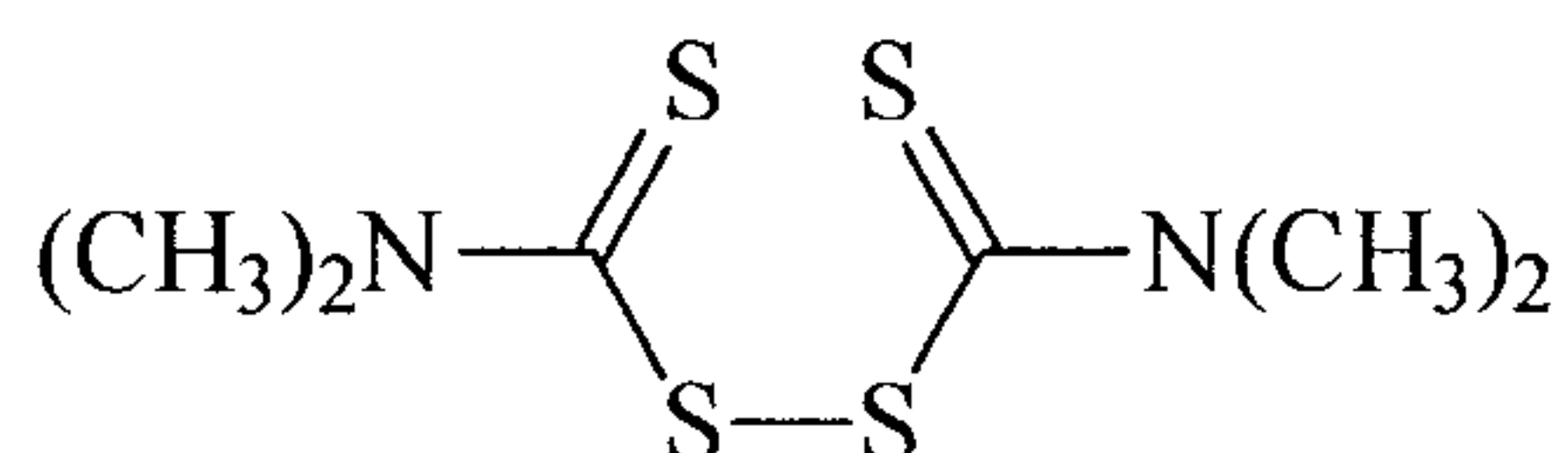
(MANEB),

10

(XXXIII-3) M = Mn/Zn

(MANCOZEB),

(33) the compound of the formula (XXXIV):

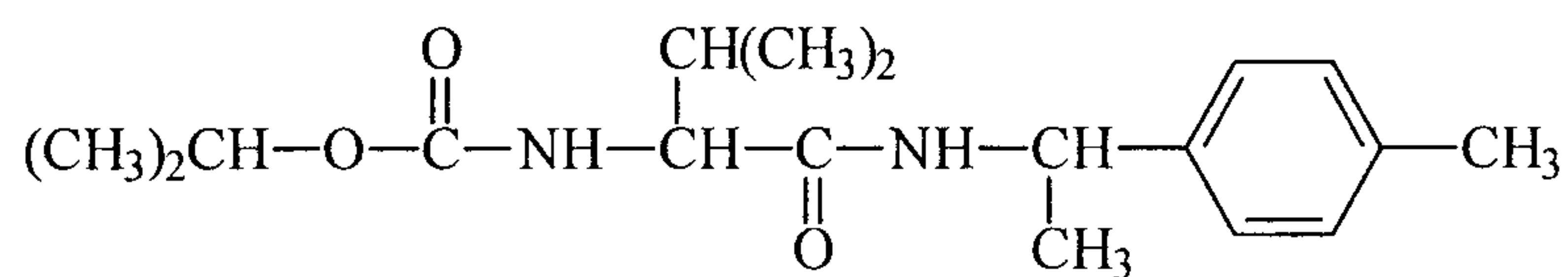


(XXXIV)

15

(THIRAM),

(37) the compound of the formula (XXXVIII):



(XXXVIII)

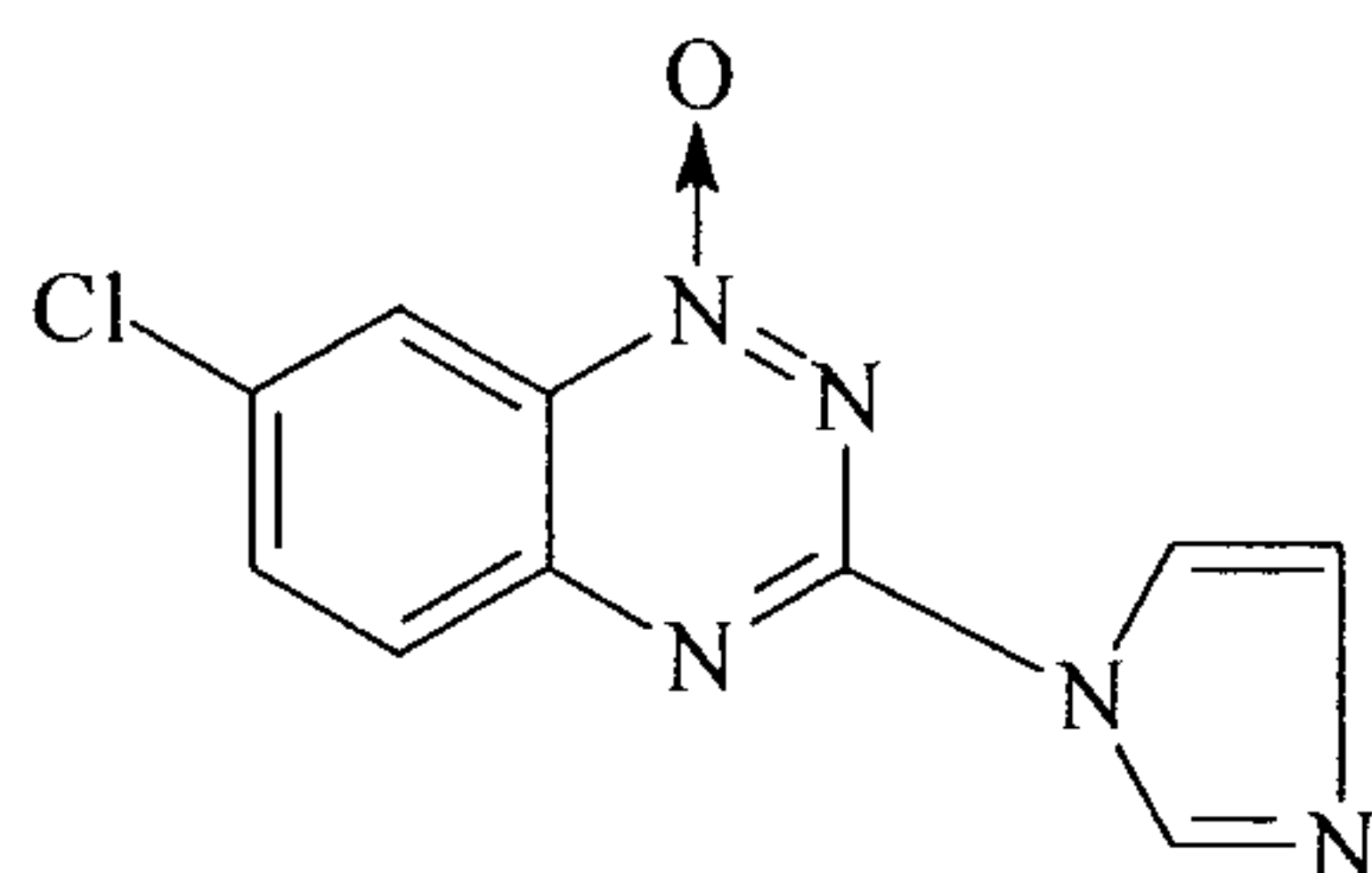
20

(IPROVALICARB),

30517-82G

- 29i -

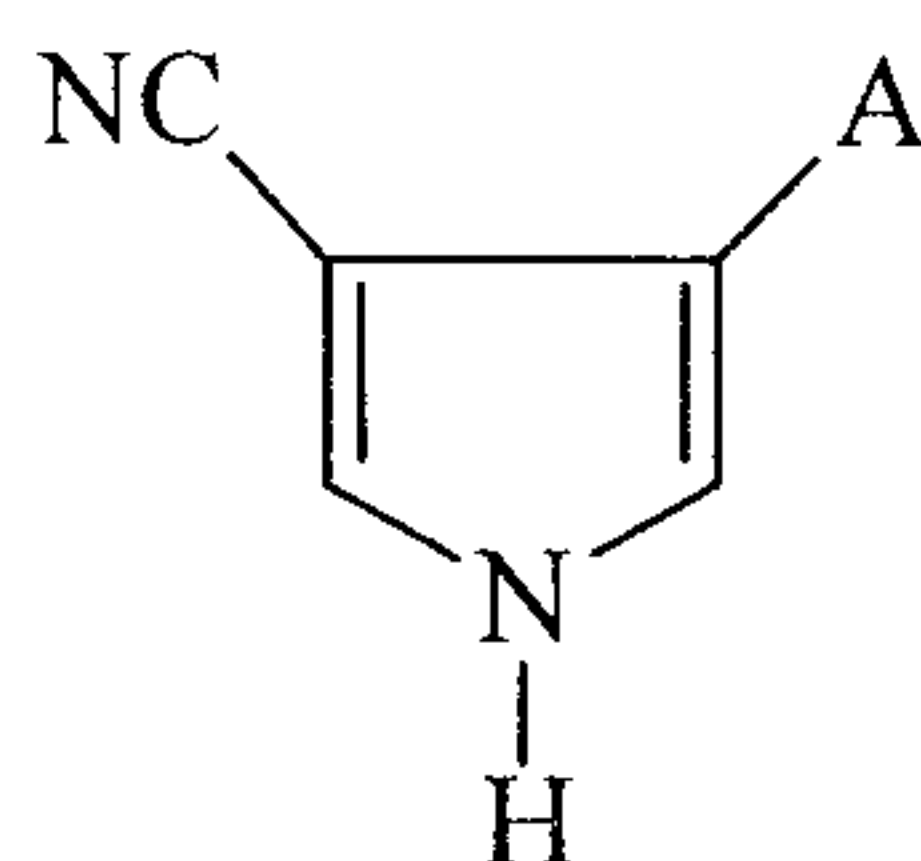
(41) the compound of the formula:



5

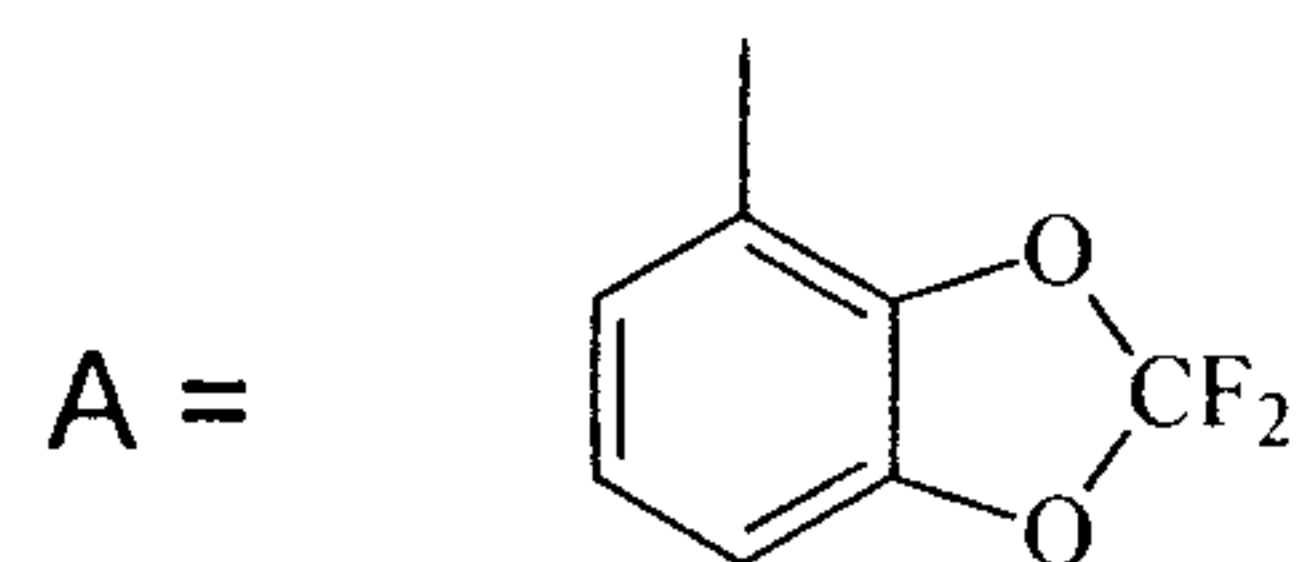
(TRIAZOXID),

(42) a compound of the general formula:



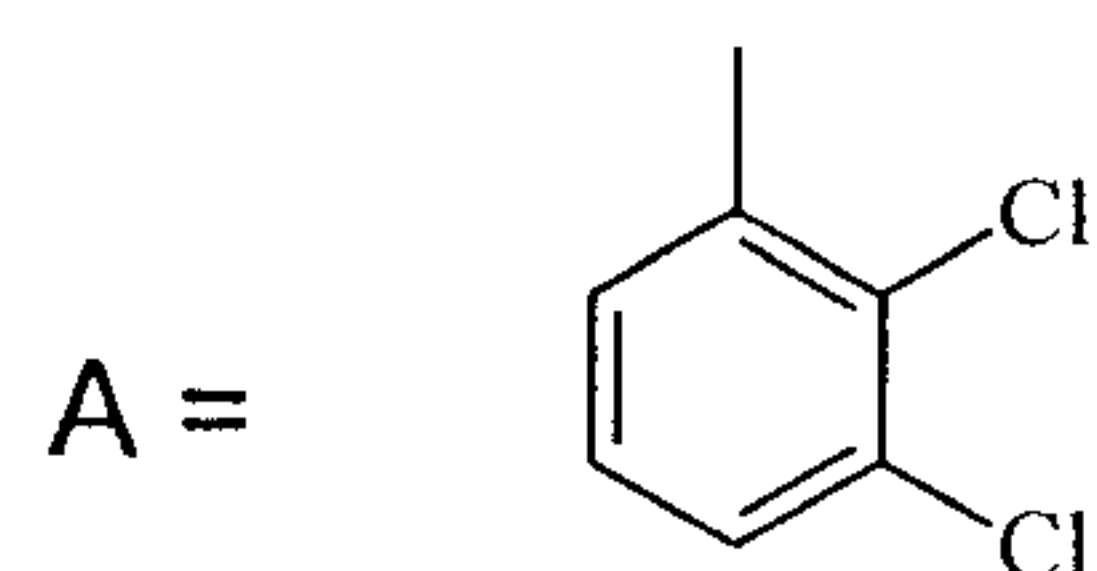
wherein:

10

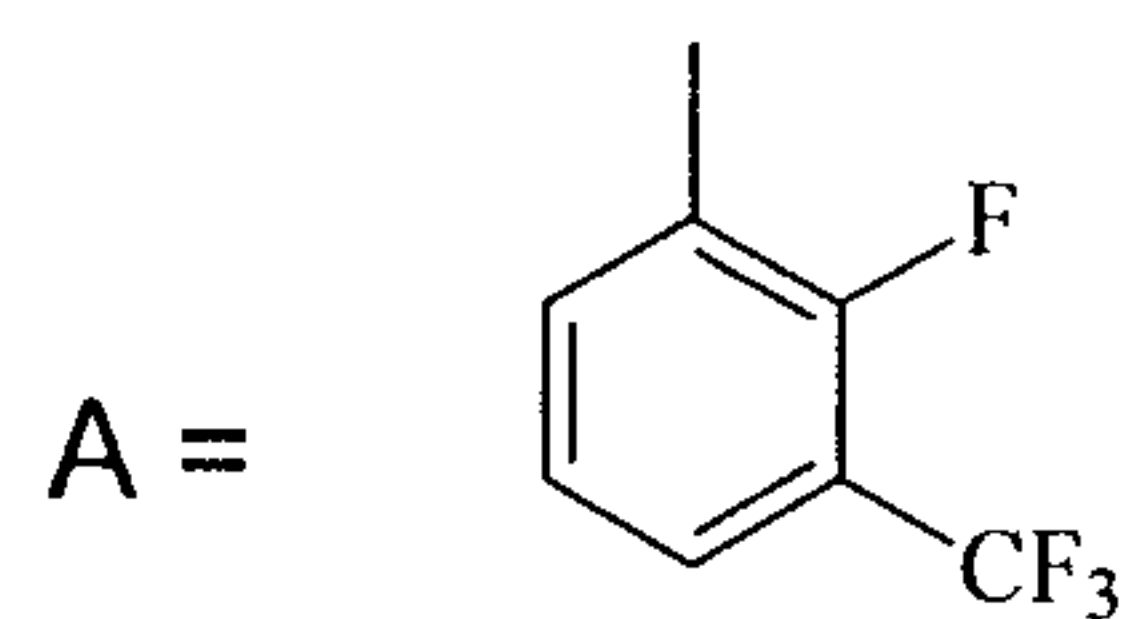


(FLUDIOXONIL),

15



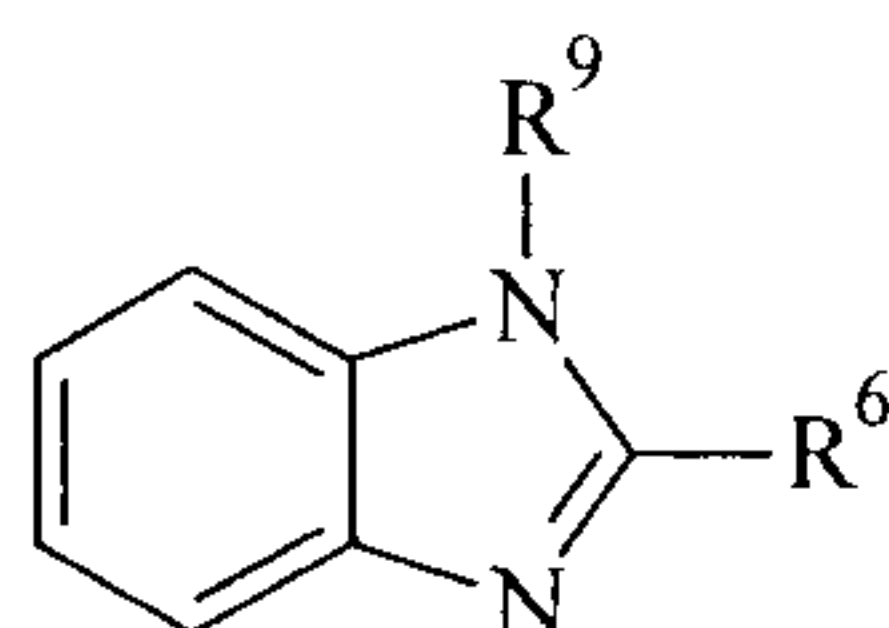
(FENPICLONIL),



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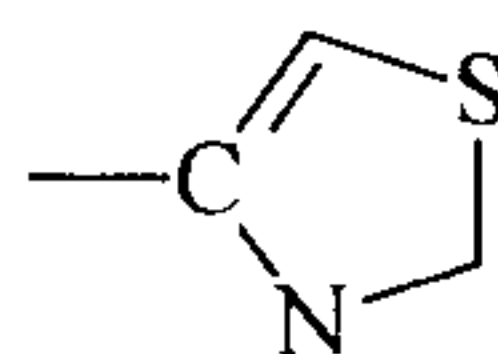
(44) a benzimidazole of the general formula:



wherein:

5 $R^9 = \text{CONHtBu}$; $R^6 = -\text{NHCOOMe}$

(BENOMYL),

 $R^9 = \text{H}$; $R^6 =$ 

(THIABENDAZOLE), and

 $R^9 = \text{H}$; $R^6 = -\text{NHCOOMe}$

10 (CARBENDAZIN),

wherein a compound of group (A) and a compound of group (B) are present in a synergistic amount.

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Besides the active compound of the formula (I), the active compound combinations according to the invention contain at least one fungicidal active compound, selected for example from the compounds of groups (1) to (47). Additionally, they may also contain other active compounds and also customary auxiliaries and additives and diluents.

5

A synergistic effect is particularly apparent when the active compounds in the active compound combinations according to the invention are present in particular weight ratios. However, the weight ratios of the active compounds in the active compound combinations can be varied within a relatively wide range. In general

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0.1 to 10 parts by weight, preferably

0.3 to 3 parts by weight, of at least one fungicidal active compound from the groups (1) to (48) is/are allocated to one part by weight of active compound of the formula (I).

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The combinations of active compounds according to the invention possess very good fungicidal properties. They can be employed, in particular, for controlling phytopathogenic fungi, such as Plasmodiophoromycetes, Oomycetes, Chytridiomycetes, Zygomycetes, Ascomycetes, Basidiomycetes, Deuteromycetes etc..

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The active compound combinations according to the invention are particularly suitable

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for controlling cereal diseases, such as *Erysiphe*, *Cochliobolus*, *Septoria*, *Pyrenophora* and *Leptosphaeria*, and for use against fungal infestations of vegetables, grapes and fruit, for example against *Venturia* or *Podosphaera* on apples, *Uncinula* on vine plants or *Sphaeroteca* on cucumbers.

5

The active compound combinations are also suitable for controlling animal pests, preferably arthropods, in particular insects encountered in agriculture, in forestry, in the protection of stored products and of materials, and in the hygiene field. They are active against normally sensitive and resistant species and against all or some stages of development. The abovementioned pests include:

10

From the order of the Isopoda, for example, *Oniscus asellus*, *Armadillidium vulgare* and *Porcellio scaber*.

From the order of the Diplopoda, for example, *Blaniulus guttulatus*.

15

From the order of the Chilopoda, for example, *Geophilus carpophagus* and *Scutigera spec.*

From the order of the Symphyla, for example, *Scutigera immaculata*.

From the order of the Thysanura, for example, *Lepisma saccharina*.

From the order of the Collembola, for example, *Onychiurus armatus*.

20

From the order of the Orthoptera, for example, *Blatta orientalis*, *Periplaneta americana*, *Leucophaea maderae*, *Blattella germanica*, *Acheta domesticus*, *Gryllotalpa* spp., *Locusta migratoria migratorioides*, *Melanoplus differentialis* and *Schistocerca gregaria*.

From the order of the Dermaptera, for example, *Forficula auricularia*.

From the order of the Isoptera, for example, *Reticulitermes* spp..

25

From the order of the Anoplura, for example, *Pediculus humanus corporis*, *Haematopinus* spp. and *Linognathus* spp.

From the order of the Mallophaga, for example, *Trichodectes* spp. and *Damalinea* spp.

From the order of the Thysanoptera, for example, *Hercinothrips femoralis* and *Thrips tabaci*.

30

From the order of the Heteroptera, for example, *Eurygaster* spp., *Dysdercus intermedius*, *Piesma quadrata*, *Cimex lectularius*, *Rhodnius prolixus* and *Triatoma* spp.

From the order of the Homoptera, for example, *Aleurodes brassicae*, *Bemisia tabaci*,

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Trialeurodes vaporariorum, Aphis gossypii, Brevicoryne brassicae, Cryptomyzus ribis, Doralis fabae, Doralis pomi, Eriosoma lanigerum, Hyalopterus arundinis, Macrosiphum avenae, Myzus spp., Phorodon humuli, Rhopalosiphum padi, Phylloxera vastrix, Pemphigus spp., Empoasca spp., Euscelis bilobatus, Nephotettix cincticeps, Lecanium
 5 corni, Saissetia oleae, Laodelphax striatellus, Nilaparvata lugens, Aonidiella aurantii, Aspidiotus hederae, Pseudococcus spp. and Psylla spp.

From the order of the Lepidoptera, for example, Pectinophora gossypiella, Bupalus piniarius, Cheimatobia brumata, Lithocolletis blancardella, Hyponomeuta padella, Plutella maculipennis, Malacosoma neustria, Euproctis chrysorrhoea, Lymantria spp.
 10 Bucculatrix thurberiella, Phyllocnistis citrella, Agrotis spp., Euxoa spp., Feltia spp., Earias insulana, Heliothis spp., Laphygma exigua, Mamestra brassicae, Panolis flammea, Prodenia litura, Spodoptera spp., Trichoplusia ni, Carpocapsa pomonella, Pieris spp., Chilo spp., Pyrausta nubilalis, Ephestia kuehniella, Galleria mellonella, Tineola bisselliella, Tinea pellionella, Hofmannophila pseudospretella, Cacoecia podana, Capua
 15 reticulana, Choristoneura fumiferana, Clysia ambiguella, Homona magnanima and Tortrix viridana.

From the order of the Coleoptera, for example, Anobium punctatum, Rhizophorthera dominica, Bruchidius obtectus, Acanthoscelides obtectus, Hylotrupes bajulus, Agelastica alni, Leptinotarsa decemlineata, Phaenon cochleariae, Diabrotica spp., Psylliodes
 20 chrysocephala, Epilachna varivestis, Atomaria spp., Oryzaephilus surinamensis, Anthonomus spp., Sitophilus spp., Otiorrhynchus sulcatus, Cosmopolites sordidus, Ceuthorrhynchus assimilis, Hypera postica, Dermestes spp., Trogoderma spp., Anthrenus spp., Attagenus spp., Lyctus spp., Meligethes aeneus, Ptinus spp., Niptus hololeucus, Gibbium psyllodes, Tribolium spp., Tenebrio molitor, Agriotes spp., Conoderus spp.,
 25 Melolontha melolontha, Amphimallon solstitialis and Costelytra zealandica.

From the order of the Hymenoptera, for example, Diprion spp., Hoplocampa spp., Lasius spp., Monomorium pharaonis and Vespa spp.

From the order of the Diptera, for example, Aedes spp., Anopheles spp., Culex spp., Drosophila melanogaster, Musca spp., Fannia spp., Calliphora erythrocephala, Lucilia
 30 spp., Chrysomyia spp., Cuterebra spp., Gastrophilus spp., Hyppobosca spp., Stomoxys spp., Oestrus spp., Hypoderma spp., Tabanus spp., Tannia spp., Bibio hortulanus, Oscinella frit, Phorbia spp., Pegomyia hyoscyami, Ceratitis capitata, Dacus oleae and

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Tipula paludosa.

The fact that the active compound combinations are well tolerated by plants at the concentrations required for controlling plant diseases permits a treatment of aerial parts
5 of plants, of propagation stock and seeds, and of the soil.

The active compounds of the invention can be converted to the customary formulations, such as solutions, emulsions, suspensions, powders, foams, pastes, granules, aerosols, very fine capsules in polymeric substances and in coating compositions for seed, as well
10 as ULV formulations.

These formulations are produced in a known manner, for example by mixing the active compounds with extenders, that is, liquid solvents, liquefied gases under pressure, and/or solid carriers, optionally with the use of surface-active agents, that is emulsifying
15 agents and/or dispersing agents, and/or foam-forming agents. In the case of the use of water as an extender, organic solvents can, for example, also be used as auxiliary solvents. As liquid solvents, there are suitable in the main: aromatics, such as xylene, toluene or alkyl naphthalenes, chlorinated aromatics or chlorinated aliphatic hydrocarbons, such as chlorobenzenes, chloroethylenes or methylene chloride, aliphatic
20 hydrocarbons, such as cyclohexane or paraffins, for example mineral oil fractions, alcohols, such as butanol or glycol as well as their ethers and esters, ketones, such as acetone, methyl ethyl ketone, methyl isobutyl ketone or cyclohexanone, strongly polar solvents, such as dimethylformamide and dimethyl sulphoxide, as well as water; by liquefied gaseous extenders or carriers are meant liquids which are gaseous at ambient
25 temperature and under atmospheric pressure, for example aerosol propellants, such as halogenated hydrocarbons as well as butane, propane, nitrogen and carbon dioxide; as solid carriers there are suitable: for example ground natural minerals, such as kaolins, clays, talc, chalk, quartz, attapulgite, montmorillonite or diatomaceous earth, and ground synthetic minerals, such as highly disperse silica, alumina and silicates; as solid carriers
30 for granules there are suitable: for example crushed and fractionated natural rocks such as calcite, marble, pumice, sepiolite and dolomite, as well as synthetic granules of inorganic and organic meals, and granules of organic material such as sawdust, coconut

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shells, maize cobs and tobacco stalks; as emulsifying and/or foam-forming agents there are suitable: for example non-ionic and anionic emulsifiers, such as polyoxyethylene fatty acid esters, polyoxyethylene fatty alcohol ethers, for example alkylaryl polyglycol ethers, alkylsulphonates, alkyl sulphates, arylsulphonates as well as albumen hydrolysis products; as dispersing agents there are suitable: for example lignin-sulphite waste liquors and methylcellulose.

Adhesives such as carboxymethylcellulose and natural and synthetic polymers in the form of powders, granules or latices, such as gum arabic, polyvinyl alcohol and polyvinyl acetate, as well as natural phospholipids, such as cephalins and lecithins, and synthetic phospholipids, can be used in the formulations. Other additives can be mineral and vegetable oils.

It is possible to use colorants such as inorganic pigments, for example iron oxide, titanium oxide and Prussian Blue, and organic dyestuffs, such as alizarin dyestuffs, azo dyestuffs and metal phthalocyanine dyestuffs, and trace nutrients such as salts of iron, manganese, boron, copper, cobalt, molybdenum and zinc.

The formulations in general contain between 0.1 and 95 per cent by weight of active compound, preferably between 0.5 and 90%.

The active compound combinations according to the invention can be present in the formulations as mixtures with other known active compounds, such as fungicides, insecticides, acaricides and herbicides, and also as mixtures with fertilizers or plant growth regulators.

The active compound combinations can be used as such, in the form of their formulations or as the use forms prepared therefrom, such as ready-to-use solutions, emulsifiable concentrates, emulsions, suspensions, wettable powders, soluble powders and granules.

They are used in the customary manner, for example by watering, spraying, atomizing,

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scattering, brushing on and as a powder for dry seed treatment, a solution for seed treatment, a water-soluble powder for seed treatment, a water-soluble powder for slurry treatment, or by encrusting.

- 5 In the treatment of parts of plants, the concentrations of active compound in the use forms can be varied within a substantial range. In general, they are between 1 and 0.0001% by weight, preferably between 0.5 and 0.001%.

10 In the treatment of seed, amounts of 0.001 to 50 g of active compound per kilogram of seed are generally required, preferably 0.01 to 10 g.

In the treatment of the soil, active compound concentrations from 0.00001 to 0.1% by weight, preferably 0.0001 to 0.02% by weight, are required at the site of action.

- 15 The good fungicidal activity of the active compound combinations according to the invention can be seen from the examples which follow. While the individual active compounds or the known active compound combinations show weaknesses with regard to the fungicidal activity, the tables of the examples which follow show clearly that the activity found in the case of the active compound combinations according to the invention exceeds the total of the activities of individual active compounds and also exceeds the activities of the known active compound combinations.
- 20

In the examples that follow, imidacloprid is employed as active compound of the formula (I). The fungicidal active compounds also used are stated in the examples.

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Example A**Drechslera graminea test (barley)/seed treatment
(syn. Helminthosporium gramineum)**

5

The active compounds are used as a powder for dry seed treatment. They are prepared by extending the active compound in question with rock meal to give a finely pulverulent mixture which ensures uniform distribution on the seed surface.

- 10 To carry out the seed treatment, the infected seed and the seed-dressing product are shaken for 3 minutes in a sealed glass flask.

The seed, embedded in screened, moist standard soil in sealed Petri dishes, is exposed to a temperature of 4°C for 10 days in a refrigerator. This triggers germination of the
15 barley and, if appropriate, of the fungal spores. 2 × 50 pregerminated barley kernels are subsequently sown in standard soil at a depth of 3 cm and grown in a greenhouse at a temperature of approximately 18°C in seed boxes which are exposed to the light for 15 hours per day.

- 20 Approximately 3 weeks after sowing, the plants are evaluated for symptoms of barley leaf stripe.

Mixtures of imidacloprid with tebuconazole, captan, euparen M, bitertanol, triazoxide, thiram, fludioxonil exhibit a pronounced increase in activity as compared with treatment
25 using the individual compounds.

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Example B**Fusarium nivale test (wheat)/seed treatment**

- 5 The active compounds are used as a powder for dry seed treatment. They are prepared by extending the active compound in question with rock meal to give a finely pulverulent mixture which ensures uniform distribution on the seed surface.

10 To carry out the seed treatment, the infected seed and the seed-dressing product are shaken for 3 minutes in a sealed glass flask.

2 × 100 wheat kernels are subsequently sown in standard soil at a depth of 1 cm and grown in the greenhouse at a temperature of approximately 10° and a relative atmospheric humidity of approximately 95% in seed boxes which are exposed to the
15 light for 15 hours per day.

Approximately 3 weeks after sowing, the plants are evaluated for snow blight symptoms.

- 20 Mixtures of imidacloprid with euparen, guazatine, triadimenol, difenconazole, fenpiclonil exhibit a pronounced increase in activity as compared with treatment using the individual compounds.

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Example C

Phaedon larvae test

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Solvent: 7 parts by weight of dimethylformamide

Emulsifier: 1 part by weight of alkylaryl polyglycol ether

10 To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and the stated amount of emulsifier, and the concentrate is diluted with water to the desired concentration.

15 Cabbage leaves (*Brassica oleracea*) are treated by being dipped into the preparation of the active compound of the desired concentration and are infested with mustard beetle larvae (*Phaedon cochleariae*), as long as the leaves are still moist.

After 7 days the destruction in % is determined.

20 Mixtures of imidacloprid with anilazine, benomyl, bitertanol, captan, diclofluanid, mancozeb, maneb, metalaxyl, prochloraz, procymidone, sulphate, tolylfluanid, triadimefon, triadimenol exhibit a pronounced increase in activity as compared with treatment using the individual compounds.

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Example D

Myzus test

- 5 Solvent: 7 parts by weight of dimethylformamide
 Emulsifier: 1 part by weight of alkylaryl polyglycol ether

10 To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and the stated amount of emulsifier, and the concentrate is diluted with water to the desired concentration.

Cabbage leaves (*Brassica oleracea*) heavily infested with aphids (*Myzus persicae*) are treated by dipping in the preparation of active compound of the desired concentration.

- 15 After 6 days, the destruction in % is determined.

Mixtures of imidacloprid with bitertanol, fenpropimorph, prochloraz, tebuconazole exhibit a pronounced increase in activity as compared with treatment using the individual compounds.

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Example E

Botrytis test (beans) / protective

- 5 Solvent: 4.7 parts by weight of acetone
 Emulsifier: 0.3 parts by weight of alkylaryl polyglycol ether

10 To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amount of solvent and the stated amount of emulsifier, and the concentrate is diluted with water to the desired concentration.

15 To test for protective activity, young plants are sprayed with the preparation of active compound until dripping wet. After the spray coating has dried on, two small pieces of agar covered with *Botrytis cinerea* are placed on each leaf. The inoculated plants are placed in a darkened humid chamber at 20°C. 3 days after the inoculation, the size of the infected spots on the leaves is evaluated.

20 Mixtures of imidacloprid with procymidone, tolyfluanid, tebuconazole exhibit a pronounced increase in activity as compared with treatment using the individual compounds.

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Example F

Podosphaera test (apple) / protective

- 5 Solvent: 4.7 parts by weight of acetone
 Emulsifier: 0.3 parts by weight of alkylaryl polyglycol ether

10 To produce a suitable preparation of active compound, 1 part by weight of active compound is mixed with the stated amounts of solvent and emulsifier, and the concentrate is diluted with water to the desired concentration.

15 To test for protective activity, young plants are sprayed with the preparation of active compound until dripping wet. After the spray coating has dried on, the plants are inoculated by dusting with conidia of the causative organism of apple mildew (Podosphaera leucotricha).

The plants are then placed in a greenhouse at 23°C and a relative atmospheric humidity of about 70%.

20 Evaluation is carried out 10 days after the inoculation.

Mixtures of imidacloprid with fenpropidin, triadimenol exhibit a pronounced increase in activity as compared with treatment using the individual compounds.

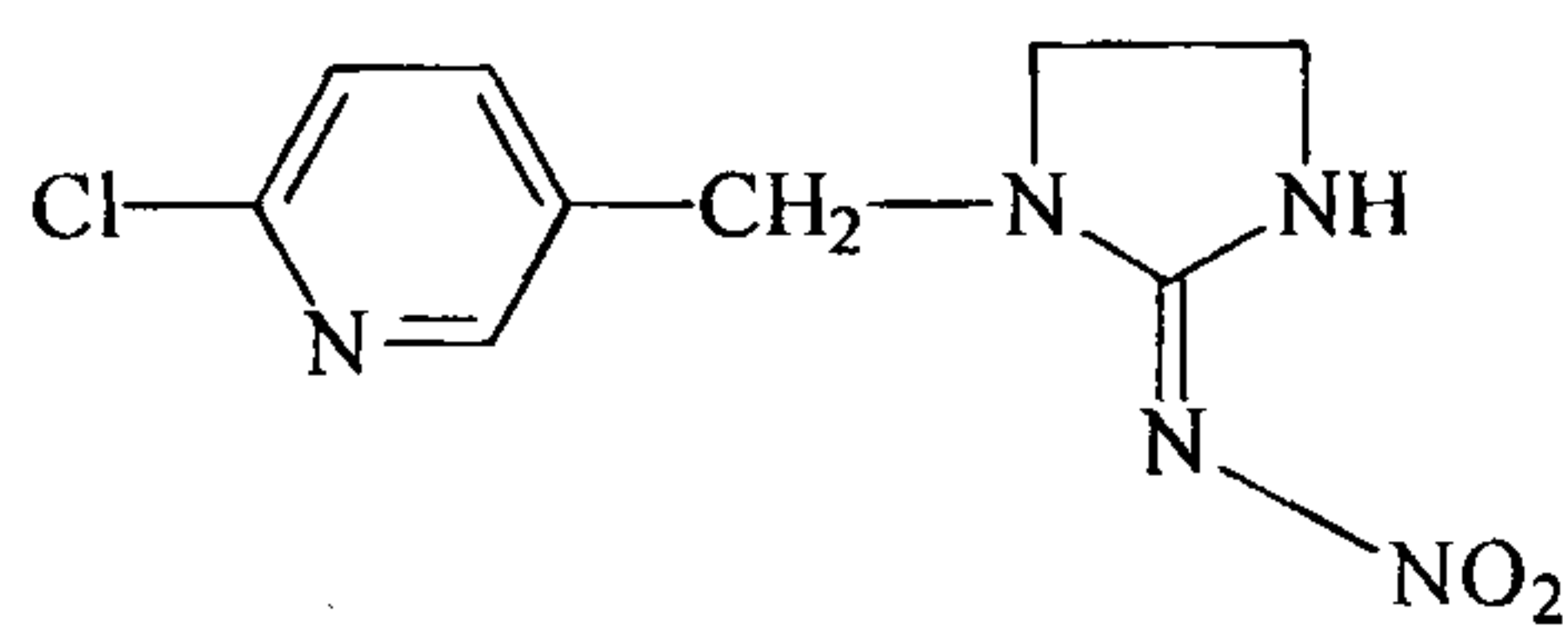
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CLAIMS:

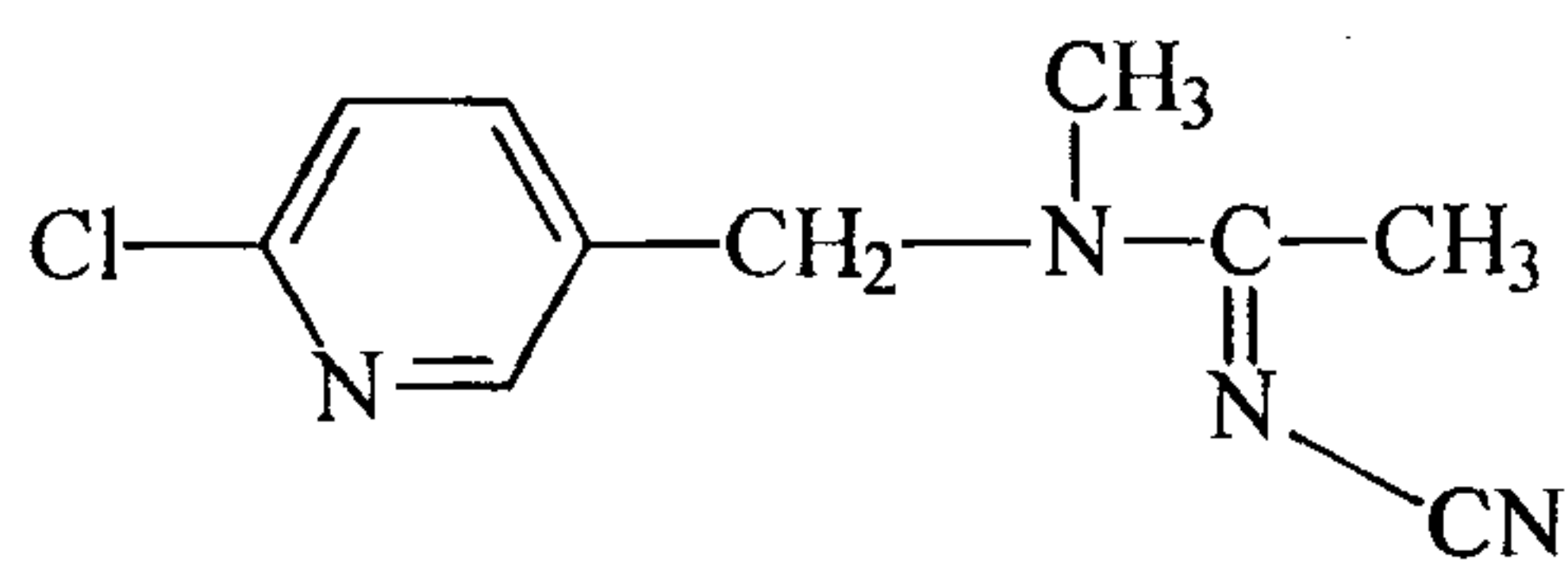
1. A composition which contains a compound selected from the group consisting of (A):

5



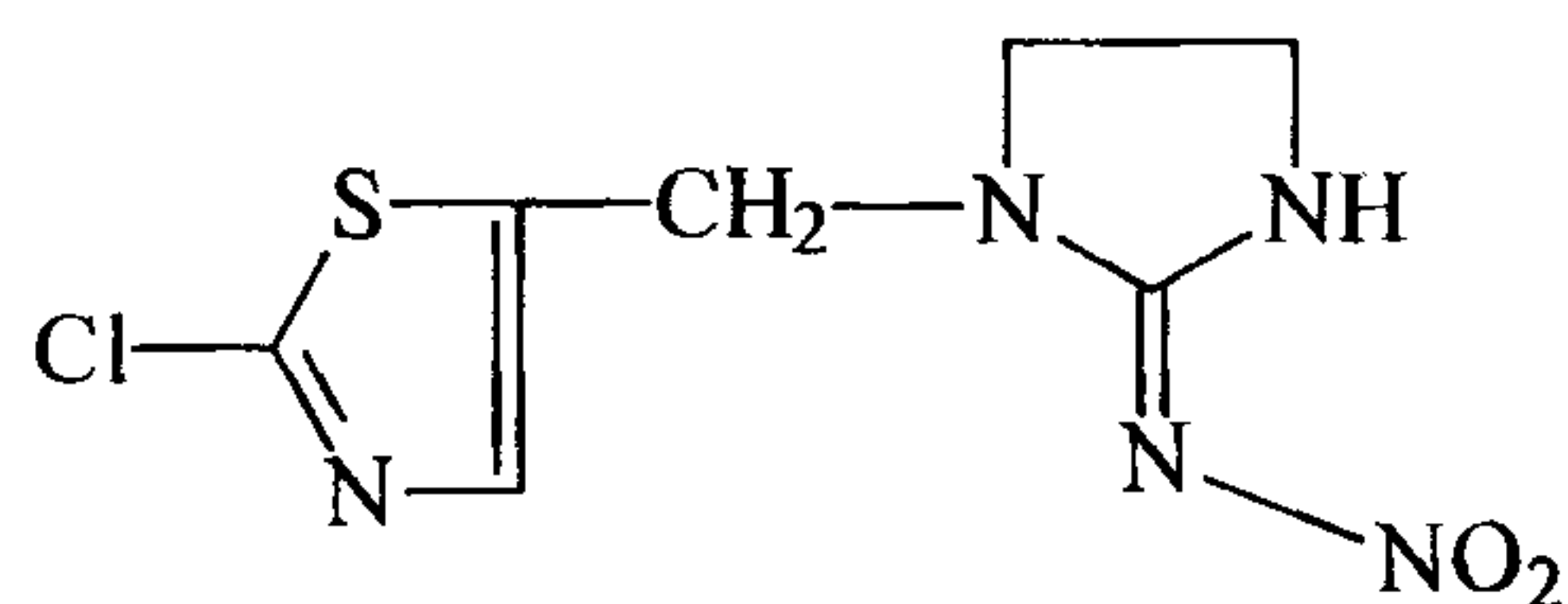
(IMIDACLOPRID),

10



(ACETAMIPRID), and

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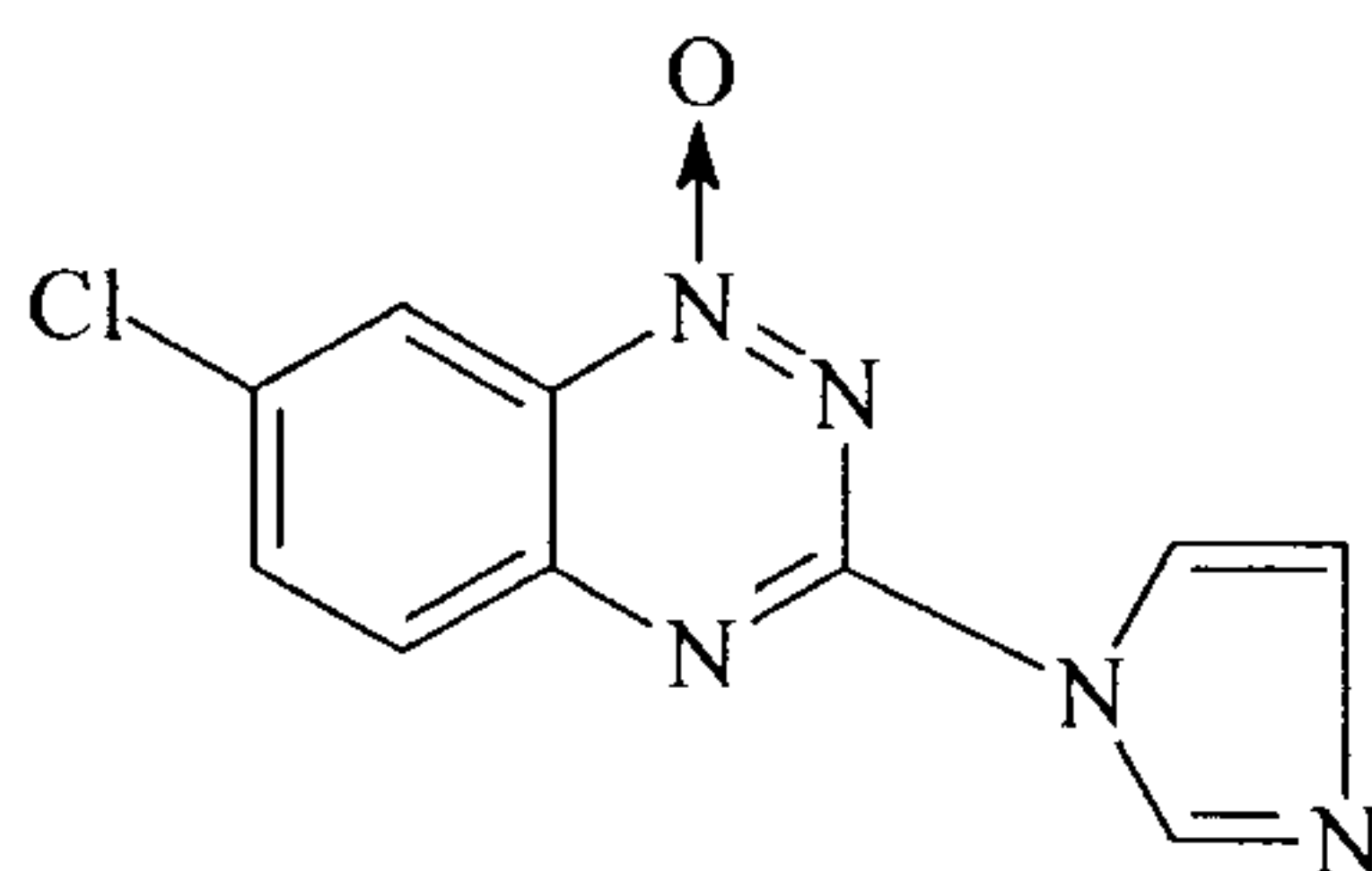
(IMIDACLOTHIZ);

and a compound selected from the group consisting of (B):

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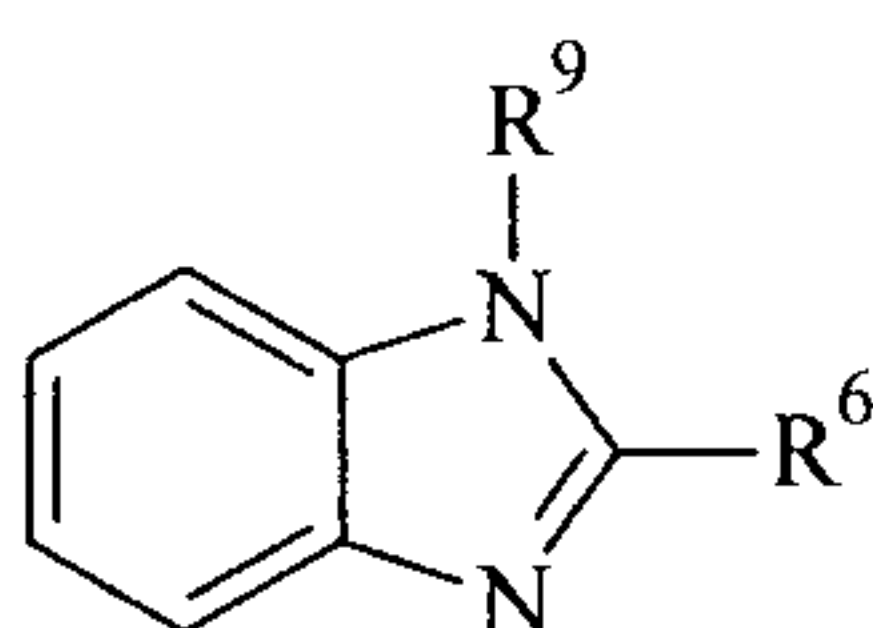
(41) the compound of the formula:



5

(TRIAZOXID), and

(44) a benzimidazole of the general formula:

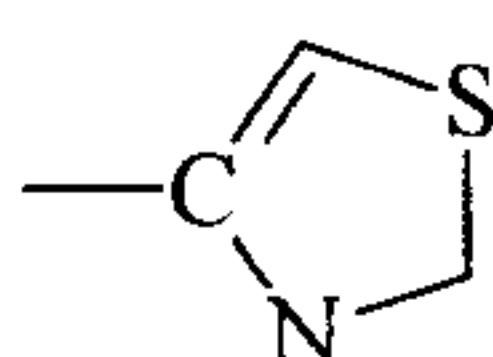


wherein:

10

 $R^9 = \text{CONHtBu}; R^6 = -\text{NHCOOMe}$

(BENOMYL),

 $R^9 = \text{H}; R^6 =$ 

(THIABENDAZOLE), or

 $R^9 = \text{H}; R^6 = -\text{NHCOOMe}$

15

(CARBENDAZIN),

wherein a compound of group (A) and a compound of group (B) are present in a synergistic amount.

2. The composition according to claim 1, which contains per part by weight of a compound of group (A), 0.1 to 10 parts by weight of a compound of group (B).

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3. A process for the control of fungi and insects, comprising applying to the fungi, insects or their habitat the composition according to claim 1 or 2.

4. Use of the composition according to claim 1 or 2, to control fungi and insects.