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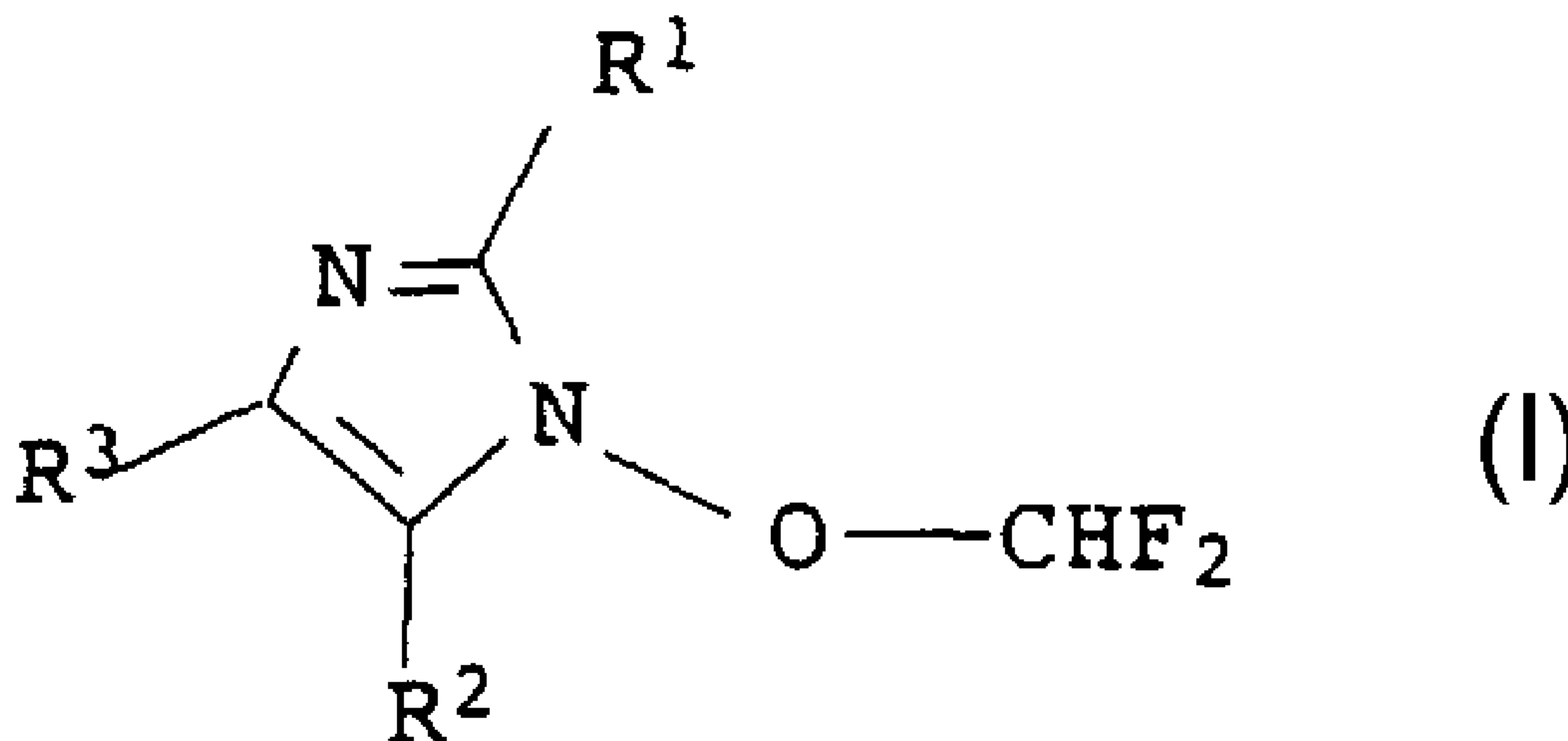
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(54) Titre : 4-ARYL-1-DIFLUOROMETHOXYIMIDAZOLE

(54) Title: 4-ARYL-1-DIFLUOROMETHOXYIMIDAZOLES AND USE THEREOF AS HERBICIDES



(57) Abrégé/Abstract:

4-Aryl-1-difluoromethoxyimidazoles of formula (I) are disclosed, where the substituents R¹ and R² have the meanings given in the description. Compounds of formula (I) are effective herbicides and can be used for the treatment of undesired plant growth. Furthermore, compounds of formula (I) are suitable for the desiccation and/or defoliation of plants, in particular, of cotton. The invention further relates to herbicidal agents and agents for desiccation and/or defoliation of plants.



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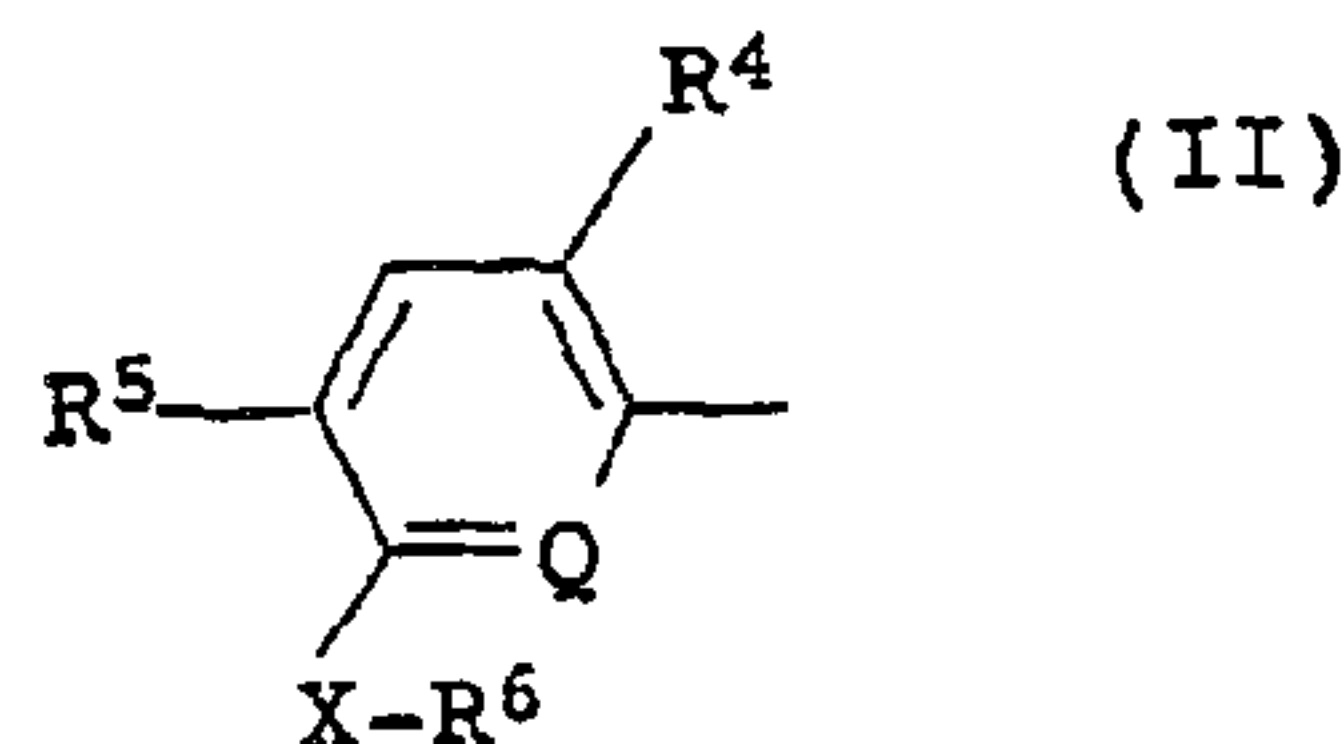
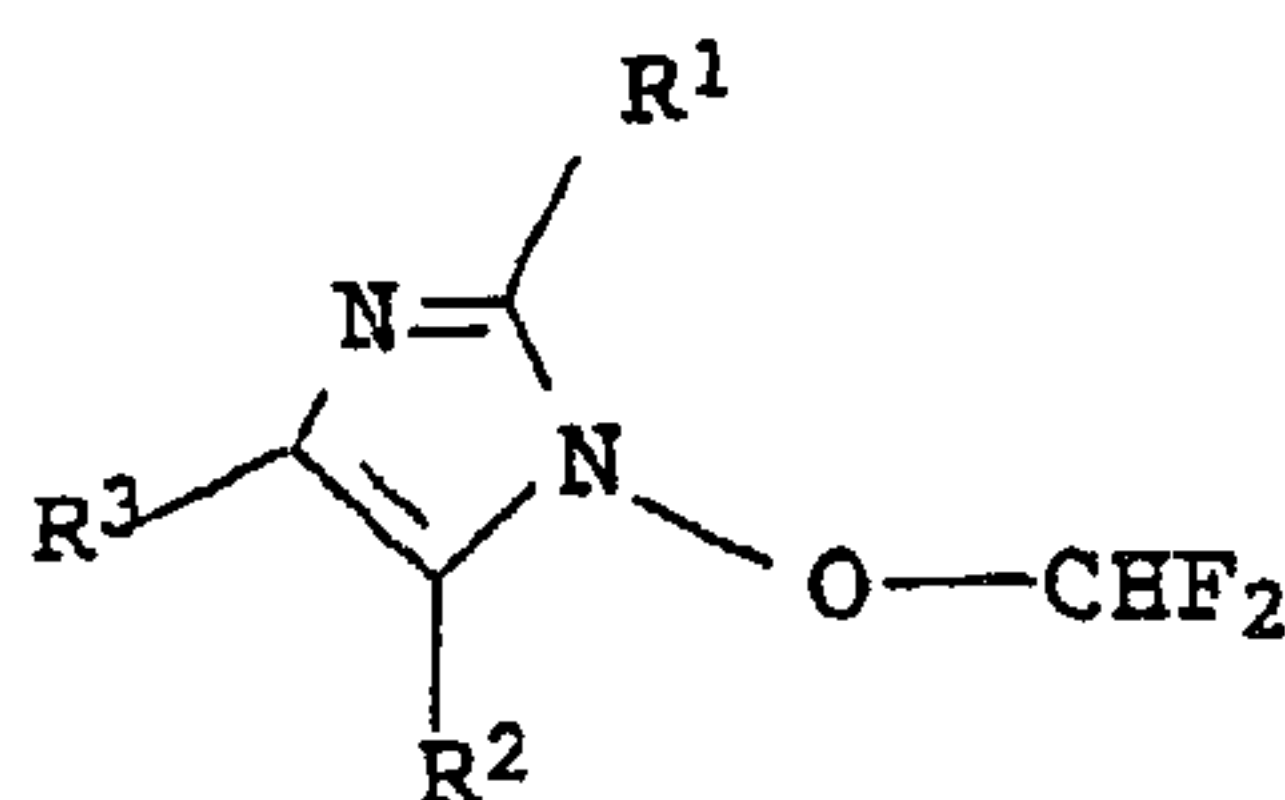
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[Fortsetzung auf der nächsten Seite]

(54) Title: 4-ARYL-1-DIFLUOROMETHOXYIMIDAZOLES AND USE THEREOF AS HERBICIDES

(54) Bezeichnung: 4-ARYL-1-DIFLUORMETHOXYIMIDAZOLE UND DEREN VERWENDUNG ALS HERBIZIDE

(57) Abstract: 4-Aryl-1-difluoromethoxyimidazoles of formula (I) are disclosed, where the substituents R¹ and R² have the meanings given in the description. Compounds of formula (I) are effective herbicides and can be used for the treatment of undesired plant growth. Furthermore, compounds of formula (I) are suitable for the desiccation and/or defoliation of plants, in particular, of cotton. The invention further relates to herbicidal agents and agents for desiccation and/or defoliation of plants.(57) Zusammenfassung: Es werden 4-Aryl-1-difluormethoxyimidazole der Formel (I) beschrieben, worin die Variablen R¹, R² und R³ die in der Beschreibung genannten Bedeutungen aufweisen. Verbindungen der Formel (I) sind wirksame Herbizide und können zur Bekämpfung von unerwünschtem Pflanzenwuchs verwendet werden. Ausserdem sind die Verbindungen I zur Desikkation und/oder Defoliation von Pflanzen, insbesondere von Baumwolle, geeignet. Die Erfindung betrifft auch Mittel zur Bekämpfung von Schadpflanzen und Mittel zur Desikkation und/oder Defoliation von Pflanzen.

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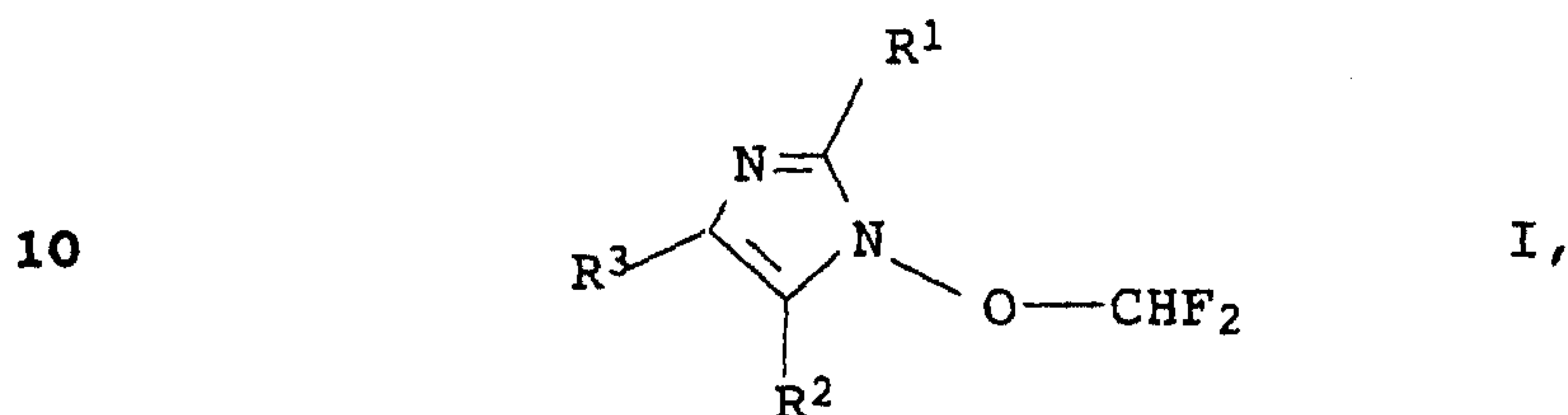
*Zur Erklärung der Zweibuchstaben-Codes und der anderen
Abkürzungen wird auf die Erklärungen ("Guidance Notes on
Codes and Abbreviations") am Anfang jeder regulären Ausgabe
der PCT-Gazette verwiesen.*

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4-Aryl-1-difluoromethoxyimidazole

The present invention relates to

5 4-aryl-1-difluoromethoxyimidazoles of the formula I



15 in which the variables R^1 , R^2 and R^3 are as defined below:

R^1 is hydrogen, C_1 - C_4 -alkyl or C_1 - C_4 -haloalkyl;

20 R^2 is hydrogen, halogen, cyano, C_1 - C_4 -alkyl or C_1 - C_4 -haloalkyl;

R^3 is a 5- or 6-membered aromatic radical which may have one, two or three heteroatoms selected from oxygen, nitrogen and sulfur, which is unsubstituted or substituted and/or may have one further fused-on 5- or 6-membered carbocyclic or
25 heterocyclic ring having 1 to 3 heteroatoms selected from nitrogen, oxygen and sulfur atoms, where the fused-on ring is partially or fully unsaturated, may be unsubstituted or may for its part carry one, two or three substituents and/or may contain one or two nonadjacent carbonyl, thiocarbonyl or
30 sulfonyl ring members,

and the agriculturally useful salts of I.

WO 91/13065, WO 97/05115, WO 96/33994, WO 94/17059 and WO
35 99/05125 disclose herbicidally active compounds having a phenyl-substituted heterocycle. Suitable heterocycles are, inter alia, substituted imidazoles.

EP 590 843 describes 4-phenylimidazoles which may have a
40 C_1 - C_{10} -alkyl, C_1 - C_6 -haloalkyl, C_3 - C_5 -alkenyl or C_3 - C_5 -alkynyl group at the imidazole nitrogen, and their use as herbicides.

Since the herbicidal properties of the prior art arylimidazoles are, with respect to the harmful plants, not always entirely
45 satisfactory, it is an object of the present invention to provide novel arylimidazoles which allow better targeted control of

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undesirable plants than hitherto. This object also extends to providing novel compounds having desiccant/defoliant action.

We have found that this object is achieved by

- 5 4-aryl-1-difluoromethoxyimidazoles which carry a difluoromethoxy group in the 1 position of the imidazole ring.

Accordingly, the present invention relates to the 4-aryl-1-difluoromethoxyimidazoles of the formula I defined at
10 the outset and their agriculturally useful salts.

Moreover, the invention relates to

- the use of compounds I and their salts as herbicides and/or for the desiccation and/or defoliation of plants,
- 15 - herbicidal compositions and compositions for the desiccation and/or defoliation of plants, which compositions comprise the compounds I and/or their salts as active substances,
- processes for preparing the compounds I and herbicidal compositions and compositions for the desiccation and/or
20 defoliation of plants using the compounds I and/or their salts, and
- methods for controlling undesirable vegetation (harmful plants) and for the desiccation and/or defoliation of plants using the compounds I and/or their salts.

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In the substituents, the compounds of the formula I may have one or more chiral centers, in which case they are present as enantiomer or diastereomer mixtures. The invention provides both the pure enantiomers or diastereomers and mixtures thereof.

30

Suitable agriculturally useful salts are, in particular, the salts of those cations or the acid addition salts of those acids whose cations or anions, respectively, do not negatively affect the herbicidal action of the compounds I. Thus, suitable cations
35 are, in particular, the ions of the alkali metals, preferably sodium and potassium, of the alkaline earth metals, preferably calcium, magnesium and barium, and of the transition metals, preferably manganese, copper, zinc and iron, and the ammonium ion which, if desired, may carry one to four C₁-C₄-alkyl substituents
40 and/or one phenyl or benzyl substituent, preferably diisopropylammonium, tetramethylammonium, tetrabutylammonium, trimethylbenzylammonium, furthermore phosphonium ions, sulfonium ions, preferably tri(C₁-C₄-alkyl)sulfonium, and sulfoxonium ions, preferably tri(C₁-C₄-alkyl)sulfoxonium.

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Anions of useful acid addition salts are primarily chloride, bromide, fluoride, hydrogen sulfate, sulfate, dihydrogen phosphate, hydrogen phosphate, phosphate, nitrate, hydrogen carbonate, carbonate, hexafluorosilicate, hexafluorophosphate, benzoate, and also the anions of C₁-C₄-alkanoic acids, preferably formate, acetate, propionate and butyrate. They can be formed by reaction of I with an acid of the corresponding anion, preferably hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid or nitric acid.

10

The organic molecule moieties mentioned in the definition of the substituents R¹, R², R⁵, R⁸ to R¹⁹ or as radicals on cycloalkyl, phenyl or heterocyclic rings or on X, Y and Z are - like the term halogen - collective terms for individual enumerations of the individual group members. All carbon chains, i.e. all alkyl, haloalkyl, phenylalkyl, cycloalkylalkyl, alkoxy, haloalkoxy, alkylthio, haloalkylthio, alkylsulfinyl, haloalkylsulfinyl, alkylsulfonyl, haloalkylsulfonyl, alkenyl, haloalkenyl, alkynyl and haloalkynyl groups and corresponding group moieties in larger groups such as alkoxycarbonyl, phenylalkyl, cycloalkylalkyl, alkoxycarbonylalkyl, etc., can be straight-chain or branched, the prefix C_n-C_m in each case denoting the possible number of carbon atoms in the group. Halogenated substituents preferably carry one, two, three, four or five identical or different halogen atoms. In each case, the term halogen denotes fluorine, chlorine, bromine or iodine.

Other examples of meanings are:

- 30 - C₁-C₄-alkyl: CH₃, C₂H₅, n-propyl, CH(CH₃)₂, n-butyl, CH(CH₃)-C₂H₅, CH₂-CH(CH₃)₂ and C(CH₃)₃;
- C₁-C₄-haloalkyl: a C₁-C₄-alkyl radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, i.e. for example CH₂F, CHF₂, CF₃, CH₂Cl, dichloromethyl, trichloromethyl, chlorofluoromethyl, dichlorofluoromethyl, chlorodifluoromethyl, 2-fluoroethyl, 2-chloroethyl, 2-bromoethyl, 2-iodoethyl, 2,2-difluoroethyl, 2,2,2-trifluoroethyl, 2-chloro-2-fluoroethyl, 2-chloro-2,2-difluoroethyl, 2,2-dichloro-2-fluoroethyl, 2,2,2-trichloroethyl, C₂F₅, 2-fluoropropyl, 3-fluoropropyl, 2,2-difluoropropyl, 2,3-difluoropropyl, 2-chloropropyl, 3-chloropropyl, 2,3-dichloropropyl, 2-bromopropyl, 3-bromopropyl, 3,3,3-trifluoropropyl, 3,3,3-trichloropropyl, 2,2,3,3,3-pentafluoropropyl, heptafluoropropyl, 1-fluoromethyl-2-fluoroethyl, 1-chloromethyl-2-chloroethyl,

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1-bromomethyl-2-bromoethyl, 4-fluorobutyl, 4-chlorobutyl, 4-bromobutyl or nonafluorobutyl;

- C₁-C₆-alkyl: C₁-C₄-alkyl as mentioned above, and also, for
5 example, n-pentyl, 1-methylbutyl, 2-methylbutyl, 3-methylbutyl, 2,2-dimethylpropyl, 1-ethylpropyl, n-hexyl, 1,1-dimethylpropyl, 1,2-dimethylpropyl, 1-methylpentyl, 2-methylpentyl, 3-methylpentyl, 4-methylpentyl, 1,1-dimethylbutyl, 1,2-dimethylbutyl, 1,3-dimethylbutyl,
10 2,2-dimethylbutyl, 2,3-dimethylbutyl, 3,3-dimethylbutyl, 1-ethylbutyl, 2-ethylbutyl, 1,1,2-trimethylpropyl, 1,2,2-trimethylpropyl, 1-ethyl-1-methylpropyl or 1-ethyl-2-methylpropyl, preferably methyl, ethyl, n-propyl, 1-methylethyl, n-butyl, 1,1-dimethylethyl, n-pentyl or
15 n-hexyl;
- C₁-C₆-haloalkyl: a C₁-C₆-alkyl radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, i.e. for example one of
20 the radicals mentioned under C₁-C₄-haloalkyl, and also 5-fluoro-1-pentyl, 5-chloro-1-pentyl, 5-bromo-1-pentyl, 5-iodo-1-pentyl, 5,5,5-trichloro-1-pentyl, undecafluoropentyl, 6-fluoro-1-hexyl, 6-chloro-1-hexyl, 6-bromo-1-hexyl, 6-iodo-1-hexyl, 6,6,6-trichloro-1-hexyl or dodecafluorohexyl;
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- phenyl-C₁-C₄-alkyl: benzyl, 1-phenylethyl, 2-phenylethyl, 1-phenylprop-1-yl, 2-phenylprop-1-yl, 3-phenylprop-1-yl, 1-phenylbut-1-yl, 2-phenylbut-1-yl, 3-phenylbut-1-yl, 4-phenylbut-1-yl, 1-phenylbut-2-yl, 2-phenylbut-2-yl,
30 3-phenylbut-2-yl, 4-phenylbut-2-yl, 1-phenylmethyleth-1-yl, 1-phenylmethyl-1-methyleth-1-yl or 1-phenylmethylprop-1-yl, preferably benzyl or 2-phenylethyl;
- heterocyclyl-C₁-C₄-alkyl: heterocyclylmethyl,
35 1-heterocyclylethyl, 2-heterocyclylethyl, 1-heterocyclylprop-1-yl, 2-heterocyclylprop-1-yl, 3-heterocyclylprop-1-yl, 1-heterocyclylbut-1-yl, 2-heterocyclylbut-1-yl, 3-heterocyclylbut-1-yl, 4-heterocyclylbut-1-yl, 1-heterocyclylbut-2-yl,
40 2-heterocyclylbut-2-yl, 3-hetero-cyclylbut-2-yl, 4-heterocyclylbut-2-yl, 1-heterocyclylmethyleth-1-yl, 1-heterocyclylmethyl-1-methyleth-1-yl or 1-heterocyclylmethylprop-1-yl, preferably heterocyclylmethyl or 2-heterocyclylethyl;
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- C₁-C₄-alkoxy: OCH₃, OC₂H₅, n-propoxy, OCH(CH₃)₂, n-butoxy, OCH(CH₃)-C₂H₅, OCH₂-CH(CH₃)₂ or OC(CH₃)₃, preferably OCH₃, OC₂H₅ or OCH(CH₃)₂;

- 5 - C₁-C₄-haloalkoxy: a C₁-C₄-alkoxy radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, i.e. for example OCH₂F, OCHF₂, OCF₃, OCH₂Cl, OCH(Cl)₂, OC(Cl)₃, chlorofluoromethoxy, dichlorofluoromethoxy, chlorodifluoromethoxy, 2-fluoroethoxy, 2-chloroethoxy, 2-bromoethoxy, 2-iodoethoxy, 2,2-difluoroethoxy, 2,2,2-trifluoroethoxy, 2-chloro-2-fluoroethoxy, 2-chloro-2,2-difluoroethoxy, 2,2-dichloro-2-fluoroethoxy, 2,2,2-trichloroethoxy, OC₂F₅, 2-fluoropropoxy, 3-fluoropropoxy, 2,2-difluoropropoxy, 2,3-difluoropropoxy, 2-chloropropoxy, 3-chloropropoxy, 2,3-dichloropropoxy, 2-bromopropoxy, 3-bromopropoxy, 3,3,3-trifluoropropoxy, 3,3,3-trichloropropoxy, 2,2,3,3,3-pentafluoropropoxy, OCF₂-C₂F₅, 1-(CH₂F)-2-fluoroethoxy, 1-(CH₂Cl)-2-chloroethoxy, 1-(CH₂Br)-2-bromoethoxy, 4-fluorobutoxy, 4-chlorobutoxy, 4-bromobutoxy or nonafluorobutoxy, preferably OCHF₂, OCF₃, dichlorofluoromethoxy, chlorodifluoromethoxy or 2,2,2-trifluoroethoxy;

- 25 - C₁-C₆-alkylthio: SCH₃, SC₂H₅, n-propylthio, SCH(CH₃)₂, n-butylthio, SCH(CH₃)-C₂H₅, SCH₂-CH(CH₃)₂ or SC(CH₃)₃, preferably SCH₃ or SC₂H₅;

- C₁-C₄-haloalkylthio: a C₁-C₄-alkylthio radical as mentioned above which is partially or fully substituted by fluorine, chlorine, bromine and/or iodine, i.e. for example SCH₂F, SCHF₂, SCH₂Cl, SCH(Cl)₂, SC(Cl)₃, SCF₃, chlorofluoromethylthio, dichlorofluoromethylthio, chlorodifluoromethylthio, 2-fluoroethylthio, 2-chloroethylthio, 2-bromoethylthio, 2-iodoethylthio, 2,2-difluoroethylthio, 2,2,2-trifluoroethylthio, 2-chloro-2-fluoroethylthio, 2-chloro-2,2-difluoroethylthio, 2,2-dichloro-2-fluoroethylthio, 2,2,2-trichloroethylthio, SC₂F₅, 2-fluoropropylthio, 3-fluoropropylthio, 2,2-difluoropropylthio, 2,3-difluoropropylthio, 2-chloropropylthio, 3-chloropropylthio, 2,3-dichloropropylthio, 2-bromopropylthio, 3-bromopropylthio, 3,3,3-trifluoropropylthio, 3,3,3-trichloropropylthio, SCH₂-C₂F₅, SCF₂-C₂F₅, 1-(CH₂F)-2-fluoroethylthio, 1-(CH₂Cl)-2-chloroethylthio, 1-(CH₂Br)-2-bromoethylthio, 4-fluorobutylthio, 4-chlorobutylthio, 4-bromobutylthio or SCF₂-CF₂-C₂F₅,

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preferably SCHF_2 , SCF_3 , dichlorofluoromethylthio, chlorodifluoromethylthio or 2,2,2-trifluoroethylthio;

- $\text{C}_1\text{-C}_4\text{-alkoxy-C}_1\text{-C}_4\text{-alkyl}$: $\text{C}_1\text{-C}_4\text{-alkyl}$ which is substituted by $\text{C}_1\text{-C}_4\text{-alkoxy}$ as mentioned above, i.e. for example $\text{CH}_2\text{-OCH}_3$, $\text{CH}_2\text{-OC}_2\text{H}_5$, n-propoxymethyl, $\text{CH}_2\text{-OCH}(\text{CH}_3)_2$, n-butoxymethyl, (1-methylpropoxy)methyl, (2-methylpropoxy)methyl, $\text{CH}_2\text{-OC}(\text{CH}_3)_3$, 2-(methoxy)ethyl, 2-(ethoxy)ethyl, 2-(n-propoxy)ethyl, 2-(1-methylethoxy)ethyl, 2-(n-butoxy)ethyl, 2-(1-methylpropoxy)ethyl, 2-(2-methylpropoxy)ethyl, 2-(1,1-dimethylethoxy)ethyl, 2-(methoxy)propyl, 2-(ethoxy)propyl, 2-(n-propoxy)propyl, 2-(1-methylethoxy)propyl, 2-(n-butoxy)propyl, 2-(1-methylpropoxy)propyl, 2-(2-methylpropoxy)propyl, 2-(1,1-dimethylethoxy)propyl, 3-(methoxy)propyl, 3-(ethoxy)propyl, 3-(n-propoxy)propyl, 3-(1-methylethoxy)propyl, 3-(n-butoxy)propyl, 3-(1-methylpropoxy)propyl, 3-(2-methylpropoxy)propyl, 3-(1,1-dimethylethoxy)propyl, 2-(methoxy)butyl, 2-(ethoxy)butyl, 2-(n-propoxy)butyl, 2-(1-methylethoxy)butyl, 2-(n-butoxy)butyl, 2-(1-methylpropoxy)butyl, 2-(2-methylpropoxy)butyl, 2-(1,1-dimethylethoxy)butyl, 3-(methoxy)butyl, 3-(ethoxy)butyl, 3-(n-propoxy)butyl, 3-(1-methylethoxy)butyl, 3-(n-butoxy)butyl, 3-(1-methylpropoxy)butyl, 3-(2-methylpropoxy)butyl, 3-(1,1-dimethylethoxy)butyl, 4-(methoxy)butyl, 4-(ethoxy)butyl, 4-(n-propoxy)butyl, 4-(1-methylethoxy)butyl, 4-(n-butoxy)butyl, 4-(1-methylpropoxy)butyl, 4-(2-methylpropoxy)butyl or 4-(1,1-dimethylethoxy)butyl, preferably $\text{CH}_2\text{-OCH}_3$, $\text{CH}_2\text{-OC}_2\text{H}_5$, 2-methoxyethyl or 2-ethoxyethyl;
- 30 - $\text{C}_1\text{-C}_4\text{-alkylthio-C}_1\text{-C}_4\text{-alkyl}$: $\text{C}_1\text{-C}_4\text{-alkyl}$ which is substituted by $\text{C}_1\text{-C}_4\text{-alkylthio}$ as mentioned above, i.e. for example $\text{CH}_2\text{-SCH}_3$, $\text{CH}_2\text{-SC}_2\text{H}_5$, n-propylthiomethyl, $\text{CH}_2\text{-SCH}(\text{CH}_3)_2$, n-butylthiomethyl, (1-methylpropylthio)methyl, (2-methylpropylthio)methyl, $\text{CH}_2\text{-SC}(\text{CH}_3)_3$, 2-(methylthio)ethyl, 2-(ethylthio)ethyl, 2-(n-propylthio)ethyl, 2-(1-methylethylthio)ethyl, 2-(n-butylthio)ethyl, 2-(1-methylpropylthio)ethyl, 2-(2-methylpropylthio)ethyl, 2-(1,1-dimethylethylthio)ethyl, 2-(methylthio)propyl, 2-(ethylthio)propyl, 2-(n-propylthio)propyl, 2-(1-methylethylthio)propyl, 2-(n-butylthio)propyl, 2-(1-methylpropylthio)propyl, 2-(2-methylpropylthio)propyl, 2-(1,1-dimethylethylthio)propyl, 3-(methylthio)propyl, 3-(ethylthio)propyl, 3-(n-propylthio)propyl, 3-(1-methylethylthio)propyl, 3-(n-butylthio)propyl, 3-(1-methylpropylthio)propyl, 3-(2-methylpropylthio)propyl, 3-(1,1-dimethylethylthio)propyl, 2-(methylthio)butyl, 2-(ethylthio)butyl, 2-(n-propylthio)butyl, 2-(1-methylethylthio)butyl,

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- 2-(n-butylthio)butyl, 2-(1-methylpropylthio)butyl,
2-(2-methylpropylthio)butyl, 2-(1,1-dimethylethylthio)butyl,
3-(methylthio)butyl, 3-(ethylthio)butyl, 3-(n-propylthio)-
butyl, 3-(1-methylethylthio)butyl, 3-(n-butylthio)butyl,
5 3-(1-methylpropylthio)butyl, 3-(2-methylpropylthio)butyl,
3-(1,1-dimethylethylthio)butyl, 4-(methylthio)butyl,
4-(ethylthio)butyl, 4-(n-propylthio)butyl, 4-(1-methyl-
ethylthio)butyl, 4-(n-butylthio)butyl, 4-(1-methylpropyl-
thio)butyl, 4-(2-methylpropylthio)butyl or 4-(1,1-dimethyl-
10 ethylthio)butyl, preferably $\text{CH}_2\text{-SCH}_3$, $\text{CH}_2\text{-SC}_2\text{H}_5$,
2-methylthioethyl or 2-ethylthioethyl;
- (C₁-C₄-alkyl)carbonyl: CO-CH_3 , $\text{CO-C}_2\text{H}_5$, $\text{CO-CH}_2\text{-C}_2\text{H}_5$,
 $\text{CO-CH(CH}_3)_2$, n-butylcarbonyl, $\text{CO-CH(CH}_3\text{)-C}_2\text{H}_5$, $\text{CO-CH}_2\text{-CH(CH}_3)_2$
15 or $\text{CO-C(CH}_3)_3$, preferably CO-CH_3 or $\text{CO-C}_2\text{H}_5$;
- (C₁-C₄-haloalkyl)carbonyl: a (C₁-C₄-alkyl)carbonyl radical as
mentioned above which is partially or fully substituted by
fluorine, chlorine, bromine and/or iodine, i.e. for example
20 $\text{CO-CH}_2\text{F}$, CO-CHF_2 , CO-CF_3 , $\text{CO-CH}_2\text{Cl}$, CO-CH(Cl)_2 , CO-C(Cl)_3 ,
chlorofluoromethylcarbonyl, dichlorofluoromethylcarbonyl,

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- O-CO-CH₂F, O-CO-CHF₂, O-CO-CF₃, O-CO-CH₂Cl, O-CO-CH(Cl)₂,
O-CO-C(Cl)₃, chlorofluoromethylcarbonyloxy,
dichlorofluoromethylcarbonyloxy,
chlorodifluoromethylcarbonyloxy, 2-fluoroethylcarbonyloxy,
5 2-chloroethylcarbonyloxy, 2-bromoethylcarbonyloxy,
2-iodoethylcarbonyloxy, 2,2-difluoroethylcarbonyloxy,
2,2,2-trifluoroethylcarbonyloxy, 2-chloro-2-fluoroethyl-
carbonyloxy, 2-chloro-2,2-difluoroethylcarbonyloxy,
2,2-dichloro-2-fluoroethylcarbonyloxy, 2,2,2-trichloroethyl-
10 carbonyloxy, O-CO-C₂F₅, 2-fluoropropylcarbonyloxy,
3-fluoropropylcarbonyloxy, 2,2-difluoropropylcarbonyloxy,
2,3-difluoropropylcarbonyloxy, 2-chloropropylcarbonyloxy,
3-chloropropylcarbonyloxy, 2,3-dichloropropylcarbonyloxy,
2-bromopropylcarbonyloxy, 3-bromopropylcarbonyloxy,
15 3,3,3-trifluoropropylcarbonyloxy, 3,3,3-trichloropropyl-
carbonyloxy, 2,2,3,3,3-pentafluoropropylcarbonyloxy,
heptafluoropropylcarbonyloxy, 1-(CH₂F)-2-fluoroethyl-
carbonyloxy, 1-(CH₂Cl)-2-chloroethylcarbonyloxy,
1-(CH₂Br)-2-bromoethylcarbonyloxy, 4-fluorobutylcarbonyloxy,
20 4-chlorobutylcarbonyloxy, 4-bromobutylcarbonyloxy or
nonafluorobutylcarbonyloxy, preferably O-CO-CF₃, O-CO-CH₂Cl.

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- 3-(n-propoxycarbonyl)propyl, 3-(1-methylethoxycarbonyl)-
propyl, 3-(n-butoxycarbonyl)propyl, 3-(1-methylpropoxy-
carbonyl)propyl, 3-(2-methylpropoxycarbonyl)propyl,
3-(1,1-dimethylethoxycarbonyl)propyl, 2-(methoxycarbonyl)-
5 butyl, 2-(ethoxycarbonyl)butyl, 2-(n-propoxycarbonyl)butyl,
2-(1-methylethoxycarbonyl)butyl, 2-(n-butoxycarbonyl)butyl,
2-(1-methylpropoxycarbonyl)butyl, 2-(2-methylpropoxy-
carbonyl)butyl, 2-(1,1-dimethylethoxycarbonyl)butyl,
3-(methoxycarbonyl)butyl, 3-(ethoxycarbonyl)butyl,
10 3-(n-propoxycarbonyl)butyl, 3-(1-methylethoxycarbonyl)butyl,
3-(n-butoxycarbonyl)butyl, 3-(1-methylpropoxycarbonyl)butyl,
3-(2-methylpropoxycarbonyl)butyl, 3-(1,1-dimethylethoxy-
carbonyl)butyl, 4-(methoxycarbonyl)butyl, 4-(ethoxy-
carbonyl)butyl, 4-(n-propoxycarbonyl)butyl, 4-(1-methyl-
15 ethoxycarbonyl)butyl, 4-(n-butoxycarbonyl)butyl, 4-(1-methyl-
propoxycarbonyl)butyl, 4-(2-methylpropoxycarbonyl)butyl or
4-(1,1-dimethylethoxycarbonyl)butyl, preferably
methoxycarbonylmethyl, ethoxycarbonylmethyl,
1-(methoxycarbonyl)ethyl or 1-(ethoxycarbonyl)ethyl;
20 - (C₁-C₄-alkoxy)carbonyl-C₁-C₄-alkoxy: C₁-C₄-alkoxy which is

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- 3-(n-butoxycarbonyl)propoxy,
 3-(1-methylpropoxycarbonyl)propoxy,
 3-(2-methylpropoxycarbonyl)propoxy,
 3-(1,1-dimethylethoxycarbonyl)propoxy,
 5 2-(methoxycarbonyl)butoxy, 2-(ethoxycarbonyl)butoxy,
 2-(n-propoxycarbonyl)butoxy,
 2-(1-methylethoxycarbonyl)butoxy, 2-(n-butoxycarbonyl)butoxy,
 2-(1-methylpropoxycarbonyl)butoxy,
 2-(2-methylpropoxycarbonyl)butoxy,
 10 2-(1,1-dimethylethoxycarbonyl)butoxy,
 3-(methoxycarbonyl)butoxy, 3-(ethoxycarbonyl)butoxy,
 3-(n-propoxycarbonyl)butoxy,
 3-(1-methylethoxycarbonyl)butoxy, 3-(n-butoxycarbonyl)butoxy,
 3-(1-methylpropoxycarbonyl)butoxy,
 15 3-(2-methylpropoxycarbonyl)butoxy,
 3-(1,1-dimethylethoxycarbonyl)butoxy,
 4-(methoxycarbonyl)butoxy, 4-(ethoxycarbonyl)butoxy,
 4-(n-propoxycarbonyl)butoxy,
 4-(1-methylethoxycarbonyl)butoxy, 4-(n-butoxycarbonyl)butoxy,
 20 4-(1-methylpropoxycarbonyl)butoxy,
 4-(2-methylpropoxycarbonyl)butyl or
 4-(1,1-dimethylethoxycarbonyl)butoxy, preferably
 methoxycarbonylmethoxy, ethoxycarbonylmethoxy,
 1-(methoxycarbonyl)ethoxy or 1-(ethoxycarbonyl)ethoxy;
 25 - (C₁-C₄-alkoxy)carbonyl-C₁-C₄-alkylthio: C₁-C₄-alkylthio which
 is substituted by (C₁-C₄-Alkoxy)carbonyl as mentioned above,
 i.e., for example, methoxycarbonylmethylthio,
 ethoxycarbonylmethylthio, n-propoxycarbonylmethylthio,
 30 (1-methylethoxycarbonyl)methylthio,
 n-butoxycarbonylmethylthio,
 (1-methylpropoxycarbonyl)methylthio,
 (2-methylpropoxycarbonyl)methylthio,
 (1,1-dimethylethoxycarbonyl)methylthio,
 35 1-(methoxycarbonyl)ethylthio, 1-(ethoxycarbonyl)ethylthio,
 1-(n-propoxycarbonyl)ethylthio,
 1-(1-methylethoxycarbonyl)ethylthio,
 1-(n-butoxycarbonyl)ethylthio, 2-(methoxycarbonyl)ethylthio,
 2-(ethoxycarbonyl)ethylthio, 2-(n-propoxycarbonyl)ethylthio,
 40 2-(1-methylethoxycarbonyl)ethylthio,
 2-(n-butoxycarbonyl)ethylthio,
 2-(1-methylpropoxycarbonyl)ethylthio,
 2-(2-methylpropoxycarbonyl)ethylthio,
 2-(1,1-dimethylethoxycarbonyl)ethylthio,
 45 2-(methoxycarbonyl)propylthio, 2-(ethoxycarbonyl)propylthio,
 2-(n-propoxycarbonyl)propylthio,
 2-(1-methylethoxycarbonyl)propylthio,

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- 2-(n-butoxycarbonyl)propylthio,
 2-(1-methylpropoxycarbonyl)propylthio,
 2-(2-methylpropoxycarbonyl)propylthio,
 2-(1,1-dimethylethoxycarbonyl)propylthio,
 5 3-(methoxycarbonyl)propylthio, 3-(ethoxycarbonyl)propylthio,
 3-(n-propoxycarbonyl)propylthio,
 3-(1-methylethoxycarbonyl)propylthio,
 3-(n-butoxycarbonyl)propylthio,
 3-(1-methylpropoxycarbonyl)propylthio,
 10 3-(2-methylpropoxycarbonyl)propylthio,
 3-(1,1-dimethylethoxycarbonyl)propylthio,
 2-(methoxycarbonyl)butylthio, 2-(ethoxycarbonyl)butylthio,
 2-(n-propoxycarbonyl)butylthio,
 2-(1-methylethoxycarbonyl)butylthio,
 15 2-(n-butoxycarbonyl)butylthio,
 2-(1-methylpropoxycarbonyl)butylthio,
 2-(2-methylpropoxycarbonyl)butylthio,
 2-(1,1-dimethylethoxycarbonyl)butylthio,
 3-(methoxycarbonyl)butylthio, 3-(ethoxycarbonyl)butylthio,
 20 3-(n-propoxycarbonyl)butylthio,
 3-(1-methylethoxycarbonyl)butylthio,
 3-(n-butoxycarbonyl)butylthio,
 3-(1-methylpropoxycarbonyl)butylthio,
 3-(2-methylpropoxycarbonyl)butylthio,
 25 3-(1,1-dimethylethoxycarbonyl)butylthio,
 4-(methoxycarbonyl)butylthio, 4-(ethoxycarbonyl)butylthio,
 4-(n-propoxycarbonyl)butylthio,
 4-(1-methylethoxycarbonyl)butylthio,
 4-(n-butoxycarbonyl)butylthio,
 30 4-(1-methylpropoxycarbonyl)butylthio,
 4-(2-methylpropoxycarbonyl)butyl or
 4-(1,1-dimethylethoxycarbonyl)butylthio, preferably
 methoxycarbonylmethylthio, ethoxycarbonylmethylthio,
 1-(methoxycarbonyl)ethylthio or 1-(ethoxycarbonyl)ethylthio;
 35 - C₁-C₄-alkylsulfinyl: SO-CH₃, SO-C₂H₅, SO-CH₂-C₂H₅, SO-CH(CH₃)₂,
 n-butylsulfinyl, SO-CH(CH₃)-C₂H₅, SO-CH₂-CH(CH₃)₂ or
 SO-C(CH₃)₃, preferably SO-CH₃ or SO-C₂H₅;
 40 - C₁-C₄-haloalkylsulfinyl: a C₁-C₄-alkylsulfinyl radical as
 mentioned above which is partially or fully substituted by
 fluorine, chlorine, bromine and/or iodine, i.e. for example
 SO-CH₂F, SO-CHF₂, SO-CF₃, SO-CH₂Cl, SO-CH(Cl)₂, SO-C(Cl)₃,
 chlorofluoromethylsulfinyl, dichlorofluoromethylsulfinyl,
 45 chlorodifluoromethylsulfinyl, 2-fluoroethylsulfinyl,
 2-chloroethylsulfinyl, 2-bromoethyl-
 sulfinyl, 2-iodoethylsulfinyl, 2,2-difluoroethylsulfinyl,

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- 2,2,2-trifluoroethylsulfinyl, 2-chloro-2-fluoroethylsulfinyl, 2-chloro-2,2-difluoroethylsulfinyl, 2,2-dichloro-2-fluoroethylsulfinyl, 2,2,2-trichloroethylsulfinyl, SO-C₂F₅, 2-fluoropropylsulfinyl, 3-fluoropropylsulfinyl, 2,2-difluoropropylsulfinyl, 2,3-difluoropropylsulfinyl, 2-chloropropylsulfinyl, 3-chloropropylsulfinyl, 2,3-dichloropropylsulfinyl, 2-bromopropylsulfinyl, 3-bromopropylsulfinyl, 3,3,3-trifluoropropylsulfinyl, 3,3,3-trichloropropylsulfinyl, SO-CH₂-C₂F₅, SO-CF₂-C₂F₅, 1-(fluoromethyl)-2-fluoroethylsulfinyl, 1-(chloromethyl)-2-chloroethylsulfinyl, 1-(bromomethyl)-2-bromoethylsulfinyl, 4-fluorobutylsulfinyl, 4-chlorobutylsulfinyl, 4-bromobutylsulfinyl or nonafluorobutylsulfinyl, preferably SO-CF₃, SO-CH₂Cl or 2,2,2-trifluoroethylsulfinyl;
- 15 - C₁-C₄-alkylsulfonyl: SO₂-CH₃, SO₂-C₂H₅, SO₂-CH₂-C₂H₅, SO₂-CH(CH₃)₂, n-butylsulfonyl, SO₂-CH(CH₃)-C₂H₅, SO₂-CH₂-CH(CH₃)₂ or SO₂-C(CH₃)₃, preferably SO₂-CH₃ or SO₂-C₂H₅;
- 20 - C₁-C₄-haloalkylsulfonyl: a C₁-C₄-alkylsulfonyl radical as mentioned above which is partially or fully substituted by

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- N-methyl-N-(1-methylethyl)amino, N-butyl-N-methylamino,
 N-methyl-N-(1-methylpropyl)amino,
 N-methyl-N-(2-methylpropyl)amino, N-(1,1-dimethylethyl)-
 N-methylamino, N-ethyl-N-propylamino, N-ethyl-N-(1-methyl-
 5 ethyl)amino, N-butyl-N-ethylamino, N-ethyl-N-(1-methyl-
 propyl)amino, N-ethyl-N-(2-methylpropyl)amino, N-ethyl-
 N-(1,1-dimethylethyl)amino, N-(1-methylethyl)-N-propylamino,
 N-butyl-N-propylamino, N-(1-methylpropyl)-N-propylamino,
 N-(2-methylpropyl)-N-propylamino, N-(1,1-dimethylethyl)-
 10 N-propylamino, N-butyl-N-(1-methylethyl)amino, N-(1-methyl-
 ethyl)-N-(1-methylpropyl)amino, N-(1-methylethyl)-
 N-(2-methylpropyl)amino, N-(1,1-dimethylethyl)-
 N-(1-methylethyl)amino, N-butyl-N-(1-methylpropyl)amino,
 N-butyl-N-(2-methylpropyl)amino, N-butyl-N-(1,1-dimethyl-
 15 ethyl)amino, N-(1-methylpropyl)-N-(2-methylpropyl)amino,
 N-(1,1-dimethylethyl)-N-(1-methylpropyl)amino or
 N-(1,1-dimethylethyl)-N-(2-methylpropyl)amino, preferably
 N(CH₃)₂ or N(C₂H₅);
- 20 - Di(C₁-C₄-alkyl)aminocarbonyl: for example
 N,N-dimethylaminocarbonyl, N,N-diethylaminocarbonyl,
 N,N-di-(1-methylethyl)aminocarbonyl,
 N,N-dipropylaminocarbonyl, N,N-dibutylaminocarbonyl,
 N,N-di-(1-methylpropyl)aminocarbonyl,
 25 N,N-di-(2-methylpropyl)aminocarbonyl,
 N,N-di-(1,1-dimethylethyl)aminocarbonyl,
 N-ethyl-N-methylaminocarbonyl,
 N-methyl-N-propylaminocarbonyl,
 N-methyl-N-(1-methylethyl)aminocarbonyl,
 30 N-butyl-N-methylaminocarbonyl,
 N-methyl-N-(1-methylpropyl)aminocarbonyl,
 N-methyl-N-(2-methylpropyl)aminocarbonyl,
 N-(1,1-dimethylethyl)-N-methylaminocarbonyl,
 N-ethyl-N-propylaminocarbonyl,
 35 N-ethyl-N-(1-methylethyl)aminocarbonyl,
 N-butyl-N-ethylaminocarbonyl,
 N-ethyl-N-(1-methylpropyl)aminocarbonyl,
 N-ethyl-N-(2-methylpropyl)aminocarbonyl,
 N-ethyl-N-(1,1-dimethylethyl)aminocarbonyl,
 40 N-(1-methylethyl)-N-propylaminocarbonyl,
 N-butyl-N-propylaminocarbonyl,
 N-(1-methylpropyl)-N-propylaminocarbonyl,
 N-(2-methylpropyl)-N-propylaminocarbonyl,
 N-(1,1-dimethylethyl)-N-propylaminocarbonyl,
 45 N-butyl-N-(1-methylethyl)aminocarbonyl,
 N-(1-methylethyl)-N-(1-methylpropyl)aminocarbonyl,
 N-(1-methylethyl)-N-(2-methylpropyl)aminocarbonyl,

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- N-(1,1-dimethylethyl)-N-(1-methylethyl)aminocarbonyl,
 N-butyl-N-(1-methylpropyl)aminocarbonyl,
 N-butyl-N-(2-methylpropyl)aminocarbonyl,
 N-butyl-N-(1,1-dimethylethyl)aminocarbonyl,
 5 N-(1-methylpropyl)-N-(2-methylpropyl)aminocarbonyl,
 N-(1,1-dimethylethyl)-N-(1-methylpropyl)aminocarbonyl or
 N-(1,1-dimethylethyl)-N-(2-methylpropyl)aminocarbonyl;
- 10 - Di(C₁-C₄-alkyl)aminocarbonyl-C₁-C₄-alkyl: C₁-C₄-alkyl which is
 monosubstituted by di(C₁-C₄-alkyl)aminocarbonyl, for example
 di(C₁-C₄-alkyl)aminocarbonylmethyl, 1- or
 2-di(C₁-C₄-alkyl)aminocarbonylethyl, 1-, 2- or
 3-di(C₁-C₄-alkyl)aminocarbonylpropyl;
- 15 - Di(C₁-C₄-alkyl)aminocarbonyl-C₁-C₄-alkoxy: C₁-C₄-alkoxy which
 is monosubstituted by di(C₁-C₄-alkyl)aminocarbonyl, for
 example di(C₁-C₄-alkyl)aminocarbonylmethoxy, 1- or
 2-di(C₁-C₄-alkyl)aminocarbonylethoxy, 1-, 2- or
 3-di(C₁-C₄-alkyl)aminocarbonylpropoxy;
- 20 - Di(C₁-C₄-alkyl)aminocarbonyl-C₁-C₄-alkylthio: C₁-C₄-alkylthio
 which is monosubstituted by di(C₁-C₄-alkyl)aminocarbonyl, for
 example di(C₁-C₄-alkyl)aminocarbonylmethylthio, 1- or
 2-di(C₁-C₄-alkyl)aminocarbonylethylthio, 1-, 2- or
 25 3-di(C₁-C₄-alkyl)aminocarbonylpropylthio;
- C₂-C₆-alkenyl: vinyl, prop-1-en-1-yl, allyl, 1-methylethenyl,
 1-buten-1-yl, 1-buten-2-yl, 1-buten-3-yl, 2-buten-1-yl,
 1-methylprop-1-en-1-yl, 2-methylprop-1-en-1-yl, 1-methyl-
 30 prop-2-en-1-yl, 2-methylprop-2-en-1-yl, n-penten-1-yl,
 n-penten-2-yl, n-penten-3-yl, n-penten-4-yl, 1-methyl-
 but-1-en-1-yl, 2-methylbut-1-en-1-yl, 3-methylbut-1-en-1-yl,
 1-methylbut-2-en-1-yl, 2-methylbut-2-en-1-yl, 3-methyl-
 but-2-en-1-yl, 1-methylbut-3-en-1-yl, 2-methylbut-3-en-1-yl,
 35 3-methylbut-3-en-1-yl, 1,1-dimethylprop-2-en-1-yl,
 1,2-dimethylprop-1-en-1-yl, 1,2-dimethylprop-2-en-1-yl,
 1-ethylprop-1-en-2-yl, 1-ethylprop-2-en-1-yl, n-hex-1-en-
 1-yl, n-hex-2-en-1-yl, n-hex-3-en-1-yl, n-hex-4-en-1-yl,
 n-hex-5-en-1-yl, 1-methylpent-1-en-1-yl, 2-methylpent-1-en-
 1-yl, 3-methylpent-1-en-1-yl, 4-methylpent-1-en-1-yl,
 40 1-methylpent-2-en-1-yl, 2-methylpent-2-en-1-yl, 3-methyl-
 pent-2-en-1-yl, 4-methylpent-2-en-1-yl, 1-methylpent-3-en-
 1-yl, 2-methylpent-3-en-1-yl, 3-methylpent-3-en-1-yl,
 4-methylpent-3-en-1-yl, 1-methylpent-4-en-1-yl, 2-methyl-
 45 pent-4-en-1-yl, 3-methylpent-4-en-1-yl, 4-methylpent-4-en-
 1-yl, 1,1-dimethylbut-2-en-1-yl, 1,1-dimethylbut-3-en-1-yl,
 1,2-dimethylbut-1-en-1-yl, 1,2-dimethylbut-2-en-1-yl,

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- 1,2-dimethylbut-3-en-1-yl, 1,3-dimethylbut-1-en-1-yl,
1,3-dimethylbut-2-en-1-yl, 1,3-dimethylbut-3-en-1-yl,
2,2-dimethylbut-3-en-1-yl, 2,3-dimethylbut-1-en-1-yl,
2,3-dimethylbut-2-en-1-yl, 2,3-dimethylbut-3-en-1-yl,
5 3,3-dimethylbut-1-en-1-yl, 3,3-dimethylbut-2-en-1-yl,
1-ethylbut-1-en-1-yl, 1-ethylbut-2-en-1-yl, 1-ethyl-
but-3-en-1-yl, 2-ethylbut-1-en-1-yl, 2-ethylbut-2-en-1-yl,
2-ethylbut-3-en-1-yl, 1,1,2-trimethylprop-2-en-1-yl,
1-ethyl-1-methylprop-2-en-1-yl, 1-ethyl-2-methylprop-1-en-
10 1-yl or 1-ethyl-2-methylprop-2-en-1-yl;
- C₂-C₆-haloalkenyl: C₂-C₆-alkenyl as mentioned above which is
partially or fully substituted by fluorine, chlorine and/or
bromine, i.e. for example 2-chlorovinyl, 2-chloroallyl,
15 3-chloroallyl, 2,3-dichloroallyl, 3,3-dichloroallyl,
2,3,3-trichloroallyl, 2,3-dichlorobut-2-enyl, 2-bromoallyl,
3-bromoallyl, 2,3-dibromoallyl, 3,3-dibromoallyl,
2,3,3-tribromoallyl and 2,3-dibromobut-2-enyl, preferably C₃-
or C₄-haloalkenyl;
- 20 - C₂-C₆-alkynyl: ethynyl and C₃-C₆-alkynyl, such as
prop-1-yn-1-yl, prop-2-yn-1-yl, n-but-1-yn-1-yl,
n-but-1-yn-3-yl, n-but-1-yn-4-yl, n-but-2-yn-1-yl,
n-pent-1-yn-1-yl, n-pent-1-yn-3-yl, n-pent-1-yn-4-yl,
25 n-pent-1-yn-5-yl, n-pent-2-yn-1-yl, n-pent-2-yn-4-yl,
n-pent-2-yn-5-yl, 3-methylbut-1-yn-3-yl,
3-methylbut-1-yn-4-yl, n-hex-1-yn-1-yl, n-hex-1-yn-3-yl,
n-hex-1-yn-4-yl, n-hex-1-yn-5-yl, n-hex-1-yn-6-yl,
n-hex-2-yn-1-yl, n-hex-2-yn-4-yl, n-hex-2-yn-5-yl,
30 n-hex-2-yn-6-yl, n-hex-3-yn-1-yl, n-hex-3-yn-2-yl,
3-methylpent-1-yn-1-yl, 3-methylpent-1-yn-3-yl,
3-methylpent-1-yn-4-yl, 3-methylpent-1-yn-5-yl,
4-methylpent-1-yn-1-yl, 4-methylpent-2-yn-4-yl or
4-methylpent-2-yn-5-yl, preferably prop-2-yn-1-yl;
- 35 - C₂-C₆-haloalkynyl: C₂-C₆-alkynyl as mentioned above which is
partially or fully substituted by fluorine, chlorine and/or
bromine, i.e. for example 1,1-difluoroprop-2-yn-1-yl,
1,1-difluorobut-2-yn-1-yl, 4-fluorobut-2-yn-1-yl,
40 4-chlorobut-2-yn-1-yl, 5-fluoropent-3-yn-1-yl or
6-fluorohex-4-yn-1-yl, preferably C₃- or C₄-haloalkynyl;
- C₃-C₈-cycloalkyl: cyclopropyl, cyclobutyl, cyclopentyl,
cyclohexyl, cycloheptyl or cyclooctyl;
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- C₃-C₈-cycloalkyl containing a carbonyl or thiocarbonyl ring member: for example cyclobutanon-2-yl, cyclobutanon-3-yl, cyclopentanon-2-yl, cyclopentanon-3-yl, cyclohexanon-2-yl, cyclohexanon-4-yl, cycloheptanon-2-yl, cyclooctanon-2-yl, cyclobutanethion-2-yl, cyclobutanethion-3-yl, cyclopentanethion-2-yl, cyclopentanethion-3-yl, cyclohexanethion-2-yl, cyclohexanethion-4-yl, cycloheptanethion-2-yl or cyclooctanethion-2-yl, preferably cyclopentanon-2-yl or cyclohexanon-2-yl;
- C₃-C₈-cycloalkyl-C₁-C₄-alkyl: cyclopropylmethyl, 1-cyclopropylethyl, 2-cyclopropylethyl, 1-cyclopropylprop-1-yl, 2-cyclopropylprop-1-yl, 3-cyclopropylprop-1-yl, 1-cyclopropylbut-1-yl, 2-cyclopropylbut-1-yl, 3-cyclopropylbut-1-yl, 4-cyclopropylbut-1-yl, 1-cyclopropylbut-2-yl, 2-cyclopropylbut-2-yl, 3-cyclopropylbut-2-yl, 4-cyclopropylbut-2-yl, 1-(cyclopropylmethyl)eth-1-yl, 1-(cyclopropylmethyl)-1-(methyl)eth-1-yl, 1-(cyclopropylmethyl)prop-1-yl, cyclobutylmethyl, 1-cyclobutylethyl, 2-cyclobutylethyl, 1-cyclobutylprop-1-yl, 2-cyclobutylprop-1-yl, 3-cyclobutylprop-1-yl, 1-cyclobutylbut-1-yl, 2-cyclobutylbut-1-yl, 3-cyclobutylbut-1-yl, 4-cyclobutylbut-1-yl, 1-cyclobutylbut-2-yl, 2-cyclobutylbut-2-yl, 3-cyclobutylbut-2-yl, 4-cyclobutylbut-2-yl, 1-(cyclobutylmethyl)eth-1-yl, 1-(cyclobutylmethyl)-1-(methyl)eth-1-yl, 1-(cyclobutylmethyl)prop-1-yl, cyclopentylmethyl, 1-cyclopentylethyl, 2-cyclopentylethyl, 1-cyclopentylprop-1-yl, 2-cyclopentylprop-1-yl, 3-cyclopentylprop-1-yl, 1-cyclopentylbut-1-yl, 2-cyclopentylbut-1-yl, 3-cyclopentylbut-1-yl, 4-cyclopentylbut-1-yl, 1-cyclopentylbut-2-yl, 2-cyclopentylbut-2-yl, 3-cyclopentylbut-2-yl, 4-cyclopentylbut-2-yl, 1-(cyclopentylmethyl)eth-1-yl, 1-(cyclopentylmethyl)-1-(methyl)eth-1-yl, 1-(cyclopentylmethyl)prop-1-yl, cyclohexylmethyl, 1-cyclohexylethyl, 2-cyclohexylethyl, 1-cyclohexylprop-1-yl, 2-cyclohexylprop-1-yl, 3-cyclohexylprop-1-yl, 1-cyclohexylbut-1-yl, 2-cyclohexylbut-1-yl, 3-cyclohexylbut-1-yl, 4-cyclohexylbut-1-yl, 1-cyclohexylbut-2-yl, 2-cyclohexylbut-2-yl, 3-cyclohexylbut-2-yl, 4-cyclohexylbut-2-yl, 1-(cyclohexylmethyl)eth-1-yl, 1-(cyclohexylmethyl)-1-(methyl)eth-1-yl, 1-(cyclohexylmethyl)prop-1-yl, cycloheptylmethyl,

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- 1-cycloheptylethyl, 2-cycloheptylethyl,
 1-cycloheptylprop-1-yl, 2-cycloheptylprop-1-yl,
 3-cycloheptylprop-1-yl, 1-cycloheptylbut-1-yl,
 2-cycloheptylbut-1-yl, 3-cycloheptylbut-1-yl,
 5 4-cycloheptylbut-1-yl, 1-cycloheptylbut-2-yl,
 2-cycloheptylbut-2-yl, 3-cycloheptylbut-2-yl,
 4-cycloheptylbut-2-yl, 1-(cycloheptylmethyl)eth-1-yl,
 1-(cycloheptylmethyl)-1-(methyl)eth-1-yl,
 1-(cycloheptylmethyl)prop-1-yl, cyclooctylmethyl,
 10 1-cyclooctylethyl, 2-cyclooctylethyl, 1-cyclooctylprop-1-yl,
 2-cyclooctylprop-1-yl, 3-cyclooctylprop-1-yl,
 1-cyclooctylbut-1-yl, 2-cyclooctylbut-1-yl,
 3-cyclooctylbut-1-yl, 4-cyclooctylbut-1-yl,
 1-cyclooctylbut-2-yl, 2-cyclooctylbut-2-yl,
 15 3-cyclooctylbut-2-yl, 4-cyclooctylbut-2-yl,
 1-(cyclooctylmethyl)eth-1-yl,
 1-(cyclooctylmethyl)-1-(methyl)eth-1-yl or
 1-(cyclooctylmethyl)prop-1-yl, preferably cyclopropylmethyl,
 cyclobutylmethyl, cyclopentylmethyl or cyclohexylmethyl;
 20 - C₃-C₈-cycloalkyl-C₁-C₄-alkyl containing a carbonyl or
 thiocarbonyl ring member: for example cyclobutanon-2-yl-
 methyl, cyclobutanon-3-ylmethyl, cyclopentanon-2-ylmethyl,
 cyclopentanon-3-ylmethyl, cyclohexanon-2-ylmethyl,
 25 cyclohexanon-4-ylmethyl, cycloheptanon-2-ylmethyl,
 cyclooctanon-2-ylmethyl, cyclobutanethion-2-ylmethyl,
 cyclobutanethion-3-ylmethyl, cyclopentanethion-2-ylmethyl,
 cyclopentanethion-3-ylmethyl, cyclohexanethion-2-ylmethyl,
 cyclohexanethion-4-ylmethyl, cycloheptanethion-2-ylmethyl,
 30 cyclooctanethion-2-ylmethyl, 1-(cyclobutanon-2-yl)ethyl,
 1-(cyclobutanon-3-yl)ethyl, 1-(cyclopentanon-2-yl)ethyl,
 1-(cyclopentanon-3-yl)ethyl, 1-(cyclohexanon-2-yl)ethyl,
 1-(cyclohexanon-4-yl)ethyl, 1-(cycloheptanon-2-yl)ethyl,
 1-(cyclooctanon-2-yl)ethyl, 1-(cyclobutanethion-2-yl)ethyl,
 35 1-(cyclobutanethion-3-yl)ethyl, 1-(cyclopentanethion-2-yl)-
 ethyl, 1-(cyclopentanethion-3-yl)ethyl, 1-(cyclohexane-
 thion-2-yl)ethyl, 1-(cyclohexanethion-4-yl)ethyl, 1-(cyclo-
 heptanethion-2-yl)ethyl, 1-(cyclooctanethion-2-yl)ethyl,
 2-(cyclobutanon-2-yl)ethyl, 2-(cyclobutanon-3-yl)ethyl,
 40 2-(cyclopentanon-2-yl)ethyl, 2-(cyclopentanon-3-yl)ethyl,
 2-(cyclohexanon-2-yl)ethyl, 2-(cyclohexanon-4-yl)ethyl,
 2-(cycloheptanon-2-yl)ethyl, 2-(cyclooctanon-2-yl)ethyl,
 2-(cyclobutanethion-2-yl)ethyl, 2-(cyclobutanethion-
 3-yl)ethyl, 2-(cyclopentanethion-2-yl)ethyl,
 45 2-(cyclopentanethion-3-yl)-ethyl, 2-(cyclohexanethion-
 2-yl)ethyl, 2-(cyclohexanethion-4-yl)ethyl,
 2-(cycloheptanethion-2-yl)ethyl, 2-(cyclooctanethion-2-

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- yl)ethyl, 3-(cyclobutanon-2-yl)propyl, 3-(cyclobutanon-3-yl)propyl, 3-(cyclopentanon-2-yl)propyl, 3-(cyclopentanon-3-yl)propyl, 3-(cyclohexanon-2-yl)propyl, 3-(cyclohexanon-4-yl)propyl, 3-(cycloheptanon-2-yl)propyl, 3-(cyclooctanon-2-yl)propyl, 3-(cyclobutanethion-2-yl)propyl, 3-(cyclobutanethion-3-yl)propyl, 3-(cyclopentanethion-2-yl)propyl, 3-(cyclopentanethion-3-yl)propyl, 3-(cyclohexanethion-2-yl)propyl, 3-(cyclohexanethion-4-yl)propyl, 3-(cycloheptanethion-2-yl)propyl, 3-(cyclooctanethion-2-yl)propyl, 4-(cyclobutanon-2-yl)butyl, 4-(cyclobutanon-3-yl)butyl, 4-(cyclopentanon-2-yl)butyl, 4-(cyclopentanon-3-yl)butyl, 4-(cyclohexanon-2-yl)butyl, 4-(cyclohexanon-4-yl)butyl, 4-(cycloheptanon-2-yl)butyl, 4-(cyclooctanon-2-yl)butyl, 4-(cyclobutanethion-2-yl)butyl, 4-(cyclobutanethion-3-yl)butyl, 4-(cyclopentanethion-2-yl)butyl, 4-(cyclopentanethion-3-yl)butyl, 4-(cyclohexanethion-2-yl)butyl, 4-(cyclohexanethion-4-yl)butyl, 4-(cycloheptanethion-2-yl)butyl or 4-(cyclooctanethion-2-yl)butyl, preferably cyclopentanon-2-ylmethyl, cyclohexanon-2-ylmethyl, 2-(cyclopentanon-2-yl)ethyl or 2-(cyclohexanon-2-yl)ethyl.

3- to 7-membered heterocyclyl is a saturated, partially or fully unsaturated or aromatic heterocycle having one to three heteroatoms selected from a group consisting of nitrogen atoms, oxygen atoms and sulfur atoms.

Examples of saturated heterocycles containing a carbonyl or thiocarbonyl ring member are:

- oxiranyl, thiranyl, aziridin-1-yl, aziridin-2-yl, diaziridin-1-yl, diaziridin-3-yl, oxetan-2-yl, oxetan-3-yl, thietan-2-yl, thietan-3-yl, azetidin-1-yl, azetidin-2-yl, azetidin-3-yl, tetrahydrofuran-2-yl, tetrahydrofuran-3-yl, tetrahydrothiophen-2-yl, tetrahydrothiophen-3-yl, pyrrolidin-1-yl, pyrrolidin-2-yl, pyrrolidin-3-yl, 1,3-dioxolan-2-yl, 1,3-dioxolan-4-yl, 1,3-oxathiolan-2-yl, 1,3-oxathiolan-4-yl, 1,3-oxathiolan-5-yl, 1,3-oxazolidin-2-yl, 1,3-oxazolidin-3-yl, 1,3-oxazolidin-4-yl, 1,3-oxazolidin-5-yl, 1,2-oxazolidin-2-yl, 1,2-oxazolidin-3-yl, 1,2-oxazolidin-4-yl, 1,2-oxazolidin-5-yl, 1,3-dithiolan-2-yl, 1,3-dithiolan-4-yl, pyrrolidin-1-yl, pyrrolidin-2-yl, pyrrolidin-5-yl, tetrahydropyrazol-1-yl, tetrahydropyrazol-3-yl, tetrahydropyrazol-4-yl, tetrahydropyran-2-yl, tetrahydropyran-3-yl, tetrahydropyran-4-yl, tetrahydrothiopyran-2-yl, tetrahydrothiopyran-3-yl, tetrahydropyran-4-yl, piperidin-1-yl, piperidin-2-yl, piperidin-3-yl, piperidin-4-yl, 1,3-dioxan-2-yl, 1,3-dioxan-4-yl, 1,3-dioxan-5-yl, 1,4-dioxan-2-yl, 1,3-oxathian-2-yl, 1,3-oxathian-4-yl, 1,3-oxathian-5-yl, 1,3-oxathian-6-yl, 1,4-oxathian-2-yl,

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1,4-oxathian-3-yl, morpholin-2-yl, morpholin-3-yl, morpholin-4-yl, hexahydropyridazin-1-yl, hexahydropyridazin-3-yl, hexahydropyridazin-4-yl, hexahydropyrimidin-1-yl, hexahydropyrimidin-2-yl, hexahydropyrimidin-4-yl, 5 hexahydropyrimidin-5-yl, piperazin-1-yl, piperazin-2-yl, piperazin-3-yl, hexahydro-1,3,5-triazin-1-yl, hexahydro-1,3,5-triazin-2-yl, oxepan-2-yl, oxepan-3-yl, oxepan-4-yl, thiepan-2-yl, thiepan-3-yl, thiepan-4-yl, 1,3-dioxepan-2-yl, 1,3-dioxepan-4-yl, 1,3-dioxepan-5-yl, 1,3-dioxepan-6-yl, 10 1,3-dithiepan-2-yl, 1,4-dioxepan-2-yl, 1,4-dioxepan-7-yl, hexahydroazepin-1-yl, hexahydroazepin-2-yl, hexahydroazepin-3-yl, hexahydroazepin-4-yl, hexahydro-1,3-diazepin-1-yl, hexahydro-1,3-diazepin-2-yl, hexahydro-1,3-diazepin-4-yl, hexahydro-1,4-diazepin-1-yl and hexahydro-1,4-diazepin-2-yl.

15

Examples of unsaturated heterocycles containing a carbonyl or thiocarbonyl ring member are:

dihydrofuran-2-yl, 1,2-oxazolin-3-yl, 1,2-oxazolin-5-yl, 1,3-oxazolin-2-yl.

20

Examples of aromatic heterocyclyl are the 5- and 6-membered aromatic heterocyclic radicals, for example furyl, such as 2-furyl and 3-furyl, thienyl, such as 2-thienyl and 3-thienyl, pyrrolyl, such as 2-pyrrolyl and 3-pyrrolyl, isoxazolyl, such as 25 3-isoxazolyl, 4-isoxazolyl and 5-isoxazolyl, isothiazolyl, such as 3-isothiazolyl, 4-isothiazolyl and 5-isothiazolyl, pyrazolyl, such as 3-pyrazolyl, 4-pyrazolyl and 5-pyrazolyl, oxazolyl, such as 2-oxazolyl, 4-oxazolyl and 5-oxazolyl, thiazolyl, such as 2-thiazolyl, 4-thiazolyl and 5-thiazolyl, imidazolyl, such as 30 2-imidazolyl and 4-imidazolyl, oxadiazolyl, such as 1,2,4-oxadiazol-3-yl, 1,2,4-oxadiazol-5-yl and 1,3,4-oxadiazol-2-yl, thiadiazolyl, such as 1,2,4-thiadiazol-3-yl, 1,2,4-thiadiazol-5-yl and 1,3,4-thiadiazol-2-yl, triazolyl, such as 1,2,4-triazol-1-yl, 1,2,4-triazol-3-yl and 1,2,4-triazol-35 4-yl, pyridinyl, such as 2-pyridinyl, 3-pyridinyl and 4-pyridinyl, pyridazinyl, such as 3-pyridazinyl and 4-pyridazinyl, pyrimidinyl, such as 2-pyrimidinyl, 4-pyrimidinyl and 5-pyrimidinyl, and furthermore 2-pyrazinyl, 1,3,5-triazin-2-yl and 1,2,4-triazin-3-yl, in particular pyridyl, pyrimidyl, 40 furanyl and thienyl.

In the context of the present invention, 5- or 6-membered aromatic radicals are phenyl and the abovementioned 5- or 6-membered aromatic heterocyclyl radicals, in particular phenyl 45 or pyridyl, for example 2-pyridyl. According to the invention, these radicals can be substituted and/or have a fused-on, 5- or 6-membered carbocyclic or heterocyclic ring with 1 to 3

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heteroatoms selected from the group consisting of nitrogen, oxygen and sulfur atoms, where the fused-on ring is partially or fully unsaturated and may be unsubstituted or may for its part carry one, two or three substituents or else contain one or two
5 nonadjacent carbonyl, thiocarbonyl or sulfonyl ring members. Examples of suitable substituents on the aromatic radical are the meanings given below for R^4 , R^5 and R^6 .

Examples of fused-on rings are, in addition to phenyl, the
10 abovementioned heteroaromatic groups, in particular pyridine, pyrazine, pyridazine, pyrimidine, furan, dihydrofuran, thiophene, dihydrothiophene, pyrrole, dihydropyrrole, 1,3-dioxolane, 1,3-dioxolan-2-one, isoxazole, oxazole, oxazolinone, isothiazole, thiazole, pyrazole, pyrazoline, imidazole, imidazolinone,
15 dihydroimidazole, 1,2,3-triazole, 1,1-dioxodihydroisothiazole, dihydro-1,4-dioxine, pyridone, dihydro-1,4-oxazine, dihydro-1,4-oxazin-2-one, dihydro-1,4-oxazin-3-one, dihydro-1,3-oxazine, dihydro-1,3-thiazin-2-one, dihydro-1,4-thiazine, dihydro-1,4-thiazin-2-one,
20 dihydro-1,4-thiazin-3-one, dihydro-1,3-thiazine and dihydro-1,3-thiazin-2-one which for their part may have one, two or three substituents. Examples of suitable substituents on the fused-on ring are the meanings given below for R^{16} , R^{17} , R^{18} and R^{19} .

25

With a view to the use of the 4-aryl-1-difluoromethoxyimidazoles I as herbicides or desiccants/defoliants, preference is given to those compounds I where the variables are as defined below, in each case on their own or in combination:

30

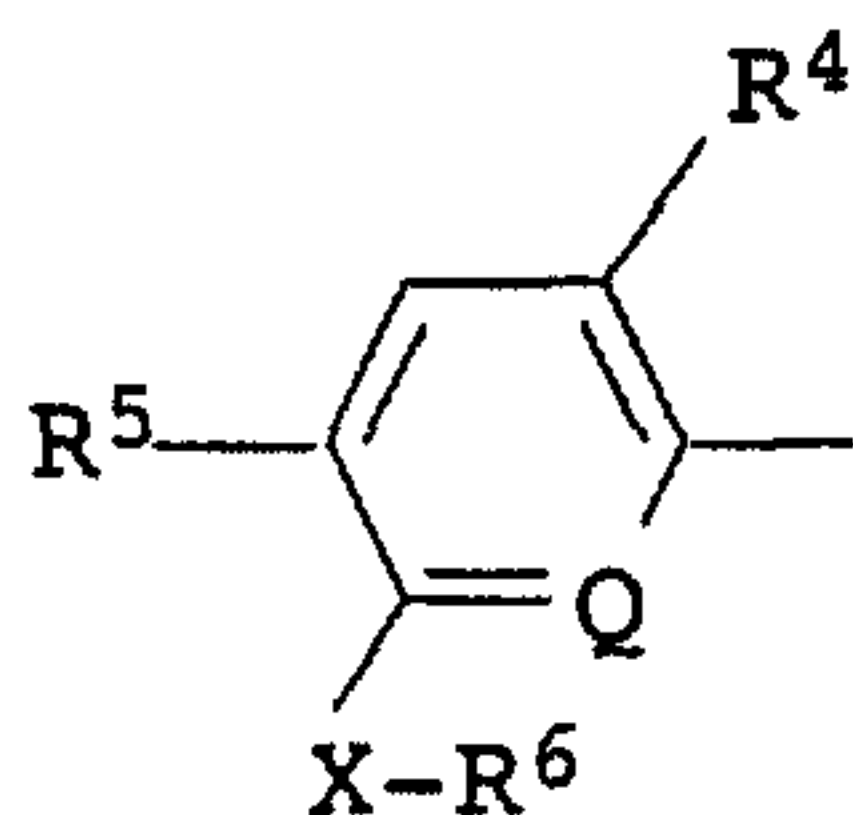
R^1 is hydrogen, methyl, ethyl or C_1 - C_2 -haloalkyl;

R^2 is hydrogen, halogen, preferably chlorine or bromine, cyano, methyl or trifluoromethyl, in particular hydrogen or halogen;

35

R^3 is a radical of the formula II

40



(II),

45 in which the variables X , Q , R^4 , R^5 and R^6 are as defined below:

21

- R⁴ is hydrogen or halogen;
- R⁵ is hydrogen, cyano, nitro, halogen, C₁-C₄-alkyl, OH, SH, NH₂, C₁-C₄-haloalkyl, C₁-C₄-alkoxy or C₁-C₄-haloalkoxy;
- 5 X is a chemical bond or a methylene, ethylene, propane-1,3-diyl or ethene-1,2-diyl chain or an oxymethylene or thiamethylene chain which is attached to the phenyl ring via the heteroatom, where all chains may be unsubstituted or may carry one or two substituents, in each case selected from the group consisting of cyano, carboxyl, halogen, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, (C₁-C₄-alkoxy)carbonyl, di(C₁-C₄-alkyl)amino and phenyl;
- 10 Q is nitrogen or a group C-R⁷ in which R⁷ is hydrogen, NH₂, OH or SH;
- 15 R⁶ is hydrogen, nitro, cyano, halogen, halosulfonyl, -O-Y-R⁸, -O-CO-Y-R⁸, -N(Y-R⁸)(Z-R⁹), -N(Y-R⁸)-SO₂-Z-R⁹, -N(SO₂-Y-R⁸)(SO₂-Z-R⁹), -N(Y-R⁸)-CO-Z-R⁹, -N(Y-R⁸)(O-Z-R⁹), -S-Y-R⁸, -SO-Z-R⁸, -SO₂-Y-R⁸, -SO₂-O-Y-R⁸, -SO₂-N(Y-R⁸)(Z-R⁹), -CO-Y-R⁸, -C(=NOR¹⁰)-Y-R⁸, -C(=NOR¹⁰)-O-Y-R⁸, -CO-O-Y-R⁸, -CO-S-Y-R⁸, -CO-N(Y-R⁸)(Z-R⁹), -CO-N(Y-R⁸)(O-Z-R⁹) or -PO(O-Y-R⁸)₂; in which the variables Y, Z, R⁸, R⁹ and R¹⁰ are as defined below:
- 20 Y, Z are, independently of one another:
- 30 a chemical bond, a methylene or ethylene group which may be unsubstituted or may carry one or two substituents, in each case selected from the group consisting of carboxyl, C₁-C₄-alkyl, C₁-C₄-haloalkyl, (C₁-C₄-alkoxy)carbonyl and phenyl;
- 35 R⁸, R⁹ are, independently of one another:
- hydrogen, C₁-C₆-haloalkyl, C₂-C₆-alkenyl, C₂-C₆-haloalkenyl, C₂-C₆-alkynyl, C₂-C₆-haloalkynyl, -CH(R¹¹)(R¹²), -C(R¹¹)(R¹²)-NO₂, -C(R¹¹)(R¹²)-CN, -C(R¹¹)(R¹²)-halogen, -C(R¹¹)(R¹²)-OR¹³, -C(R¹¹)(R¹²)-N(R¹³)R¹⁴, -C(R¹¹)(R¹²)-N(R¹³)-OR¹⁴, -C(R¹¹)(R¹²)-SR¹³, -C(R¹¹)(R¹²)-SO-R¹³, -C(R¹¹)(R¹²)-SO₂-R¹³, -C(R¹¹)(R¹²)-SO₂-OR¹³, -C(R¹¹)(R¹²)-SO₂-N(R¹³)R¹⁴, -C(R¹¹)(R¹²)-CO-R¹³, -C(R¹¹)(R¹²)-C(=NOR¹⁵)-R¹³, -C(R¹¹)(R¹²)-CO-OR¹³, -C(R¹¹)(R¹²)-CO-SR¹³, -C(R¹¹)(R¹²)-CO-N(R¹³)R¹⁴, -C(R¹¹)(R¹²)-CO-N(R¹³)-OR¹⁴, -C(R¹¹)(R¹²)-PO(OR¹³)₂,
- 40
- 45

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- is C₃-C₈-cycloalkyl which may contain a carbonyl or thiocarbonyl ring member,
is phenyl or 3- to 7-membered heterocyclyl which may contain a carbonyl or thiocarbonyl ring member, where
5 each cycloalkyl, the phenyl and each heterocyclyl ring may be unsubstituted or may carry one to four substituents, in each case selected from the group consisting of cyano, nitro, amino, hydroxyl, carboxyl, halogen, C₁-C₄-alkyl, C₁-C₄-haloalkyl,
10 C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, C₁-C₄-alkylthio, C₁-C₄-haloalkylthio, C₁-C₄-alkylsulfonyl, C₁-C₄-haloalkylsulfonyl, (C₁-C₄-alkyl)carbonyl, (C₁-C₄-haloalkyl)carbonyl, (C₁-C₄-alkyl)carbonyloxy, (C₁-C₄-haloalkyl)carbonyloxy, (C₁-C₄-alkoxy)carbonyl
15 and di-(C₁-C₄-alkyl)amino;
- R¹⁰ is hydrogen, C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₂-C₆-alkenyl, C₂-C₆-haloalkenyl, C₂-C₆-alkynyl, C₂-C₆-haloalkynyl, C₃-C₈-cycloalkyl, phenyl or
20 phenyl-C₁-C₄-alkyl;

23

5 C₁-C₄-haloalkylthio, C₁-C₄-alkylsulfonyl,
C₁-C₄-haloalkylsulfonyl, (C₁-C₄-alkyl)carbonyl,
(C₁-C₄-haloalkyl)carbonyl, (C₁-C₄-alkyl)carbonyloxy,
(C₁-C₄-haloalkyl)carbonyloxy, (C₁-C₄-alkoxy)carbonyl
and di-(C₁-C₄-alkyl)amino;

10 R¹⁵ is hydrogen, C₁-C₆-alkyl, C₁-C₆-haloalkyl,
C₂-C₆-alkenyl, C₂-C₆-haloalkenyl, C₂-C₆-alkynyl,
C₂-C₆-haloalkynyl, C₃-C₈-cycloalkyl, phenyl or
phenyl-C₁-C₄-alkyl.

15 Examples of combinations of the variables X-R⁶ are given in Table
1. In the formula II, the variables Q, R⁴, R⁵, X and R⁶ preferably
have the following meanings, in each case on their own or in
combination:

Q is CH;

20 R⁴ is hydrogen, fluorine or chlorine;

R⁵ is halogen, in particular chlorine;

25 X is a chemical bond, methylene or ethane-1,2-diyl,
ethene-1,2-diyl, 2-chloroethane-1,2-diyl and
2-chloroethene-1,2-diyl;

30 R⁶ is hydrogen, -O-Y-R⁸, -O-CO-Y-R⁸, -N(Y-R⁸)-SO₂-Z-R⁹,
-N(SO₂-Y-R⁸)(SO₂-Z-R⁹), -S-Y-R⁸, -SO₂-N(Y-R⁸)(Z-R⁹),
-C(=NOR¹⁰)-O-Y-R⁸, -CO-O-Y-R⁸, -CO-N(Y-R⁸)(Z-R⁹) or
-PO(O-Y-R⁸)₂,
in particular hydrogen, -O-Y-R⁸, -N(Y-R⁸)-SO₂-Z-R⁹, -S-Y-R⁸ or
-CO-O-Y-R⁸,
particularly preferably hydrogen or -O-Y-R⁸.

35 The variables R⁸, R⁹, R¹⁰, Y and Z mentioned in the definition of
the variable R⁶ preferably have the following meanings:

Y, Z are, independently of one another, a chemical bond or
methylene;

40 R⁸, R⁹ are, independently of one another,
hydrogen, C₁-C₆-haloalkyl, C₂-C₆-alkenyl, C₂-C₆-haloalkenyl,
C₂-C₆-alkynyl, -CH(R¹¹)(R¹²), -C(R¹¹)(R¹²)-NO₂, -C(R¹¹)(R¹²)-CN,
-C(R¹¹)(R¹²)-halogen, -C(R¹¹)(R¹²)-OR¹³, -C(R¹¹)(R¹²)-N(R¹³)R¹⁴,
45 -C(R¹¹)(R¹²)-N(R¹³)-OR¹⁴, -C(R¹¹)(R¹²)-SR¹³, -C(R¹¹)(R¹²)-SO-R¹³,
-C(R¹¹)(R¹²)-SO₂-R¹³, -C(R¹¹)(R¹²)-SO₂-OR¹³,
-C(R¹¹)(R¹²)-SO₂-N(R¹³)R¹⁴, -C(R¹¹)(R¹²)-CO-R¹³,

24

- $-C(R^{11})(R^{12})-C(=NOR^{15})-R^{13}$, $-C(R^{11})(R^{12})-CO-OR^{13}$,
 $-C(R^{11})(R^{12})-CO-SR^{13}$, $-C(R^{11})(R^{12})-CO-N(R^{13})R^{14}$,
 $-C(R^{11})(R^{12})-CO-N(R^{13})-OR^{14}$,
5 C_3-C_8 -cycloalkyl which may contain a carbonyl or thiocarbonyl
ring member, phenyl or 3- to 7-membered heterocyclyl having
one or two nitrogen and/or one oxygen or sulfur atom as
heteroatom and, if desired, a carbonyl or thiocarbonyl ring
member,
10 where each cycloalkyl, the phenyl and each heterocyclyl ring
may be unsubstituted or may carry one or two substituents, in
each case selected from the group consisting of cyano, nitro,
halogen, C_1-C_4 -alkyl, C_1-C_4 -alkoxy, C_1-C_4 -alkylsulfonyl,
(C_1-C_4 -alkyl)carbonyl, (C_1-C_4 -alkyl)carbonyloxy and
(C_1-C_4 -alkoxy)carbonyl;
15 in particular hydrogen, C_1-C_6 -haloalkyl, C_2-C_6 -alkenyl,
 C_2-C_6 -alkynyl, $-CH(R^{11})(R^{12})$, $-C(R^{11})(R^{12})-CO-OR^{13}$,
 $-C(R^{11})(R^{12})-CO-N(R^{13})R^{14}$ or C_3-C_8 -cycloalkyl, particularly
preferably hydrogen, C_1-C_6 -alkyl, C_2-C_6 -alkenyl,
20 C_2-C_6 -alkynyl, $-C(R^{11})(R^{12})-CO-OR^{13}$ or C_3-C_8 -cycloalkyl.

25

Among these, preference is given to compounds I in which R⁵ together with X-R⁶ in formula II is a chain of the formulae:
-O-C(R¹⁶,R¹⁷)-CO-N(R¹⁸)-, -S-C(R¹⁶,R¹⁷)-CO-N(R¹⁸)-, -N=C(R¹⁹)-O- or
-N=C(R¹⁹)-S- (compounds IC) in which the variables R¹⁶ to R¹⁹ are
5 as defined below:

- R¹⁶, R¹⁷ are, independently of one another,
hydrogen, C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₂-C₆-alkenyl,
C₂-C₆-haloalkenyl, C₂-C₆-alkynyl, C₂-C₆-haloalkynyl,
10 C₃-C₈-cycloalkyl, phenyl or phenyl-C₁-C₄-alkyl;
- R¹⁸ is hydrogen, hydroxyl, C₁-C₆-alkyl, C₁-C₆-haloalkyl,
C₂-C₆-alkenyl, C₂-C₆-haloalkenyl, C₂-C₆-alkynyl, C₁-C₄-alkoxy,
C₁-C₄-haloalkoxy, C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy,
15 C₁-C₄-alkylsulfonyl, C₁-C₄-haloalkylsulfonyl,
C₁-C₄-alkylcarbonyl, C₁-C₄-haloalkylcarbonyl,
C₁-C₄-alkoxycarbonyl, C₁-C₄-alkoxycarbonyl-C₁-C₄-alkyl,
C₁-C₄-alkoxycarbonyl-C₁-C₄-alkoxy,
di(C₁-C₄-alkyl)aminocarbonyl,
20 di(C₁-C₄-alkyl)aminocarbonyl-C₁-C₄-alkyl,
di(C₁-C₄-alkyl)aminocarbonyl-C₁-C₄-alkoxy, phenyl or
phenyl-C₁-C₄-alkyl;
- R¹⁹ is hydrogen, halogen, cyano, amino, C₁-C₆-alkyl,
25 C₁-C₆-haloalkyl, C₂-C₆-alkenyl, C₂-C₆-haloalkenyl,
C₂-C₆-alkynyl, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy,
C₃-C₆-alkenyloxy, C₃-C₆-alkynyloxy, C₁-C₄-alkylamino,
di(C₁-C₄-alkyl)amino, C₁-C₄-haloalkoxy, C₁-C₄-alkylthio,
C₁-C₄-haloalkylthio, C₁-C₄-alkylsulfinyl,
30 C₁-C₄-haloalkylsulfinyl, C₁-C₄-alkylsulfonyl,
C₁-C₄-haloalkylsulfonyl, C₁-C₄-alkylcarbonyl,
C₁-C₄-haloalkylcarbonyl, C₁-C₄-alkoxycarbonyl,
C₁-C₄-alkoxycarbonyl-C₁-C₄-alkyl,
C₁-C₄-alkoxycarbonyl-C₁-C₄-alkoxy,
35 C₁-C₄-alkoxycarbonyl-C₁-C₄-alkylthio,
di(C₁-C₄-alkyl)aminocarbonyl,
di(C₁-C₄-alkyl)aminocarbonyl-C₁-C₄-alkyl,
di(C₁-C₄-alkyl)aminocarbonyl-C₁-C₄-alkoxy,
di(C₁-C₄-alkyl)aminocarbonyl-C₁-C₄-alkylthio, phenyl or
40 phenyl-C₁-C₄-alkyl.

The variables R¹⁶ to R¹⁹ are preferably as defined below:

- R¹⁶, R¹⁷ are, independently of one another,
45 hydrogen or methyl;

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- R^{18} is hydrogen, hydroxyl, C_1 - C_6 -alkyl, C_1 - C_6 -haloalkyl, C_2 - C_6 -alkenyl, C_2 - C_6 -alkynyl, C_1 - C_4 -alkoxy, C_1 - C_4 -haloalkoxy, C_3 - C_6 -alkenyloxy, C_3 - C_6 -alkynyloxy, C_1 - C_4 -alkoxycarbonyl- C_1 - C_4 -alkyl,
 5 C_1 - C_4 -alkoxycarbonyl- C_1 - C_4 -alkoxy or phenyl- C_1 - C_4 -alkyl;
- R^{19} is hydrogen, halogen, amino, C_1 - C_6 -alkyl, C_1 - C_6 -haloalkyl, C_1 - C_4 -alkoxy, C_3 - C_6 -alkenyloxy, C_3 - C_6 -alkynyloxy, C_1 - C_4 -alkylamino, di(C_1 - C_4 -alkyl)amino, C_1 - C_4 -alkylthio,
 10 C_1 - C_4 -alkoxycarbonyl- C_1 - C_4 -alkyl, C_1 - C_4 -alkoxycarbonyl- C_1 - C_4 -alkoxy, C_1 - C_4 -alkoxycarbonyl- C_1 - C_4 -alkylthio, phenyl or phenyl- C_1 - C_4 -alkyl.
- 15 In these compounds, Q and R^4 are as defined above, and Q is in particular CH and R^4 has in particular the meanings given above as being preferred.
- Among the compounds IC, particular preference is given to those
 20 compounds in which R^5 together with X- R^6 is a chain of the formula -O-CH(R^{16})-CO-N(R^{18})-, -S-CH(R^{16})-CO-N(R^{18})-. R^{16} and R^{18} in particular have the meanings given as being preferred. Among these, very particular preference is given to compounds IC in which the nitrogen atom of the chain -O-CH(R^{16})-CO-N(R^{18})-,
 25 -S-CH(R^{16})-CO-N(R^{18})- is attached to the carbon atom of the phenyl ring in formula II which is adjacent to the group Q (meta position with respect to the imidazolyl group).
- Among the compounds of the formula I in which R^3 is a radical of
 30 the formula II, preference is furthermore given to compounds I in which Q is a group C- R^7 and R^7 together with X- R^6 in the formula II is a chain of the formulae: -O-C(R^{16} , R^{17})-CO-N(R^{18})-, -S-C(R^{16} , R^{17})-CO-N(R^{18})-, -N=C(R^{19})-O- or -N=C(R^{19})-S-, in which the variables R^{16} - R^{19} have the meanings given above, in
 35 particular the meanings given as being preferred. Hereinbelow, such compounds are referred to as compounds ID. Amongst these, preference is given to those compounds in which R^7 together with X- R^6 is a chain of the formula -N=C(R^{19})-O- or -N=C(R^{19})-S-. In these compounds, R^4 and R^5 have the meanings mentioned above, in
 40 particular the meanings mentioned as being preferred.

Particular preference is given to the compounds of the formula IAa (compounds IA where Q = CH, R¹ = H and R⁵ = Cl) in which the variables R², R⁴ and X-R⁶ together have the meanings given in each 5 case in one row of Table 1 (compounds IAa.1-IAa.936).

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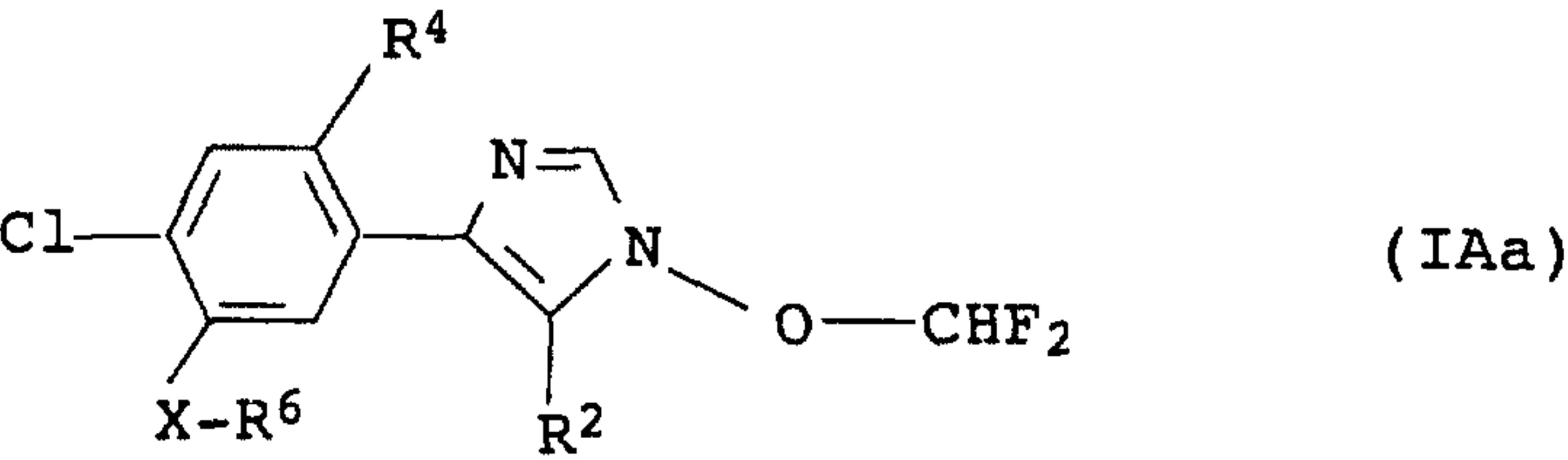


Table 1

15	No.	R ²	R ⁴	-X-R ⁶
	1	H	H	H
	2	H	F	H
	3	H	Cl	H
	4	Cl	H	H
	5	Cl	F	H
20	6	Cl	Cl	H
	7	Br	H	H
	8	Br	F	H
	9	Br	Cl	H
	10	CH ₃	H	H
25	11	CH ₃	F	H
	12	CH ₃	Cl	H
	13	H	H	CH ₃
	14	H	F	CH ₃
	15	H	Cl	CH ₃
	16	Cl	H	CH ₃
30	17	Cl	F	CH ₃
	18	Cl	Cl	CH ₃
	19	Br	H	CH ₃
	20	Br	F	CH ₃
	21	Br	Cl	CH ₃
35	22	CH ₃	H	CH ₃
	23	CH ₃	F	CH ₃
	24	CH ₃	Cl	CH ₃
	25	H	H	NO ₂
	26	H	F	NO ₂
	27	H	Cl	NO ₂
40	28	Cl	H	NO ₂
	29	Cl	F	NO ₂
	30	Cl	Cl	NO ₂
	31	Br	H	NO ₂
	32	Br	F	NO ₂
45	33	Br	Cl	NO ₂
	34	CH ₃	H	NO ₂
	35	CH ₃	F	NO ₂
	36	CH ₃	Cl	NO ₂

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	No.	R ²	R ⁴	-X-R ⁶
	37	H	H	CN
	38	H	F	CN
	39	H	Cl	CN
5	40	Cl	H	CN
	41	Cl	F	CN
	42	Cl	Cl	CN
	43	Br	H	CN
	44	Br	F	CN
	45	Br	Cl	CN
10	46	CH ₃	H	CN
	47	CH ₃	F	CN
	48	CH ₃	Cl	CN
	49	H	H	F
	50	H	F	F
15	51	H	Cl	F
	52	Cl	H	F
	53	Cl	F	F
	54	Cl	Cl	F
	55	Br	H	F
	56	Br	F	F
20	57	Br	Cl	F
	58	CH ₃	H	F
	59	CH ₃	F	F
	60	CH ₃	Cl	F
	61	H	H	Cl
25	62	H	F	Cl
	63	H	Cl	Cl
	64	Cl	H	Cl
	65	Cl	F	Cl
	66	Cl	Cl	Cl
	67	Br	H	Cl
30	68	Br	F	Cl
	69	Br	Cl	Cl
	70	CH ₃	H	Cl
	71	CH ₃	F	Cl
	72	CH ₃	Cl	Cl
35	73	H	H	Br
	74	H	F	Br
	75	H	Cl	Br
	76	Cl	H	Br
	77	Cl	F	Br
	78	Cl	Cl	Br
40	79	Br	H	Br
	80	Br	F	Br
	81	Br	Cl	Br
	82	CH ₃	H	Br
	83	CH ₃	F	Br
45	84	CH ₃	Cl	Br
	85	H	H	OH
	86	H	F	OH
	87	H	Cl	OH

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	No.	R ²	R ⁴	-X-R ⁶
5	88	Cl	H	OH
	89	Cl	F	OH
	90	Cl	Cl	OH
	91	Br	H	OH
	92	Br	F	OH
10	93	Br	Cl	OH
	94	CH ₃	H	OH
	95	CH ₃	F	OH
	96	CH ₃	Cl	OH
	97	H	H	OCH ₃
15	98	H	F	OCH ₃
	99	H	Cl	OCH ₃
	100	Cl	H	OCH ₃
	101	Cl	F	OCH ₃
	102	Cl	Cl	OCH ₃
20	103	Br	H	OCH ₃
	104	Br	F	OCH ₃
	105	Br	Cl	OCH ₃
	106	CH ₃	H	OCH ₃
	107	CH ₃	F	OCH ₃
25	108	CH ₃	Cl	OCH ₃
	109	H	H	OCH(CH ₃) ₂
	110	H	F	OCH(CH ₃) ₂
	111	H	Cl	OCH(CH ₃) ₂
	112	Cl	H	OCH(CH ₃) ₂
30	113	Cl	F	OCH(CH ₃) ₂
	114	Cl	Cl	OCH(CH ₃) ₂
	115	Br	H	OCH(CH ₃) ₂
	116	Br	F	OCH(CH ₃) ₂
	117	Br	Cl	OCH(CH ₃) ₂
35	118	CH ₃	H	OCH(CH ₃) ₂
	119	CH ₃	F	OCH(CH ₃) ₂
	120	CH ₃	Cl	OCH(CH ₃) ₂
	121	H	H	OCH ₂ -CH=CH ₂
	122	H	F	OCH ₂ -CH=CH ₂
40	123	H	Cl	OCH ₂ -CH=CH ₂
	124	Cl	H	OCH ₂ -CH=CH ₂
	125	Cl	F	OCH ₂ -CH=CH ₂
	126	Cl	Cl	OCH ₂ -CH=CH ₂
	127	Br	H	OCH ₂ -CH=CH ₂
45	128	Br	F	OCH ₂ -CH=CH ₂
	129	Br	Cl	OCH ₂ -CH=CH ₂
	130	CH ₃	H	OCH ₂ -CH=CH ₂
	131	CH ₃	F	OCH ₂ -CH=CH ₂
	132	CH ₃	Cl	OCH ₂ -CH=CH ₂
45	133	H	H	OCH ₂ -C≡CH
	134	H	F	OCH ₂ -C≡CH
	135	H	Cl	OCH ₂ -C≡CH
	136	Cl	H	OCH ₂ -C≡CH
	137	Cl	F	OCH ₂ -C≡CH
	138	Cl	Cl	OCH ₂ -C≡CH

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	No.	R ²	R ⁴	-X-R ⁶
5	139	Br	H	OCH ₂ -C≡CH
	140	Br	F	OCH ₂ -C≡CH
	141	Br	Cl	OCH ₂ -C≡CH
	142	CH ₃	H	OCH ₂ -C≡CH
	143	CH ₃	F	OCH ₂ -C≡CH
	144	CH ₃	Cl	OCH ₂ -C≡CH
10	145	H	H	OCH ₂ -COOH
	146	H	F	OCH ₂ -COOH
	147	H	Cl	OCH ₂ -COOH
	148	Cl	H	OCH ₂ -COOH
	149	Cl	F	OCH ₂ -COOH
	150	Cl	Cl	OCH ₂ -COOH
15	151	Br	H	OCH ₂ -COOH
	152	Br	F	OCH ₂ -COOH
	153	Br	Cl	OCH ₂ -COOH
	154	CH ₃	H	OCH ₂ -COOH
	155	CH ₃	F	OCH ₂ -COOH
	156	CH ₃	Cl	OCH ₂ -COOH
20	157	H	H	OCH ₂ -COOCH ₃
	158	H	F	OCH ₂ -COOCH ₃
	159	H	Cl	OCH ₂ -COOCH ₃
	160	Cl	H	OCH ₂ -COOCH ₃
	161	Cl	F	OCH ₂ -COOCH ₃
	162	Cl	Cl	OCH ₂ -COOCH ₃
25	163	Br	H	OCH ₂ -COOCH ₃
	164	Br	F	OCH ₂ -COOCH ₃
	165	Br	Cl	OCH ₂ -COOCH ₃
	166	CH ₃	H	OCH ₂ -COOCH ₃
	167	CH ₃	F	OCH ₂ -COOCH ₃
	168	CH ₃	Cl	OCH ₂ -COOCH ₃
30	169	H	H	OCH ₂ -COOC ₂ H ₅
	170	H	F	OCH ₂ -COOC ₂ H ₅
	171	H	Cl	OCH ₂ -COOC ₂ H ₅
	172	Cl	H	OCH ₂ -COOC ₂ H ₅
	173	Cl	F	OCH ₂ -COOC ₂ H ₅
	174	Cl	Cl	OCH ₂ -COOC ₂ H ₅
35	175	Br	H	OCH ₂ -COOC ₂ H ₅
	176	Br	F	OCH ₂ -COOC ₂ H ₅
	177	Br	Cl	OCH ₂ -COOC ₂ H ₅
	178	CH ₃	H	OCH ₂ -COOC ₂ H ₅
	179	CH ₃	F	OCH ₂ -COOC ₂ H ₅
	180	CH ₃	Cl	OCH ₂ -COOC ₂ H ₅
40	181	H	H	OCH ₂ -CO-N(CH ₃) ₂
	182	H	F	OCH ₂ -CO-N(CH ₃) ₂
	183	H	Cl	OCH ₂ -CO-N(CH ₃) ₂
	184	Cl	H	OCH ₂ -CO-N(CH ₃) ₂
	185	Cl	F	OCH ₂ -CO-N(CH ₃) ₂
	186	Cl	Cl	OCH ₂ -CO-N(CH ₃) ₂
45	187	Br	H	OCH ₂ -CO-N(CH ₃) ₂
	188	Br	F	OCH ₂ -CO-N(CH ₃) ₂
	189	Br	Cl	OCH ₂ -CO-N(CH ₃) ₂

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No.	R ²	R ⁴	-X-R ⁶
190	CH ₃	H	OCH ₂ -CO-N(CH ₃) ₂
191	CH ₃	F	OCH ₂ -CO-N(CH ₃) ₂
192	CH ₃	Cl	OCH ₂ -CO-N(CH ₃) ₂
5 193	H	H	OCH(CH ₃)-COOH
194	H	F	OCH(CH ₃)-COOH
195	H	Cl	OCH(CH ₃)-COOH
196	Cl	H	OCH(CH ₃)-COOH
197	Cl	F	OCH(CH ₃)-COOH
198	Cl	Cl	OCH(CH ₃)-COOH
10 199	Br	H	OCH(CH ₃)-COOH
200	Br	F	OCH(CH ₃)-COOH
201	Br	Cl	OCH(CH ₃)-COOH
202	CH ₃	H	OCH(CH ₃)-COOH
203	CH ₃	F	OCH(CH ₃)-COOH
15 204	CH ₃	Cl	OCH(CH ₃)-COOH
205	H	H	OCH(CH ₃)-COOCH ₃
206	H	F	OCH(CH ₃)-COOCH ₃
207	H	Cl	OCH(CH ₃)-COOCH ₃
208	Cl	H	OCH(CH ₃)-COOCH ₃
209	Cl	F	OCH(CH ₃)-COOCH ₃
20 210	Cl	Cl	OCH(CH ₃)-COOCH ₃
211	Br	H	OCH(CH ₃)-COOCH ₃
212	Br	F	OCH(CH ₃)-COOCH ₃
213	Br	Cl	OCH(CH ₃)-COOCH ₃
214	CH ₃	H	OCH(CH ₃)-COOCH ₃
25 215	CH ₃	F	OCH(CH ₃)-COOCH ₃
216	CH ₃	Cl	OCH(CH ₃)-COOCH ₃
217	H	H	OCH(CH ₃)-COOC ₂ H ₅
218	H	F	OCH(CH ₃)-COOC ₂ H ₅
219	H	Cl	OCH(CH ₃)-COOC ₂ H ₅
220	Cl	H	OCH(CH ₃)-COOC ₂ H ₅
30 221	Cl	F	OCH(CH ₃)-COOC ₂ H ₅
222	Cl	Cl	OCH(CH ₃)-COOC ₂ H ₅
223	Br	H	OCH(CH ₃)-COOC ₂ H ₅
224	Br	F	OCH(CH ₃)-COOC ₂ H ₅
225	Br	Cl	OCH(CH ₃)-COOC ₂ H ₅
35 226	CH ₃	H	OCH(CH ₃)-COOC ₂ H ₅
227	CH ₃	F	OCH(CH ₃)-COOC ₂ H ₅
228	CH ₃	Cl	OCH(CH ₃)-COOC ₂ H ₅
229	H	H	OCH(CH ₃)-CO-N(CH ₃) ₂
230	H	F	OCH(CH ₃)-CO-N(CH ₃) ₂
231	H	Cl	OCH(CH ₃)-CO-N(CH ₃) ₂
40 232	Cl	H	OCH(CH ₃)-CO-N(CH ₃) ₂
233	Cl	F	OCH(CH ₃)-CO-N(CH ₃) ₂
234	Cl	Cl	OCH(CH ₃)-CO-N(CH ₃) ₂
235	Br	H	OCH(CH ₃)-CO-N(CH ₃) ₂
236	Br	F	OCH(CH ₃)-CO-N(CH ₃) ₂
237	Br	Cl	OCH(CH ₃)-CO-N(CH ₃) ₂
45 238	CH ₃	H	OCH(CH ₃)-CO-N(CH ₃) ₂
239	CH ₃	F	OCH(CH ₃)-CO-N(CH ₃) ₂
240	CH ₃	Cl	OCH(CH ₃)-CO-N(CH ₃) ₂

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	No.	R ²	R ⁴	-X-R ⁶
5	241	H	H	O-cyclopentyl
	242	H	F	O-cyclopentyl
	243	H	Cl	O-cyclopentyl
	244	Cl	H	O-cyclopentyl
	245	Cl	F	O-cyclopentyl
10	246	Cl	Cl	O-cyclopentyl
	247	Br	H	O-cyclopentyl
	248	Br	F	O-cyclopentyl
	249	Br	Cl	O-cyclopentyl
	250	CH ₃	H	O-cyclopentyl
15	251	CH ₃	F	O-cyclopentyl
	252	CH ₃	Cl	O-cyclopentyl
	253	H	H	O-CH ₂ -phenyl
	254	H	F	O-CH ₂ -phenyl
	255	H	Cl	O-CH ₂ -phenyl
20	256	Cl	H	O-CH ₂ -phenyl
	257	Cl	F	O-CH ₂ -phenyl
	258	Cl	Cl	O-CH ₂ -phenyl
	259	Br	H	O-CH ₂ -phenyl
	260	Br	F	O-CH ₂ -phenyl
25	261	Br	Cl	O-CH ₂ -phenyl
	262	CH ₃	H	O-CH ₂ -phenyl
	263	CH ₃	F	O-CH ₂ -phenyl
	264	CH ₃	Cl	O-CH ₂ -phenyl
	265	H	H	NH ₂
30	266	H	F	NH ₂
	267	H	Cl	NH ₂
	268	Cl	H	NH ₂
	269	Cl	F	NH ₂
	270	Cl	Cl	NH ₂
35	271	Br	H	NH ₂
	272	Br	F	NH ₂
	273	Br	Cl	NH ₂
	274	CH ₃	H	NH ₂
	275	CH ₃	F	NH ₂
40	276	CH ₃	Cl	NH ₂
	277	H	H	N(CH ₃)-CH ₂ -C≡CH
	278	H	F	N(CH ₃)-CH ₂ -C≡CH
	279	H	Cl	N(CH ₃)-CH ₂ -C≡CH
	280	Cl	H	N(CH ₃)-CH ₂ -C≡CH
45	281	Cl	F	N(CH ₃)-CH ₂ -C≡CH
	282	Cl	Cl	N(CH ₃)-CH ₂ -C≡CH
	283	Br	H	N(CH ₃)-CH ₂ -C≡CH
	284	Br	F	N(CH ₃)-CH ₂ -C≡CH
	285	Br	Cl	N(CH ₃)-CH ₂ -C≡CH
	286	CH ₃	H	N(CH ₃)-CH ₂ -C≡CH
	287	CH ₃	F	N(CH ₃)-CH ₂ -C≡CH
	288	CH ₃	Cl	N(CH ₃)-CH ₂ -C≡CH
	289	H	H	N(SO ₂ -CH ₃) ₂
	290	H	F	N(SO ₂ -CH ₃) ₂
	291	H	Cl	N(SO ₂ -CH ₃) ₂

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No.	R ²	R ⁴	-X-R ⁶
292	Cl	H	N(SO ₂ -CH ₃) ₂
293	Cl	F	N(SO ₂ -CH ₃) ₂
294	Cl	Cl	N(SO ₂ -CH ₃) ₂
5 295	Br	H	N(SO ₂ -CH ₃) ₂
296	Br	F	N(SO ₂ -CH ₃) ₂
297	Br	Cl	N(SO ₂ -CH ₃) ₂
298	CH ₃	H	N(SO ₂ -CH ₃) ₂
299	CH ₃	F	N(SO ₂ -CH ₃) ₂
300	CH ₃	Cl	N(SO ₂ -CH ₃) ₂
10 301	H	H	NH-(SO ₂ -CH ₃)
302	H	F	NH-(SO ₂ -CH ₃)
303	H	Cl	NH-(SO ₂ -CH ₃)
304	Cl	H	NH-(SO ₂ -CH ₃)
305	Cl	F	NH-(SO ₂ -CH ₃)
15 306	Cl	Cl	NH-(SO ₂ -CH ₃)
307	Br	H	NH-(SO ₂ -CH ₃)
308	Br	F	NH-(SO ₂ -CH ₃)
309	Br	Cl	NH-(SO ₂ -CH ₃)
310	CH ₃	H	NH-(SO ₂ -CH ₃)
311	CH ₃	F	NH-(SO ₂ -CH ₃)
20 312	CH ₃	Cl	NH-(SO ₂ -CH ₃)
313	H	H	N(CH ₃)-(SO ₂ -CH ₃)
314	H	F	N(CH ₃)-(SO ₂ -CH ₃)
315	H	Cl	N(CH ₃)-(SO ₂ -CH ₃)
316	Cl	H	N(CH ₃)-(SO ₂ -CH ₃)
25 317	Cl	F	N(CH ₃)-(SO ₂ -CH ₃)
318	Cl	Cl	N(CH ₃)-(SO ₂ -CH ₃)
319	Br	H	N(CH ₃)-(SO ₂ -CH ₃)
320	Br	F	N(CH ₃)-(SO ₂ -CH ₃)
321	Br	Cl	N(CH ₃)-(SO ₂ -CH ₃)
322	CH ₃	H	N(CH ₃)-(SO ₂ -CH ₃)
30 323	CH ₃	F	N(CH ₃)-(SO ₂ -CH ₃)
324	CH ₃	Cl	N(CH ₃)-(SO ₂ -CH ₃)
325	H	H	SH
326	H	F	SH
327	H	Cl	SH
328	Cl	H	SH
35 329	Cl	F	SH
330	Cl	Cl	SH
331	Br	H	SH
332	Br	F	SH
333	Br	Cl	SH
40 334	CH ₃	H	SH
335	CH ₃	F	SH
336	CH ₃	Cl	SH
337	H	H	SCH ₃
338	H	F	SCH ₃
339	H	Cl	SCH ₃
45 340	Cl	H	SCH ₃
341	Cl	F	SCH ₃
342	Cl	Cl	SCH ₃

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	No.	R ²	R ⁴	-X-R ⁶
5	343	Br	H	SCH ₃
	344	Br	F	SCH ₃
	345	Br	Cl	SCH ₃
	346	CH ₃	H	SCH ₃
	347	CH ₃	F	SCH ₃
10	348	CH ₃	Cl	SCH ₃
	349	H	H	SCH(CH ₃) ₂
	350	H	F	SCH(CH ₃) ₂
	351	H	Cl	SCH(CH ₃) ₂
	352	Cl	H	SCH(CH ₃) ₂
15	353	Cl	F	SCH(CH ₃) ₂
	354	Cl	Cl	SCH(CH ₃) ₂
	355	Br	H	SCH(CH ₃) ₂
	356	Br	F	SCH(CH ₃) ₂
	357	Br	Cl	SCH(CH ₃) ₂
20	358	CH ₃	H	SCH(CH ₃) ₂
	359	CH ₃	F	SCH(CH ₃) ₂
	360	CH ₃	Cl	SCH(CH ₃) ₂
	361	H	H	SCH ₂ -CH=CH ₂
	362	H	F	SCH ₂ -CH=CH ₂
25	363	H	Cl	SCH ₂ -CH=CH ₂
	364	Cl	H	SCH ₂ -CH=CH ₂
	365	Cl	F	SCH ₂ -CH=CH ₂
	366	Cl	Cl	SCH ₂ -CH=CH ₂
	367	Br	H	SCH ₂ -CH=CH ₂
30	368	Br	F	SCH ₂ -CH=CH ₂
	369	Br	Cl	SCH ₂ -CH=CH ₂
	370	CH ₃	H	SCH ₂ -CH=CH ₂
	371	CH ₃	F	SCH ₂ -CH=CH ₂
	372	CH ₃	Cl	SCH ₂ -CH=CH ₂
35	373	H	H	SCH ₂ -C≡CH
	374	H	F	SCH ₂ -C≡CH
	375	H	Cl	SCH ₂ -C≡CH
	376	Cl	H	SCH ₂ -C≡CH
	377	Cl	F	SCH ₂ -C≡CH
40	378	Cl	Cl	SCH ₂ -C≡CH
	379	Br	H	SCH ₂ -C≡CH
	380	Br	F	SCH ₂ -C≡CH
	381	Br	Cl	SCH ₂ -C≡CH
	382	CH ₃	H	SCH ₂ -C≡CH
45	383	CH ₃	F	SCH ₂ -C≡CH
	384	CH ₃	Cl	SCH ₂ -C≡CH
	385	H	H	SCH ₂ -COOH
	386	H	F	SCH ₂ -COOH
	387	H	Cl	SCH ₂ -COOH
	388	Cl	H	SCH ₂ -COOH
	389	Cl	F	SCH ₂ -COOH
	390	Cl	Cl	SCH ₂ -COOH
	391	Br	H	SCH ₂ -COOH
	392	Br	F	SCH ₂ -COOH
	393	Br	Cl	SCH ₂ -COOH

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	No.	R ²	R ⁴	-X-R ⁶
5	394	CH ₃	H	SCH ₂ -COOH
	395	CH ₃	F	SCH ₂ -COOH
	396	CH ₃	Cl	SCH ₂ -COOH
	397	H	H	SCH ₂ -COOCH ₃
	398	H	F	SCH ₂ -COOCH ₃
10	399	H	Cl	SCH ₂ -COOCH ₃
	400	Cl	H	SCH ₂ -COOCH ₃
	401	Cl	F	SCH ₂ -COOCH ₃
	402	Cl	Cl	SCH ₂ -COOCH ₃
	403	Br	H	SCH ₂ -COOCH ₃
15	404	Br	F	SCH ₂ -COOCH ₃
	405	Br	Cl	SCH ₂ -COOCH ₃
	406	CH ₃	H	SCH ₂ -COOCH ₃
	407	CH ₃	F	SCH ₂ -COOCH ₃
	408	CH ₃	Cl	SCH ₂ -COOCH ₃
20	409	H	H	SCH ₂ -COOC ₂ H ₅
	410	H	F	SCH ₂ -COOC ₂ H ₅
	411	H	Cl	SCH ₂ -COOC ₂ H ₅
	412	Cl	H	SCH ₂ -COOC ₂ H ₅
	413	Cl	F	SCH ₂ -COOC ₂ H ₅
25	414	Cl	Cl	SCH ₂ -COOC ₂ H ₅
	415	Br	H	SCH ₂ -COOC ₂ H ₅
	416	Br	F	SCH ₂ -COOC ₂ H ₅
	417	Br	Cl	SCH ₂ -COOC ₂ H ₅
	418	CH ₃	H	SCH ₂ -COOC ₂ H ₅
30	419	CH ₃	F	SCH ₂ -COOC ₂ H ₅
	420	CH ₃	Cl	SCH ₂ -COOC ₂ H ₅
	421	H	H	SCH ₂ -CO-N(CH ₃) ₂
	422	H	F	SCH ₂ -CO-N(CH ₃) ₂
	423	H	Cl	SCH ₂ -CO-N(CH ₃) ₂
35	424	Cl	H	SCH ₂ -CO-N(CH ₃) ₂
	425	Cl	F	SCH ₂ -CO-N(CH ₃) ₂
	426	Cl	Cl	SCH ₂ -CO-N(CH ₃) ₂
	427	Br	H	SCH ₂ -CO-N(CH ₃) ₂
	428	Br	F	SCH ₂ -CO-N(CH ₃) ₂
40	429	Br	Cl	SCH ₂ -CO-N(CH ₃) ₂
	430	CH ₃	H	SCH ₂ -CO-N(CH ₃) ₂
	431	CH ₃	F	SCH ₂ -CO-N(CH ₃) ₂
	432	CH ₃	Cl	SCH ₂ -CO-N(CH ₃) ₂
	433	H	H	SCH(CH ₃)-COOH
45	434	H	F	SCH(CH ₃)-COOH
	435	H	Cl	SCH(CH ₃)-COOH
	436	Cl	H	SCH(CH ₃)-COOH
	437	Cl	F	SCH(CH ₃)-COOH
	438	Cl	Cl	SCH(CH ₃)-COOH
	439	Br	H	SCH(CH ₃)-COOH
	440	Br	F	SCH(CH ₃)-COOH
	441	Br	Cl	SCH(CH ₃)-COOH
	442	CH ₃	H	SCH(CH ₃)-COOH
	443	CH ₃	F	SCH(CH ₃)-COOH
	444	CH ₃	Cl	SCH(CH ₃)-COOH

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No.	R ²	R ⁴	-X-R ⁶
445	H	H	SCH(CH ₃)-COOCH ₃
446	H	F	SCH(CH ₃)-COOCH ₃
447	H	Cl	SCH(CH ₃)-COOCH ₃
5 448	Cl	H	SCH(CH ₃)-COOCH ₃
449	Cl	F	SCH(CH ₃)-COOCH ₃
450	Cl	Cl	SCH(CH ₃)-COOCH ₃
451	Br	H	SCH(CH ₃)-COOCH ₃
452	Br	F	SCH(CH ₃)-COOCH ₃
453	Br	Cl	SCH(CH ₃)-COOCH ₃
10 454	CH ₃	H	SCH(CH ₃)-COOCH ₃
455	CH ₃	F	SCH(CH ₃)-COOCH ₃
456	CH ₃	Cl	SCH(CH ₃)-COOCH ₃
457	H	H	SCH(CH ₃)-COOC ₂ H ₅
458	H	F	SCH(CH ₃)-COOC ₂ H ₅
15 459	H	Cl	SCH(CH ₃)-COOC ₂ H ₅
460	Cl	H	SCH(CH ₃)-COOC ₂ H ₅
461	Cl	F	SCH(CH ₃)-COOC ₂ H ₅
462	Cl	Cl	SCH(CH ₃)-COOC ₂ H ₅
463	Br	H	SCH(CH ₃)-COOC ₂ H ₅
464	Br	F	SCH(CH ₃)-COOC ₂ H ₅
20 465	Br	Cl	SCH(CH ₃)-COOC ₂ H ₅
466	CH ₃	H	SCH(CH ₃)-COOC ₂ H ₅
467	CH ₃	F	SCH(CH ₃)-COOC ₂ H ₅
468	CH ₃	Cl	SCH(CH ₃)-COOC ₂ H ₅
469	H	H	SCH(CH ₃)-CO-N(CH ₃) ₂
25 470	H	F	SCH(CH ₃)-CO-N(CH ₃) ₂
471	H	Cl	SCH(CH ₃)-CO-N(CH ₃) ₂
472	Cl	H	SCH(CH ₃)-CO-N(CH ₃) ₂
473	Cl	F	SCH(CH ₃)-CO-N(CH ₃) ₂
474	Cl	Cl	SCH(CH ₃)-CO-N(CH ₃) ₂
475	Br	H	SCH(CH ₃)-CO-N(CH ₃) ₂
30 476	Br	F	SCH(CH ₃)-CO-N(CH ₃) ₂
477	Br	Cl	SCH(CH ₃)-CO-N(CH ₃) ₂
478	CH ₃	H	SCH(CH ₃)-CO-N(CH ₃) ₂
479	CH ₃	F	SCH(CH ₃)-CO-N(CH ₃) ₂
480	CH ₃	Cl	SCH(CH ₃)-CO-N(CH ₃) ₂
35 481	H	H	S-cyclopentyl
482	H	F	S-cyclopentyl
483	H	Cl	S-cyclopentyl
484	Cl	H	S-cyclopentyl
485	Cl	F	S-cyclopentyl
486	Cl	Cl	S-cyclopentyl
40 487	Br	H	S-cyclopentyl
488	Br	F	S-cyclopentyl
489	Br	Cl	S-cyclopentyl
490	CH ₃	H	S-cyclopentyl
491	CH ₃	F	S-cyclopentyl
45 492	CH ₃	Cl	S-cyclopentyl
493	H	H	S-CH ₂ -phenyl
494	H	F	S-CH ₂ -phenyl
495	H	Cl	S-CH ₂ -phenyl

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	No.	R ²	R ⁴	-X-R ⁶
5	496	Cl	H	S-CH ₂ -phenyl
	497	Cl	F	S-CH ₂ -phenyl
	498	Cl	Cl	S-CH ₂ -phenyl
	499	Br	H	S-CH ₂ -phenyl
	500	Br	F	S-CH ₂ -phenyl
10	501	Br	Cl	S-CH ₂ -phenyl
	502	CH ₃	H	S-CH ₂ -phenyl
	503	CH ₃	F	S-CH ₂ -phenyl
	504	CH ₃	Cl	S-CH ₂ -phenyl
	505	H	H	SO ₂ -Cl
15	506	H	F	SO ₂ -Cl
	507	H	Cl	SO ₂ -Cl
	508	Cl	H	SO ₂ -Cl
	509	Cl	F	SO ₂ -Cl
	510	Cl	Cl	SO ₂ -Cl
20	511	Br	H	SO ₂ -Cl
	512	Br	F	SO ₂ -Cl
	513	Br	Cl	SO ₂ -Cl
	514	CH ₃	H	SO ₂ -Cl
	515	CH ₃	F	SO ₂ -Cl
25	516	CH ₃	Cl	SO ₂ -Cl
	517	H	H	SO ₂ -NH ₂
	518	H	F	SO ₂ -NH ₂
	519	H	Cl	SO ₂ -NH ₂
	520	Cl	H	SO ₂ -NH ₂
30	521	Cl	F	SO ₂ -NH ₂
	522	Cl	Cl	SO ₂ -NH ₂
	523	Br	H	SO ₂ -NH ₂
	524	Br	F	SO ₂ -NH ₂
	525	Br	Cl	SO ₂ -NH ₂
35	526	CH ₃	H	SO ₂ -NH ₂
	527	CH ₃	F	SO ₂ -NH ₂
	528	CH ₃	Cl	SO ₂ -NH ₂
	529	H	H	SO ₂ -N(CH ₃) ₂
	530	H	F	SO ₂ -N(CH ₃) ₂
40	531	H	Cl	SO ₂ -N(CH ₃) ₂
	532	Cl	H	SO ₂ -N(CH ₃) ₂
	533	Cl	F	SO ₂ -N(CH ₃) ₂
	534	Cl	Cl	SO ₂ -N(CH ₃) ₂
	535	Br	H	SO ₂ -N(CH ₃) ₂
45	536	Br	F	SO ₂ -N(CH ₃) ₂
	537	Br	Cl	SO ₂ -N(CH ₃) ₂
	538	CH ₃	H	SO ₂ -N(CH ₃) ₂
	539	CH ₃	F	SO ₂ -N(CH ₃) ₂
	540	CH ₃	Cl	SO ₂ -N(CH ₃) ₂
45	541	H	H	CHO
	542	H	F	CHO
	543	H	Cl	CHO
	544	Cl	H	CHO
	545	Cl	F	CHO
	546	Cl	Cl	CHO

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	No.	R ²	R ⁴	-X-R ⁶
5	547	Br	H	CHO
	548	Br	F	CHO
	549	Br	Cl	CHO
	550	CH ₃	H	CHO
	551	CH ₃	F	CHO
10	552	CH ₃	Cl	CHO
	553	H	H	CH=N-OH
	554	H	F	CH=N-OH
	555	H	Cl	CH=N-OH
	556	Cl	H	CH=N-OH
15	557	Cl	F	CH=N-OH
	558	Cl	Cl	CH=N-OH
	559	Br	H	CH=N-OH
	560	Br	F	CH=N-OH
	561	Br	Cl	CH=N-OH
20	562	CH ₃	H	CH=N-OH
	563	CH ₃	F	CH=N-OH
	564	CH ₃	Cl	CH=N-OH
	565	H	H	CH=N-OCH ₃
	566	H	F	CH=N-OCH ₃
25	567	H	Cl	CH=N-OCH ₃
	568	Cl	H	CH=N-OCH ₃
	569	Cl	F	CH=N-OCH ₃
	570	Cl	Cl	CH=N-OCH ₃
	571	Br	H	CH=N-OCH ₃
30	572	Br	F	CH=N-OCH ₃
	573	Br	Cl	CH=N-OCH ₃
	574	CH ₃	H	CH=N-OCH ₃
	575	CH ₃	F	CH=N-OCH ₃
	576	CH ₃	Cl	CH=N-OCH ₃
35	577	H	H	CH=N-OC ₂ H ₅
	578	H	F	CH=N-OC ₂ H ₅
	579	H	Cl	CH=N-OC ₂ H ₅
	580	Cl	H	CH=N-OC ₂ H ₅
	581	Cl	F	CH=N-OC ₂ H ₅
40	582	Cl	Cl	CH=N-OC ₂ H ₅
	583	Br	H	CH=N-OC ₂ H ₅
	584	Br	F	CH=N-OC ₂ H ₅
	585	Br	Cl	CH=N-OC ₂ H ₅
	586	CH ₃	H	CH=N-OC ₂ H ₅
45	587	CH ₃	F	CH=N-OC ₂ H ₅
	588	CH ₃	Cl	CH=N-OC ₂ H ₅
	589	H	H	COOH
	590	H	F	COOH
	591	H	Cl	COOH
	592	Cl	H	COOH
	593	Cl	F	COOH
	594	Cl	Cl	COOH
	595	Br	H	COOH
	596	Br	F	COOH
	597	Br	Cl	COOH

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	No.	R ²	R ⁴	-X-R ⁶
	598	CH ₃	H	COOH
	599	CH ₃	F	COOH
	600	CH ₃	Cl	COOH
5	601	H	H	COOCH ₃
	602	H	F	COOCH ₃
	603	H	Cl	COOCH ₃
	604	Cl	H	COOCH ₃
	605	Cl	F	COOCH ₃
10	606	Cl	Cl	COOCH ₃
	607	Br	H	COOCH ₃
	608	Br	F	COOCH ₃
	609	Br	Cl	COOCH ₃
	610	CH ₃	H	COOCH ₃
15	611	CH ₃	F	COOCH ₃
	612	CH ₃	Cl	COOCH ₃
	613	H	H	COOC ₂ H ₅
	614	H	F	COOC ₂ H ₅
	615	H	Cl	COOC ₂ H ₅
	616	Cl	H	COOC ₂ H ₅
20	617	Cl	F	COOC ₂ H ₅
	618	Cl	Cl	COOC ₂ H ₅
	619	Br	H	COOC ₂ H ₅
	620	Br	F	COOC ₂ H ₅
	621	Br	Cl	COOC ₂ H ₅
	622	CH ₃	H	COOC ₂ H ₅
25	623	CH ₃	F	COOC ₂ H ₅
	624	CH ₃	Cl	COOC ₂ H ₅
	625	H	H	COOCH(CH ₃) ₂
	626	H	F	COOCH(CH ₃) ₂
	627	H	Cl	COOCH(CH ₃) ₂
30	628	Cl	H	COOCH(CH ₃) ₂
	629	Cl	F	COOCH(CH ₃) ₂
	630	Cl	Cl	COOCH(CH ₃) ₂
	631	Br	H	COOCH(CH ₃) ₂
	632	Br	F	COOCH(CH ₃) ₂
	633	Br	Cl	COOCH(CH ₃) ₂
35	634	CH ₃	H	COOCH(CH ₃) ₂
	635	CH ₃	F	COOCH(CH ₃) ₂
	636	CH ₃	Cl	COOCH(CH ₃) ₂
	637	H	H	COO-CH ₂ -COOCH ₃
	638	H	F	COO-CH ₂ -COOCH ₃
	639	H	Cl	COO-CH ₂ -COOCH ₃
40	640	Cl	H	COO-CH ₂ -COOCH ₃
	641	Cl	F	COO-CH ₂ -COOCH ₃
	642	Cl	Cl	COO-CH ₂ -COOCH ₃
	643	Br	H	COO-CH ₂ -COOCH ₃
	644	Br	F	COO-CH ₂ -COOCH ₃
45	645	Br	Cl	COO-CH ₂ -COOCH ₃
	646	CH ₃	H	COO-CH ₂ -COOCH ₃
	647	CH ₃	F	COO-CH ₂ -COOCH ₃
	648	CH ₃	Cl	COO-CH ₂ -COOCH ₃

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	No.	R ²	R ⁴	-X-R ⁶
5	649	H	H	COO-CH(CH ₃)-COOCH ₃
	650	H	F	COO-CH(CH ₃)-COOCH ₃
	651	H	Cl	COO-CH(CH ₃)-COOCH ₃
	652	Cl	H	COO-CH(CH ₃)-COOCH ₃
	653	Cl	F	COO-CH(CH ₃)-COOCH ₃
10	654	Cl	Cl	COO-CH(CH ₃)-COOCH ₃
	655	Br	H	COO-CH(CH ₃)-COOCH ₃
	656	Br	F	COO-CH(CH ₃)-COOCH ₃
	657	Br	Cl	COO-CH(CH ₃)-COOCH ₃
	658	CH ₃	H	COO-CH(CH ₃)-COOCH ₃
15	659	CH ₃	F	COO-CH(CH ₃)-COOCH ₃
	660	CH ₃	Cl	COO-CH(CH ₃)-COOCH ₃
	661	H	H	COO-C(CH ₃) ₂ -COO-CH ₂ -CH=CH ₂
	662	H	F	COO-C(CH ₃) ₂ -COO-CH ₂ -CH=CH ₂
	663	H	Cl	COO-C(CH ₃) ₂ -COO-CH ₂ -CH=CH ₂
20	664	Cl	H	COO-C(CH ₃) ₂ -COO-CH ₂ -CH=CH ₂
	665	Cl	F	COO-C(CH ₃) ₂ -COO-CH ₂ -CH=CH ₂
	666	Cl	Cl	COO-C(CH ₃) ₂ -COO-CH ₂ -CH=CH ₂
	667	Br	H	COO-C(CH ₃) ₂ -COO-CH ₂ -CH=CH ₂
	668	Br	F	COO-C(CH ₃) ₂ -COO-CH ₂ -CH=CH ₂
25	669	Br	Cl	COO-C(CH ₃) ₂ -COO-CH ₂ -CH=CH ₂
	670	CH ₃	H	COO-C(CH ₃) ₂ -COO-CH ₂ -CH=CH ₂
	671	CH ₃	F	COO-C(CH ₃) ₂ -COO-CH ₂ -CH=CH ₂
	672	CH ₃	Cl	COO-C(CH ₃) ₂ -COO-CH ₂ -CH=CH ₂
	673	H	H	CH ₂ -CH(Cl)-COOH
30	674	H	F	CH ₂ -CH(Cl)-COOH
	675	H	Cl	CH ₂ -CH(Cl)-COOH
	676	Cl	H	CH ₂ -CH(Cl)-COOH
	677	Cl	F	CH ₂ -CH(Cl)-COOH
	678	Cl	Cl	CH ₂ -CH(Cl)-COOH
35	679	Br	H	CH ₂ -CH(Cl)-COOH
	680	Br	F	CH ₂ -CH(Cl)-COOH
	681	Br	Cl	CH ₂ -CH(Cl)-COOH
	682	CH ₃	H	CH ₂ -CH(Cl)-COOH
	683	CH ₃	F	CH ₂ -CH(Cl)-COOH
40	684	CH ₃	Cl	CH ₂ -CH(Cl)-COOH
	685	H	H	CH ₂ -CH(Cl)-COOCH ₃
	686	H	F	CH ₂ -CH(Cl)-COOCH ₃
	687	H	Cl	CH ₂ -CH(Cl)-COOCH ₃
	688	Cl	H	CH ₂ -CH(Cl)-COOCH ₃
45	689	Cl	F	CH ₂ -CH(Cl)-COOCH ₃
	690	Cl	Cl	CH ₂ -CH(Cl)-COOCH ₃
	691	Br	H	CH ₂ -CH(Cl)-COOCH ₃
	692	Br	F	CH ₂ -CH(Cl)-COOCH ₃
	693	Br	Cl	CH ₂ -CH(Cl)-COOCH ₃
	694	CH ₃	H	CH ₂ -CH(Cl)-COOCH ₃
	695	CH ₃	F	CH ₂ -CH(Cl)-COOCH ₃
	696	CH ₃	Cl	CH ₂ -CH(Cl)-COOCH ₃
	697	H	H	CH ₂ -CH(Cl)-COOC ₂ H ₅
	698	H	F	CH ₂ -CH(Cl)-COOC ₂ H ₅
	699	H	Cl	CH ₂ -CH(Cl)-COOC ₂ H ₅

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	No.	R ²	R ⁴	-X-R ⁶
5	700	Cl	H	CH ₂ -CH(Cl)-COOC ₂ H ₅
	701	Cl	F	CH ₂ -CH(Cl)-COOC ₂ H ₅
	702	Cl	Cl	CH ₂ -CH(Cl)-COOC ₂ H ₅
	703	Br	H	CH ₂ -CH(Cl)-COOC ₂ H ₅
	704	Br	F	CH ₂ -CH(Cl)-COOC ₂ H ₅
10	705	Br	Cl	CH ₂ -CH(Cl)-COOC ₂ H ₅
	706	CH ₃	H	CH ₂ -CH(Cl)-COOC ₂ H ₅
	707	CH ₃	F	CH ₂ -CH(Cl)-COOC ₂ H ₅
	708	CH ₃	Cl	CH ₂ -CH(Cl)-COOC ₂ H ₅
	709	H	H	CH ₂ -CH(Cl)-CO-N(CH ₃) ₂
15	710	H	F	CH ₂ -CH(Cl)-CO-N(CH ₃) ₂
	711	H	Cl	CH ₂ -CH(Cl)-CO-N(CH ₃) ₂
	712	Cl	H	CH ₂ -CH(Cl)-CO-N(CH ₃) ₂
	713	Cl	F	CH ₂ -CH(Cl)-CO-N(CH ₃) ₂
	714	Cl	Cl	CH ₂ -CH(Cl)-CO-N(CH ₃) ₂
20	715	Br	H	CH ₂ -CH(Cl)-CO-N(CH ₃) ₂
	716	Br	F	CH ₂ -CH(Cl)-CO-N(CH ₃) ₂
	717	Br	Cl	CH ₂ -CH(Cl)-CO-N(CH ₃) ₂
	718	CH ₃	H	CH ₂ -CH(Cl)-CO-N(CH ₃) ₂
	719	CH ₃	F	CH ₂ -CH(Cl)-CO-N(CH ₃) ₂
25	720	CH ₃	Cl	CH ₂ -CH(Cl)-CO-N(CH ₃) ₂
	721	H	H	CH=C(Cl)-COOH
	722	H	F	CH=C(Cl)-COOH
	723	H	Cl	CH=C(Cl)-COOH
	724	Cl	H	CH=C(Cl)-COOH
30	725	Cl	F	CH=C(Cl)-COOH
	726	Cl	Cl	CH=C(Cl)-COOH
	727	Br	H	CH=C(Cl)-COOH
	728	Br	F	CH=C(Cl)-COOH
	729	Br	Cl	CH=C(Cl)-COOH
35	730	CH ₃	H	CH=C(Cl)-COOH
	731	CH ₃	F	CH=C(Cl)-COOH
	732	CH ₃	Cl	CH=C(Cl)-COOH
	733	H	H	CH=C(Cl)-COOCH ₃
	734	H	F	CH=C(Cl)-COOCH ₃
40	735	H	Cl	CH=C(Cl)-COOCH ₃
	736	Cl	H	CH=C(Cl)-COOCH ₃
	737	Cl	F	CH=C(Cl)-COOCH ₃
	738	Cl	Cl	CH=C(Cl)-COOCH ₃
	739	Br	H	CH=C(Cl)-COOCH ₃
45	740	Br	F	CH=C(Cl)-COOCH ₃
	741	Br	Cl	CH=C(Cl)-COOCH ₃
	742	CH ₃	H	CH=C(Cl)-COOCH ₃
	743	CH ₃	F	CH=C(Cl)-COOCH ₃
	744	CH ₃	Cl	CH=C(Cl)-COOCH ₃
	745	H	H	CH=C(Cl)-COOC ₂ H ₅
	746	H	F	CH=C(Cl)-COOC ₂ H ₅
	747	H	Cl	CH=C(Cl)-COOC ₂ H ₅
	748	Cl	H	CH=C(Cl)-COOC ₂ H ₅
	749	Cl	F	CH=C(Cl)-COOC ₂ H ₅
	750	Cl	Cl	CH=C(Cl)-COOC ₂ H ₅

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No.	R ²	R ⁴	-X-R ⁶
751	Br	H	CH=C(Cl)-COOC ₂ H ₅
752	Br	F	CH=C(Cl)-COOC ₂ H ₅
753	Br	Cl	CH=C(Cl)-COOC ₂ H ₅
5 754	CH ₃	H	CH=C(Cl)-COOC ₂ H ₅
755	CH ₃	F	CH=C(Cl)-COOC ₂ H ₅
756	CH ₃	Cl	CH=C(Cl)-COOC ₂ H ₅
757	H	H	CH=C(Cl)-CO-N(CH ₃) ₂
758	H	F	CH=C(Cl)-CO-N(CH ₃) ₂
759	H	Cl	CH=C(Cl)-CO-N(CH ₃) ₂
10 760	Cl	H	CH=C(Cl)-CO-N(CH ₃) ₂
761	Cl	F	CH=C(Cl)-CO-N(CH ₃) ₂
762	Cl	Cl	CH=C(Cl)-CO-N(CH ₃) ₂
763	Br	H	CH=C(Cl)-CO-N(CH ₃) ₂
764	Br	F	CH=C(Cl)-CO-N(CH ₃) ₂
15 765	Br	Cl	CH=C(Cl)-CO-N(CH ₃) ₂
766	CH ₃	H	CH=C(Cl)-CO-N(CH ₃) ₂
767	CH ₃	F	CH=C(Cl)-CO-N(CH ₃) ₂
768	CH ₃	Cl	CH=C(Cl)-CO-N(CH ₃) ₂
769	H	H	CO-NH ₂
770	H	F	CO-NH ₂
20 771	H	Cl	CO-NH ₂
772	Cl	H	CO-NH ₂
773	Cl	F	CO-NH ₂
774	Cl	Cl	CO-NH ₂
775	Br	H	CO-NH ₂
25 776	Br	F	CO-NH ₂
777	Br	Cl	CO-NH ₂
778	CH ₃	H	CO-NH ₂
779	CH ₃	F	CO-NH ₂
780	CH ₃	Cl	CO-NH ₂
781	H	H	CO-NH-CH ₃
30 782	H	F	CO-NH-CH ₃
783	H	Cl	CO-NH-CH ₃
784	Cl	H	CO-NH-CH ₃
785	Cl	F	CO-NH-CH ₃
786	Cl	Cl	CO-NH-CH ₃
35 787	Br	H	CO-NH-CH ₃
788	Br	F	CO-NH-CH ₃
789	Br	Cl	CO-NH-CH ₃
790	CH ₃	H	CO-NH-CH ₃
791	CH ₃	F	CO-NH-CH ₃
792	CH ₃	Cl	CO-NH-CH ₃
40 793	H	H	CO-N(CH ₃) ₂
794	H	F	CO-N(CH ₃) ₂
795	H	Cl	CO-N(CH ₃) ₂
796	Cl	H	CO-N(CH ₃) ₂
797	Cl	F	CO-N(CH ₃) ₂
45 798	Cl	Cl	CO-N(CH ₃) ₂
799	Br	H	CO-N(CH ₃) ₂
800	Br	F	CO-N(CH ₃) ₂
801	Br	Cl	CO-N(CH ₃) ₂

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	No.	R ²	R ⁴	-X-R ⁶
5	802	CH ₃	H	CO-N(CH ₃) ₂
	803	CH ₃	F	CO-N(CH ₃) ₂
	804	CH ₃	Cl	CO-N(CH ₃) ₂
	805	H	H	CO-NH-OCH ₃
	806	H	F	CO-NH-OCH ₃
10	807	H	Cl	CO-NH-OCH ₃
	808	Cl	H	CO-NH-OCH ₃
	809	Cl	F	CO-NH-OCH ₃
	810	Cl	Cl	CO-NH-OCH ₃
	811	Br	H	CO-NH-OCH ₃
15	812	Br	F	CO-NH-OCH ₃
	813	Br	Cl	CO-NH-OCH ₃
	814	CH ₃	H	CO-NH-OCH ₃
	815	CH ₃	F	CO-NH-OCH ₃
	816	CH ₃	Cl	CO-NH-OCH ₃
20	817	H	H	C(N=OCH ₃)-OCH ₃
	818	H	F	C(N=OCH ₃)-OCH ₃
	819	H	Cl	C(N=OCH ₃)-OCH ₃
	820	Cl	H	C(N=OCH ₃)-OCH ₃
	821	Cl	F	C(N=OCH ₃)-OCH ₃
25	822	Cl	Cl	C(N=OCH ₃)-OCH ₃
	823	Br	H	C(N=OCH ₃)-OCH ₃
	824	Br	F	C(N=OCH ₃)-OCH ₃
	825	Br	Cl	C(N=OCH ₃)-OCH ₃
	826	CH ₃	H	C(N=OCH ₃)-OCH ₃
30	827	CH ₃	F	C(N=OCH ₃)-OCH ₃
	828	CH ₃	Cl	C(N=OCH ₃)-OCH ₃
	829	H	H	C(N=OCH ₃)-OCH ₂ -COOCH ₃
	830	H	F	C(N=OCH ₃)-OCH ₂ -COOCH ₃
	831	H	Cl	C(N=OCH ₃)-OCH ₂ -COOCH ₃
35	832	Cl	H	C(N=OCH ₃)-OCH ₂ -COOCH ₃
	833	Cl	F	C(N=OCH ₃)-OCH ₂ -COOCH ₃
	834	Cl	Cl	C(N=OCH ₃)-OCH ₂ -COOCH ₃
	835	Br	H	C(N=OCH ₃)-OCH ₂ -COOCH ₃
	836	Br	F	C(N=OCH ₃)-OCH ₂ -COOCH ₃
40	837	Br	Cl	C(N=OCH ₃)-OCH ₂ -COOCH ₃
	838	CH ₃	H	C(N=OCH ₃)-OCH ₂ -COOCH ₃
	839	CH ₃	F	C(N=OCH ₃)-OCH ₂ -COOCH ₃
	840	CH ₃	Cl	C(N=OCH ₃)-OCH ₂ -COOCH ₃
	841	H	H	PO(OCH ₃) ₂
45	842	H	F	PO(OCH ₃) ₂
	843	H	Cl	PO(OCH ₃) ₂
	844	Cl	H	PO(OCH ₃) ₂
	845	Cl	F	PO(OCH ₃) ₂
	846	Cl	Cl	PO(OCH ₃) ₂
45	847	Br	H	PO(OCH ₃) ₂
	848	Br	F	PO(OCH ₃) ₂
	849	Br	Cl	PO(OCH ₃) ₂
	850	CH ₃	H	PO(OCH ₃) ₂
	851	CH ₃	F	PO(OCH ₃) ₂
	852	CH ₃	Cl	PO(OCH ₃) ₂

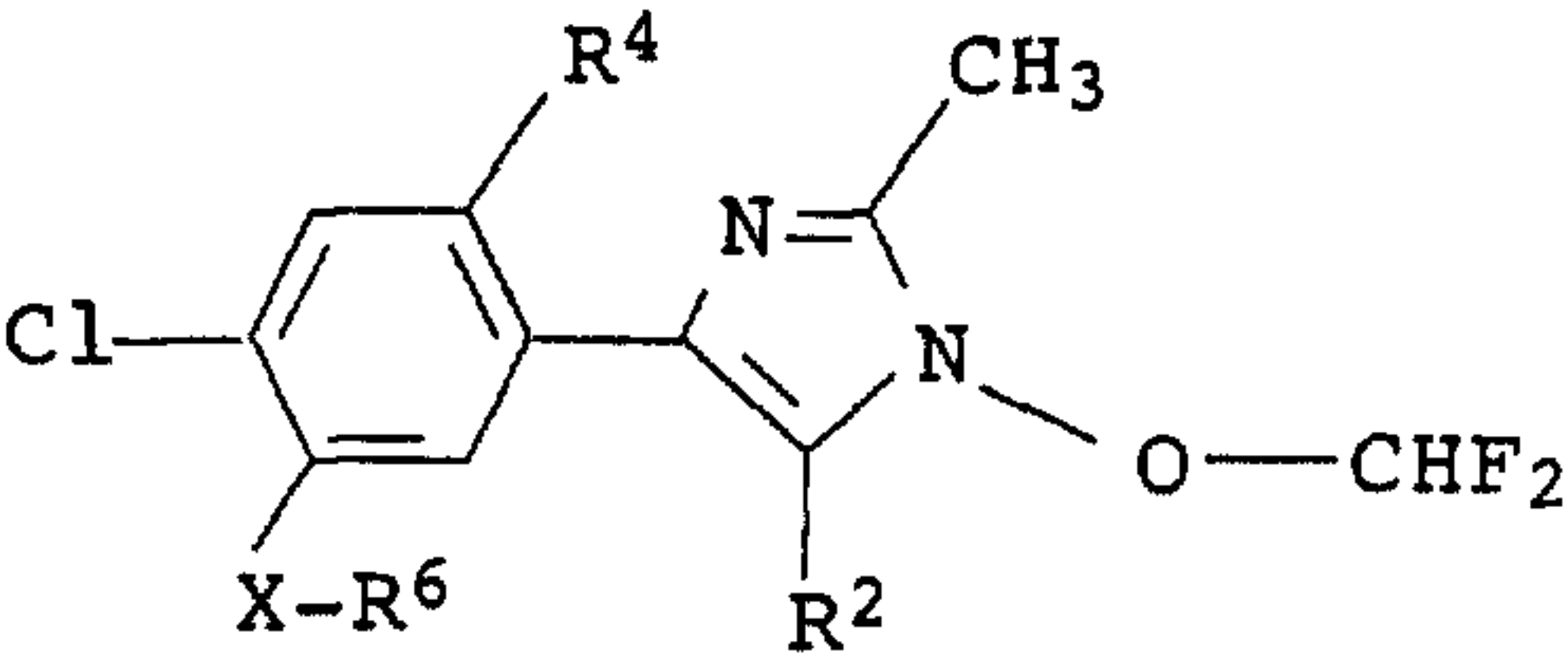
	No.	R ²	R ⁴	-X-R ⁶
5	853	H	H	PO(OC ₂ H ₅) ₂
	854	H	F	PO(OC ₂ H ₅) ₂
	855	H	Cl	PO(OC ₂ H ₅) ₂
	856	Cl	H	PO(OC ₂ H ₅) ₂
	857	Cl	F	PO(OC ₂ H ₅) ₂
	858	Cl	Cl	PO(OC ₂ H ₅) ₂
	859	Br	H	PO(OC ₂ H ₅) ₂
	860	Br	F	PO(OC ₂ H ₅) ₂
	861	Br	Cl	PO(OC ₂ H ₅) ₂
	862	CH ₃	H	PO(OC ₂ H ₅) ₂
10	863	CH ₃	F	PO(OC ₂ H ₅) ₂
	864	CH ₃	Cl	PO(OC ₂ H ₅) ₂
	865	H	H	CH ₂ -PO(OCH ₃) ₂
	866	H	F	CH ₂ -PO(OCH ₃) ₂
	867	H	Cl	CH ₂ -PO(OCH ₃) ₂
	868	Cl	H	CH ₂ -PO(OCH ₃) ₂
	869	Cl	F	CH ₂ -PO(OCH ₃) ₂
	870	Cl	Cl	CH ₂ -PO(OCH ₃) ₂
	871	Br	H	CH ₂ -PO(OCH ₃) ₂
	872	Br	F	CH ₂ -PO(OCH ₃) ₂
20	873	Br	Cl	CH ₂ -PO(OCH ₃) ₂
	874	CH ₃	H	CH ₂ -PO(OCH ₃) ₂
	875	CH ₃	F	CH ₂ -PO(OCH ₃) ₂
	876	CH ₃	Cl	CH ₂ -PO(OCH ₃) ₂
	877	H	H	CH ₂ -PO(OC ₂ H ₅) ₂
	878	H	F	CH ₂ -PO(OC ₂ H ₅) ₂
	879	H	Cl	CH ₂ -PO(OC ₂ H ₅) ₂
	880	Cl	H	CH ₂ -PO(OC ₂ H ₅) ₂
	881	Cl	F	CH ₂ -PO(OC ₂ H ₅) ₂
	882	Cl	Cl	CH ₂ -PO(OC ₂ H ₅) ₂
30	883	Br	H	CH ₂ -PO(OC ₂ H ₅) ₂
	884	Br	F	CH ₂ -PO(OC ₂ H ₅) ₂
	885	Br	Cl	CH ₂ -PO(OC ₂ H ₅) ₂
	886	CH ₃	H	CH ₂ -PO(OC ₂ H ₅) ₂
	887	CH ₃	F	CH ₂ -PO(OC ₂ H ₅) ₂
	888	CH ₃	Cl	CH ₂ -PO(OC ₂ H ₅) ₂
	889	H	H	CH ₂ -CH(Cl)-PO(OCH ₃) ₂
	890	H	F	CH ₂ -CH(Cl)-PO(OCH ₃) ₂
	891	H	Cl	CH ₂ -CH(Cl)-PO(OCH ₃) ₂
	892	Cl	H	CH ₂ -CH(Cl)-PO(OCH ₃) ₂
40	893	Cl	F	CH ₂ -CH(Cl)-PO(OCH ₃) ₂
	894	Cl	Cl	CH ₂ -CH(Cl)-PO(OCH ₃) ₂
	895	Br	H	CH ₂ -CH(Cl)-PO(OCH ₃) ₂
	896	Br	F	CH ₂ -CH(Cl)-PO(OCH ₃) ₂
	897	Br	Cl	CH ₂ -CH(Cl)-PO(OCH ₃) ₂
	898	CH ₃	H	CH ₂ -CH(Cl)-PO(OCH ₃) ₂
	899	CH ₃	F	CH ₂ -CH(Cl)-PO(OCH ₃) ₂
	900	CH ₃	Cl	CH ₂ -CH(Cl)-PO(OCH ₃) ₂
	901	H	H	CH ₂ -CH(Cl)-PO(OC ₂ H ₅) ₂
	902	H	F	CH ₂ -CH(Cl)-PO(OC ₂ H ₅) ₂
45	903	H	Cl	CH ₂ -CH(Cl)-PO(OC ₂ H ₅) ₂

45

No.	R ²	R ⁴	-X-R ⁵
904	Cl	H	CH ₂ -CH(Cl)-PO(OC ₂ H ₅) ₂
905	Cl	F	CH ₂ -CH(Cl)-PO(OC ₂ H ₅) ₂
906	Cl	Cl	CH ₂ -CH(Cl)-PO(OC ₂ H ₅) ₂
5 907	Br	H	CH ₂ -CH(Cl)-PO(OC ₂ H ₅) ₂
908	Br	F	CH ₂ -CH(Cl)-PO(OC ₂ H ₅) ₂
909	Br	Cl	CH ₂ -CH(Cl)-PO(OC ₂ H ₅) ₂
910	CH ₃	H	CH ₂ -CH(Cl)-PO(OC ₂ H ₅) ₂
911	CH ₃	F	CH ₂ -CH(Cl)-PO(OC ₂ H ₅) ₂
912	CH ₃	Cl	CH ₂ -CH(Cl)-PO(OC ₂ H ₅) ₂
10 913	H	H	CH=C(Cl)-PO(OCH ₃) ₂
914	H	F	CH=C(Cl)-PO(OCH ₃) ₂
915	H	Cl	CH=C(Cl)-PO(OCH ₃) ₂
916	Cl	H	CH=C(Cl)-PO(OCH ₃) ₂
917	Cl	F	CH=C(Cl)-PO(OCH ₃) ₂
15 918	Cl	Cl	CH=C(Cl)-PO(OCH ₃) ₂
919	Br	H	CH=C(Cl)-PO(OCH ₃) ₂
920	Br	F	CH=C(Cl)-PO(OCH ₃) ₂
921	Br	Cl	CH=C(Cl)-PO(OCH ₃) ₂
922	CH ₃	H	CH=C(Cl)-PO(OCH ₃) ₂
923	CH ₃	F	CH=C(Cl)-PO(OCH ₃) ₂
20 924	CH ₃	Cl	CH=C(Cl)-PO(OCH ₃) ₂
925	H	H	CH=C(Cl)-PO(OC ₂ H ₅) ₂
926	H	F	CH=C(Cl)-PO(OC ₂ H ₅) ₂
927	H	Cl	CH=C(Cl)-PO(OC ₂ H ₅) ₂
928	Cl	H	CH=C(Cl)-PO(OC ₂ H ₅) ₂
25 929	Cl	F	CH=C(Cl)-PO(OC ₂ H ₅) ₂
930	Cl	Cl	CH=C(Cl)-PO(OC ₂ H ₅) ₂
931	Br	H	CH=C(Cl)-PO(OC ₂ H ₅) ₂
932	Br	F	CH=C(Cl)-PO(OC ₂ H ₅) ₂
933	Br	Cl	CH=C(Cl)-PO(OC ₂ H ₅) ₂
934	CH ₃	H	CH=C(Cl)-PO(OC ₂ H ₅) ₂
30 935	CH ₃	F	CH=C(Cl)-PO(OC ₂ H ₅) ₂
936	CH ₃	Cl	CH=C(Cl)-PO(OC ₂ H ₅) ₂

Particular preference is also given to the compounds of the formula IAb (compounds IA where Q = CH, R¹ = CH₃ and R⁵ = Cl) in which the variables R², R⁴ and X-R⁶ together have the meanings given in each case in one row of Table 1 (compounds IAb.1-IAb.936).

40



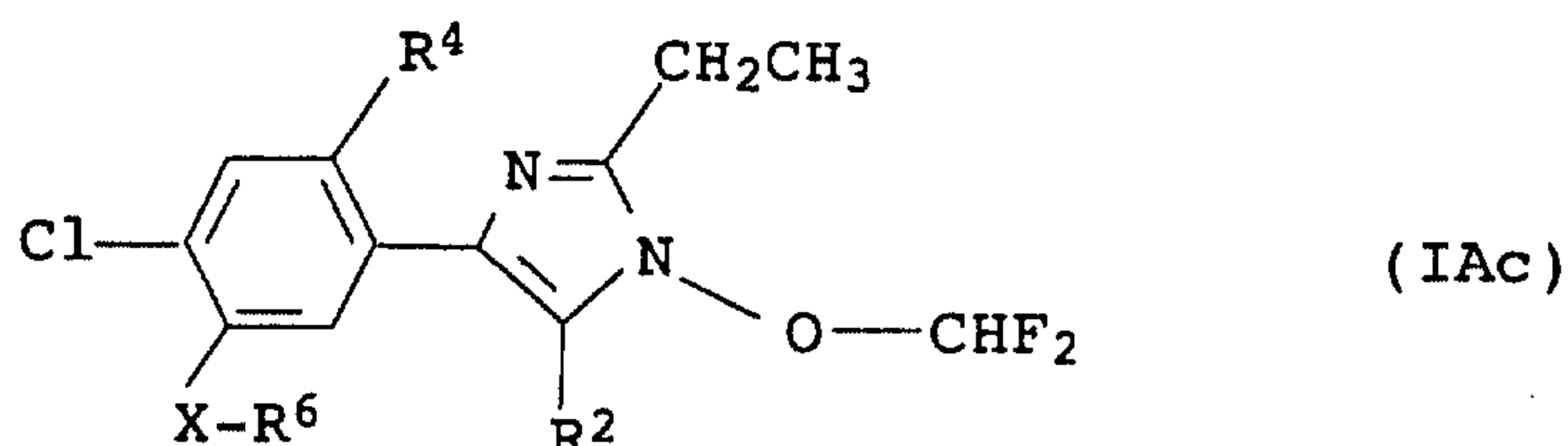
(IAb)

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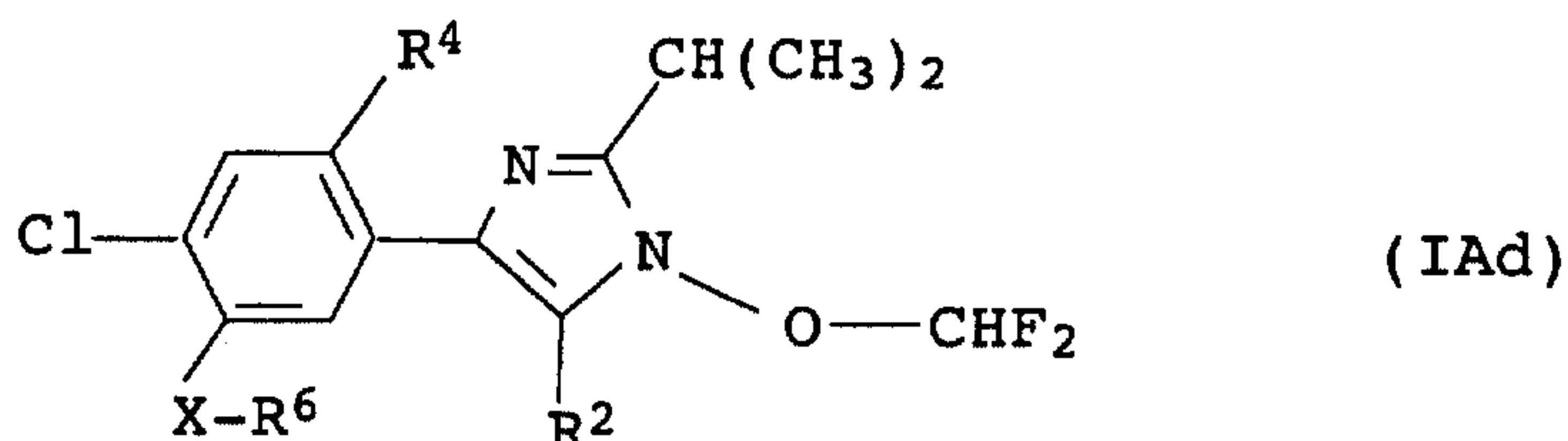
Particular preference is also given to the compounds of the formula IAc (compounds IA where $Q = CH$, $R^1 = C_2H_5$ and $R^5 = Cl$) in which the variables R^2 , R^4 and $X-R^6$ together have the meanings given in each case in one row of Table 1 (compounds 5 IAc.1-IAc.936).

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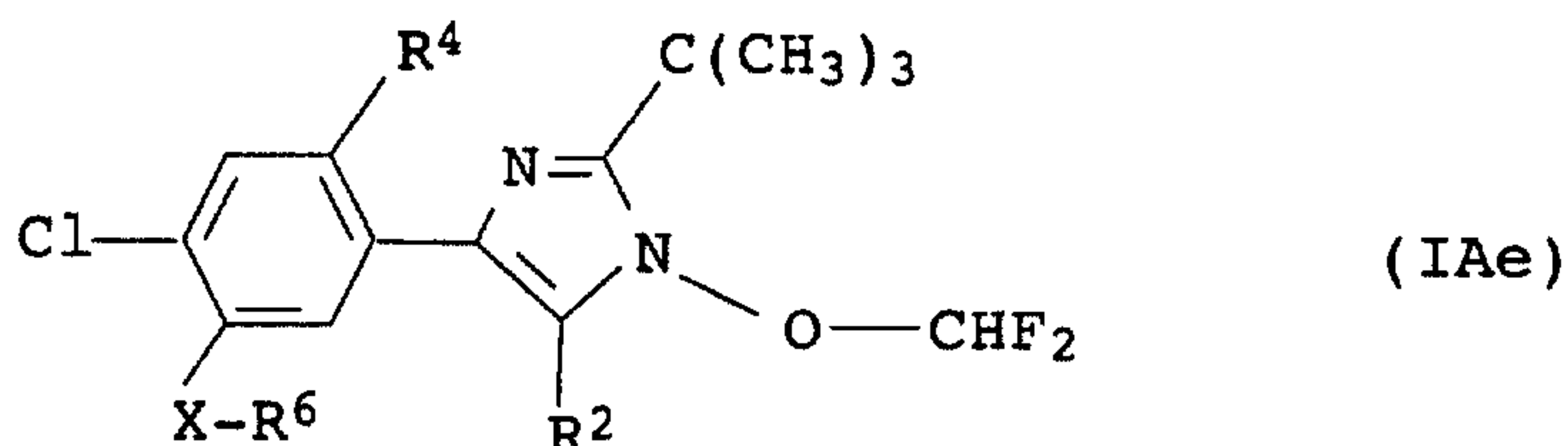
Particular preference is also given to the compounds of the formula IAd (compounds IA where $Q = CH$, $R^1 = CH(CH_3)_2$ and $R^5 = Cl$) in which the variables R^2 , R^4 and $X-R^6$ together have the meanings given in each case in one row of Table 1 (compounds 15 IAd.1-IAd.936).

20



25 Particular preference is also given to the compounds of the formula IAe (compounds IA where $Q = CH$, $R^1 = C(CH_3)_3$ and $R^5 = Cl$) in which the variables R^2 , R^4 and $X-R^6$ together have the meanings given in each case in one row of Table 1 (compounds 30 IAe.1-IAe.936).

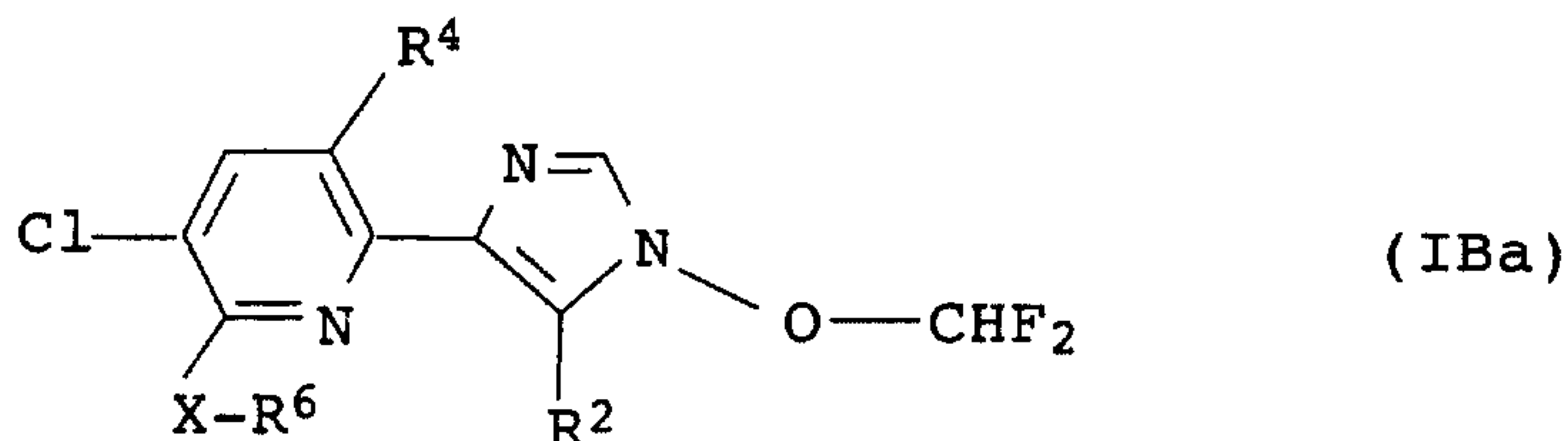
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Preference is furthermore given to the compounds of the formula IBa (compounds IB where $Q = N$, $R^1 = H$ and $R^5 = Cl$) in which the variables R^2 , R^4 and $X-R^6$ together have the meanings given in each 40 case in one row of Table 1 (compounds IBa.1-IBa.936).

45

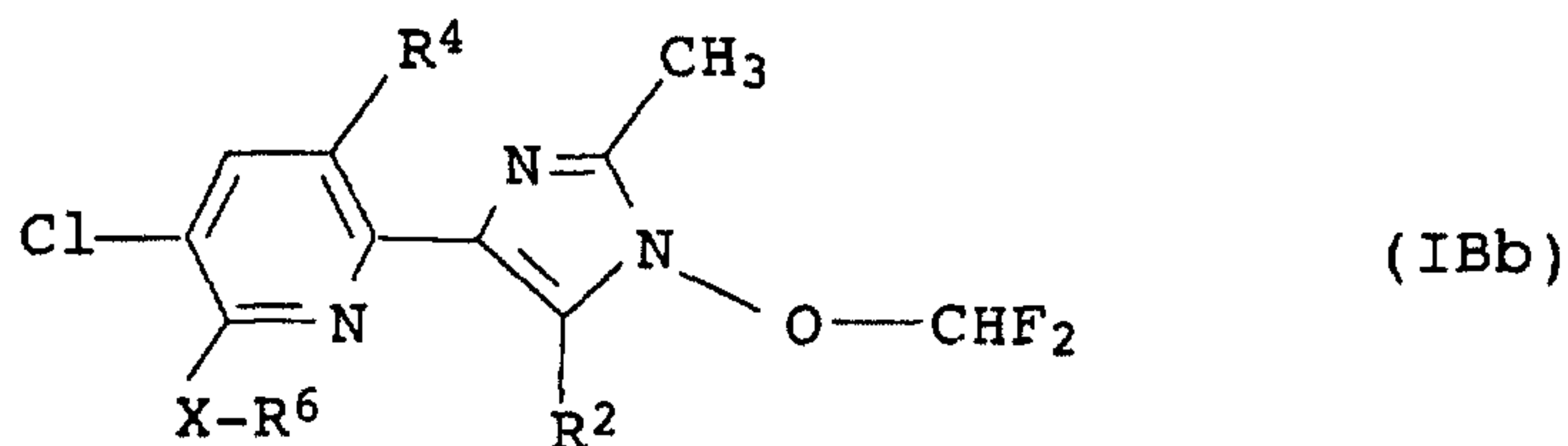


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47

Preference is also given to the compounds of the formula IBb (compounds IB where $Q = N$, $R^1 = CH_3$ and $R^5 = Cl$) in which the variables R^2 , R^4 and $X-R^6$ together have the meanings given in each case in one row of Table 1 (compounds IBb.1-IBb.936).

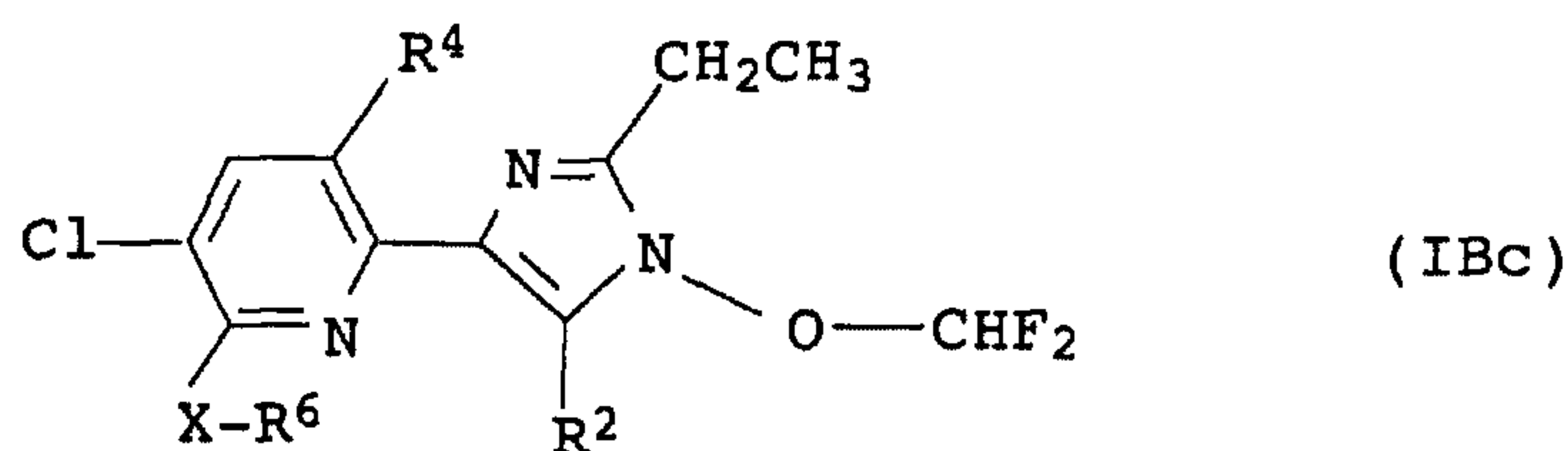
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10

Preference is also given to the compounds of the formula IBc (compounds IB where $Q = N$, $R^1 = C_2H_5$ and $R^5 = Cl$) in which the variables R^2 , R^4 and $X-R^6$ together have the meanings given in each case in one row of Table 1 (compounds IBc.1-IBc.936).

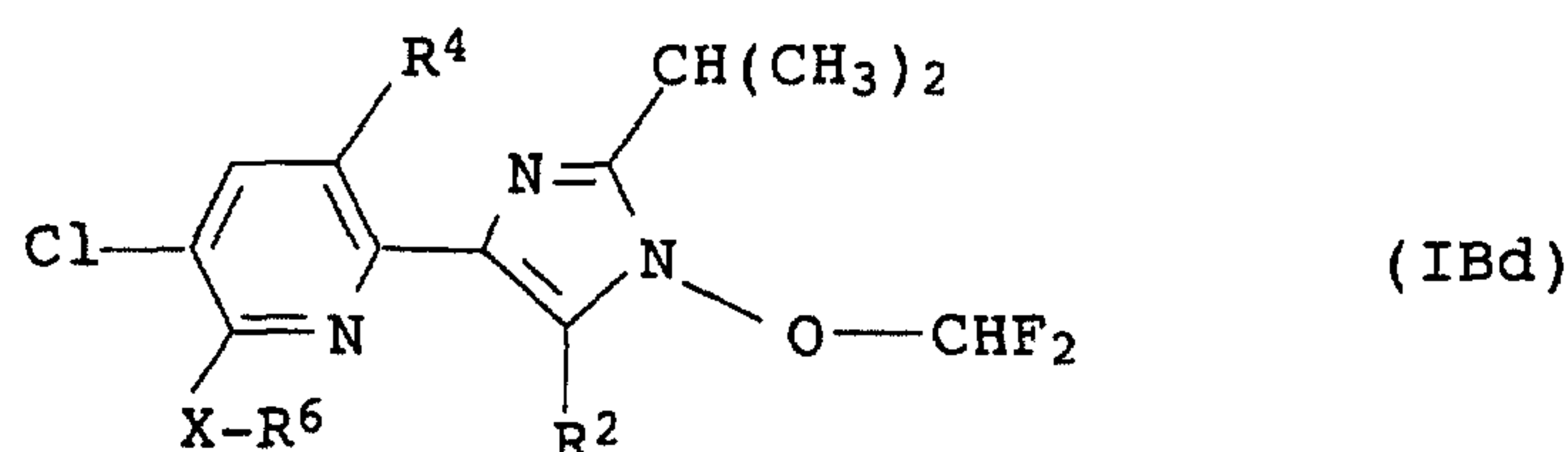
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20

Preference is also given to the compounds of the formula IBd (compounds IB where $Q = N$, $R^1 = CH(CH_3)_2$ and $R^5 = Cl$) in which the variables R^2 , R^4 and $X-R^6$ together have the meanings given in each case in one row of Table 1 (compounds IBd.1-IBd.936).

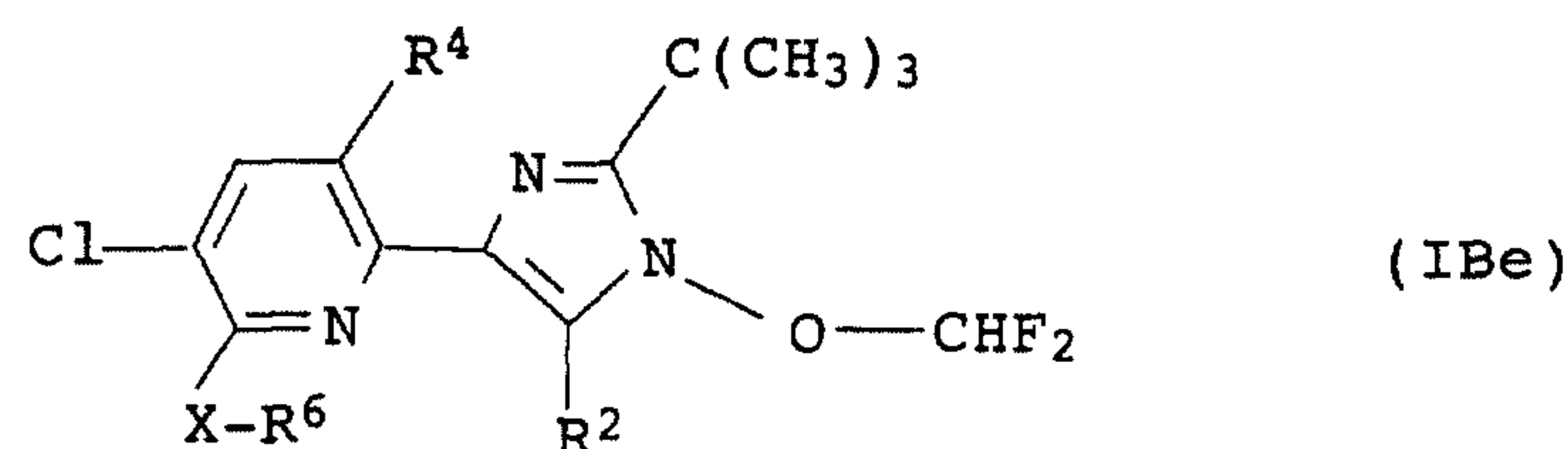
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30

Preference is also given to the compounds of the formula IBe (compounds IB where $Q = N$, $R^1 = C(CH_3)_3$ and $R^5 = Cl$) in which the variables R^2 , R^4 and $X-R^6$ together have the meanings given in each case in one row of Table 1 (compounds IBe.1-IBe.936).

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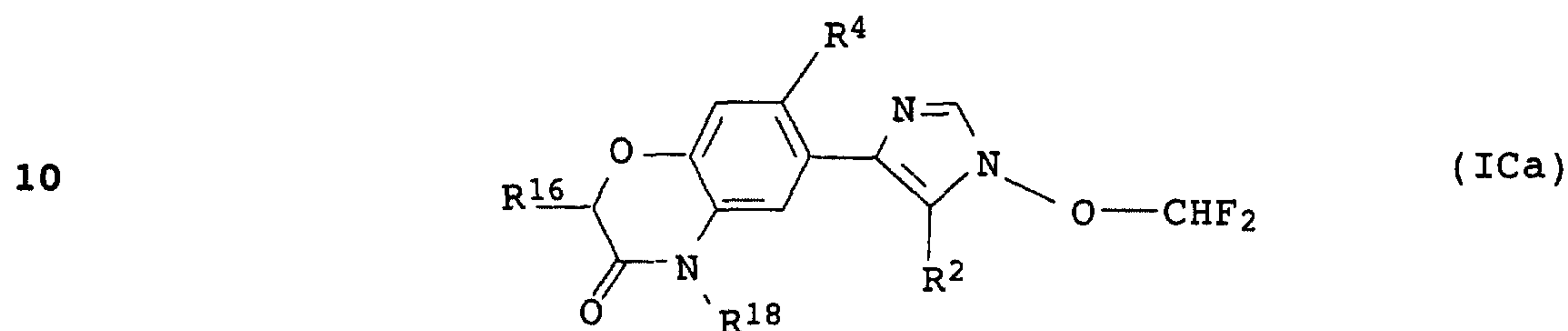


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48

Particular preference is furthermore given to the compounds of the formula ICa (compounds IC where Q = CH, R¹ = H and where R⁵ and X-R⁶ form a chain -OCH(R¹⁶)-C(O)-NR¹⁸-) in which the variables R², R⁴ and R¹⁶ and R¹⁸ together have the meanings given in each case in one row of Table 2 (compounds ICa.1-ICa.696).



15 Table 2:

No.	R ²	R ⁴	R ¹⁶	R ¹⁸
1	H	H	H	H
2	H	F	H	H
20 3	H	Cl	H	H
4	Cl	H	H	H
5	Cl	F	H	H
6	Cl	Cl	H	H
7	Br	H	H	H
8	Br	F	H	H
25 9	Br	Cl	H	H
10	CH ₃	H	H	H
11	CH ₃	F	H	H
12	CH ₃	Cl	H	H
13	H	H	CH ₃	H
30 14	H	F	CH ₃	H
15	H	Cl	CH ₃	H
16	Cl	H	CH ₃	H
17	Cl	F	CH ₃	H
18	Cl	Cl	CH ₃	H
19	Br	H	CH ₃	H
35 20	Br	F	CH ₃	H
21	Br	Cl	CH ₃	H
22	CH ₃	H	CH ₃	H
23	CH ₃	F	CH ₃	H
24	CH ₃	Cl	CH ₃	H
40 25	H	H	H	OH
26	H	F	H	OH
27	H	Cl	H	OH
28	Cl	H	H	OH
29	Cl	F	H	OH
30	Cl	Cl	H	OH
45 31	Br	H	H	OH
32	Br	F	H	OH
33	Br	Cl	H	OH

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No.	R ²	R ⁴	R ¹⁶	R ¹⁸
34	CH ₃	H	H	OH
35	CH ₃	F	H	OH
36	CH ₃	Cl	H	OH
37	H	H	CH ₃	OH
38	H	F	CH ₃	OH
39	H	Cl	CH ₃	OH
40	Cl	H	CH ₃	OH
41	Cl	F	CH ₃	OH
42	Cl	Cl	CH ₃	OH
43	Br	H	CH ₃	OH
44	Br	F	CH ₃	OH
45	Br	Cl	CH ₃	OH
46	CH ₃	H	CH ₃	OH
47	CH ₃	F	CH ₃	OH
48	CH ₃	Cl	CH ₃	OH
49	H	H	H	CH ₃
50	H	F	H	CH ₃
51	H	Cl	H	CH ₃
52	Cl	H	H	CH ₃
53	Cl	F	H	CH ₃
54	Cl	Cl	H	CH ₃
55	Br	H	H	CH ₃
56	Br	F	H	CH ₃
57	Br	Cl	H	CH ₃
58	CH ₃	H	H	CH ₃
59	CH ₃	F	H	CH ₃
60	CH ₃	Cl	H	CH ₃
61	H	H	CH ₃	CH ₃
62	H	F	CH ₃	CH ₃
63	H	Cl	CH ₃	CH ₃
64	Cl	H	CH ₃	CH ₃
65	Cl	F	CH ₃	CH ₃
66	Cl	Cl	CH ₃	CH ₃
67	Br	H	CH ₃	CH ₃
68	Br	F	CH ₃	CH ₃
69	Br	Cl	CH ₃	CH ₃
70	CH ₃	H	CH ₃	CH ₃
71	CH ₃	F	CH ₃	CH ₃
72	CH ₃	Cl	CH ₃	CH ₃
73	H	H	H	C ₂ H ₅
74	H	F	H	C ₂ H ₅
75	H	Cl	H	C ₂ H ₅
76	Cl	H	H	C ₂ H ₅
77	Cl	F	H	C ₂ H ₅
78	Cl	Cl	H	C ₂ H ₅
79	Br	H	H	C ₂ H ₅
80	Br	F	H	C ₂ H ₅
81	Br	Cl	H	C ₂ H ₅
82	CH ₃	H	H	C ₂ H ₅
83	CH ₃	F	H	C ₂ H ₅
84	CH ₃	Cl	H	C ₂ H ₅

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	No.	R ²	R ⁴	R ¹⁶	R ¹⁸
5	85	H	H	CH ₃	C ₂ H ₅
	86	H	F	CH ₃	C ₂ H ₅
	87	H	Cl	CH ₃	C ₂ H ₅
	88	Cl	H	CH ₃	C ₂ H ₅
	89	Cl	F	CH ₃	C ₂ H ₅
10	90	Cl	Cl	CH ₃	C ₂ H ₅
	91	Br	H	CH ₃	C ₂ H ₅
	92	Br	F	CH ₃	C ₂ H ₅
	93	Br	Cl	CH ₃	C ₂ H ₅
	94	CH ₃	H	CH ₃	C ₂ H ₅
15	95	CH ₃	F	CH ₃	C ₂ H ₅
	96	CH ₃	Cl	CH ₃	C ₂ H ₅
	97	H	H	H	n-C ₃ H ₇
	98	H	F	H	n-C ₃ H ₇
	99	H	Cl	H	n-C ₃ H ₇
20	100	Cl	H	H	n-C ₃ H ₇
	101	Cl	F	H	n-C ₃ H ₇
	102	Cl	Cl	H	n-C ₃ H ₇
	103	Br	H	H	n-C ₃ H ₇
	104	Br	F	H	n-C ₃ H ₇
25	105	Br	Cl	H	n-C ₃ H ₇
	106	CH ₃	H	H	n-C ₃ H ₇
	107	CH ₃	F	H	n-C ₃ H ₇
	108	CH ₃	Cl	H	n-C ₃ H ₇
	109	H	H	CH ₃	n-C ₃ H ₇
30	110	H	F	CH ₃	n-C ₃ H ₇
	111	H	Cl	CH ₃	n-C ₃ H ₇
	112	Cl	H	CH ₃	n-C ₃ H ₇
	113	Cl	F	CH ₃	n-C ₃ H ₇
	114	Cl	Cl	CH ₃	n-C ₃ H ₇
35	115	Br	H	CH ₃	n-C ₃ H ₇
	116	Br	F	CH ₃	n-C ₃ H ₇
	117	Br	Cl	CH ₃	n-C ₃ H ₇
	118	CH ₃	H	CH ₃	n-C ₃ H ₇
	119	CH ₃	F	CH ₃	n-C ₃ H ₇
40	120	CH ₃	Cl	CH ₃	n-C ₃ H ₇
	121	H	H	H	CH(CH ₃) ₂
	122	H	F	H	CH(CH ₃) ₂
	123	H	Cl	H	CH(CH ₃) ₂
	124	Cl	H	H	CH(CH ₃) ₂
45	125	Cl	F	H	CH(CH ₃) ₂
	126	Cl	Cl	H	CH(CH ₃) ₂
	127	Br	H	H	CH(CH ₃) ₂
	128	Br	F	H	CH(CH ₃) ₂
	129	Br	Cl	H	CH(CH ₃) ₂
	130	CH ₃	H	H	CH(CH ₃) ₂
	131	CH ₃	F	H	CH(CH ₃) ₂
	132	CH ₃	Cl	H	CH(CH ₃) ₂
	133	H	H	CH ₃	CH(CH ₃) ₂
	134	H	F	CH ₃	CH(CH ₃) ₂
	135	H	Cl	CH ₃	CH(CH ₃) ₂

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	No.	R ²	R ⁴	R ¹⁶	R ¹⁸
5	136	Cl	H	CH ₃	CH(CH ₃) ₂
	137	Cl	F	CH ₃	CH(CH ₃) ₂
	138	Cl	Cl	CH ₃	CH(CH ₃) ₂
	139	Br	H	CH ₃	CH(CH ₃) ₂
	140	Br	F	CH ₃	CH(CH ₃) ₂
10	141	Br	Cl	CH ₃	CH(CH ₃) ₂
	142	CH ₃	H	CH ₃	CH(CH ₃) ₂
	143	CH ₃	F	CH ₃	CH(CH ₃) ₂
	144	CH ₃	Cl	CH ₃	CH(CH ₃) ₂
	145	H	H	H	n-C ₄ H ₉
15	146	H	F	H	n-C ₄ H ₉
	147	H	Cl	H	n-C ₄ H ₉
	148	Cl	H	H	n-C ₄ H ₉
	149	Cl	F	H	n-C ₄ H ₉
	150	Cl	Cl	H	n-C ₄ H ₉
20	151	Br	H	H	n-C ₄ H ₉
	152	Br	F	H	n-C ₄ H ₉
	153	Br	Cl	H	n-C ₄ H ₉
	154	CH ₃	H	H	n-C ₄ H ₉
	155	CH ₃	F	H	n-C ₄ H ₉
25	156	CH ₃	Cl	H	n-C ₄ H ₉
	157	H	H	CH ₃	n-C ₄ H ₉
	158	H	F	CH ₃	n-C ₄ H ₉
	159	H	Cl	CH ₃	n-C ₄ H ₉
	160	Cl	H	CH ₃	n-C ₄ H ₉
30	161	Cl	F	CH ₃	n-C ₄ H ₉
	162	Cl	Cl	CH ₃	n-C ₄ H ₉
	163	Br	H	CH ₃	n-C ₄ H ₉
	164	Br	F	CH ₃	n-C ₄ H ₉
	165	Br	Cl	CH ₃	n-C ₄ H ₉
35	166	CH ₃	H	CH ₃	n-C ₄ H ₉
	167	CH ₃	F	CH ₃	n-C ₄ H ₉
	168	CH ₃	Cl	CH ₃	n-C ₄ H ₉
	169	H	H	H	CH(CH ₃)-C ₂ H ₅
	170	H	F	H	CH(CH ₃)-C ₂ H ₅
40	171	H	Cl	H	CH(CH ₃)-C ₂ H ₅
	172	Cl	H	H	CH(CH ₃)-C ₂ H ₅
	173	Cl	F	H	CH(CH ₃)-C ₂ H ₅
	174	Cl	Cl	H	CH(CH ₃)-C ₂ H ₅
	175	Br	H	H	CH(CH ₃)-C ₂ H ₅
45	176	Br	F	H	CH(CH ₃)-C ₂ H ₅
	177	Br	Cl	H	CH(CH ₃)-C ₂ H ₅
	178	CH ₃	H	H	CH(CH ₃)-C ₂ H ₅
	179	CH ₃	F	H	CH(CH ₃)-C ₂ H ₅
	180	CH ₃	Cl	H	CH(CH ₃)-C ₂ H ₅
	181	H	H	CH ₃	CH(CH ₃)-C ₂ H ₅
	182	H	F	CH ₃	CH(CH ₃)-C ₂ H ₅
	183	H	Cl	CH ₃	CH(CH ₃)-C ₂ H ₅
	184	Cl	H	CH ₃	CH(CH ₃)-C ₂ H ₅
	185	Cl	F	CH ₃	CH(CH ₃)-C ₂ H ₅
	186	Cl	Cl	CH ₃	CH(CH ₃)-C ₂ H ₅

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	No.	R ²	R ⁴	R ¹⁶	R ¹⁸
5	187	Br	H	CH ₃	CH(CH ₃)-C ₂ H ₅
	188	Br	F	CH ₃	CH(CH ₃)-C ₂ H ₅
	189	Br	Cl	CH ₃	CH(CH ₃)-C ₂ H ₅
	190	CH ₃	H	CH ₃	CH(CH ₃)-C ₂ H ₅
	191	CH ₃	F	CH ₃	CH(CH ₃)-C ₂ H ₅
	192	CH ₃	Cl	CH ₃	CH(CH ₃)-C ₂ H ₅
10	193	H	H	H	CH ₂ -CH(CH ₃) ₂
	194	H	F	H	CH ₂ -CH(CH ₃) ₂
	195	H	Cl	H	CH ₂ -CH(CH ₃) ₂
	196	Cl	H	H	CH ₂ -CH(CH ₃) ₂
	197	Cl	F	H	CH ₂ -CH(CH ₃) ₂
	198	Cl	Cl	H	CH ₂ -CH(CH ₃) ₂
15	199	Br	H	H	CH ₂ -CH(CH ₃) ₂
	200	Br	F	H	CH ₂ -CH(CH ₃) ₂
	201	Br	Cl	H	CH ₂ -CH(CH ₃) ₂
	202	CH ₃	H	H	CH ₂ -CH(CH ₃) ₂
	203	CH ₃	F	H	CH ₂ -CH(CH ₃) ₂
	204	CH ₃	Cl	H	CH ₂ -CH(CH ₃) ₂
20	205	H	H	CH ₃	CH ₂ -CH(CH ₃) ₂
	206	H	F	CH ₃	CH ₂ -CH(CH ₃) ₂
	207	H	Cl	CH ₃	CH ₂ -CH(CH ₃) ₂
	208	Cl	H	CH ₃	CH ₂ -CH(CH ₃) ₂
	209	Cl	F	CH ₃	CH ₂ -CH(CH ₃) ₂
	210	Cl	Cl	CH ₃	CH ₂ -CH(CH ₃) ₂
25	211	Br	H	CH ₃	CH ₂ -CH(CH ₃) ₂
	212	Br	F	CH ₃	CH ₂ -CH(CH ₃) ₂
	213	Br	Cl	CH ₃	CH ₂ -CH(CH ₃) ₂
	214	CH ₃	H	CH ₃	CH ₂ -CH(CH ₃) ₂
	215	CH ₃	F	CH ₃	CH ₂ -CH(CH ₃) ₂
	216	CH ₃	Cl	CH ₃	CH ₂ -CH(CH ₃) ₂
30	217	H	H	H	CH ₂ -CF ₃
	218	H	F	H	CH ₂ -CF ₃
	219	H	Cl	H	CH ₂ -CF ₃
	220	Cl	H	H	CH ₂ -CF ₃
	221	Cl	F	H	CH ₂ -CF ₃
	222	Cl	Cl	H	CH ₂ -CF ₃
35	223	Br	H	H	CH ₂ -CF ₃
	224	Br	F	H	CH ₂ -CF ₃
	225	Br	Cl	H	CH ₂ -CF ₃
	226	CH ₃	H	H	CH ₂ -CF ₃
	227	CH ₃	F	H	CH ₂ -CF ₃
	228	CH ₃	Cl	H	CH ₂ -CF ₃
40	229	H	H	CH ₃	CH ₂ -CF ₃
	230	H	F	CH ₃	CH ₂ -CF ₃
	231	H	Cl	CH ₃	CH ₂ -CF ₃
	232	Cl	H	CH ₃	CH ₂ -CF ₃
	233	Cl	F	CH ₃	CH ₂ -CF ₃
	234	Cl	Cl	CH ₃	CH ₂ -CF ₃
45	235	Br	H	CH ₃	CH ₂ -CF ₃
	236	Br	F	CH ₃	CH ₂ -CF ₃
	237	Br	Cl	CH ₃	CH ₂ -CF ₃

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No.	R ²	R ⁴	R ¹⁶	R ¹⁸
238	CH ₃	H	CH ₃	CH ₂ -CF ₃
239	CH ₃	F	CH ₃	CH ₂ -CF ₃
240	CH ₃	Cl	CH ₃	CH ₂ -CF ₃
5 241	H	H	H	CH ₂ -CH=CH ₂
242	H	F	H	CH ₂ -CH=CH ₂
243	H	Cl	H	CH ₂ -CH=CH ₂
244	Cl	H	H	CH ₂ -CH=CH ₂
245	Cl	F	H	CH ₂ -CH=CH ₂
10 246	Cl	Cl	H	CH ₂ -CH=CH ₂
247	Br	H	H	CH ₂ -CH=CH ₂
248	Br	F	H	CH ₂ -CH=CH ₂
249	Br	Cl	H	CH ₂ -CH=CH ₂
250	CH ₃	H	H	CH ₂ -CH=CH ₂
251	CH ₃	F	H	CH ₂ -CH=CH ₂
15 252	CH ₃	Cl	H	CH ₂ -CH=CH ₂
253	H	H	CH ₃	CH ₂ -CH=CH ₂
254	H	F	CH ₃	CH ₂ -CH=CH ₂
255	H	Cl	CH ₃	CH ₂ -CH=CH ₂
256	Cl	H	CH ₃	CH ₂ -CH=CH ₂
257	Cl	F	CH ₃	CH ₂ -CH=CH ₂
20 258	Cl	Cl	CH ₃	CH ₂ -CH=CH ₂
259	Br	H	CH ₃	CH ₂ -CH=CH ₂
260	Br	F	CH ₃	CH ₂ -CH=CH ₂
261	Br	Cl	CH ₃	CH ₂ -CH=CH ₂
262	CH ₃	H	CH ₃	CH ₂ -CH=CH ₂
25 263	CH ₃	F	CH ₃	CH ₂ -CH=CH ₂
264	CH ₃	Cl	CH ₃	CH ₂ -CH=CH ₂
265	H	H	H	CH ₂ -C≡CH
266	H	F	H	CH ₂ -C≡CH
267	H	Cl	H	CH ₂ -C≡CH
268	Cl	H	H	CH ₂ -C≡CH
30 269	Cl	F	H	CH ₂ -C≡CH
270	Cl	Cl	H	CH ₂ -C≡CH
271	Br	H	H	CH ₂ -C≡CH
272	Br	F	H	CH ₂ -C≡CH
273	Br	Cl	H	CH ₂ -C≡CH
35 274	CH ₃	H	H	CH ₂ -C≡CH
275	CH ₃	F	H	CH ₂ -C≡CH
276	CH ₃	Cl	H	CH ₂ -C≡CH
277	H	H	CH ₃	CH ₂ -C≡CH
278	H	F	CH ₃	CH ₂ -C≡CH
279	H	Cl	CH ₃	CH ₂ -C≡CH
40 280	Cl	H	CH ₃	CH ₂ -C≡CH
281	Cl	F	CH ₃	CH ₂ -C≡CH
282	Cl	Cl	CH ₃	CH ₂ -C≡CH
283	Br	H	CH ₃	CH ₂ -C≡CH
284	Br	F	CH ₃	CH ₂ -C≡CH
45 285	Br	Cl	CH ₃	CH ₂ -C≡CH
286	CH ₃	H	CH ₃	CH ₂ -C≡CH
287	CH ₃	F	CH ₃	CH ₂ -C≡CH
288	CH ₃	Cl	CH ₃	CH ₂ -C≡CH

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	No.	R ²	R ⁴	R ¹⁶	R ¹⁸
5	289	H	H	H	OCH ₃
	290	H	F	H	OCH ₃
	291	H	Cl	H	OCH ₃
	292	Cl	H	H	OCH ₃
	293	Cl	F	H	OCH ₃
10	294	Cl	Cl	H	OCH ₃
	295	Br	H	H	OCH ₃
	296	Br	F	H	OCH ₃
	297	Br	Cl	H	OCH ₃
	298	CH ₃	H	H	OCH ₃
15	299	CH ₃	F	H	OCH ₃
	300	CH ₃	Cl	H	OCH ₃
	301	H	H	CH ₃	OCH ₃
	302	H	F	CH ₃	OCH ₃
	303	H	Cl	CH ₃	OCH ₃
20	304	Cl	H	CH ₃	OCH ₃
	305	Cl	F	CH ₃	OCH ₃
	306	Cl	Cl	CH ₃	OCH ₃
	307	Br	H	CH ₃	OCH ₃
	308	Br	F	CH ₃	OCH ₃
25	309	Br	Cl	CH ₃	OCH ₃
	310	CH ₃	H	CH ₃	OCH ₃
	311	CH ₃	F	CH ₃	OCH ₃
	312	CH ₃	Cl	CH ₃	OCH ₃
	313	H	H	H	OC ₂ H ₅
30	314	H	F	H	OC ₂ H ₅
	315	H	Cl	H	OC ₂ H ₅
	316	Cl	H	H	OC ₂ H ₅
	317	Cl	F	H	OC ₂ H ₅
	318	Cl	Cl	H	OC ₂ H ₅
35	319	Br	H	H	OC ₂ H ₅
	320	Br	F	H	OC ₂ H ₅
	321	Br	Cl	H	OC ₂ H ₅
	322	CH ₃	H	H	OC ₂ H ₅
	323	CH ₃	F	H	OC ₂ H ₅
40	324	CH ₃	Cl	H	OC ₂ H ₅
	325	H	H	CH ₃	OC ₂ H ₅
	326	H	F	CH ₃	OC ₂ H ₅
	327	H	Cl	CH ₃	OC ₂ H ₅
	328	Cl	H	CH ₃	OC ₂ H ₅
45	329	Cl	F	CH ₃	OC ₂ H ₅
	330	Cl	Cl	CH ₃	OC ₂ H ₅
	331	Br	H	CH ₃	OC ₂ H ₅
	332	Br	F	CH ₃	OC ₂ H ₅
	333	Br	Cl	CH ₃	OC ₂ H ₅
	334	CH ₃	H	CH ₃	OC ₂ H ₅
	335	CH ₃	F	CH ₃	OC ₂ H ₅
	336	CH ₃	Cl	CH ₃	OC ₂ H ₅
	337	H	H	H	O-n-C ₃ H ₇
	338	H	F	H	O-n-C ₃ H ₇
	339	H	Cl	H	O-n-C ₃ H ₇

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	No.	R ²	R ⁴	R ¹⁶	R ¹⁸
5	340	Cl	H	H	O-n-C ₃ H ₇
	341	Cl	F	H	O-n-C ₃ H ₇
	342	Cl	Cl	H	O-n-C ₃ H ₇
	343	Br	H	H	O-n-C ₃ H ₇
	344	Br	F	H	O-n-C ₃ H ₇
10	345	Br	Cl	H	O-n-C ₃ H ₇
	346	CH ₃	H	H	O-n-C ₃ H ₇
	347	CH ₃	F	H	O-n-C ₃ H ₇
	348	CH ₃	Cl	H	O-n-C ₃ H ₇
	349	H	H	CH ₃	O-n-C ₃ H ₇
15	350	H	F	CH ₃	O-n-C ₃ H ₇
	351	H	Cl	CH ₃	O-n-C ₃ H ₇
	352	Cl	H	CH ₃	O-n-C ₃ H ₇
	353	Cl	F	CH ₃	O-n-C ₃ H ₇
	354	Cl	Cl	CH ₃	O-n-C ₃ H ₇
20	355	Br	H	CH ₃	O-n-C ₃ H ₇
	356	Br	F	CH ₃	O-n-C ₃ H ₇
	357	Br	Cl	CH ₃	O-n-C ₃ H ₇
	358	CH ₃	H	CH ₃	O-n-C ₃ H ₇
	359	CH ₃	F	CH ₃	O-n-C ₃ H ₇
25	360	CH ₃	Cl	CH ₃	O-n-C ₃ H ₇
	361	H	H	H	OCH(CH ₃) ₂
	362	H	F	H	OCH(CH ₃) ₂
	363	H	Cl	H	OCH(CH ₃) ₂
	364	Cl	H	H	OCH(CH ₃) ₂
30	365	Cl	F	H	OCH(CH ₃) ₂
	366	Cl	Cl	H	OCH(CH ₃) ₂
	367	Br	H	H	OCH(CH ₃) ₂
	368	Br	F	H	OCH(CH ₃) ₂
	369	Br	Cl	H	OCH(CH ₃) ₂
35	370	CH ₃	H	H	OCH(CH ₃) ₂
	371	CH ₃	F	H	OCH(CH ₃) ₂
	372	CH ₃	Cl	H	OCH(CH ₃) ₂
	373	H	H	CH ₃	OCH(CH ₃) ₂
	374	H	F	CH ₃	OCH(CH ₃) ₂
40	375	H	Cl	CH ₃	OCH(CH ₃) ₂
	376	Cl	H	CH ₃	OCH(CH ₃) ₂
	377	Cl	F	CH ₃	OCH(CH ₃) ₂
	378	Cl	Cl	CH ₃	OCH(CH ₃) ₂
	379	Br	H	CH ₃	OCH(CH ₃) ₂
45	380	Br	F	CH ₃	OCH(CH ₃) ₂
	381	Br	Cl	CH ₃	OCH(CH ₃) ₂
	382	CH ₃	H	CH ₃	OCH(CH ₃) ₂
	383	CH ₃	F	CH ₃	OCH(CH ₃) ₂
	384	CH ₃	Cl	CH ₃	OCH(CH ₃) ₂
	385	H	H	H	O-n-C ₄ H ₉
	386	H	F	H	O-n-C ₄ H ₉
	387	H	Cl	H	O-n-C ₄ H ₉
	388	Cl	H	H	O-n-C ₄ H ₉
	389	Cl	F	H	O-n-C ₄ H ₉
	390	Cl	Cl	H	O-n-C ₄ H ₉

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	No.	R ²	R ⁴	R ¹⁶	R ¹⁸
5	391	Br	H	H	O-n-C ₄ H ₉
	392	Br	F	H	O-n-C ₄ H ₉
	393	Br	Cl	H	O-n-C ₄ H ₉
	394	CH ₃	H	H	O-n-C ₄ H ₉
	395	CH ₃	F	H	O-n-C ₄ H ₉
10	396	CH ₃	Cl	H	O-n-C ₄ H ₉
	397	H	H	CH ₃	O-n-C ₄ H ₉
	398	H	F	CH ₃	O-n-C ₄ H ₉
	399	H	Cl	CH ₃	O-n-C ₄ H ₉
	400	Cl	H	CH ₃	O-n-C ₄ H ₉
15	401	Cl	F	CH ₃	O-n-C ₄ H ₉
	402	Cl	Cl	CH ₃	O-n-C ₄ H ₉
	403	Br	H	CH ₃	O-n-C ₄ H ₉
	404	Br	F	CH ₃	O-n-C ₄ H ₉
	405	Br	Cl	CH ₃	O-n-C ₄ H ₉
20	406	CH ₃	H	CH ₃	O-n-C ₄ H ₉
	407	CH ₃	F	CH ₃	O-n-C ₄ H ₉
	408	CH ₃	Cl	CH ₃	O-n-C ₄ H ₉
	409	H	H	H	OCH(CH ₃)-C ₂ H ₅
	410	H	F	H	OCH(CH ₃)-C ₂ H ₅
25	411	H	Cl	H	OCH(CH ₃)-C ₂ H ₅
	412	Cl	H	H	OCH(CH ₃)-C ₂ H ₅
	413	Cl	F	H	OCH(CH ₃)-C ₂ H ₅
	414	Cl	Cl	H	OCH(CH ₃)-C ₂ H ₅
	415	Br	H	H	OCH(CH ₃)-C ₂ H ₅
30	416	Br	F	H	OCH(CH ₃)-C ₂ H ₅
	417	Br	Cl	H	OCH(CH ₃)-C ₂ H ₅
	418	CH ₃	H	H	OCH(CH ₃)-C ₂ H ₅
	419	CH ₃	F	H	OCH(CH ₃)-C ₂ H ₅
	420	CH ₃	Cl	H	OCH(CH ₃)-C ₂ H ₅
35	421	H	H	CH ₃	OCH(CH ₃)-C ₂ H ₅
	422	H	F	CH ₃	OCH(CH ₃)-C ₂ H ₅
	423	H	Cl	CH ₃	OCH(CH ₃)-C ₂ H ₅
	424	Cl	H	CH ₃	OCH(CH ₃)-C ₂ H ₅
	425	Cl	F	CH ₃	OCH(CH ₃)-C ₂ H ₅
40	426	Cl	Cl	CH ₃	OCH(CH ₃)-C ₂ H ₅
	427	Br	H	CH ₃	OCH(CH ₃)-C ₂ H ₅
	428	Br	F	CH ₃	OCH(CH ₃)-C ₂ H ₅
	429	Br	Cl	CH ₃	OCH(CH ₃)-C ₂ H ₅
	430	CH ₃	H	CH ₃	OCH(CH ₃)-C ₂ H ₅
45	431	CH ₃	F	CH ₃	OCH(CH ₃)-C ₂ H ₅
	432	CH ₃	Cl	CH ₃	OCH(CH ₃)-C ₂ H ₅
	433	H	H	H	OCH ₂ -CH(CH ₃) ₂
	434	H	F	H	OCH ₂ -CH(CH ₃) ₂
	435	H	Cl	H	OCH ₂ -CH(CH ₃) ₂
	436	Cl	H	H	OCH ₂ -CH(CH ₃) ₂
	437	Cl	F	H	OCH ₂ -CH(CH ₃) ₂
	438	Cl	Cl	H	OCH ₂ -CH(CH ₃) ₂
	439	Br	H	H	OCH ₂ -CH(CH ₃) ₂
	440	Br	F	H	OCH ₂ -CH(CH ₃) ₂
	441	Br	Cl	H	OCH ₂ -CH(CH ₃) ₂

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No.	R ²	R ⁴	R ¹⁶	R ¹⁸
442	CH ₃	H	H	OCH ₂ -CH(CH ₃) ₂
443	CH ₃	F	H	OCH ₂ -CH(CH ₃) ₂
444	CH ₃	Cl	H	OCH ₂ -CH(CH ₃) ₂
5 445	H	H	CH ₃	OCH ₂ -CH(CH ₃) ₂
446	H	F	CH ₃	OCH ₂ -CH(CH ₃) ₂
447	H	Cl	CH ₃	OCH ₂ -CH(CH ₃) ₂
448	Cl	H	CH ₃	OCH ₂ -CH(CH ₃) ₂
449	Cl	F	CH ₃	OCH ₂ -CH(CH ₃) ₂
450	Cl	Cl	CH ₃	OCH ₂ -CH(CH ₃) ₂
10 451	Br	H	CH ₃	OCH ₂ -CH(CH ₃) ₂
452	Br	F	CH ₃	OCH ₂ -CH(CH ₃) ₂
453	Br	Cl	CH ₃	OCH ₂ -CH(CH ₃) ₂
454	CH ₃	H	CH ₃	OCH ₂ -CH(CH ₃) ₂
455	CH ₃	F	CH ₃	OCH ₂ -CH(CH ₃) ₂
15 456	CH ₃	Cl	CH ₃	OCH ₂ -CH(CH ₃) ₂
457	H	H	H	OCH ₂ -CH=CH ₂
458	H	F	H	OCH ₂ -CH=CH ₂
459	H	Cl	H	OCH ₂ -CH=CH ₂
460	Cl	H	H	OCH ₂ -CH=CH ₂
461	Cl	F	H	OCH ₂ -CH=CH ₂
20 462	Cl	Cl	H	OCH ₂ -CH=CH ₂
463	Br	H	H	OCH ₂ -CH=CH ₂
464	Br	F	H	OCH ₂ -CH=CH ₂
465	Br	Cl	H	OCH ₂ -CH=CH ₂
466	CH ₃	H	H	OCH ₂ -CH=CH ₂
25 467	CH ₃	F	H	OCH ₂ -CH=CH ₂
468	CH ₃	Cl	H	OCH ₂ -CH=CH ₂
469	H	H	CH ₃	OCH ₂ -CH=CH ₂
470	H	F	CH ₃	OCH ₂ -CH=CH ₂
471	H	Cl	CH ₃	OCH ₂ -CH=CH ₂
472	Cl	H	CH ₃	OCH ₂ -CH=CH ₂
30 473	Cl	F	CH ₃	OCH ₂ -CH=CH ₂
474	Cl	Cl	CH ₃	OCH ₂ -CH=CH ₂
475	Br	H	CH ₃	OCH ₂ -CH=CH ₂
476	Br	F	CH ₃	OCH ₂ -CH=CH ₂
477	Br	Cl	CH ₃	OCH ₂ -CH=CH ₂
35 478	CH ₃	H	CH ₃	OCH ₂ -CH=CH ₂
479	CH ₃	F	CH ₃	OCH ₂ -CH=CH ₂
480	CH ₃	Cl	CH ₃	OCH ₂ -CH=CH ₂
481	H	H	H	OCH ₂ -C≡CH
482	H	F	H	OCH ₂ -C≡CH
483	H	Cl	H	OCH ₂ -C≡CH
40 484	Cl	H	H	OCH ₂ -C≡CH
485	Cl	F	H	OCH ₂ -C≡CH
486	Cl	Cl	H	OCH ₂ -C≡CH
487	Br	H	H	OCH ₂ -C≡CH
488	Br	F	H	OCH ₂ -C≡CH
489	Br	Cl	H	OCH ₂ -C≡CH
45 490	CH ₃	H	H	OCH ₂ -C≡CH
491	CH ₃	F	H	OCH ₂ -C≡CH
492	CH ₃	Cl	H	OCH ₂ -C≡CH

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	No.	R ²	R ⁴	R ¹⁶	R ¹⁸
5	493	H	H	CH ₃	OCH ₂ -C≡CH
	494	H	F	CH ₃	OCH ₂ -C≡CH
	495	H	Cl	CH ₃	OCH ₂ -C≡CH
	496	Cl	H	CH ₃	OCH ₂ -C≡CH
	497	Cl	F	CH ₃	OCH ₂ -C≡CH
	498	Cl	Cl	CH ₃	OCH ₂ -C≡CH
	499	Br	H	CH ₃	OCH ₂ -C≡CH
10	500	Br	F	CH ₃	OCH ₂ -C≡CH
	501	Br	Cl	CH ₃	OCH ₂ -C≡CH
	502	CH ₃	H	CH ₃	OCH ₂ -C≡CH
	503	CH ₃	F	CH ₃	OCH ₂ -C≡CH
	504	CH ₃	Cl	CH ₃	OCH ₂ -C≡CH
15	505	H	H	H	CH ₂ -COOCH ₃
	506	H	F	H	CH ₂ -COOCH ₃
	507	H	Cl	H	CH ₂ -COOCH ₃
	508	Cl	H	H	CH ₂ -COOCH ₃
	509	Cl	F	H	CH ₂ -COOCH ₃
	510	Cl	Cl	H	CH ₂ -COOCH ₃
	511	Br	H	H	CH ₂ -COOCH ₃
20	512	Br	F	H	CH ₂ -COOCH ₃
	513	Br	Cl	H	CH ₂ -COOCH ₃
	514	CH ₃	H	H	CH ₂ -COOCH ₃
	515	CH ₃	F	H	CH ₂ -COOCH ₃
	516	CH ₃	Cl	H	CH ₂ -COOCH ₃
25	517	H	H	CH ₃	CH ₂ -COOCH ₃
	518	H	F	CH ₃	CH ₂ -COOCH ₃
	519	H	Cl	CH ₃	CH ₂ -COOCH ₃
	520	Cl	H	CH ₃	CH ₂ -COOCH ₃
	521	Cl	F	CH ₃	CH ₂ -COOCH ₃
	522	Cl	Cl	CH ₃	CH ₂ -COOCH ₃
	523	Br	H	CH ₃	CH ₂ -COOCH ₃
30	524	Br	F	CH ₃	CH ₂ -COOCH ₃
	525	Br	Cl	CH ₃	CH ₂ -COOCH ₃
	526	CH ₃	H	CH ₃	CH ₂ -COOCH ₃
	527	CH ₃	F	CH ₃	CH ₂ -COOCH ₃
	528	CH ₃	Cl	CH ₃	CH ₂ -COOCH ₃
35	529	H	H	H	CH ₂ -COOC ₂ H ₅
	530	H	F	H	CH ₂ -COOC ₂ H ₅
	531	H	Cl	H	CH ₂ -COOC ₂ H ₅
	532	Cl	H	H	CH ₂ -COOC ₂ H ₅
	533	Cl	F	H	CH ₂ -COOC ₂ H ₅
40	534	Cl	Cl	H	CH ₂ -COOC ₂ H ₅
	535	Br	H	H	CH ₂ -COOC ₂ H ₅
	536	Br	F	H	CH ₂ -COOC ₂ H ₅
	537	Br	Cl	H	CH ₂ -COOC ₂ H ₅
	538	CH ₃	H	H	CH ₂ -COOC ₂ H ₅
45	539	CH ₃	F	H	CH ₂ -COOC ₂ H ₅
	540	CH ₃	Cl	H	CH ₂ -COOC ₂ H ₅
	541	H	H	CH ₃	CH ₂ -COOC ₂ H ₅
	542	H	F	CH ₃	CH ₂ -COOC ₂ H ₅
	543	H	Cl	CH ₃	CH ₂ -COOC ₂ H ₅

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No.	R ²	R ⁴	R ¹⁶	R ¹⁸
544	Cl	H	CH ₃	CH ₂ -COOC ₂ H ₅
545	Cl	F	CH ₃	CH ₂ -COOC ₂ H ₅
546	Cl	Cl	CH ₃	CH ₂ -COOC ₂ H ₅
547	Br	H	CH ₃	CH ₂ -COOC ₂ H ₅
548	Br	F	CH ₃	CH ₂ -COOC ₂ H ₅
549	Br	Cl	CH ₃	CH ₂ -COOC ₂ H ₅
550	CH ₃	H	CH ₃	CH ₂ -COOC ₂ H ₅
551	CH ₃	F	CH ₃	CH ₂ -COOC ₂ H ₅
552	CH ₃	Cl	CH ₃	CH ₂ -COOC ₂ H ₅
553	H	H	H	CH(CH ₃)-COOCH ₃
554	H	F	H	CH(CH ₃)-COOCH ₃
555	H	Cl	H	CH(CH ₃)-COOCH ₃
556	Cl	H	H	CH(CH ₃)-COOCH ₃
557	Cl	F	H	CH(CH ₃)-COOCH ₃
558	Cl	Cl	H	CH(CH ₃)-COOCH ₃
559	Br	H	H	CH(CH ₃)-COOCH ₃
560	Br	F	H	CH(CH ₃)-COOCH ₃
561	Br	Cl	H	CH(CH ₃)-COOCH ₃
562	CH ₃	H	H	CH(CH ₃)-COOCH ₃
563	CH ₃	F	H	CH(CH ₃)-COOCH ₃
564	CH ₃	Cl	H	CH(CH ₃)-COOCH ₃
565	H	H	CH ₃	CH(CH ₃)-COOCH ₃
566	H	F	CH ₃	CH(CH ₃)-COOCH ₃
567	H	Cl	CH ₃	CH(CH ₃)-COOCH ₃
568	Cl	H	CH ₃	CH(CH ₃)-COOCH ₃
569	Cl	F	CH ₃	CH(CH ₃)-COOCH ₃
570	Cl	Cl	CH ₃	CH(CH ₃)-COOCH ₃
571	Br	H	CH ₃	CH(CH ₃)-COOCH ₃
572	Br	F	CH ₃	CH(CH ₃)-COOCH ₃
573	Br	Cl	CH ₃	CH(CH ₃)-COOCH ₃
574	CH ₃	H	CH ₃	CH(CH ₃)-COOCH ₃
575	CH ₃	F	CH ₃	CH(CH ₃)-COOCH ₃
576	CH ₃	Cl	CH ₃	CH(CH ₃)-COOCH ₃
577	H	H	H	CH(CH ₃)-COOC ₂ H ₅
578	H	F	H	CH(CH ₃)-COOC ₂ H ₅
579	H	Cl	H	CH(CH ₃)-COOC ₂ H ₅
580	Cl	H	H	CH(CH ₃)-COOC ₂ H ₅
581	Cl	F	H	CH(CH ₃)-COOC ₂ H ₅
582	Cl	Cl	H	CH(CH ₃)-COOC ₂ H ₅
583	Br	H	H	CH(CH ₃)-COOC ₂ H ₅
584	Br	F	H	CH(CH ₃)-COOC ₂ H ₅
585	Br	Cl	H	CH(CH ₃)-COOC ₂ H ₅
586	CH ₃	H	H	CH(CH ₃)-COOC ₂ H ₅
587	CH ₃	F	H	CH(CH ₃)-COOC ₂ H ₅
588	CH ₃	Cl	H	CH(CH ₃)-COOC ₂ H ₅
589	H	H	CH ₃	CH(CH ₃)-COOC ₂ H ₅
590	H	F	CH ₃	CH(CH ₃)-COOC ₂ H ₅
591	H	Cl	CH ₃	CH(CH ₃)-COOC ₂ H ₅
592	Cl	H	CH ₃	CH(CH ₃)-COOC ₂ H ₅
593	Cl	F	CH ₃	CH(CH ₃)-COOC ₂ H ₅
594	Cl	Cl	CH ₃	CH(CH ₃)-COOC ₂ H ₅

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	No.	R ²	R ⁴	R ¹⁶	R ¹⁸
5	595	Br	H	CH ₃	CH(CH ₃)-COOC ₂ H ₅
	596	Br	F	CH ₃	CH(CH ₃)-COOC ₂ H ₅
	597	Br	Cl	CH ₃	CH(CH ₃)-COOC ₂ H ₅
	598	CH ₃	H	CH ₃	CH(CH ₃)-COOC ₂ H ₅
	599	CH ₃	F	CH ₃	CH(CH ₃)-COOC ₂ H ₅
10	600	CH ₃	Cl	CH ₃	CH(CH ₃)-COOC ₂ H ₅
	601	H	H	H	OCH ₂ -COOCH ₃
	602	H	F	H	OCH ₂ -COOCH ₃
	603	H	Cl	H	OCH ₂ -COOCH ₃
	604	Cl	H	H	OCH ₂ -COOCH ₃
15	605	Cl	F	H	OCH ₂ -COOCH ₃
	606	Cl	Cl	H	OCH ₂ -COOCH ₃
	607	Br	H	H	OCH ₂ -COOCH ₃
	608	Br	F	H	OCH ₂ -COOCH ₃
	609	Br	Cl	H	OCH ₂ -COOCH ₃
20	610	CH ₃	H	H	OCH ₂ -COOCH ₃
	611	CH ₃	F	H	OCH ₂ -COOCH ₃
	612	CH ₃	Cl	H	OCH ₂ -COOCH ₃
	613	H	H	CH ₃	OCH ₂ -COOCH ₃
	614	H	F	CH ₃	OCH ₂ -COOCH ₃
25	615	H	Cl	CH ₃	OCH ₂ -COOCH ₃
	616	Cl	H	CH ₃	OCH ₂ -COOCH ₃
	617	Cl	F	CH ₃	OCH ₂ -COOCH ₃
	618	Cl	Cl	CH ₃	OCH ₂ -COOCH ₃
	619	Br	H	CH ₃	OCH ₂ -COOCH ₃
30	620	Br	F	CH ₃	OCH ₂ -COOCH ₃
	621	Br	Cl	CH ₃	OCH ₂ -COOCH ₃
	622	CH ₃	H	CH ₃	OCH ₂ -COOCH ₃
	623	CH ₃	F	CH ₃	OCH ₂ -COOCH ₃
	624	CH ₃	Cl	CH ₃	OCH ₂ -COOCH ₃
35	625	H	H	H	OCH ₂ -COOC ₂ H ₅
	626	H	F	H	OCH ₂ -COOC ₂ H ₅
	627	H	Cl	H	OCH ₂ -COOC ₂ H ₅
	628	Cl	H	H	OCH ₂ -COOC ₂ H ₅
	629	Cl	F	H	OCH ₂ -COOC ₂ H ₅
40	630	Cl	Cl	H	OCH ₂ -COOC ₂ H ₅
	631	Br	H	H	OCH ₂ -COOC ₂ H ₅
	632	Br	F	H	OCH ₂ -COOC ₂ H ₅
	633	Br	Cl	H	OCH ₂ -COOC ₂ H ₅
	634	CH ₃	H	H	OCH ₂ -COOC ₂ H ₅
45	635	CH ₃	F	H	OCH ₂ -COOC ₂ H ₅
	636	CH ₃	Cl	H	OCH ₂ -COOC ₂ H ₅
	637	H	H	CH ₃	OCH ₂ -COOC ₂ H ₅
	638	H	F	CH ₃	OCH ₂ -COOC ₂ H ₅
	639	H	Cl	CH ₃	OCH ₂ -COOC ₂ H ₅
	640	Cl	H	CH ₃	OCH ₂ -COOC ₂ H ₅
	641	Cl	F	CH ₃	OCH ₂ -COOC ₂ H ₅
	642	Cl	Cl	CH ₃	OCH ₂ -COOC ₂ H ₅
	643	Br	H	CH ₃	OCH ₂ -COOC ₂ H ₅
	644	Br	F	CH ₃	OCH ₂ -COOC ₂ H ₅
	645	Br	Cl	CH ₃	OCH ₂ -COOC ₂ H ₅

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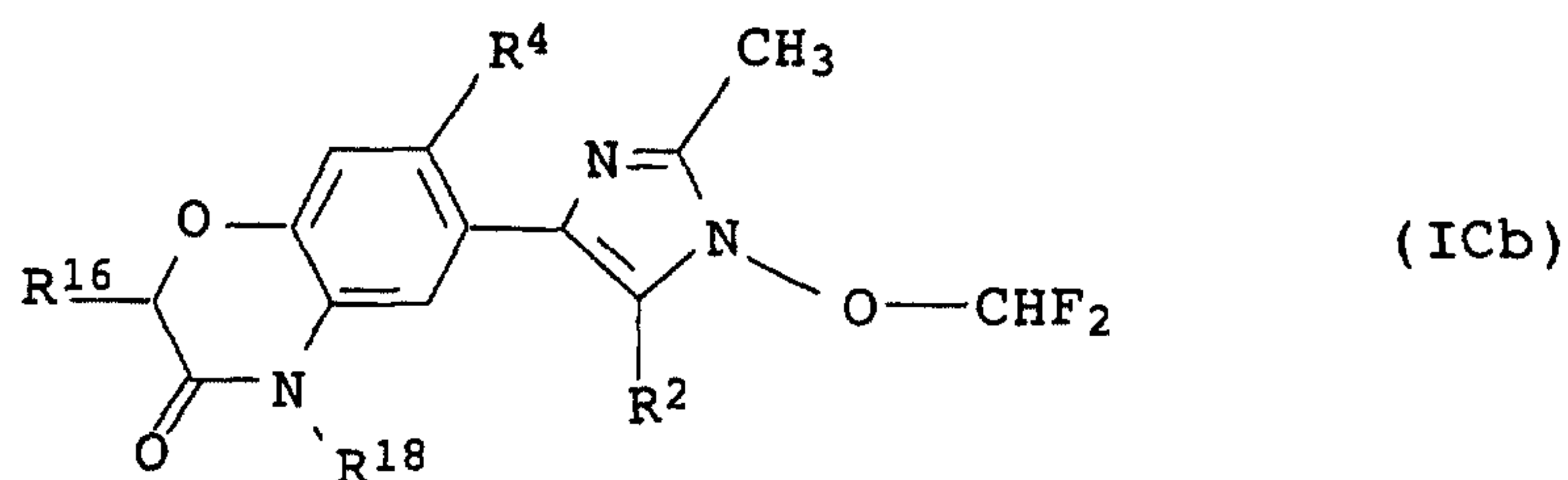
No.	R ²	R ⁴	R ¹⁶	R ¹⁸
646	CH ₃	H	CH ₃	OCH ₂ -COOC ₂ H ₅
647	CH ₃	F	CH ₃	OCH ₂ -COOC ₂ H ₅
648	CH ₃	Cl	CH ₃	OCH ₂ -COOC ₂ H ₅
5 649	H	H	H	OCH(CH ₃)-COOCH ₃
650	H	F	H	OCH(CH ₃)-COOCH ₃
651	H	Cl	H	OCH(CH ₃)-COOCH ₃
652	Cl	H	H	OCH(CH ₃)-COOCH ₃
653	Cl	F	H	OCH(CH ₃)-COOCH ₃
654	Cl	Cl	H	OCH(CH ₃)-COOCH ₃
10 655	Br	H	H	OCH(CH ₃)-COOCH ₃
656	Br	F	H	OCH(CH ₃)-COOCH ₃
657	Br	Cl	H	OCH(CH ₃)-COOCH ₃
658	CH ₃	H	H	OCH(CH ₃)-COOCH ₃
659	CH ₃	F	H	OCH(CH ₃)-COOCH ₃
15 660	CH ₃	Cl	H	OCH(CH ₃)-COOCH ₃
661	H	H	CH ₃	OCH(CH ₃)-COOCH ₃
662	H	F	CH ₃	OCH(CH ₃)-COOCH ₃
663	H	Cl	CH ₃	OCH(CH ₃)-COOCH ₃
664	Cl	H	CH ₃	OCH(CH ₃)-COOCH ₃
665	Cl	F	CH ₃	OCH(CH ₃)-COOCH ₃
20 666	Cl	Cl	CH ₃	OCH(CH ₃)-COOCH ₃
667	Br	H	CH ₃	OCH(CH ₃)-COOCH ₃
668	Br	F	CH ₃	OCH(CH ₃)-COOCH ₃
669	Br	Cl	CH ₃	OCH(CH ₃)-COOCH ₃
670	CH ₃	H	CH ₃	OCH(CH ₃)-COOCH ₃
25 671	CH ₃	F	CH ₃	OCH(CH ₃)-COOCH ₃
672	CH ₃	Cl	CH ₃	OCH(CH ₃)-COOCH ₃
673	H	H	H	OCH(CH ₃)-COOC ₂ H ₅
674	H	F	H	OCH(CH ₃)-COOC ₂ H ₅
675	H	Cl	H	OCH(CH ₃)-COOC ₂ H ₅
676	Cl	H	H	OCH(CH ₃)-COOC ₂ H ₅
30 677	Cl	F	H	OCH(CH ₃)-COOC ₂ H ₅
678	Cl	Cl	H	OCH(CH ₃)-COOC ₂ H ₅
679	Br	H	H	OCH(CH ₃)-COOC ₂ H ₅
680	Br	F	H	OCH(CH ₃)-COOC ₂ H ₅
681	Br	Cl	H	OCH(CH ₃)-COOC ₂ H ₅
35 682	CH ₃	H	H	OCH(CH ₃)-COOC ₂ H ₅
683	CH ₃	F	H	OCH(CH ₃)-COOC ₂ H ₅
684	CH ₃	Cl	H	OCH(CH ₃)-COOC ₂ H ₅
685	H	H	CH ₃	OCH(CH ₃)-COOC ₂ H ₅
686	H	F	CH ₃	OCH(CH ₃)-COOC ₂ H ₅
687	H	Cl	CH ₃	OCH(CH ₃)-COOC ₂ H ₅
40 688	Cl	H	CH ₃	OCH(CH ₃)-COOC ₂ H ₅
689	Cl	F	CH ₃	OCH(CH ₃)-COOC ₂ H ₅
690	Cl	Cl	CH ₃	OCH(CH ₃)-COOC ₂ H ₅
691	Br	H	CH ₃	OCH(CH ₃)-COOC ₂ H ₅
692	Br	F	CH ₃	OCH(CH ₃)-COOC ₂ H ₅
45 693	Br	Cl	CH ₃	OCH(CH ₃)-COOC ₂ H ₅
694	CH ₃	H	CH ₃	OCH(CH ₃)-COOC ₂ H ₅
695	CH ₃	F	CH ₃	OCH(CH ₃)-COOC ₂ H ₅
696	CH ₃	Cl	CH ₃	OCH(CH ₃)-COOC ₂ H ₅

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Particular preference is furthermore given to the compounds of the formula ICb (compounds IC where $Q = CH$, $R^1 = CH_3$ and in which R^5 and $X-R^6$ form a chain $-OCH(R^{16})-C(O)-NR^{18}-$) in which the variables R^2 , R^4 and R^{16} and R^{18} together have the meanings given 5 in each case in one row of Table 2 (compounds ICb.1-ICb.696).

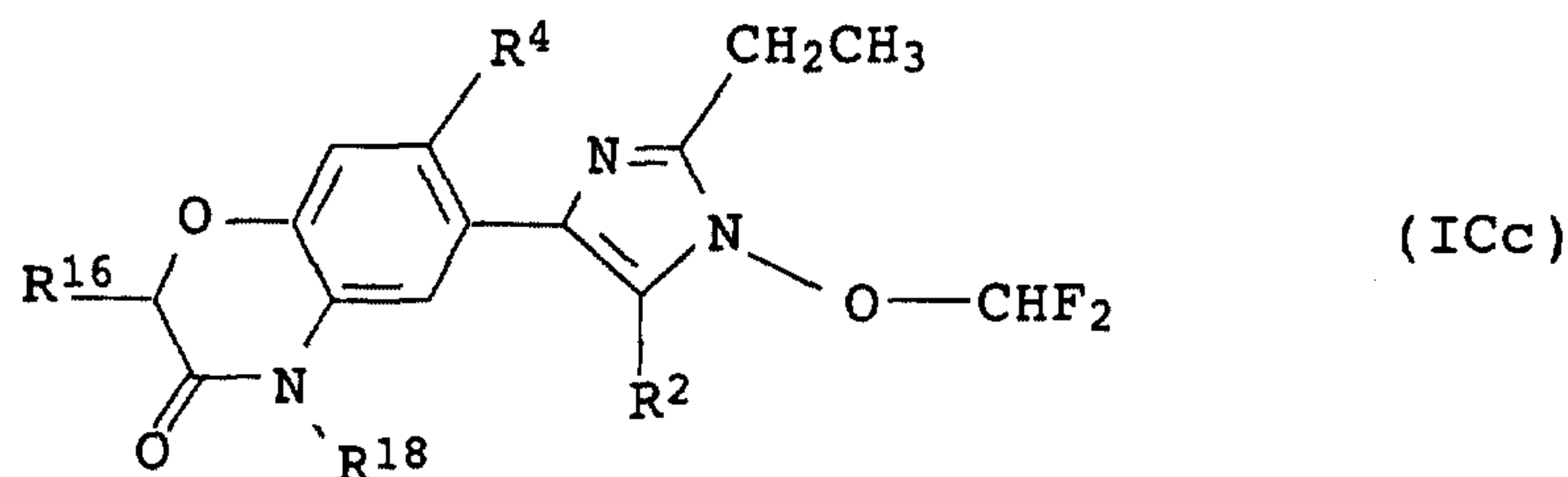
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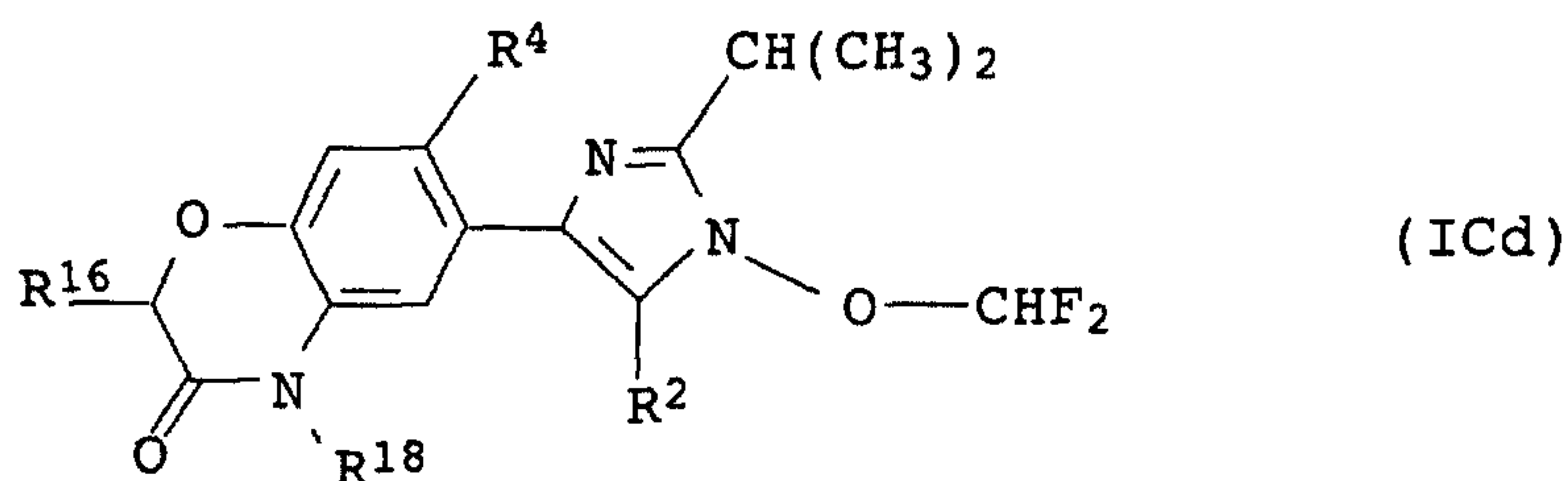
Particular preference is furthermore given to the compounds of the formula ICc (compounds IC where $Q = CH$, $R^1 = CH_2CH_3$ and in which R^5 and $X-R^6$ form a chain $-OCH(R^{16})-C(O)-NR^{18}-$) in which the variables R^2 , R^4 and R^{16} and R^{18} together have the meanings given in each case in one row of Table 2 (compounds ICc.1-ICc.696).



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Particular preference is furthermore given to the compounds of the formula ICd (compounds IC where $Q = CH$, $R^1 = CH(CH_3)_2$ and in which R^5 and $X-R^6$ form a chain $-OCH(R^{16})-C(O)-NR^{18}-$) in which the variables R^2 , R^4 and R^{16} and R^{18} together have the meanings given in each case in one row of Table 2 (compounds ICd.1-ICd.696).

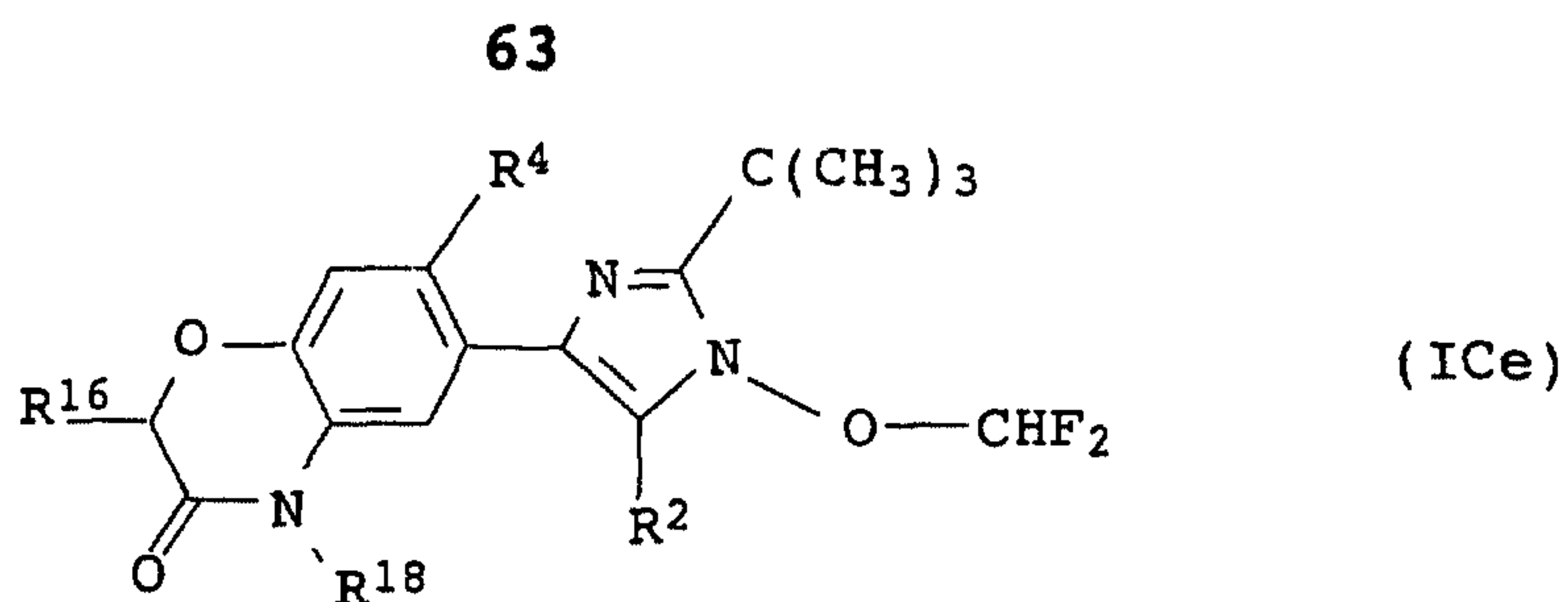


Particular preference is furthermore given to the compounds of the formula ICe (compounds IC where $Q = CH$, $R^1 = C(CH_3)_3$ and in which R^5 and $X-R^6$ form a chain $-OCH(R^{16})-C(O)-NR^{18}-$) in which the variables R^2 , R^4 and R^{16} and R^{18} together have the meanings given in each case in one row of Table 2 (compounds ICe.1-ICe.696).

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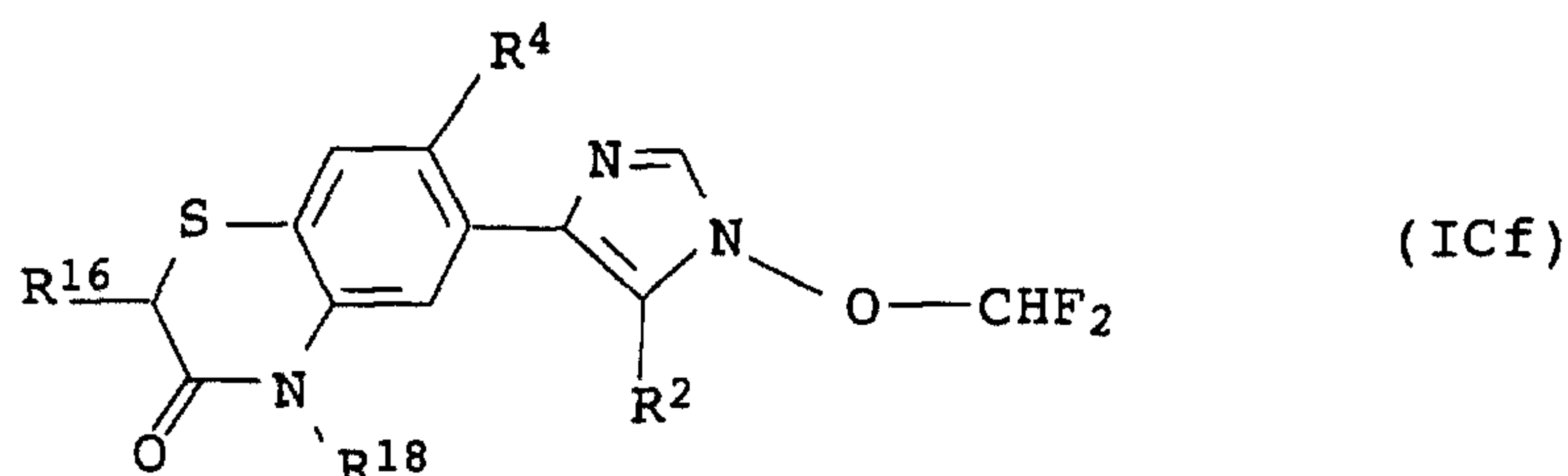
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Particular preference is furthermore given to the compounds of the formula ICf (compounds IC where Q = CH, R¹ = H and in which R⁵ and X-R⁶ form a chain -SCH(R¹⁶)-C(O)-NR¹⁸-) in which the variables R², R⁴ and R¹⁶ and R¹⁸ together have the meanings given in each case in one row of Table 2 (compounds ICf.1-ICf.696).

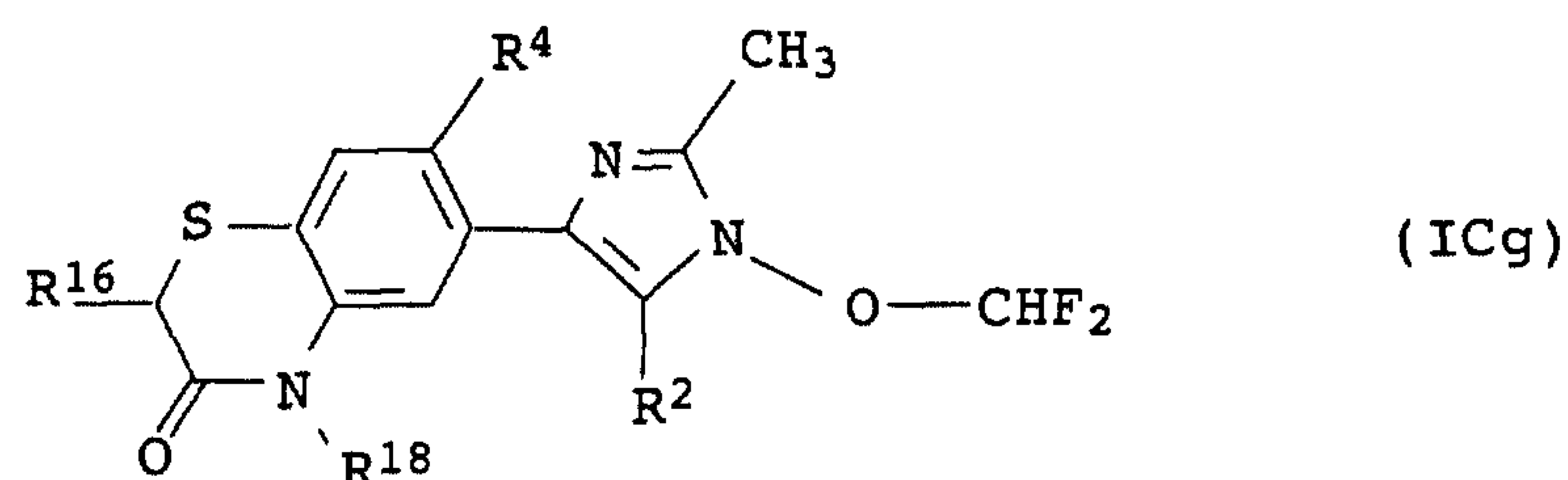
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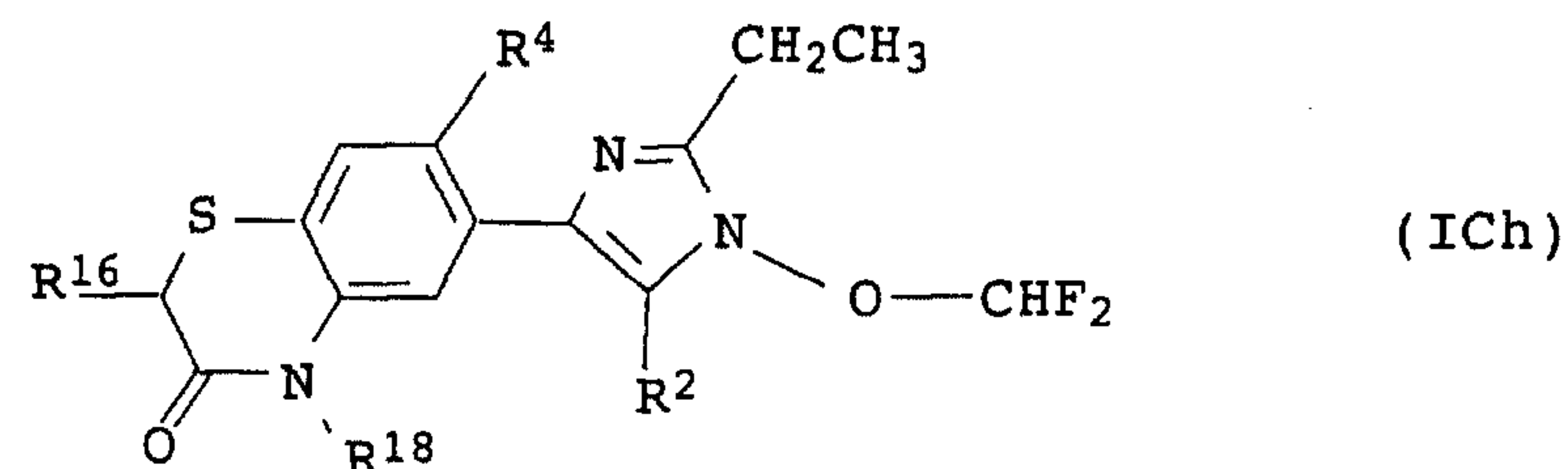
Particular preference is furthermore given to the compounds of the formula ICg (compounds IC where Q = CH, R¹ = CH₃ and in which R⁵ and X-R⁶ form a chain -SCH(R¹⁶)-C(O)-NR¹⁸-) in which the variables R², R⁴ and R¹⁶ and R¹⁸ together have the meanings given in each case in one row of Table 2 (compounds ICg.1-ICg.696).

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Particular preference is furthermore given to the compounds of the formula ICh (compounds IC where Q = CH, R¹ = CH₂CH₃ and in which R⁵ and X-R⁶ form a chain -SCH(R¹⁶)-C(O)-NR¹⁸-) in which the variables R², R⁴ and R¹⁶ and R¹⁸ together have the meanings given in each case in one row of Table 2 (compounds ICh.1-ICh.696).

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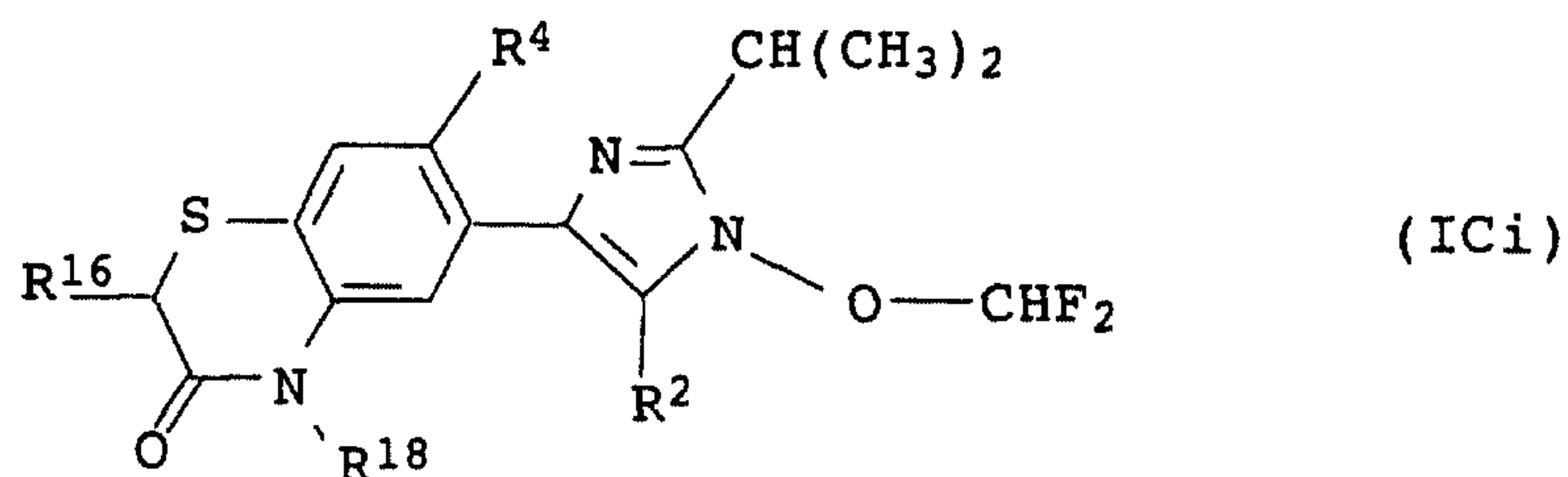


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Particular preference is furthermore given to the compounds of the formula ICI (compounds IC where $Q = CH$, $R^1 = CH(CH_3)_2$ and in which R^5 and $X-R^6$ form a chain $-SCH(R^{16})-C(O)-NR^{18}-$) in which the variables R^2 , R^4 and R^{16} and R^{18} together have the meanings given 5 in each case in one row of Table 2 (compounds ICI.1-ICI.696).

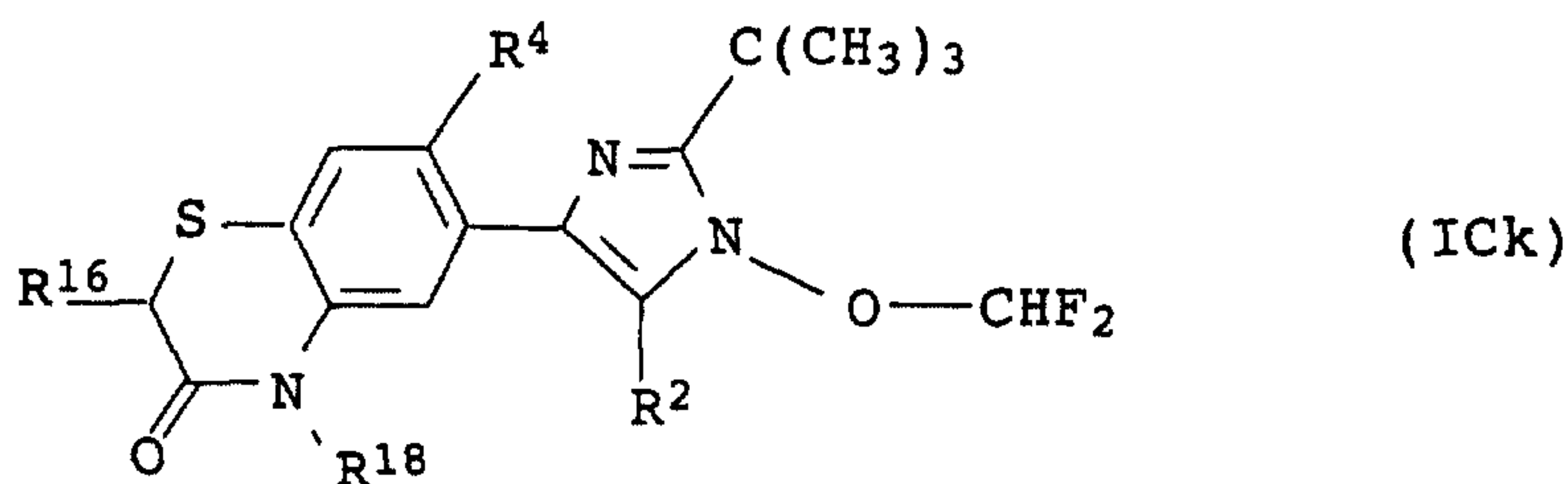
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Particular preference is furthermore given to the compounds of the formula ICK (compounds IC where $Q = H$, $R^1 = C(CH_3)_3$ and in which R^5 and $X-R^6$ form a chain $-SCH(R^{16})-C(O)-NR^{18}-$) in which the variables R^2 , R^4 and R^{16} and R^{18} together have the meanings given in each case in one row of Table 2 (compounds ICK.1-ICK.696).

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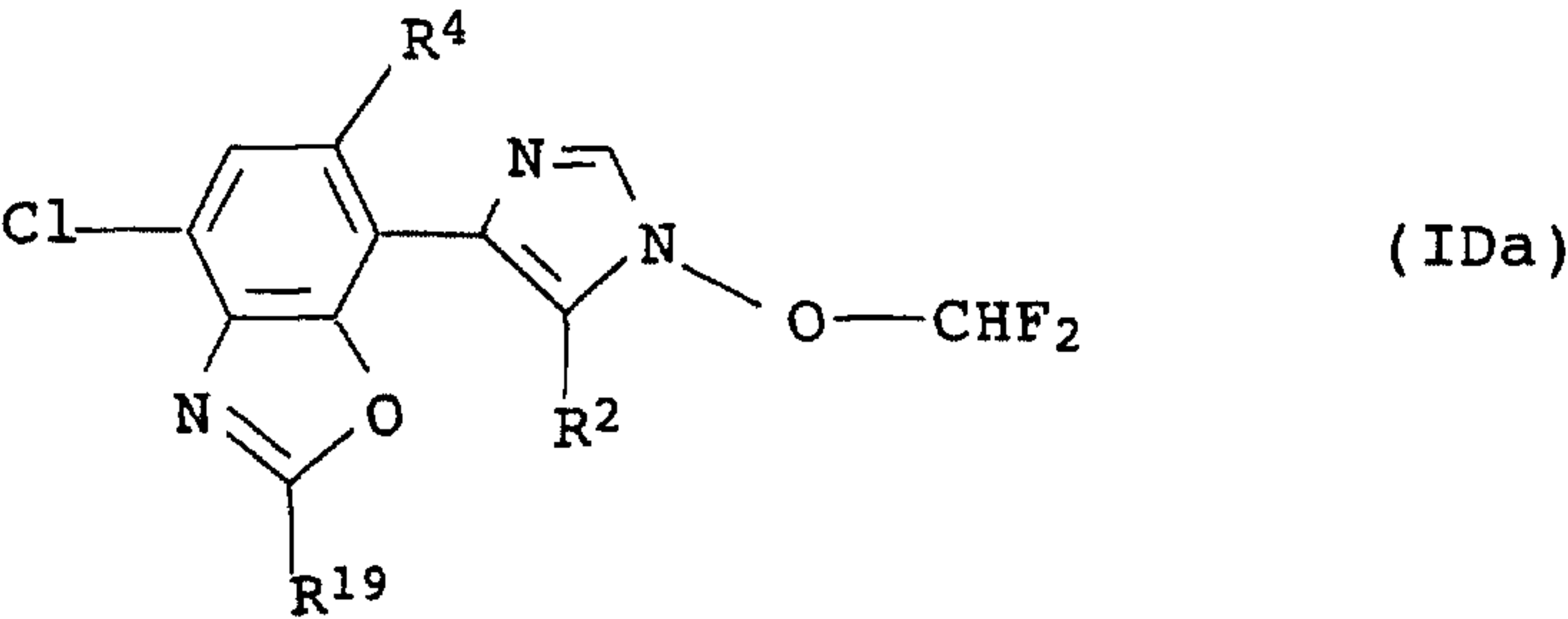
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Particular preference is furthermore given to the compounds of the formula IDa (compounds ID where Q = C-R⁷, R¹ = H and R⁵ = Cl and in which R⁷ and X-R⁶ form a chain -O-C(R¹⁹)=N-) in which the 5 variables R², R⁴ and R¹⁹ together have the meanings given in each case in one row of Table 3 (compounds IDa.1-IDa.444).

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Table 3

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No.	R ²	R ⁴	R ¹⁹
1	H	H	H
2	H	F	H
3	H	Cl	H
4	Cl	H	H
5	Cl	F	H
6	Cl	Cl	H
7	Br	H	H
8	Br	F	H
9	Br	Cl	H
10	CH ₃	H	H
11	CH ₃	F	H
12	CH ₃	Cl	H
13	H	H	CH ₃
14	H	F	CH ₃
15	H	Cl	CH ₃
16	Cl	H	CH ₃
17	Cl	F	CH ₃
18	Cl	Cl	CH ₃
19	Br	H	CH ₃
20	Br	F	CH ₃
21	Br	Cl	CH ₃
22	CH ₃	H	CH ₃
23	CH ₃	F	CH ₃
24	CH ₃	Cl	CH ₃
25	H	H	C ₂ H ₅
26	H	F	C ₂ H ₅
27	H	Cl	C ₂ H ₅
28	Cl	H	C ₂ H ₅
29	Cl	F	C ₂ H ₅
30	Cl	Cl	C ₂ H ₅
31	Br	H	C ₂ H ₅
32	Br	F	C ₂ H ₅

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	No.	R ²	R ⁴	R ¹⁹
	33	Br	Cl	C ₂ H ₅
	34	CH ₃	H	C ₂ H ₅
	35	CH ₃	F	C ₂ H ₅
5	36	CH ₃	Cl	C ₂ H ₅
	37	H	H	n-C ₃ H ₇
	38	H	F	n-C ₃ H ₇
	39	H	Cl	n-C ₃ H ₇
	40	Cl	H	n-C ₃ H ₇
10	41	Cl	F	n-C ₃ H ₇
	42	Cl	Cl	n-C ₃ H ₇
	43	Br	H	n-C ₃ H ₇
	44	Br	F	n-C ₃ H ₇
	45	Br	Cl	n-C ₃ H ₇
	46	CH ₃	H	n-C ₃ H ₇
15	47	CH ₃	F	n-C ₃ H ₇
	48	CH ₃	Cl	n-C ₃ H ₇
	49	H	H	F
	50	H	F	F
	51	H	Cl	F
20	52	Cl	H	F
	53	Cl	F	F
	54	Cl	Cl	F
	55	Br	H	F
	56	Br	F	F
	57	Br	Cl	F
25	58	CH ₃	H	F
	59	CH ₃	F	F
	60	CH ₃	Cl	F
	61	H	H	Cl
	62	H	F	Cl
	63	H	Cl	Cl
30	64	Cl	H	Cl
	65	Cl	F	Cl
	66	Cl	Cl	Cl
	67	Br	H	Cl
	68	Br	F	Cl
35	69	Br	Cl	Cl
	70	CH ₃	H	Cl
	71	CH ₃	F	Cl
	72	CH ₃	Cl	Cl
	73	H	H	Br
	74	H	F	Br
40	75	H	Cl	Br
	76	Cl	H	Br
	77	Cl	F	Br
	78	Cl	Cl	Br
	79	Br	H	Br
45	80	Br	F	Br
	81	Br	Cl	Br
	82	CH ₃	H	Br
	83	CH ₃	F	Br

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No.	R ²	R ⁴	R ¹⁹
84	CH ₃	Cl	Br
85	H	H	CH(CH ₃) ₂
86	H	F	CH(CH ₃) ₂
5 87	H	Cl	CH(CH ₃) ₂
88	Cl	H	CH(CH ₃) ₂
89	Cl	F	CH(CH ₃) ₂
90	Cl	Cl	CH(CH ₃) ₂
91	Br	H	CH(CH ₃) ₂
92	Br	F	CH(CH ₃) ₂
10 93	Br	Cl	CH(CH ₃) ₂
94	CH ₃	H	CH(CH ₃) ₂
95	CH ₃	F	CH(CH ₃) ₂
96	CH ₃	Cl	CH(CH ₃) ₂
97	H	H	OCH ₃
15 98	H	F	OCH ₃
99	H	Cl	OCH ₃
100	Cl	H	OCH ₃
101	Cl	F	OCH ₃
102	Cl	Cl	OCH ₃
103	Br	H	OCH ₃
20 104	Br	F	OCH ₃
105	Br	Cl	OCH ₃
106	CH ₃	H	OCH ₃
107	CH ₃	F	OCH ₃
108	CH ₃	Cl	OCH ₃
25 109	H	H	OCH(CH ₃) ₂
110	H	F	OCH(CH ₃) ₂
111	H	Cl	OCH(CH ₃) ₂
112	Cl	H	OCH(CH ₃) ₂
113	Cl	F	OCH(CH ₃) ₂
114	Cl	Cl	OCH(CH ₃) ₂
30 115	Br	H	OCH(CH ₃) ₂
116	Br	F	OCH(CH ₃) ₂
117	Br	Cl	OCH(CH ₃) ₂
118	CH ₃	H	OCH(CH ₃) ₂
119	CH ₃	F	OCH(CH ₃) ₂
35 120	CH ₃	Cl	OCH(CH ₃) ₂
121	H	H	OCH ₂ -CH=CH ₂
122	H	F	OCH ₂ -CH=CH ₂
123	H	Cl	OCH ₂ -CH=CH ₂
124	Cl	H	OCH ₂ -CH=CH ₂
125	Cl	F	OCH ₂ -CH=CH ₂
40 126	Cl	Cl	OCH ₂ -CH=CH ₂
127	Br	H	OCH ₂ -CH=CH ₂
128	Br	F	OCH ₂ -CH=CH ₂
129	Br	Cl	OCH ₂ -CH=CH ₂
130	CH ₃	H	OCH ₂ -CH=CH ₂
45 131	CH ₃	F	OCH ₂ -CH=CH ₂
132	CH ₃	Cl	OCH ₂ -CH=CH ₂
133	H	H	OCH ₂ -C≡CH
134	H	F	OCH ₂ -C≡CH

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No.	R ²	R ⁴	R ¹⁹
135	H	Cl	OCH ₂ -C≡CH
136	Cl	H	OCH ₂ -C≡CH
137	Cl	F	OCH ₂ -C≡CH
5 138	Cl	Cl	OCH ₂ -C≡CH
139	Br	H	OCH ₂ -C≡CH
140	Br	F	OCH ₂ -C≡CH
141	Br	Cl	OCH ₂ -C≡CH
142	CH ₃	H	OCH ₂ -C≡CH
143	CH ₃	F	OCH ₂ -C≡CH
10 144	CH ₃	Cl	OCH ₂ -C≡CH
145	H	H	n-C ₄ H ₉
146	H	F	n-C ₄ H ₉
147	H	Cl	n-C ₄ H ₉
148	Cl	H	n-C ₄ H ₉
15 149	Cl	F	n-C ₄ H ₉
150	Cl	Cl	n-C ₄ H ₉
151	Br	H	n-C ₄ H ₉
152	Br	F	n-C ₄ H ₉
153	Br	Cl	n-C ₄ H ₉
154	CH ₃	H	n-C ₄ H ₉
20 155	CH ₃	F	n-C ₄ H ₉
156	CH ₃	Cl	n-C ₄ H ₉
157	H	H	OCH ₂ -COOCH ₃
158	H	F	OCH ₂ -COOCH ₃
159	H	Cl	OCH ₂ -COOCH ₃
25 160	Cl	H	OCH ₂ -COOCH ₃
161	Cl	F	OCH ₂ -COOCH ₃
162	Cl	Cl	OCH ₂ -COOCH ₃
163	Br	H	OCH ₂ -COOCH ₃
164	Br	F	OCH ₂ -COOCH ₃
165	Br	Cl	OCH ₂ -COOCH ₃
30 166	CH ₃	H	OCH ₂ -COOCH ₃
167	CH ₃	F	OCH ₂ -COOCH ₃
168	CH ₃	Cl	OCH ₂ -COOCH ₃
169	H	H	OCH ₂ -COOC ₂ H ₅
170	H	F	OCH ₂ -COOC ₂ H ₅
35 171	H	Cl	OCH ₂ -COOC ₂ H ₅
172	Cl	H	OCH ₂ -COOC ₂ H ₅
173	Cl	F	OCH ₂ -COOC ₂ H ₅
174	Cl	Cl	OCH ₂ -COOC ₂ H ₅
175	Br	H	OCH ₂ -COOC ₂ H ₅
176	Br	F	OCH ₂ -COOC ₂ H ₅
40 177	Br	Cl	OCH ₂ -COOC ₂ H ₅
178	CH ₃	H	OCH ₂ -COOC ₂ H ₅
179	CH ₃	F	OCH ₂ -COOC ₂ H ₅
180	CH ₃	Cl	OCH ₂ -COOC ₂ H ₅
181	H	H	CH(CH ₃)-C ₂ H ₅
45 182	H	F	CH(CH ₃)-C ₂ H ₅
183	H	Cl	CH(CH ₃)-C ₂ H ₅
184	Cl	H	CH(CH ₃)-C ₂ H ₅
185	Cl	F	CH(CH ₃)-C ₂ H ₅

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	No.	R ²	R ⁴	R ¹⁹
5	186	Cl	Cl	CH(CH ₃)-C ₂ H ₅
	187	Br	H	CH(CH ₃)-C ₂ H ₅
	188	Br	F	CH(CH ₃)-C ₂ H ₅
	189	Br	Cl	CH(CH ₃)-C ₂ H ₅
	190	CH ₃	H	CH(CH ₃)-C ₂ H ₅
10	191	CH ₃	F	CH(CH ₃)-C ₂ H ₅
	192	CH ₃	Cl	CH(CH ₃)-C ₂ H ₅
	193	H	H	CH ₂ -CH(CH ₃) ₂
	194	H	F	CH ₂ -CH(CH ₃) ₂
	195	H	Cl	CH ₂ -CH(CH ₃) ₂
15	196	Cl	H	CH ₂ -CH(CH ₃) ₂
	197	Cl	F	CH ₂ -CH(CH ₃) ₂
	198	Cl	Cl	CH ₂ -CH(CH ₃) ₂
	199	Br	H	CH ₂ -CH(CH ₃) ₂
	200	Br	F	CH ₂ -CH(CH ₃) ₂
20	201	Br	Cl	CH ₂ -CH(CH ₃) ₂
	202	CH ₃	H	CH ₂ -CH(CH ₃) ₂
	203	CH ₃	F	CH ₂ -CH(CH ₃) ₂
	204	CH ₃	Cl	CH ₂ -CH(CH ₃) ₂
	205	H	H	OCH(CH ₃)-COOCH ₃
25	206	H	F	OCH(CH ₃)-COOCH ₃
	207	H	Cl	OCH(CH ₃)-COOCH ₃
	208	Cl	H	OCH(CH ₃)-COOCH ₃
	209	Cl	F	OCH(CH ₃)-COOCH ₃
	210	Cl	Cl	OCH(CH ₃)-COOCH ₃
30	211	Br	H	OCH(CH ₃)-COOCH ₃
	212	Br	F	OCH(CH ₃)-COOCH ₃
	213	Br	Cl	OCH(CH ₃)-COOCH ₃
	214	CH ₃	H	OCH(CH ₃)-COOCH ₃
	215	CH ₃	F	OCH(CH ₃)-COOCH ₃
35	216	CH ₃	Cl	OCH(CH ₃)-COOCH ₃
	217	H	H	OCH(CH ₃)-COOC ₂ H ₅
	218	H	F	OCH(CH ₃)-COOC ₂ H ₅
	219	H	Cl	OCH(CH ₃)-COOC ₂ H ₅
	220	Cl	H	OCH(CH ₃)-COOC ₂ H ₅
40	221	Cl	F	OCH(CH ₃)-COOC ₂ H ₅
	222	Cl	Cl	OCH(CH ₃)-COOC ₂ H ₅
	223	Br	H	OCH(CH ₃)-COOC ₂ H ₅
	224	Br	F	OCH(CH ₃)-COOC ₂ H ₅
	225	Br	Cl	OCH(CH ₃)-COOC ₂ H ₅
45	226	CH ₃	H	OCH(CH ₃)-COOC ₂ H ₅
	227	CH ₃	F	OCH(CH ₃)-COOC ₂ H ₅
	228	CH ₃	Cl	OCH(CH ₃)-COOC ₂ H ₅
	229	H	H	cyclopropyl
	230	H	F	cyclopropyl
	231	H	Cl	cyclopropyl
	232	Cl	H	cyclopropyl
	233	Cl	F	cyclopropyl
	234	Cl	Cl	cyclopropyl
	235	Br	H	cyclopropyl
	236	Br	F	cyclopropyl

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No.	R ²	R ⁴	R ¹⁹
237	Br	Cl	cyclopropyl
238	CH ₃	H	cyclopropyl
239	CH ₃	F	cyclopropyl
5 240	CH ₃	Cl	cyclopropyl
241	H	H	cyclopentyl
242	H	F	cyclopentyl
243	H	Cl	cyclopentyl
244	Cl	H	cyclopentyl
245	Cl	F	cyclopentyl
10 246	Cl	Cl	cyclopentyl
247	Br	H	cyclopentyl
248	Br	F	cyclopentyl
249	Br	Cl	cyclopentyl
250	CH ₃	H	cyclopentyl
15 251	CH ₃	F	cyclopentyl
252	CH ₃	Cl	cyclopentyl
253	H	H	CH ₂ -COOCH ₃
254	H	F	CH ₂ -COOCH ₃
255	H	Cl	CH ₂ -COOCH ₃
256	Cl	H	CH ₂ -COOCH ₃
20 257	Cl	F	CH ₂ -COOCH ₃
258	Cl	Cl	CH ₂ -COOCH ₃
259	Br	H	CH ₂ -COOCH ₃
260	Br	F	CH ₂ -COOCH ₃
261	Br	Cl	CH ₂ -COOCH ₃
25 262	CH ₃	H	CH ₂ -COOCH ₃
263	CH ₃	F	CH ₂ -COOCH ₃
264	CH ₃	Cl	CH ₂ -COOCH ₃
265	H	H	NH ₂
266	H	F	NH ₂
267	H	Cl	NH ₂
30 268	Cl	H	NH ₂
269	Cl	F	NH ₂
270	Cl	Cl	NH ₂
271	Br	H	NH ₂
272	Br	F	NH ₂
35 273	Br	Cl	NH ₂
274	CH ₃	H	NH ₂
275	CH ₃	F	NH ₂
276	CH ₃	Cl	NH ₂
277	H	H	N(CH ₃) ₂
278	H	F	N(CH ₃) ₂
40 279	H	Cl	N(CH ₃) ₂
280	Cl	H	N(CH ₃) ₂
281	Cl	F	N(CH ₃) ₂
282	Cl	Cl	N(CH ₃) ₂
283	Br	H	N(CH ₃) ₂
45 284	Br	F	N(CH ₃) ₂
285	Br	Cl	N(CH ₃) ₂
286	CH ₃	H	N(CH ₃) ₂
287	CH ₃	F	N(CH ₃) ₂

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	No.	R ²	R ⁴	R ¹⁹
	288	CH ₃	Cl	N(CH ₃) ₂
	289	H	H	CH ₂ -COOC ₂ H ₅
	290	H	F	CH ₂ -COOC ₂ H ₅
5	291	H	Cl	CH ₂ -COOC ₂ H ₅
	292	Cl	H	CH ₂ -COOC ₂ H ₅
	293	Cl	F	CH ₂ -COOC ₂ H ₅
	294	Cl	Cl	CH ₂ -COOC ₂ H ₅
	295	Br	H	CH ₂ -COOC ₂ H ₅
	296	Br	F	CH ₂ -COOC ₂ H ₅
10	297	Br	Cl	CH ₂ -COOC ₂ H ₅
	298	CH ₃	H	CH ₂ -COOC ₂ H ₅
	299	CH ₃	F	CH ₂ -COOC ₂ H ₅
	300	CH ₃	Cl	CH ₂ -COOC ₂ H ₅
	301	H	H	CH ₂ -CH ₂ -COOCH ₃
15	302	H	F	CH ₂ -CH ₂ -COOCH ₃
	303	H	Cl	CH ₂ -CH ₂ -COOCH ₃
	304	Cl	H	CH ₂ -CH ₂ -COOCH ₃
	305	Cl	F	CH ₂ -CH ₂ -COOCH ₃
	306	Cl	Cl	CH ₂ -CH ₂ -COOCH ₃
	307	Br	H	CH ₂ -CH ₂ -COOCH ₃
20	308	Br	F	CH ₂ -CH ₂ -COOCH ₃
	309	Br	Cl	CH ₂ -CH ₂ -COOCH ₃
	310	CH ₃	H	CH ₂ -CH ₂ -COOCH ₃
	311	CH ₃	F	CH ₂ -CH ₂ -COOCH ₃
	312	CH ₃	Cl	CH ₂ -CH ₂ -COOCH ₃
25	313	H	H	CH ₂ -CH ₂ -COOC ₂ H ₅
	314	H	F	CH ₂ -CH ₂ -COOC ₂ H ₅
	315	H	Cl	CH ₂ -CH ₂ -COOC ₂ H ₅
	316	Cl	H	CH ₂ -CH ₂ -COOC ₂ H ₅
	317	Cl	F	CH ₂ -CH ₂ -COOC ₂ H ₅
	318	Cl	Cl	CH ₂ -CH ₂ -COOC ₂ H ₅
30	319	Br	H	CH ₂ -CH ₂ -COOC ₂ H ₅
	320	Br	F	CH ₂ -CH ₂ -COOC ₂ H ₅
	321	Br	Cl	CH ₂ -CH ₂ -COOC ₂ H ₅
	322	CH ₃	H	CH ₂ -CH ₂ -COOC ₂ H ₅
	323	CH ₃	F	CH ₂ -CH ₂ -COOC ₂ H ₅
35	324	CH ₃	Cl	CH ₂ -CH ₂ -COOC ₂ H ₅
	325	H	H	SCH ₃
	326	H	F	SCH ₃
	327	H	Cl	SCH ₃
	328	Cl	H	SCH ₃
	329	Cl	F	SCH ₃
40	330	Cl	Cl	SCH ₃
	331	Br	H	SCH ₃
	332	Br	F	SCH ₃
	333	Br	Cl	SCH ₃
	334	CH ₃	H	SCH ₃
45	335	CH ₃	F	SCH ₃
	336	CH ₃	Cl	SCH ₃
	337	H	H	SCH(CH ₃) ₂
	338	H	F	SCH(CH ₃) ₂

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	No.	R ²	R ⁴	R ¹⁹
5	339	H	Cl	SCH(CH ₃) ₂
	340	Cl	H	SCH(CH ₃) ₂
	341	Cl	F	SCH(CH ₃) ₂
	342	Cl	Cl	SCH(CH ₃) ₂
	343	Br	H	SCH(CH ₃) ₂
10	344	Br	F	SCH(CH ₃) ₂
	345	Br	Cl	SCH(CH ₃) ₂
	346	CH ₃	H	SCH(CH ₃) ₂
	347	CH ₃	F	SCH(CH ₃) ₂
	348	CH ₃	Cl	SCH(CH ₃) ₂
15	349	H	H	SCH ₂ -CH=CH ₂
	350	H	F	SCH ₂ -CH=CH ₂
	351	H	Cl	SCH ₂ -CH=CH ₂
	352	Cl	H	SCH ₂ -CH=CH ₂
	353	Cl	F	SCH ₂ -CH=CH ₂
20	354	Cl	Cl	SCH ₂ -CH=CH ₂
	355	Br	H	SCH ₂ -CH=CH ₂
	356	Br	F	SCH ₂ -CH=CH ₂
	357	Br	Cl	SCH ₂ -CH=CH ₂
	358	CH ₃	H	SCH ₂ -CH=CH ₂
25	359	CH ₃	F	SCH ₂ -CH=CH ₂
	360	CH ₃	Cl	SCH ₂ -CH=CH ₂
	361	H	H	SCH ₂ -C≡CH
	362	H	F	SCH ₂ -C≡CH
	363	H	Cl	SCH ₂ -C≡CH
30	364	Cl	H	SCH ₂ -C≡CH
	365	Cl	F	SCH ₂ -C≡CH
	366	Cl	Cl	SCH ₂ -C≡CH
	367	Br	H	SCH ₂ -C≡CH
	368	Br	F	SCH ₂ -C≡CH
35	369	Br	Cl	SCH ₂ -C≡CH
	370	CH ₃	H	SCH ₂ -C≡CH
	371	CH ₃	F	SCH ₂ -C≡CH
	372	CH ₃	Cl	SCH ₂ -C≡CH
	373	H	H	SCH ₂ -COOCH ₃
40	374	H	F	SCH ₂ -COOCH ₃
	375	H	Cl	SCH ₂ -COOCH ₃
	376	Cl	H	SCH ₂ -COOCH ₃
	377	Cl	F	SCH ₂ -COOCH ₃
	378	Cl	Cl	SCH ₂ -COOCH ₃
45	379	Br	H	SCH ₂ -COOCH ₃
	380	Br	F	SCH ₂ -COOCH ₃
	381	Br	Cl	SCH ₂ -COOCH ₃
	382	CH ₃	H	SCH ₂ -COOCH ₃
	383	CH ₃	F	SCH ₂ -COOCH ₃
	384	CH ₃	Cl	SCH ₂ -COOCH ₃
	385	H	H	SCH ₂ -COOC ₂ H ₅
	386	H	F	SCH ₂ -COOC ₂ H ₅
	387	H	Cl	SCH ₂ -COOC ₂ H ₅
	388	Cl	H	SCH ₂ -COOC ₂ H ₅
	389	Cl	F	SCH ₂ -COOC ₂ H ₅

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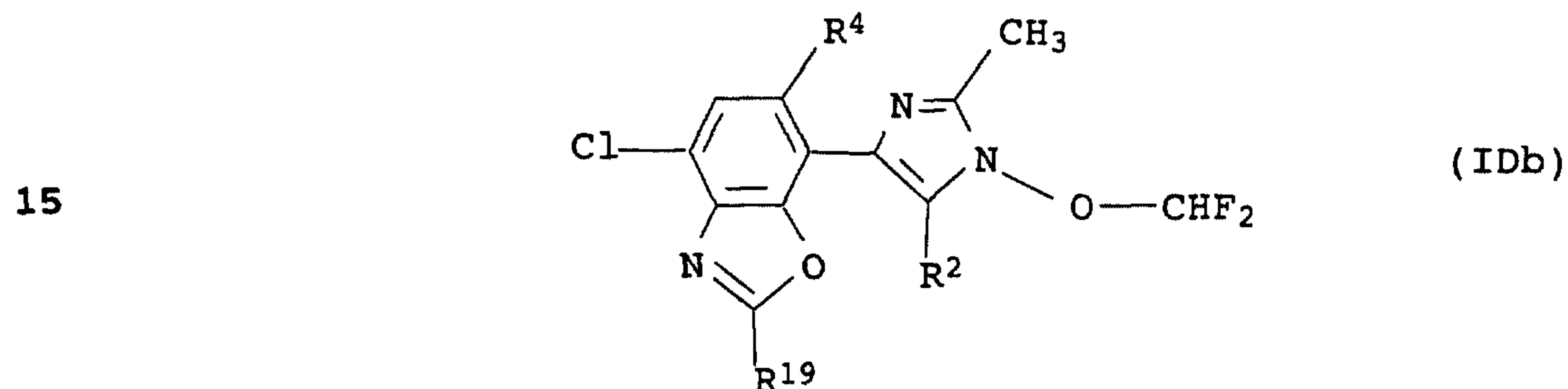
73

	No.	R ²	R ⁴	R ¹⁹
5	390	Cl	Cl	SCH ₂ -COOC ₂ H ₅
	391	Br	H	SCH ₂ -COOC ₂ H ₅
	392	Br	F	SCH ₂ -COOC ₂ H ₅
	393	Br	Cl	SCH ₂ -COOC ₂ H ₅
	394	CH ₃	H	SCH ₂ -COOC ₂ H ₅
10	395	CH ₃	F	SCH ₂ -COOC ₂ H ₅
	396	CH ₃	Cl	SCH ₂ -COOC ₂ H ₅
	397	H	H	SCH(CH ₃)-COOCH ₃
	398	H	F	SCH(CH ₃)-COOCH ₃
	399	H	Cl	SCH(CH ₃)-COOCH ₃
15	400	Cl	H	SCH(CH ₃)-COOCH ₃
	401	Cl	F	SCH(CH ₃)-COOCH ₃
	402	Cl	Cl	SCH(CH ₃)-COOCH ₃
	403	Br	H	SCH(CH ₃)-COOCH ₃
	404	Br	F	SCH(CH ₃)-COOCH ₃
20	405	Br	Cl	SCH(CH ₃)-COOCH ₃
	406	CH ₃	H	SCH(CH ₃)-COOCH ₃
	407	CH ₃	F	SCH(CH ₃)-COOCH ₃
	408	CH ₃	Cl	SCH(CH ₃)-COOCH ₃
	409	H	H	SCH(CH ₃)-COOC ₂ H ₅
25	410	H	F	SCH(CH ₃)-COOC ₂ H ₅
	411	H	Cl	SCH(CH ₃)-COOC ₂ H ₅
	412	Cl	H	SCH(CH ₃)-COOC ₂ H ₅
	413	Cl	F	SCH(CH ₃)-COOC ₂ H ₅
	414	Cl	Cl	SCH(CH ₃)-COOC ₂ H ₅
30	415	Br	H	SCH(CH ₃)-COOC ₂ H ₅
	416	Br	F	SCH(CH ₃)-COOC ₂ H ₅
	417	Br	Cl	SCH(CH ₃)-COOC ₂ H ₅
	418	CH ₃	H	SCH(CH ₃)-COOC ₂ H ₅
	419	CH ₃	F	SCH(CH ₃)-COOC ₂ H ₅
35	420	CH ₃	Cl	SCH(CH ₃)-COOC ₂ H ₅
	421	H	H	COOCH ₃
	422	H	F	COOCH ₃
	423	H	Cl	COOCH ₃
	424	Cl	H	COOCH ₃
40	425	Cl	F	COOCH ₃
	426	Cl	Cl	COOCH ₃
	427	Br	H	COOCH ₃
	428	Br	F	COOCH ₃
	429	Br	Cl	COOCH ₃
45	430	CH ₃	H	COOCH ₃
	431	CH ₃	F	COOCH ₃
	432	CH ₃	Cl	COOCH ₃
	433	H	H	COOC ₂ H ₅
	434	H	F	COOC ₂ H ₅
	435	H	Cl	COOC ₂ H ₅
	436	Cl	H	COOC ₂ H ₅
	437	Cl	F	COOC ₂ H ₅
	438	Cl	Cl	COOC ₂ H ₅
	439	Br	H	COOC ₂ H ₅
	440	Br	F	COOC ₂ H ₅

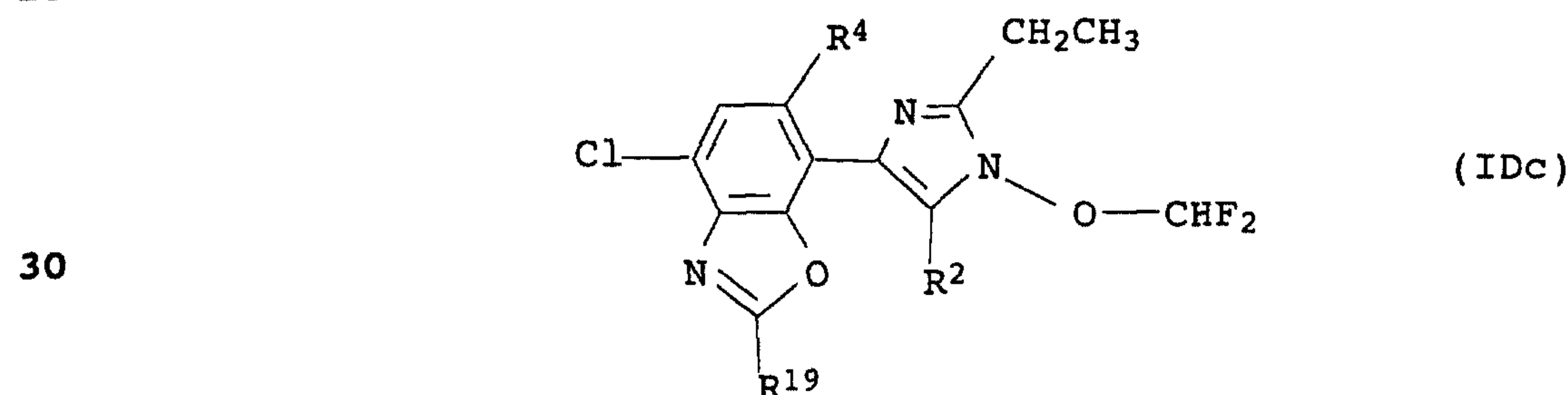
74

No.	R ²	R ⁴	R ¹⁹
441	Br	Cl	COOC ₂ H ₅
442	CH ₃	H	COOC ₂ H ₅
443	CH ₃	F	COOC ₂ H ₅
5 444	CH ₃	Cl	COOC ₂ H ₅

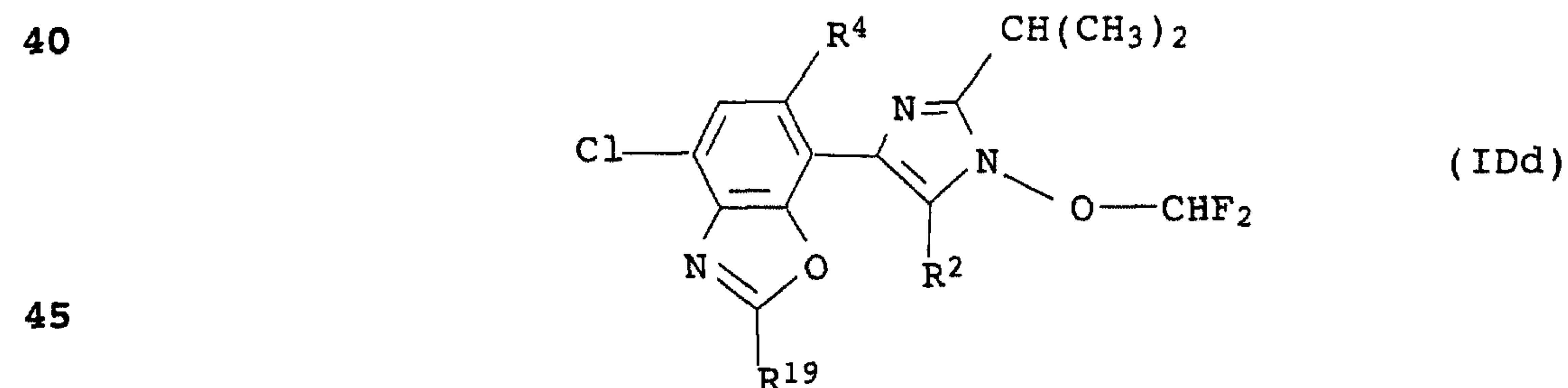
Particular preference is furthermore given to the compounds of the formula IDb (compounds ID where Q = C-R⁷, R¹ = CH₃ and R⁵ = Cl and in which R⁷ and X-R⁶ form a chain -O-C(R¹⁹)=N-) in which the variables R², R⁴ and R¹⁹ together have the meanings given in each case in one row of Table 3 (compounds IDb.1-IDb.444).



20 Particular preference is furthermore given to the compounds of the formula IDc (compounds ID where Q = C-R⁷, R¹ = CH₂CH₃ and R⁵ = Cl and in which R⁷ and X-R⁶ form a chain -O-C(R¹⁹)=N-) in which the variables R², R⁴ and R¹⁹ together have the meanings given in each case in one row of Table 3 (compounds IDc.1-IDc.444).



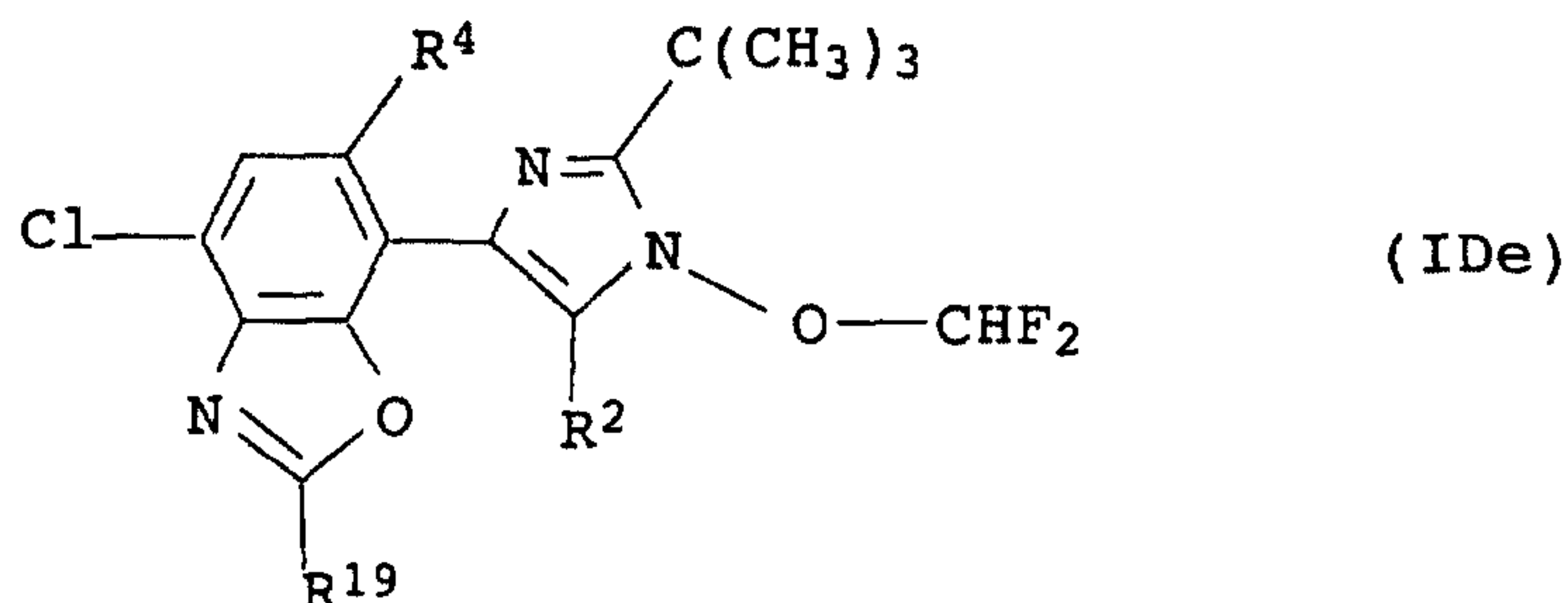
35 Particular preference is furthermore given to the compounds of the formula IDd (compounds ID where Q = C-R⁷, R¹ = CH(CH₃)₂ and R⁵ = Cl and in which R⁷ and X-R⁶ form a chain -O-C(R¹⁹)=N-) in which the variables R², R⁴ and R¹⁹ together have the meanings given in each case in one row of Table 3 (compounds IDd.1-IDd.444).



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Particular preference is furthermore given to the compounds of the formula IDe (compounds ID where $Q = C-R^7$, $R^1 = C(CH_3)_3$ and $R^5 = Cl$ and in which R^7 and $X-R^6$ form a chain $-O-C(R^{19})=N-$ in which the variables R^2 , R^4 and R^{19} together have the meanings given in 5 each case in one row of Table 3 (compounds IDe.1-IDE.444).

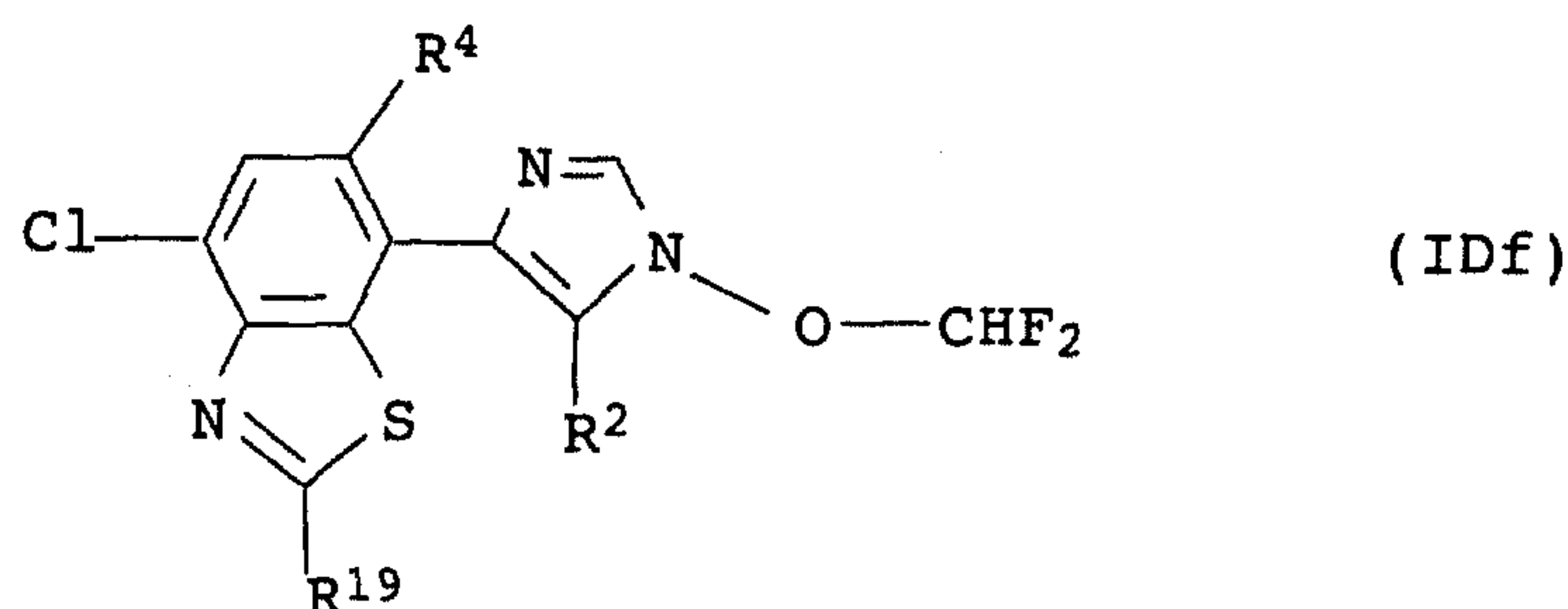
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15 Particular preference is furthermore given to the compounds of the formula IDf (compounds ID where $Q = C-R^7$, $R^1 = H$ and $R^5 = Cl$ and in which R^7 and $X-R^6$ form a chain $-S-C(R^{19})=N-$ in which the variables R^2 , R^4 and R^{19} together have the meanings given in each case in one row of Table 3 (compounds IDf.1-IDf.444).

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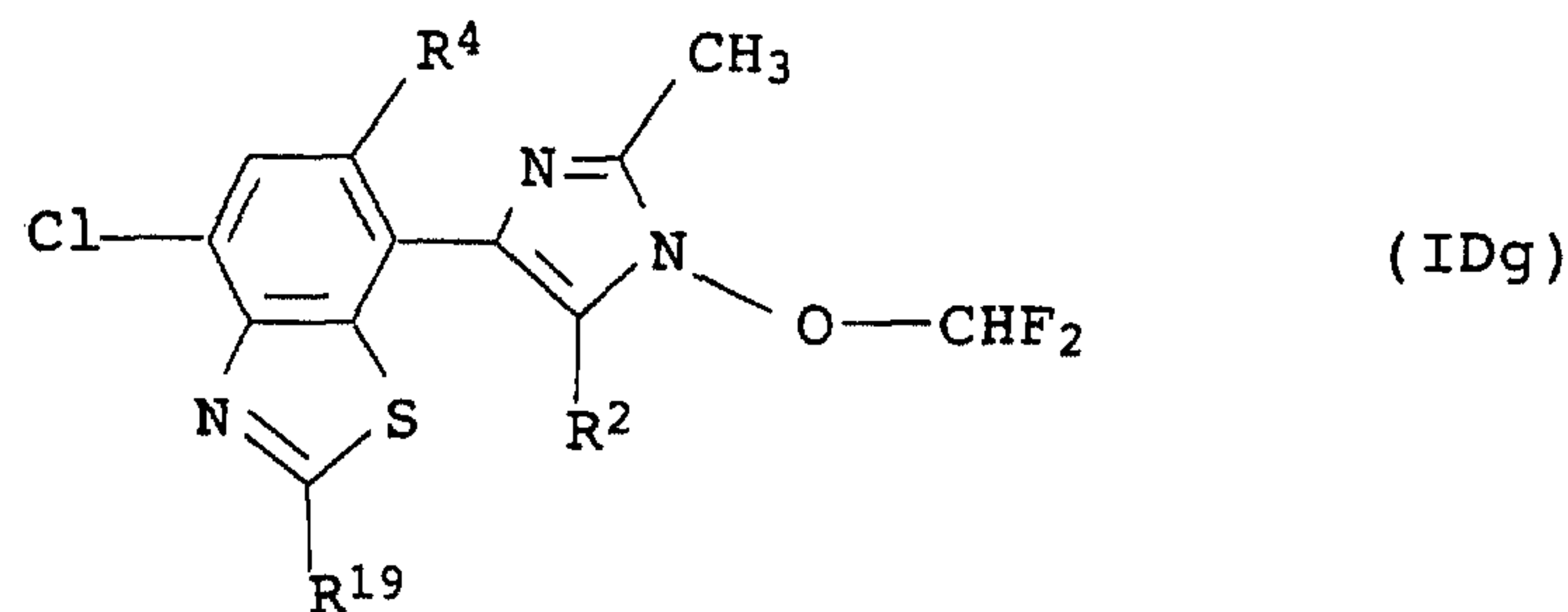
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30 Particular preference is furthermore given to the compounds of the formula IDg (compounds ID where $Q = C-R^7$, $R^1 = CH_3$ and $R^5 = Cl$ and in which R^7 and $X-R^6$ form a chain $-S-C(R^{19})=N-$ in which the variables R^2 , R^4 and R^{19} together have the meanings given in each case in one row of Table 3 (compounds IDg.1-IDg.444).

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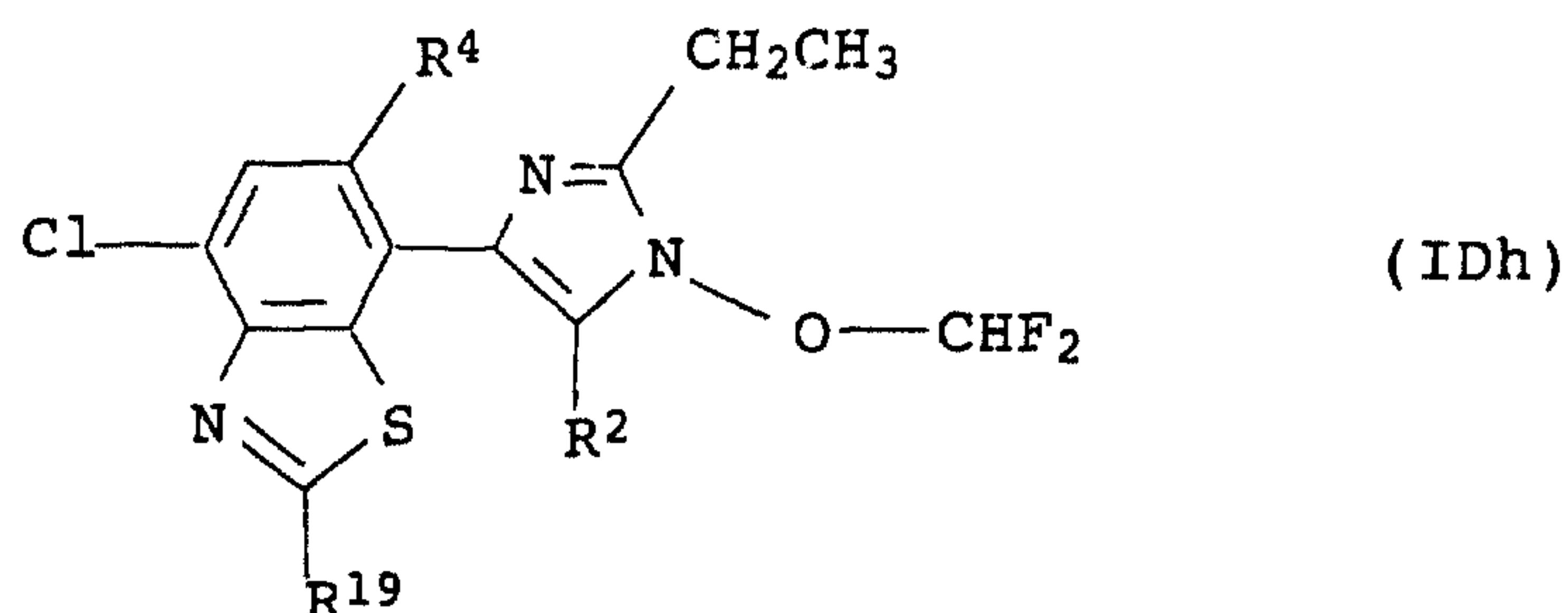
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45 Particular preference is furthermore given to the compounds of the formula IDh (compounds ID where $Q = C-R^7$, $R^1 = CH_2CH_3$ and $R^5 = Cl$ and in which R^7 and $X-R^6$ form a chain $-S-C(R^{19})=N-$ in which the variables R^2 , R^4 and R^{19} together have the meanings given in each case in one row of Table 3 (compounds IDh.1-IDh.444).

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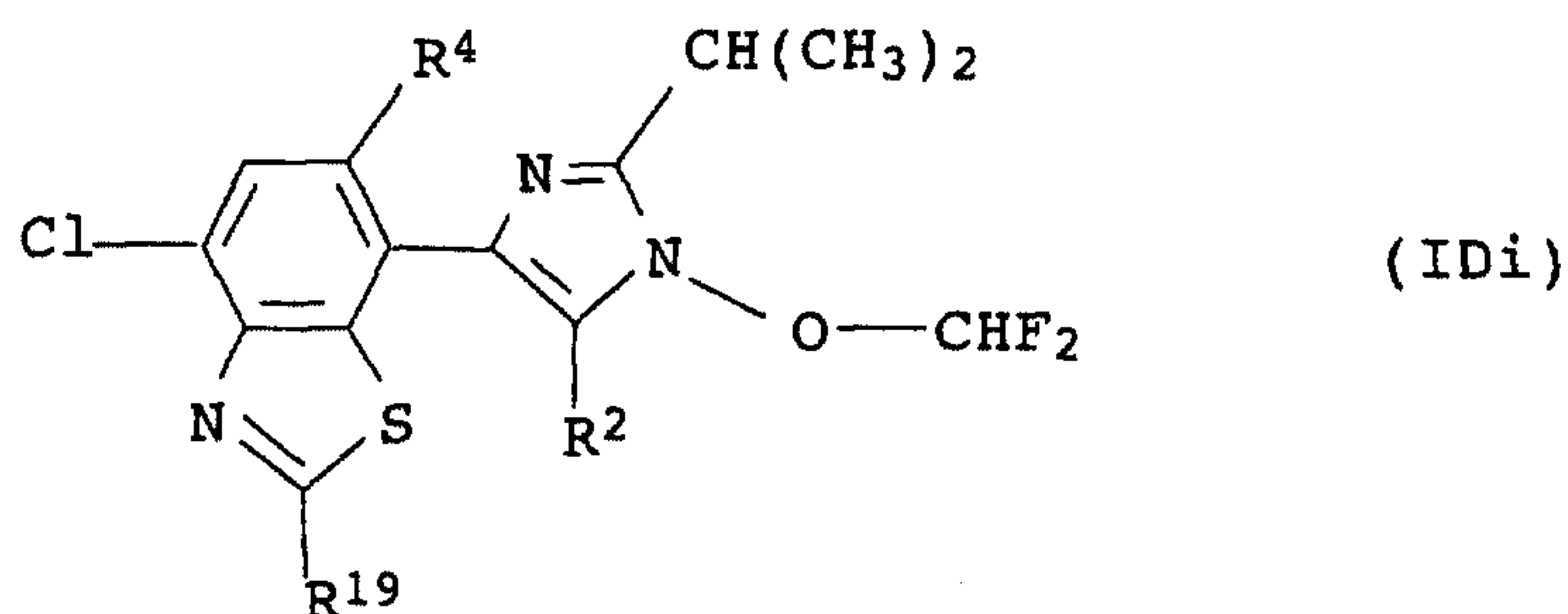
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10 Particular preference is furthermore given to the compounds of the formula IDi (compounds ID where Q = C-R⁷, R¹ = CH(CH₃)₂ and R⁵ = Cl and in which R⁷ and X-R⁶ form a chain -S-C(R¹⁹)=N-) in which the variables R², R⁴ and R¹⁹ together have the meanings given in each case in one row of Table 3 (compounds IDi.1-IDi.444).

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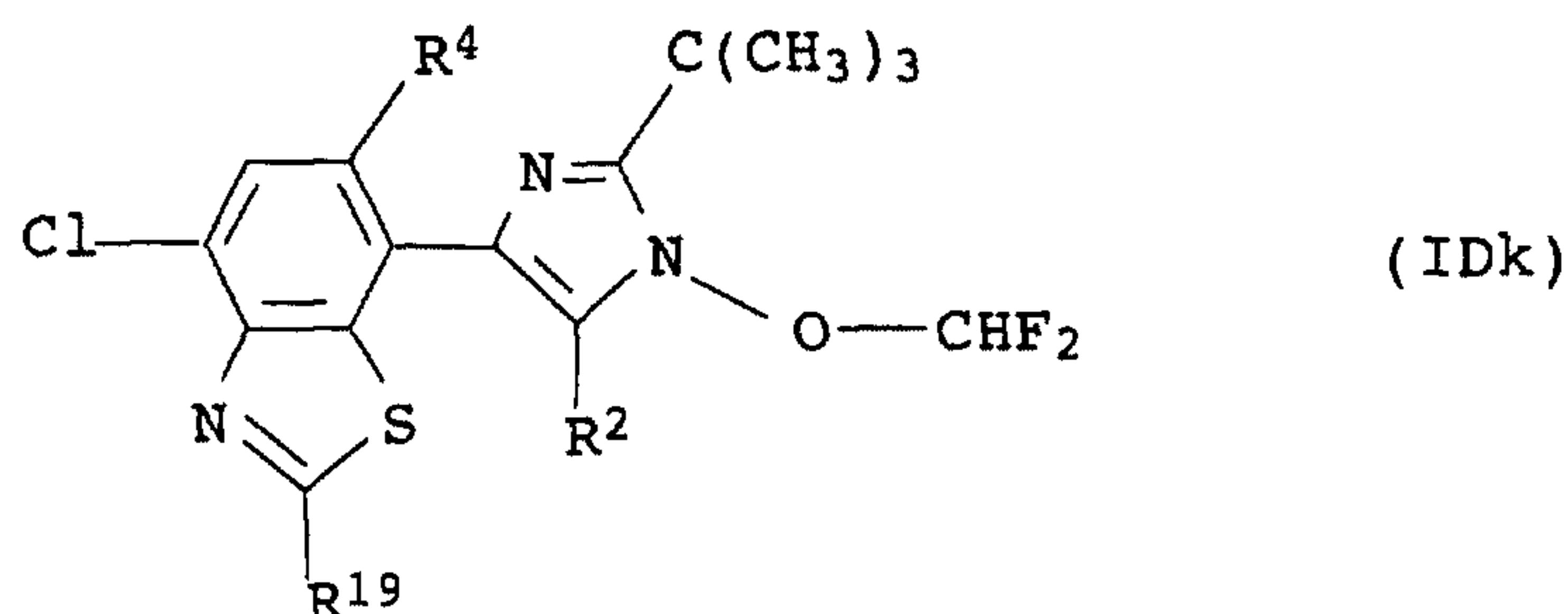
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25 Particular preference is furthermore given to the compounds of the formula IDk (compounds ID where Q = C-R⁷, R¹ = C(CH₃)₃ and R⁵ = Cl and in which R⁷ and X-R⁶ form a chain -S-C(R¹⁹)=N-) in which the variables R², R⁴ and R¹⁹ together have the meanings given in each case in one row of Table 3 (compounds IDk.1-IDk.444).

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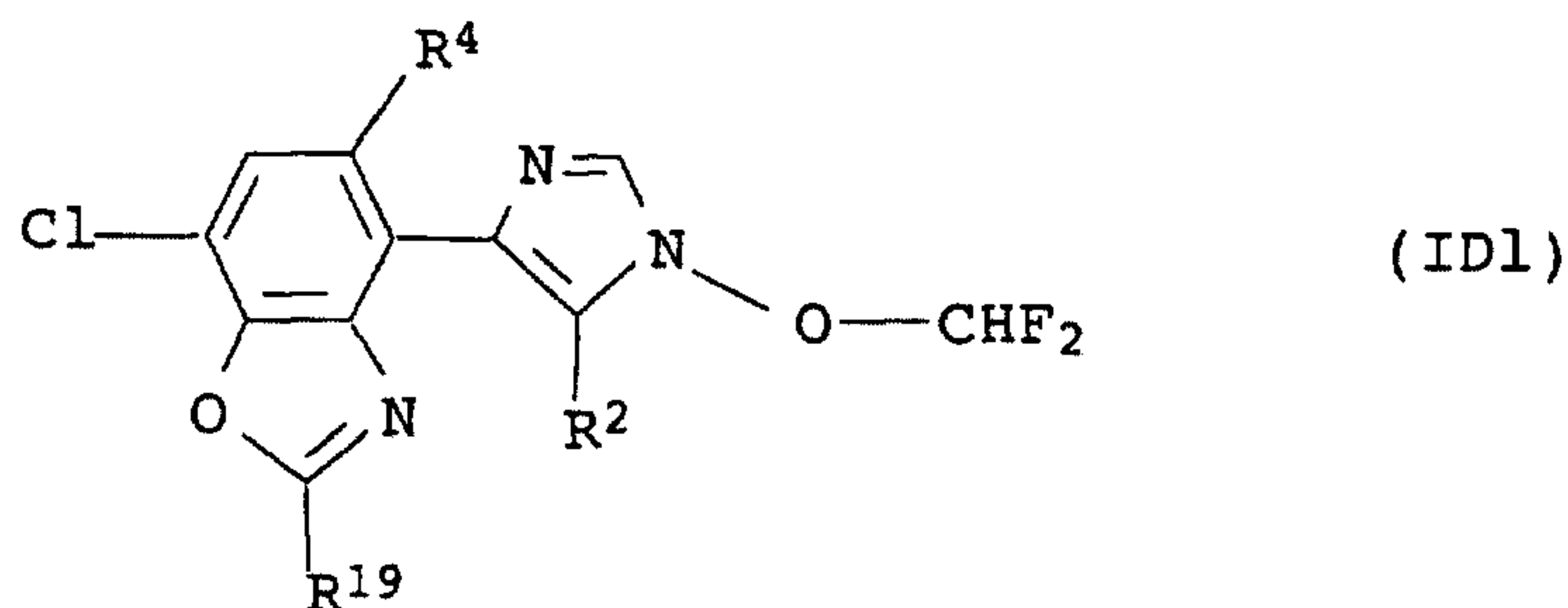


40 Particular preference is furthermore given to the compounds of the formula IDl (compounds ID where Q = C-R⁷, R¹ = H and R⁵ = Cl and in which R⁷ and X-R⁶ form a chain -N=C(R¹⁹)-O-) in which the variables R², R⁴ and R¹⁹ together have the meanings given in each case in one row of Table 3 (compounds IDl.1-IDl.444).

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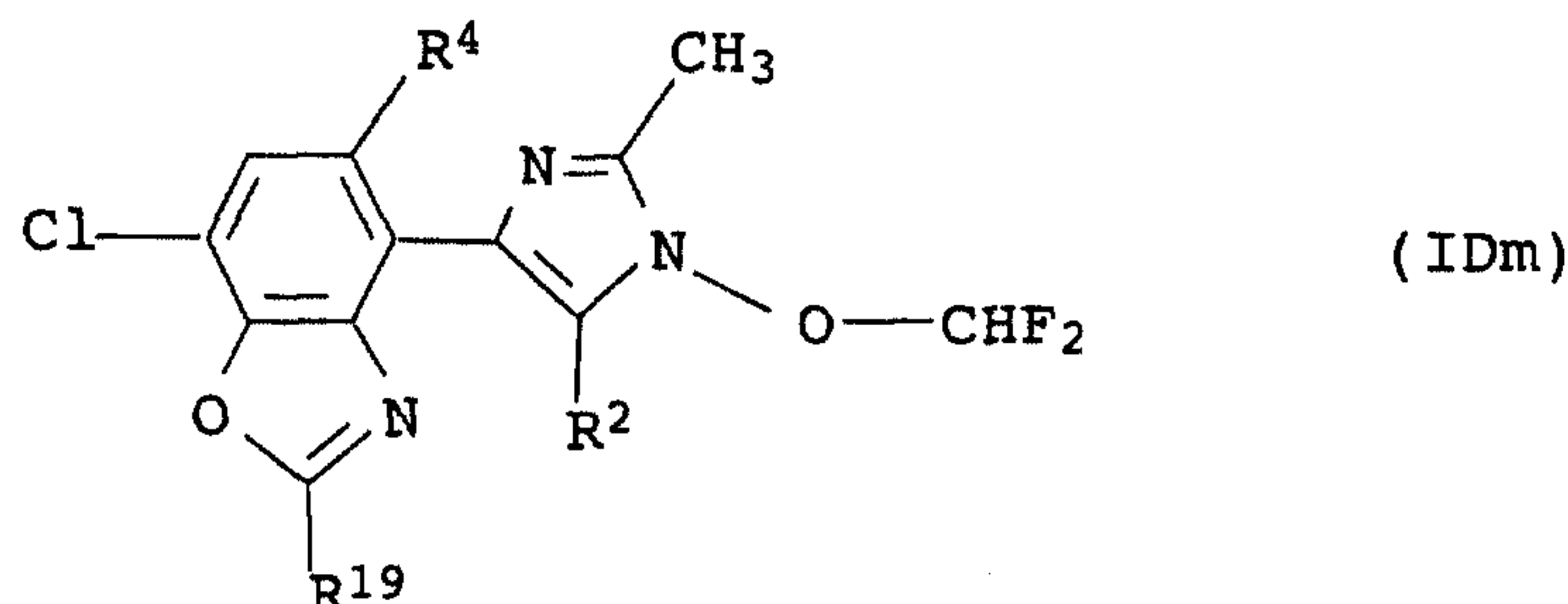
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10 Particular preference is furthermore given to the compounds of the formula IDm (compounds ID where $Q = C-R^7$, $R^1 = CH_3$ and $R^5 = Cl$ and in which R^7 and $X-R^6$ form a chain $-N=C(R^{19})-O-$) in which the variables R^2 , R^4 and R^{19} together have the meanings given in each case in one row of Table 3 (compounds IDm.1-IDm.444).

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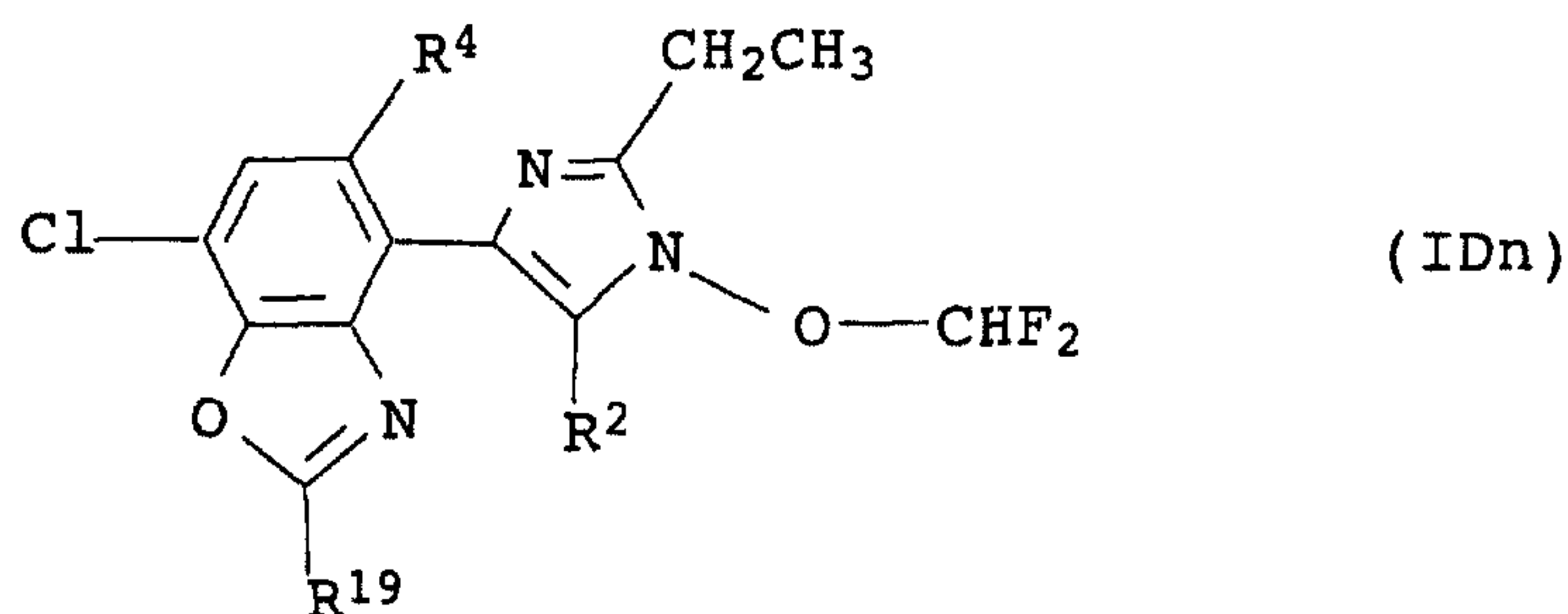
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25 Particular preference is furthermore given to the compounds of the formula IDn (compounds ID where $Q = C-R^7$, $R^1 = CH_2CH_3$ and $R^5 = Cl$ and in which R^7 and $X-R^6$ form a chain $-N=C(R^{19})-O-$) in which the variables R^2 , R^4 and R^{19} together have the meanings given in each case in one row of Table 3 (compounds IDn.1-IDn.444).

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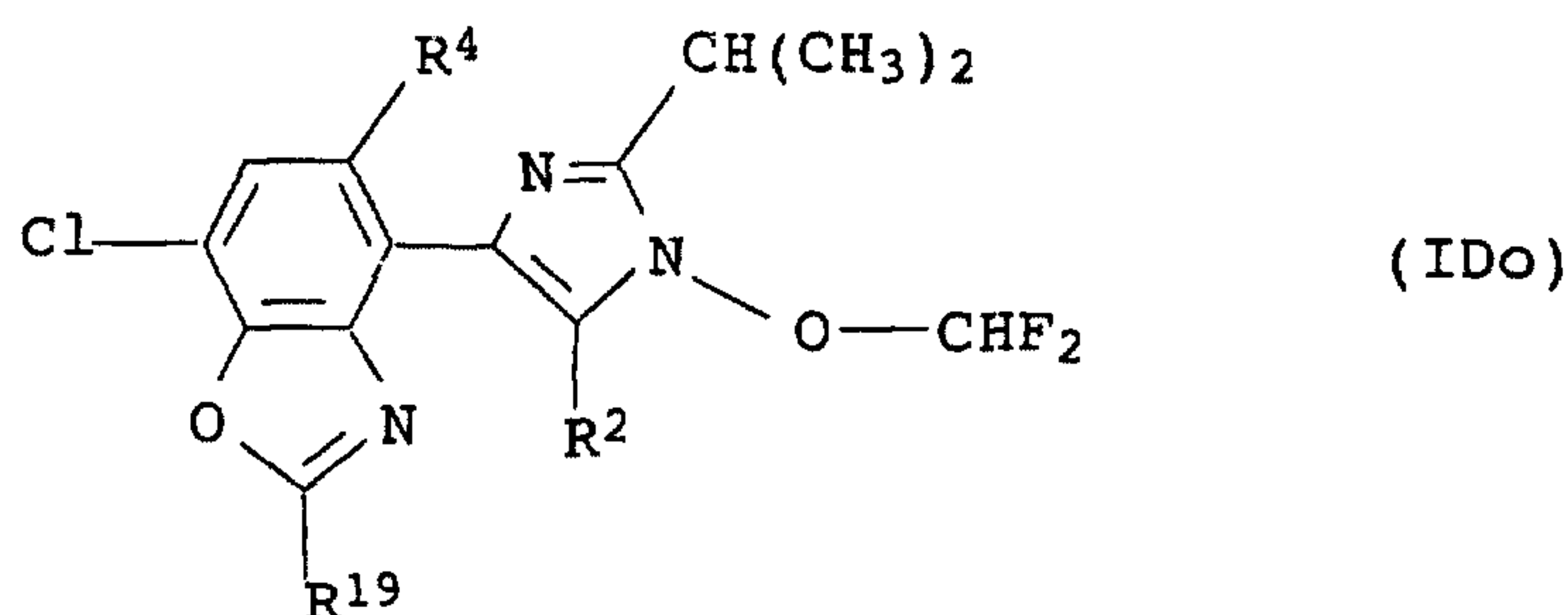


40 Particular preference is furthermore given to the compounds of the formula IDo (compounds ID where $Q = C-R^7$, $R^1 = CH(CH_3)_2$ and $R^5 = Cl$ and in which R^7 and $X-R^6$ form a chain $-N=C(R^{19})-O-$) in which the variables R^2 , R^4 and R^{19} together have the meanings given in each case in one row of Table 3 (compounds IDo.1-IDo.444).

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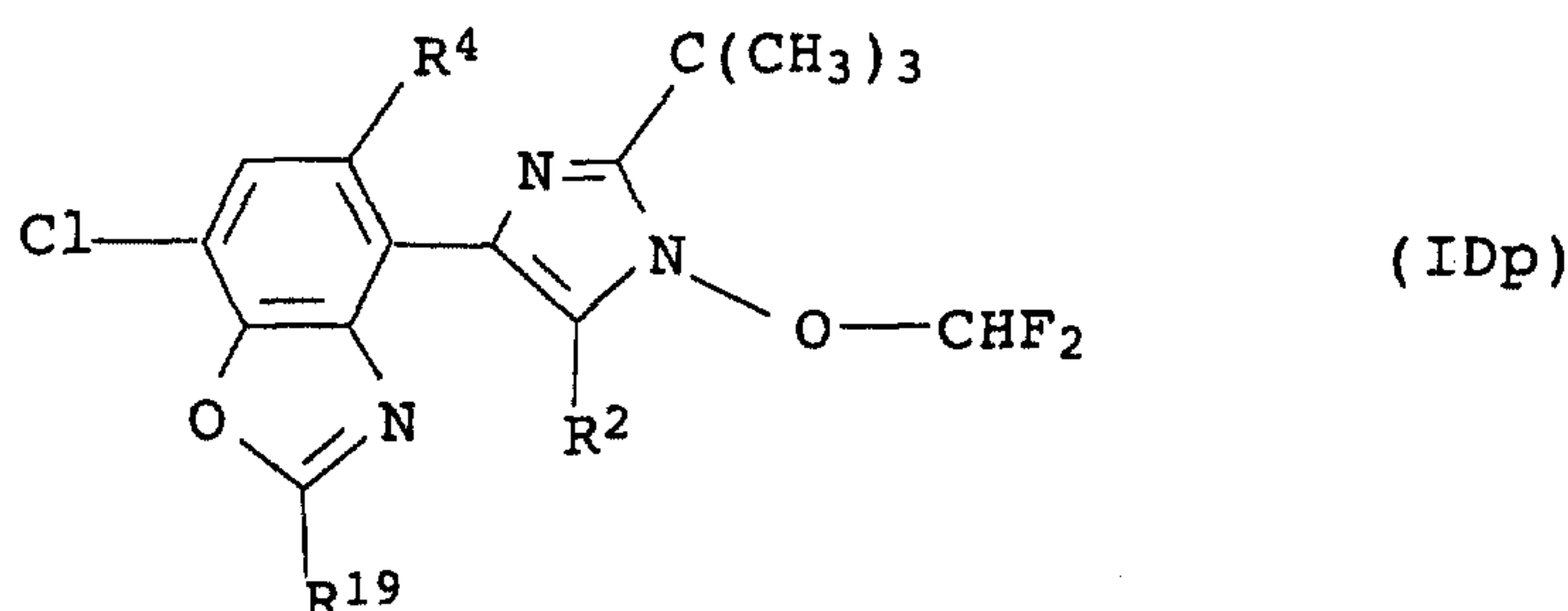
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10 Particular preference is furthermore given to the compounds of the formula IDp (compounds ID where Q = C-R⁷, R¹ = C(CH₃)₃ and R⁵ = Cl and in which R⁷ and X-R⁶ form a chain -N=C(R¹⁹)-O-) in which the variables R², R⁴ and R¹⁹ together have the meanings given in each case in one row of Table 3 (compounds IDp.1-IDp.444).

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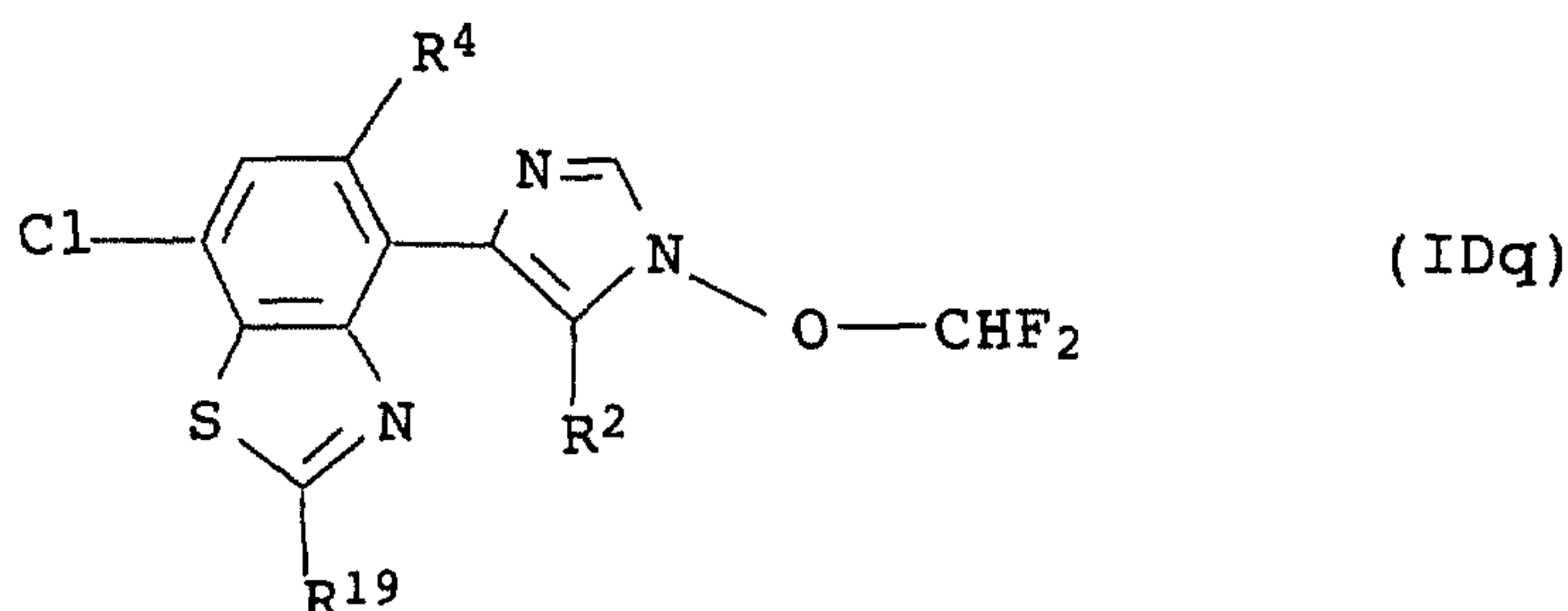
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25 Particular preference is furthermore given to the compounds of the formula IDq (compounds ID where Q = C-R⁷, R¹ = H and R⁵ = Cl and in which R⁷ and X-R⁶ form a chain -N=C(R¹⁹)-S-) in which the variables R², R⁴ and R¹⁹ together have the meanings given in each case in one row of Table 3 (compounds IDq.1-IDq.444).

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35



40 Particular preference is furthermore given to the compounds of the formula IDr (compounds ID where Q = C-R⁷, R¹ = CH₃ and R⁵ = Cl and in which R⁷ and X-R⁶ form a chain -N=C(R¹⁹)-S-) in which the variables R², R⁴ and R¹⁹ together have the meanings given in each case in one row of Table 3 (compounds IDr.1-IDr.444).

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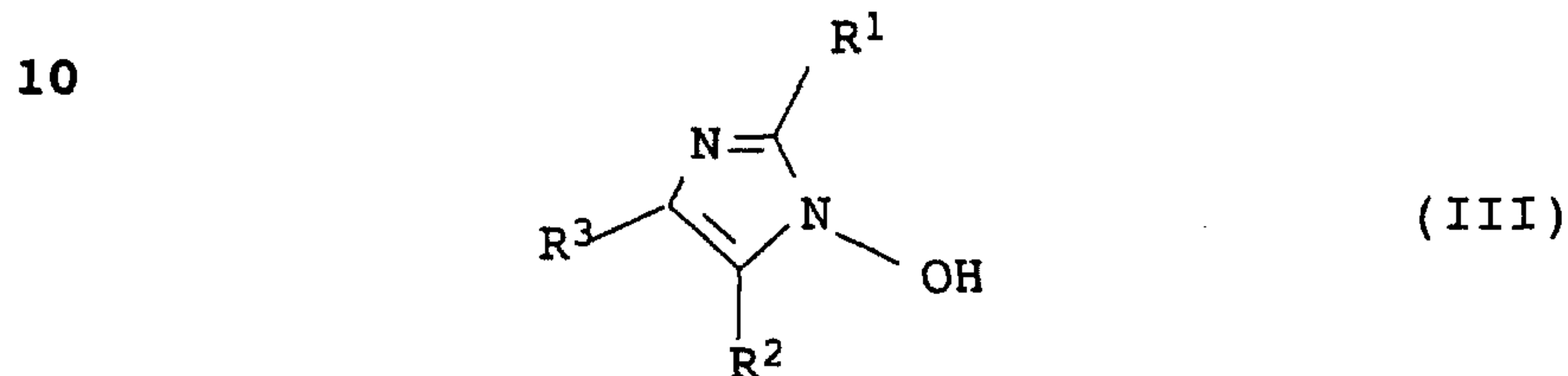


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The 4-aryl-1-difluoromethoxyimidazoles of the formula I according to the invention can be prepared by the synthesis routes described below:

- 5 A) An important route to the 4-aryl-1-difluoromethoxyimidazoles of the formula I according to the invention is the difluoromethylation of 4-aryl-1-hydroxyimidazoles of the formula III



in which the variables $R^1 - R^3$ are as defined in claim 1.

- 20 To this end, the 4-aryl-1-hydroxyimidazole of the formula III is reacted with chlorodifluoromethane, preferably in an organic solvent. This reaction is preferably carried out in the presence of a base. Examples of suitable bases are alkali metal hydroxides, such as sodium hydroxide or potassium hydroxide, alkali metal carbonates and bicarbonates, such as
- 25 potassium carbonate or bicarbonate or sodium carbonate or bicarbonate, or an organic base, for example an alkoxide, such as sodium methoxide or ethoxide or potassium methoxide or ethoxide, in particular tertiary amines, such as triethylamine or pyridine.

- 30 The gaseous chlorodifluoromethane is preferably introduced slowly into the reaction mixture comprising the compound III, preferably dissolved or suspended in a solvent, and, if appropriate, a base and/or further catalysts. If the reaction
- 35 is carried out under atmospheric pressure, excess chlorodifluoromethane gas is preferably trapped using a low-temperature condenser. However, the reaction can also be carried out under elevated chlorodifluoromethane pressure in a closed apparatus (autoclave), at pressures between about
- 40 0.1 and 100 bar.

- 45 The reaction temperature is usually between the melting point and the boiling point of the reaction mixture, preferably in the range from 50 to 150°C.

81

To obtain a high yield, it may be advantageous to employ an excess of chlorodifluoromethane (based on III). The excess can, for example, be up to five times the molar amount of the 1-hydroxyimidazole III used.

5

Suitable solvents are inert organic solvents, for example hydrocarbons, such as toluene or hexane, ethers, such as diethyl ether, dimethoxyethane, methyl t-butyl ether, dioxane or tetrahydrofuran (THF), amides, such as dimethylformamide (DMF), N,N-dimethylacetamide (DMA) or N-methylpyrrolidone (NMP), C₁-C₆-alkanols, such as methanol or ethanol, or else mixtures of such solvents with one another or with water.

10

15

To improve the conversion or to increase the reaction rate, it is frequently advantageous to add catalytic amounts (0.01-20 mol%, based on III) of a phase-transfer catalyst, for example a tetraalkylammonium salt, such as tetrabutylammonium chloride, or a crown ether, such as 18-crown-6 or 15-crown-5.

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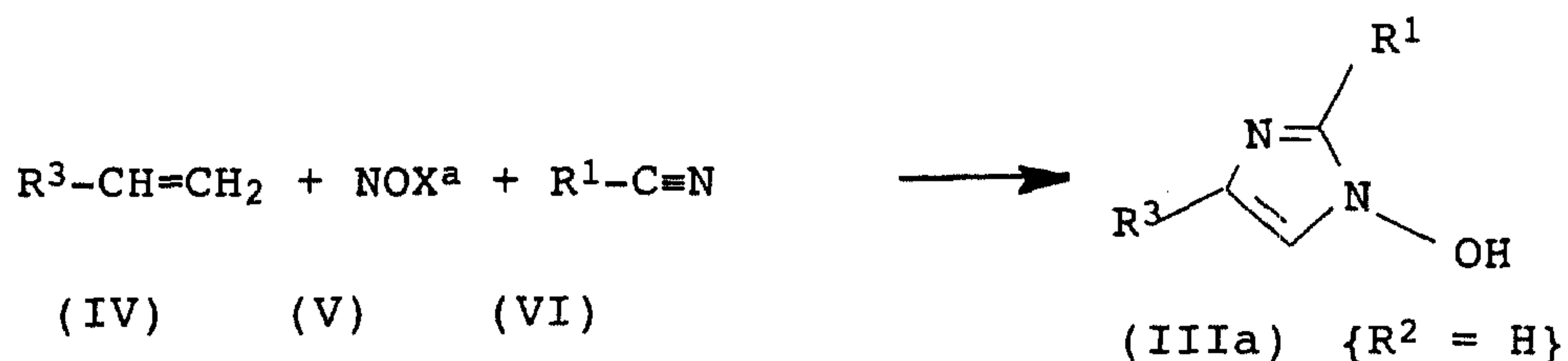
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The 1-hydroxyimidazoles of the formula III are in principle known from the literature (for example A. Katritzky, C. Rees, Ed., Comprehensive Heterocyclic Chemistry, Vol. 5, p. 474 et seq.), or they can be prepared analogously to compounds known from the literature. In particular, they can be prepared by the two processes mentioned below:

30

1. Reaction of a styrene derivative of the formula IV with a nitroso compound of the formula V and a nitrile of the formula VI to give the hydroxyimidazoles of the formula IIIa (compounds III where R² = H) according to the scheme below:

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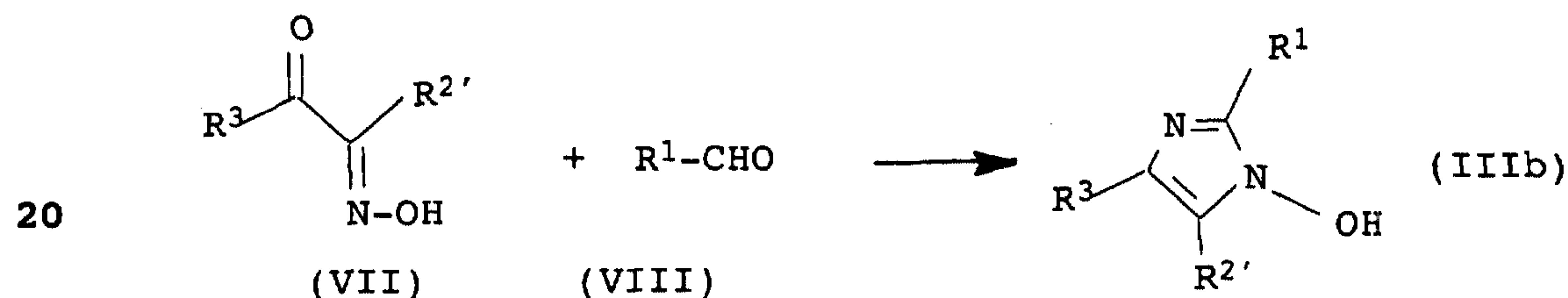
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In the formulae IV, VI and IIIa, R¹ and R³ are as defined above. NOX^a is a customary nitrosating agent, X^a being, for example, an inorganic anion, for example halogen, in particular chlorine, hydrogen sulfate or tetrafluoroborate, or an alkoxide radical, such as tert-butoxide.

82

Such reactions are known in principle from the literature (for example M. Scheinbaum, M. Dines, Tetrahedron Lett. 24 (1971), 2205; B. Lipshutz, B. Huff, W. Vaccaro, Tetrahedron Lett. 27 (1986), 4241; J. Beger, J. prakt. Chem. 311 (1969), 746). Suitable nitroso compounds are, in addition to nitrosonium tetrafluoroborate, which is customarily used, also other nitrosating agents, such as, for example, nitrosyl chloride, nitrosyl sulfuric acid, alkyl nitrites, such as, for example, t-butyl nitrite, or salts of nitrous acid, such as, for example, sodium nitrite.

2. Reaction of the oxime VII of an α -dicarbonyl compound with ammonia and an aldehyde of the formula VIII according to the scheme below:



In this scheme, R^1 and R^3 are as defined above. In the formulae VII and IIIb, $\text{R}^{2'}$ is hydrogen, CN, C_1 - C_4 -alkyl or C_1 - C_4 -haloalkyl.

These reactions, too, are known in principle ("Diels-Reaktion"; see, for example, H. Lettau, Z. Chem. 10 (1970), 338 and literature quoted therein).

B) Moreover, 4-aryl-1-difluoromethoxyimidazoles I can be prepared by functionalization, for example by halogenation of 4-aryl-1-difluoromethoxyimidazoles I in which R^2 is hydrogen:



Suitable halogenating agents are, for example, fluorine, DAST (diethylaminosulfur trifluoride), chlorine, N-chlorosuccinimide, sulfuryl chloride, thionyl chloride, phosgene, phosphorus trichloride, phosphorus oxychloride, bromine, N-bromosuccinimide, phosphorus tribromide and phosphorus oxybromide.

The reaction is usually carried out in an inert solvent/diluent, for example in a hydrocarbon, such as n-hexane and toluene, a halogenated hydrocarbon, such as

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dichloromethane, tetrachloromethane and chloroform, an ether, such as methyl tert-butyl ether, an alcohol, such as methanol and ethanol, a carboxylic acid, such as acetic acid, or in a polar aprotic solvent, such as acetonitrile.

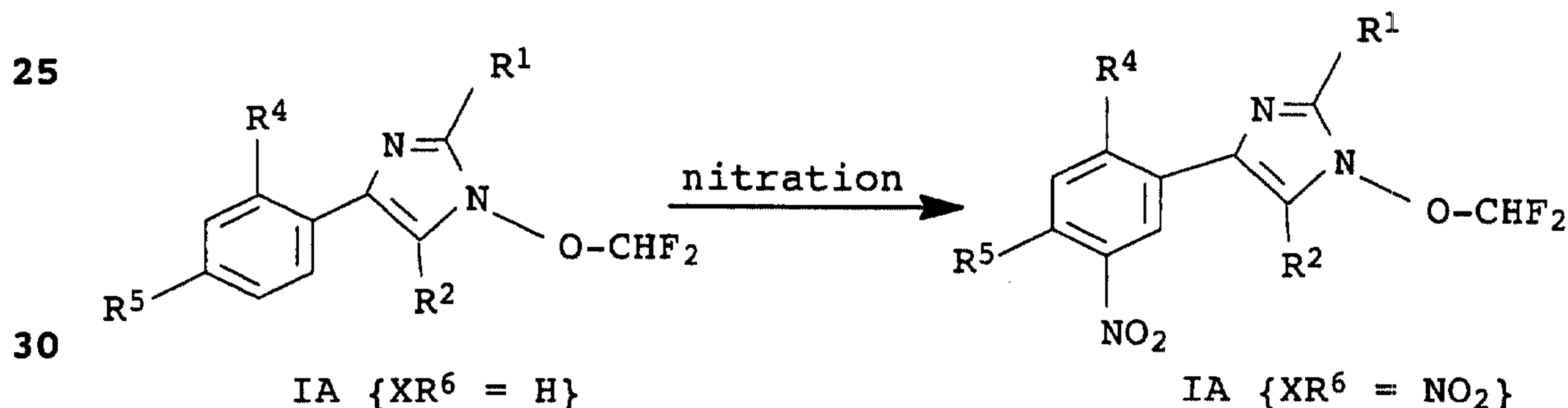
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The reaction temperature is usually between the melting point and the boiling point of the reaction mixture, preferably from 0 to 100°C.

10 To obtain as high a yield of the product of value as possible, the halogenating agent is employed in approximately equimolar amounts or in an excess of up to five times the molar amount, based on the amount of starting material.

15 C) Compounds I in which R^3 is a radical of the formula II where $Q = CH$ (compounds IA or IC) can be converted into other compounds IA by functionalization of the phenyl ring in the aromatic radical R^3 . Examples of this are:

20 C.1 Nitration of 4-aryl-1-difluoromethoxyimidazoles IA in which XR^6 is hydrogen, and conversion of the products of the process into further compounds of the formula IA:



Suitable nitrating agents are, for example, nitric acid in various concentrations, including concentrated and fuming nitric acid, mixtures of sulfuric acid and nitric acid, acetyl nitrates and alkyl nitrates.

40 The reaction can be carried out either without using a solvent in an excess of the nitrating agent, or in an inert solvent or diluent, suitable solvents or diluents being, for example, water, mineral acids, organic acids, halogenated hydrocarbons, such as methylene chloride, anhydrides, such as acetic anhydride, and mixtures of these.

45 Starting material IA { $XR^6 = H$ } and nitrating agent are advantageously employed in about equimolar amounts; however, to optimize the conversion of the starting material, it may

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be advantageous to use an excess of nitrating agent, up to about 10 times the molar amount based on IA. When the reaction is carried out without a solvent in the nitrating agent, the latter is present in an even greater excess.

5

The reaction temperature is usually from -100°C to 200°C , preferably from -30 to 50°C .

10

The compounds IA where $\text{XR}^6 = \text{NO}_2$ can then be reduced to give compounds IA where $\text{X-R}^6 = \text{NH}_2$ or $-\text{NHOH}$:



15

The reduction is generally carried out by reacting the nitro compound with a metal, such as iron, zinc or tin, under acidic reaction conditions, or using a complex hydride, such as lithium aluminum hydride and sodium borohydride, the reaction being carried out without dilution or in a solvent or diluent. Suitable solvents are - depending on the reducing agent chosen - for example water, alcohols, such as methanol, ethanol and isopropanol, or ethers, such as diethyl ether, methyl tert-butyl ether, dioxane, tetrahydrofuran and ethylene glycol dimethyl ether.

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If the reduction is carried out using a metal, the reaction is preferably carried out without a solvent in an inorganic acid, in particular in concentrated or dilute hydrochloric acid, or in a liquid organic acid, such as acetic acid or propionic acid. However, it is also possible to dilute the acid with an inert solvent, for example one of those mentioned above. The reduction with complex hydrides is preferably carried out in a solvent, for example an ether or an alcohol.

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The nitro compound IA $\{\text{X-R}^6 = \text{NO}_2\}$ and the reducing agent are frequently employed in approximately equimolar amounts; to optimize the reaction it may be advantageous to use an excess of one of the two components, up to about 10 times the molar amount.

40

The amount of acid is not critical. To ensure as complete a reduction of the starting material as possible, it is advantageous to use at least an equivalent amount of acid. Frequently, an excess of acid, based on IA $\{\text{X-R}^6 = \text{NO}_2\}$, is employed.

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The reaction temperature is usually in the range from -30°C to 200°C , preferably in the range from 0°C to 80°C .

5 For work-up, the reaction mixture is usually diluted with water, and the product is isolated by filtration, crystallization or extraction with a substantially water-immiscible solvent, for example ethyl acetate, diethyl ether or methylene chloride. If desired, the product can then be purified in a conventional manner.

10

The nitro group of the compounds IA $\{\text{X-R}^6 = \text{NO}_2\}$ can also be hydrogenated catalytically using hydrogen. Catalysts suitable for this purpose are, for example, Raney nickel, palladium on activated carbon, palladium oxide, platinum and platinum oxide, an amount of catalyst of from 0.05 to 10.0 mol%, based on the compound to be reduced, generally being sufficient.

15

The reaction is carried out either without a solvent or in an inert solvent or diluent, for example an acetic acid, a mixture of acetic acid and water, ethyl acetate, ethanol or in toluene.

20

After removal of the catalyst, the reaction solution can be worked up in a conventional manner to afford the product.

25

The hydrogenation can be carried out under atmospheric hydrogen pressure or under elevated hydrogen pressure.

The amino group in IA $\{\text{X-R}^6 = \text{NH}_2\}$ can then be diazotized in a conventional manner. The diazonium salts then give access to the compounds I where:

30

- $\text{X-R}^6 =$ cyano or halogen {for example by the Sandmeyer reaction: cf., for example, Houben-Weyl, Methoden der Organischen Chemie, Georg Thieme Verlag Stuttgart, Vol. 5/4, 4th Edition 1960, p. 438 et seq.},
- 35 - $\text{X-R}^6 =$ hydroxyl {for example by generating phenols by heating diazonium salts: cf. for example Org. Synth. Coll. Vol. 3 (1955), p. 130},
- 40 - $\text{X-R}^6 =$ mercapto or $\text{C}_1\text{-C}_6\text{-alkylthio}$ {cf., for example, Houben-Weyl, Methoden der Organischen Chemie, Georg Thieme Verlag Stuttgart, Vol. E11 1984, p. 43 and 176},
- $\text{X-R}^6 =$ halosulfonyl {cf., for example, Houben-Weyl, Methoden der Organischen Chemie, Georg Thieme Verlag Stuttgart, Vol. E11 1984, p. 1069 et seq.},
- 45

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- X-R⁶ = for example -CH₂-CH(halogen)-CO-O-Y-R⁸,
-CH=C(halogen)-CO-O-Y-R⁸, -CH₂-CH(halogen)-PO-(O-Y-R⁸)₂,
-CH=C(halogen)-CO-(O-Y-R⁸)₂ {these are generally products
of a Meerwein arylation; cf., for example, C.S.

5 Rondestredt, Org. React. 11 (1960), 189 and H.P. Doyle et
al., J. Org. Chem. 42 (1977), 2431}.

10 The diazonium salt in question of IA {X-R⁶ = N₂⁺} is generally
prepared in a manner known per se by reacting IA {X-R⁶ = NH₂}
in an aqueous solution of acid, for example in hydrochloric
acid, hydrobromic acid or sulfuric acid, with a nitrite, such
as sodium nitrite and potassium nitrite.

15 For preparing the diazonium salt IA {X-R⁶ = N₂⁺}, the amino
compound IA {X-R⁶ = NH₂} can be reacted in the absence of
water, for example in glacial acetic acid containing hydrogen
chloride, in absolute alcohol, in dioxane or tetrahydrofuran,
in acetonitrile or in acetone, with a nitrite, such as
tert-butyl nitrite and isopentyl nitrite.

20 The conversion of the resulting diazonium salt into the
corresponding compound IA where X-R⁶ = cyano, chlorine,
bromine or iodine is particularly preferably carried out by
treatment with a solution or suspension of a copper(I) salt,
25 such as copper(I) cyanide, chloride, bromide or iodide, or
with a solution of an alkali metal salt.

30 The conversion of the resulting diazonium salt into the
corresponding hydroxyl compound IA {X-R⁶ = hydroxyl} is
advantageously carried out by treatment of the diazonium salt
IA with an aqueous acid, preferably sulfuric acid. The
addition of a copper(II) salt, such as copper(II) sulfate,
can have a positive effect on the course of the reaction. In
general, this reaction is carried out at from 0 to 100°C,
35 preferably at the boiling point of the reaction mixture.

40 Compounds IA where X-R⁶ = mercapto, C₁-C₆-alkylthio or
halosulfonyl are obtained, for example, by reacting the
diazonium salt in question of IA with hydrogen sulfide, an
alkali metal sulfide, a dialkyl disulfide, such as dimethyl
disulfide, or with sulfur dioxide.

45 The Meerwein arylation usually entails reacting the diazonium
salts with alkenes or alkynes. The alkene or alkyne is
preferably employed in an excess of up to 3000 mol%, based on
the amount of the diazonium salt.

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5 The reactions described above of the diazonium salt IA {X-R⁶ = N₂⁺} can be carried out, for example, in water, in aqueous hydrochloric acid or hydrobromic acid, in a ketone, such as acetone, diethyl ketone and methyl ethyl ketone, in a nitrile, such as acetonitrile, in an ether, such as dioxane and tetrahydrofuran, or in an alcohol, such as methanol and ethanol.

10 Unless stated otherwise for the individual reactions, the reaction temperatures are usually from -30°C to 50°C.

15 All reaction partners are preferably employed in approximately stoichiometric amounts; however, an excess of one or the other component of up to about 3000 mol% may be advantageous.

20 The mercapto compounds IA {X-R⁶ = SH} can also be obtained by reducing the compounds IA described below where X-R⁶ = halosulfonyl. Suitable reducing agents are, for example, transition metals, such as iron, zinc and tin (cf., for example, "The Chemistry of the Thiol Group", John Wiley, 1974, p. 216).

25 C.2 Halosulfonation of 4-aryl-1-difluoromethoxyimidazoles IA in which XR⁶ is hydrogen:



30 The halosulfonation can be carried out in the absence of a solvent in an excess of sulfonating agent, or in an inert solvent/diluent, for example in a halogenated hydrocarbon, an ether, an alkylnitrile or a mineral acid.

35 Chlorosulfonic acid is the preferred agent as well as the preferred solvent.

40 The amount of sulfonating agent used is usually slightly less (up to about 95 mol%) or an excess of 1 to 5 times the molar amount of the starting material IA (where X-R⁶ = H). In the absence of an inert solvent, it may be advantageous to employ an even larger excess.

45 The reaction temperature is usually from 0°C to the boiling point of the reaction mixture.

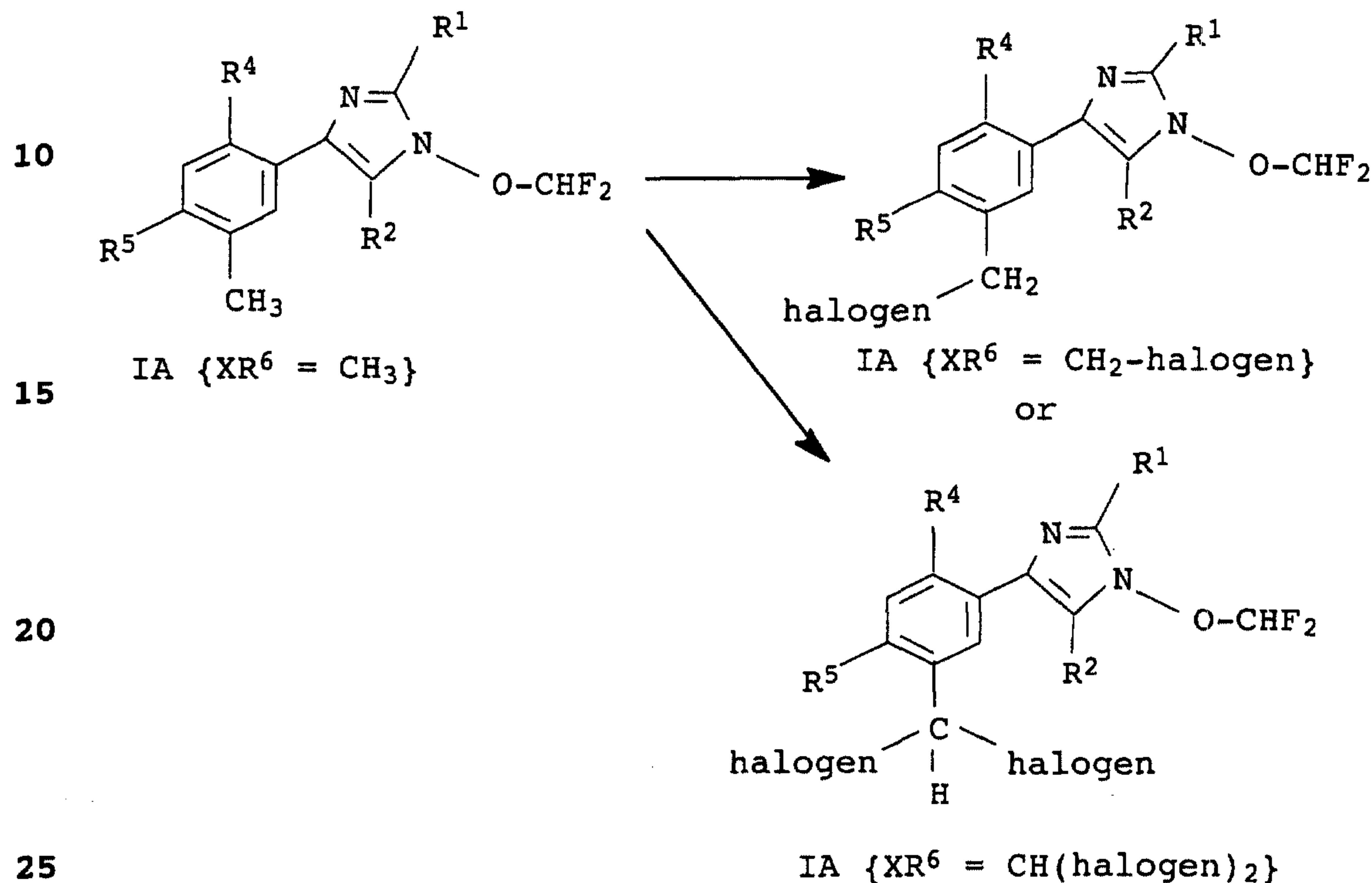
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For work-up, the reaction mixture is mixed, for example, with water, whereupon the product can be isolated as usual.

C.3 Side-chain halogenation of 4-aryl-1-difluoromethoxyimidazoles

5 IA in which X-R⁶ is methyl, and conversion of the products into further compounds of the formula IA:



Examples of suitable solvents include organic acids, inorganic acids, aliphatic or aromatic hydrocarbons, which may be halogenated, and also ethers, sulfides, sulfoxides and sulfones.

Suitable halogenating agents are, for example, chlorine, bromine, N-bromosuccinimide, N-chlorosuccinimide or sulfuryl chloride. Depending on the starting material and the halogenating agent used, the addition of a free-radical initiator, for example an organic peroxide, such as dibenzoyl peroxide, or an azo compound, such as azobisisobutyronitrile, or irradiation with light, may have an advantageous effect on the course of the reaction.

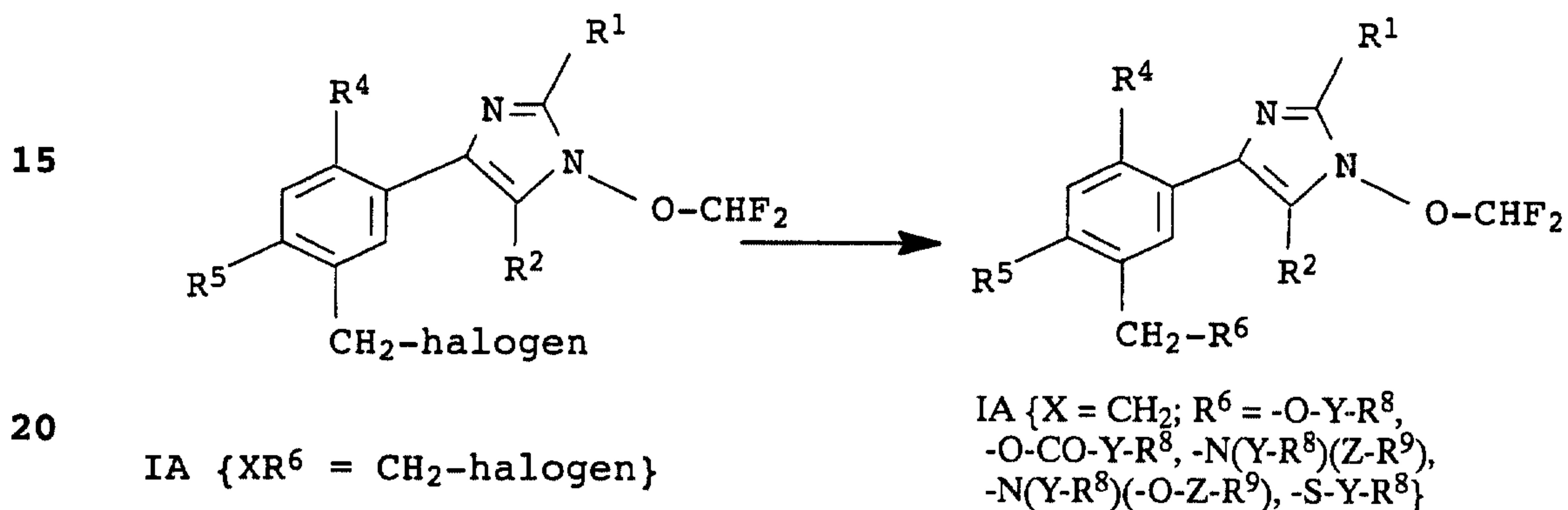
The amount of halogenating agent is not critical. Both substoichiometric amounts and large excesses of halogenating agent, based on the compound IA to be halogenated (where X-R⁶ = methyl), are possible.

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When using a free-radical initiator, a catalytic amount is usually sufficient.

5 The reaction temperature is usually from -100°C to 200°C , mainly from 10 to 100°C or the boiling point of the reaction mixture.

10 By nucleophilic substitution, those halogenated products IA where $\text{X-R}^6 = \text{CH}_2\text{-halogen}$ can be converted according to the scheme below into their corresponding ethers, thioethers, esters, amines or hydroxylamines:



25 The nucleophile used is either a suitable alcohol, thiol, carboxylic acid or amine, the reaction in this case being preferably carried out in the presence of a base (for example an alkali metal hydroxide or an alkaline earth metal hydroxide or an alkali metal carbonate or alkaline earth metal carbonate), or the alkali metal salts of these compounds obtained by reaction of the alcohol, thiol, 30 carboxylic acid or amine with a base (for example an alkali metal hydride).

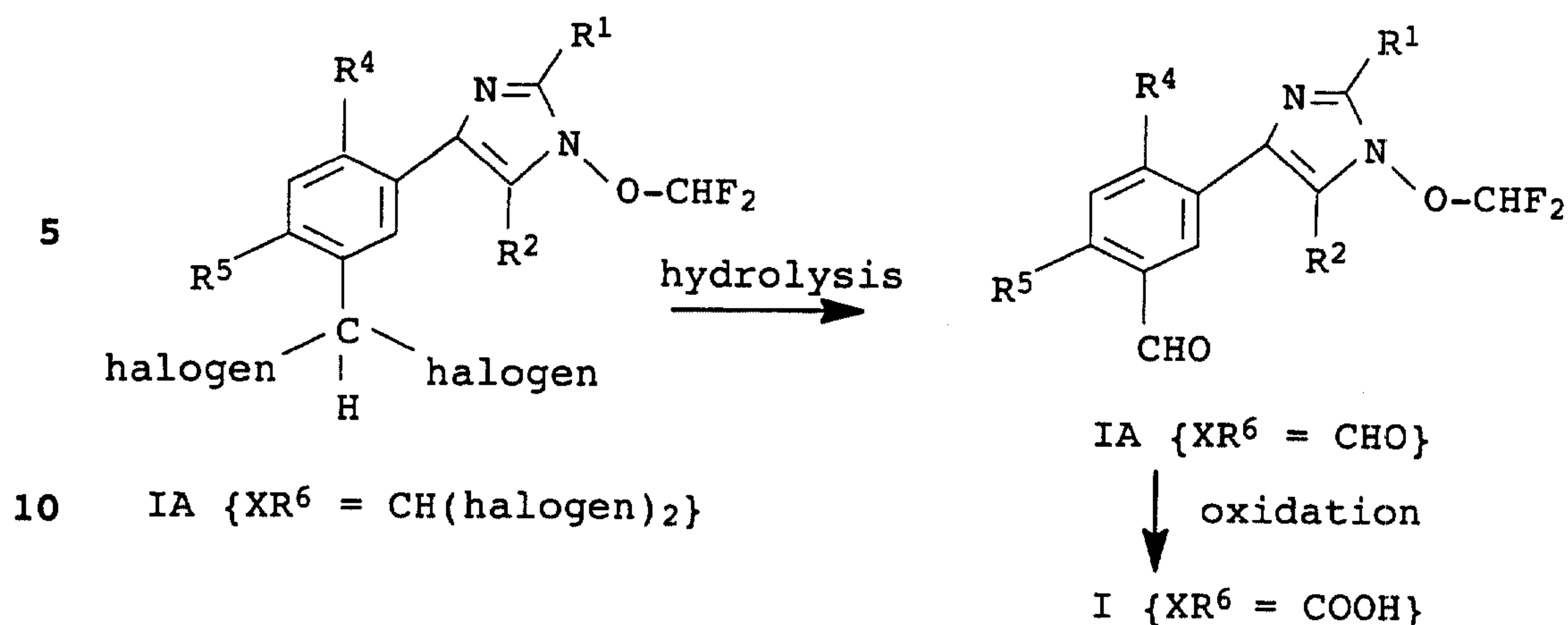
35 Particularly suitable solvents are aprotic organic solvents, for example tetrahydrofuran, dimethylformamide, dimethyl sulfoxide, or hydrocarbons, such as toluene and n-hexane.

The reaction is carried out at a temperature from the melting point to the boiling point of the reaction mixture, preferably at from 0 to 100°C .

40 Those halogenation products IA where $\text{X-R}^6 = \text{CH}(\text{halogen})_2$ can be hydrolyzed to the corresponding aldehydes (IA where $\text{X-R}^6 = \text{CHO}$). The latter can in turn be oxidized analogously to known processes to give the carboxylic acids IA {X-R⁶ = COOH}:

45

90



15 The hydrolysis of the compounds IA where X-R⁶ = dihalomethyl is preferably carried out under acidic conditions, in particular without a solvent in hydrochloric acid, acetic acid, formic acid or sulfuric acid, or in an aqueous solution of one of the acids mentioned, for example in a mixture of acetic acid and water (for example 3:1).

20 The reaction temperature is usually at from 0 to 120°C.

25 The oxidation of the hydrolysis products IA where XR⁶ = formyl to the corresponding carboxylic acids can be carried out in the manner known per se, for example according to Kornblum (cf. in particular pages 179 to 181 of the volume "Methods for the Oxidation of Organic Compounds" by A.H. Haines, Academic Press 1988, in the series "Best Synthetic Methods"). A suitable solvent is, for example, dimethyl sulfoxide.

30 The aldehydes IA {X-R⁶ = CHO} can also be converted in a manner known per se into olefinic compounds IA where X = unsubstituted or substituted ethene-1,2-diyl:



40 The olefination is preferably carried out by the method of Wittig or one of its modifications, suitable reaction partners being phosphorus ylides, phosphonium salts and phosphonates, or by aldol condensation.

45 If a phosphonium salt or a phosphonate is used, it is advantageous to carry out the reaction in the presence of a base, particularly suitable bases being alkali metal alkyls, such as n-butyllithium, alkali metal hydrides and alkoxides,

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such as sodium hydride, sodium ethoxide and potassium tert-butoxide, and alkali metal hydroxides and alkaline earth metal hydroxides, such as calcium hydroxide.

5 For a complete conversion, all reaction partners are employed in a ratio which is about stoichiometric; however, preference is given to using an excess of phosphorus compound and/or base of up to about 10 mol%, based on the starting material (IA where $X-R^6 = CHO$).

10

The reaction temperature is generally from -40 to 150°C .

15

The 4-aryl-1-difluoromethoxyimidazoles IA where $X-R^6 = \text{formyl}$ can be converted in a manner known per se into the compounds IA where $X-R^6 = -CO-Y-R^8$, for example by reaction with a suitable organometal compound $Me-Y-R^8$ - where Me is preferably lithium or magnesium - and subsequent oxidation of the alcohols obtained in this reaction (cf., for example, J. March, Advanced Organic Chemistry, 3rd Ed., John Wiley, New York 1985, p. 816 et seq. and 1057 et seq.).

20

25

The compounds IA where $X-R^6 = -CO-Y-R^8$ can in turn be reacted further in a Wittig reaction. The phosphonium salts, phosphonates or phosphorus ylides required as reaction partner which are not already known can be prepared in a manner known per se (cf., for example, Houben-Weyl, Methoden der Organischen Chemie, Vol. E1, p. 636 et seq. and Vol. E2, p. 345 et seq., Georg Thieme Verlag Stuttgart 1982; Chem. Ber. 95 (1962), 3993).

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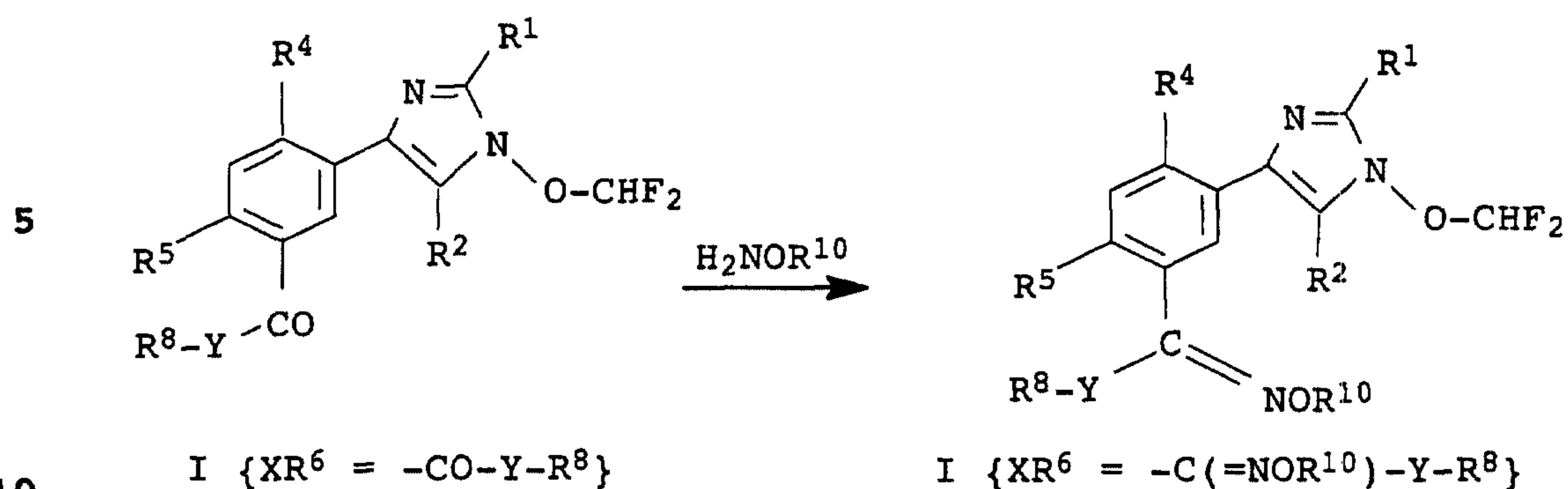
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Further possible ways of preparing other 4-aryl-1-difluoromethoxyimidazoles IA from compounds IA where $X-R^6 = \text{formyl}$ include the aldol condensation known per se, and condensation reactions according to Knoevenagel or Perkin. Suitable conditions for these processes are described, for example, in Nielson, Org. React. 16 (1968), 1 et seq. {aldol condensation}, Org. React. 15 (1967), 204 et seq. {Knoevenagel condensation} and Johnson, Org. React. 1 (1942), 210 et seq. {Perkin condensation}.

40

45

The compounds IA where $X-R^6 = -CO-Y-R^8$ can also be converted in a manner known per se into their corresponding oximes {cf., for example, Houben-Weyl, Methoden der Organischen Chemie, Georg Thieme Verlag Stuttgart, Vol. 10/4, 4th Edition 1968, p. 55 et seq. and p. 73 et seq.}:



C.4 Synthesis of ethers, thioethers, amines, esters, amides, sulfonamides, thioesters, hydroxamic esters, hydroxylamines, sulfonic acid derivatives, oximes or carboxylic acid derivatives:

4-Aryl-1-difluoromethoxyimidazoles IA where R⁶ is hydroxyl, amino, -NH-Y-R⁸, hydroxylamino, -N(Y-R⁸)-OH, -NH-O-Y-R⁸, mercapto, halosulfonyl, -C(=NOH)-Y-R⁸, carboxyl or -CO-NH-O-Z-R⁹ can be converted in a manner known per se by alkylation, acylation, sulfonylation, esterification or amidation into the corresponding ethers {IA where R⁶ = -O-Y-R⁸}, esters {IA where R⁶ = -O-CO-Y-R⁸}, amines {IA where R⁶ = -N(Y-R⁸)(Z-R⁹)}, amides {IA where R⁶ = -N(Y-R⁸)-CO-Z-R⁹}, sulfonamides {IA where R⁶ = -N(Y-R⁸)-SO₂-Z-R⁹ or -N(SO₂-Y-R⁸)(SO₂-Z-R⁹)}, hydroxylamines {IA where R⁶ = -N(Y-R⁸)(O-Z-R⁹)}, thioethers {IA where R⁶ = -S-Y-R⁸}, sulfonic acid derivatives {IA where R⁶ = -SO₂-Y-R⁸, -SO₂-O-Y-R⁸ or -SO₂-N(Y-R⁸)(Z-R⁹)}, oximes {IA where R⁶ = -C(=NOR¹⁰)-Y-R⁸}, carboxylic acid derivatives {IA where R⁶ = -CO-O-Y-R⁸, -CO-S-Y-R⁸, -CO-N(Y-R⁸)(Z-R⁹), -CO-N(Y-R⁸)(O-Z-R⁹)} or hydroxamic esters {IA where R⁶ = -C(=NOR¹⁰)-O-Y-R⁸}.

Such conversions are described, for example, in Houben-Weyl, Methoden der Organischen Chemie, Georg Thieme Verlag Stuttgart (Vol. E16d, p. 1241 et seq.; Vol. 6/1a, 4th Edition 1980, p. 262 et seq.; Vol. 8, 4th Edition 1952, p. 471 et seq., 516 et seq., 655 et seq. and p. 686 et seq.; Vol. 6/3, 4th Edition 1965, p. 10 et seq.; Vol. 9, 4th Edition 1955, p. 103 et seq., 227 et seq., 343 et seq., 530 et seq., 659 et seq., 745 et seq. and p. 753 et seq.; Vol. E5, p. 934 et seq., 941 et seq. and p. 1148 et seq.).

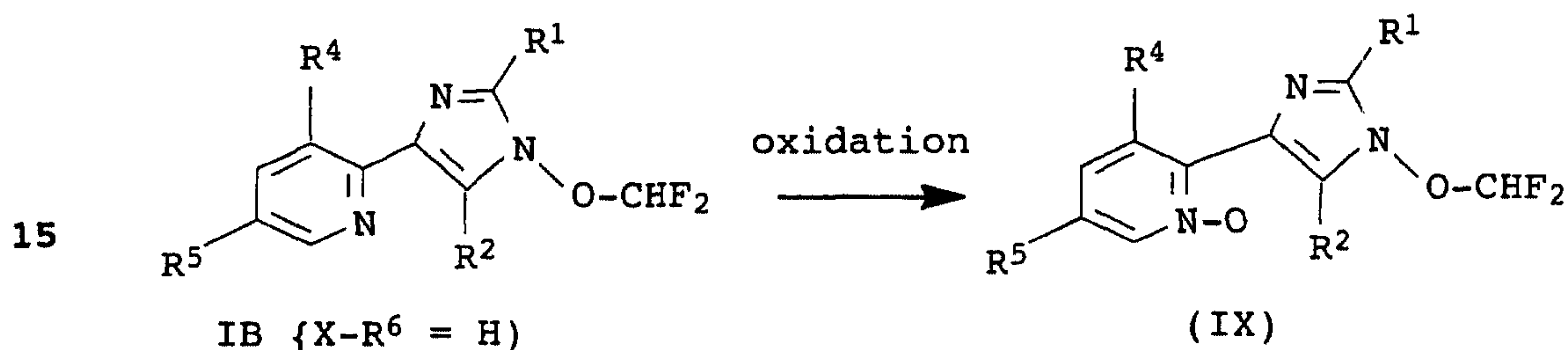
D) Preparation of compounds of the formula I in which R³ is a radical of the formula II where Q is nitrogen (compounds IB).

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In addition to the processes already mentioned in sections A, B and C above, the processes D.1 and D.2 below are particularly suitable:

- 5 D.1 Halogenation of the pyridine ring of compounds IB where $X-R^6 = H$: to this end, a pyridyl imidazole of the formula IB ($X-R^6 = H$) is preferably initially converted into the corresponding pyridine N-oxide of the formula IX. In the formula IX, R^1 , R^2 , R^4 and R^5 are as defined above.

10



- 20 Suitable oxidizing agents for this reaction are, for example, hydrogen peroxide or organic peracids, for example performic acid, peracetic acid, trifluoroperacetic acid or m-chloroperbenzoic acid.

- 25 Suitable solvents are organic solvents which are inert to oxidation, such as, for example, hydrocarbons, such as toluene or hexane, ethers, such as diethyl ether, dimethoxyethane, methyl t-butyl ether, dioxane or THF, alcohols, such as methanol or ethanol, or else mixtures of such solvents with one another or with water. If the
- 30 oxidation is carried out using an organic peracid, the preferred solvent is the parent organic acid, i.e., for example, formic, acetic or trifluoroacetic acid, if appropriate in a mixture with one or more of the abovementioned solvents.

35

The reaction temperature is usually from the melting point to the boiling point of the reaction mixture, preferably 0-150°C.

40

To obtain a high yield, it is frequently advantageous to employ the oxidizing agent in a molar excess of up to about 5 times, based on the IB (where $X-R^6 = H$) used.

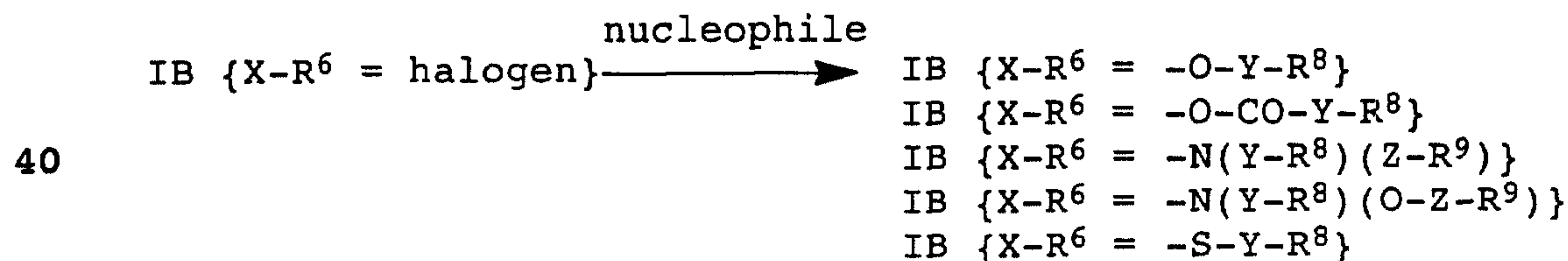
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The pyridine N-oxide IX is then converted into IB ($X-R^6 =$ halogen) by reaction with a halogenating agent.



- 5 Suitable halogenating agents are phosphoryl halides, such as POCl_3 or POBr_3 , phosphorus halides, such as PCl_5 , PBr_5 , PCl_3 or PBr_3 , phosgene or organic or inorganic acid halides, such as, for example, trifluoromethanesulfonyl chloride, acetyl chloride, bromoacetyl bromide, acetyl bromide, benzoyl chloride, benzoyl bromide, phthaloyl dichloride,
- 10 toluenesulfonyl chloride, thionyl chloride or sulfonyl chloride. If appropriate, it may be advantageous to carry out the reaction in the presence of a base, such as, for example, trimethylamine or triethylamine or hexamethyldisilazane.
- 15 Suitable solvents are inert organic solvents, such as, for example, hydrocarbons, such as toluene or hexane, ethers, such as diethyl ether, dimethoxyethane, methyl t-butyl ether, dioxane or THF, amides, such as DMF, DMA or NMP, or mixtures thereof. If the reaction is carried out using a liquid
- 20 halogenating agent, this can preferably also be used as solvent, if appropriate in a mixture with one of the abovementioned solvents.
- 25 The reaction temperature is usually from the melting point to the boiling point of the reaction mixture, preferably at 50-150°C.
- 30 To obtain a high yield, it may be advantageous to employ an excess of halogenating agent or base of up to about five times, based on the IX used.

- D.2 Nucleophilic substitution on halopyridines of the formula IB ($X-R^6 = \text{halogen}$). In the scheme below, examples of the
- 35 classes of compounds obtainable by this route are shown.



- 45 Suitable nucleophiles are alcohols, thiols, amines, carboxylic acids or CH-acidic compounds, for example nitroalkanes, such as nitromethane, malonic acid derivatives,

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such as diethyl malonate, or cyanoacetic acid derivatives, such as methyl cyanoacetate. To carry out the reaction, what has been said under C.3 applies.

- 5 E) Preparation of compounds of the formula I in which R^3 is a radical of the formula II, where R^5 together with $X-R^6$ or R^7 together with $X-R^6$ is one of the chains $N=C(R^{19})-S-$ (compounds IC-1 or compounds ID-1) or $N=C(R^{19})-O-$ (compounds IC-2 and compounds ID-2).

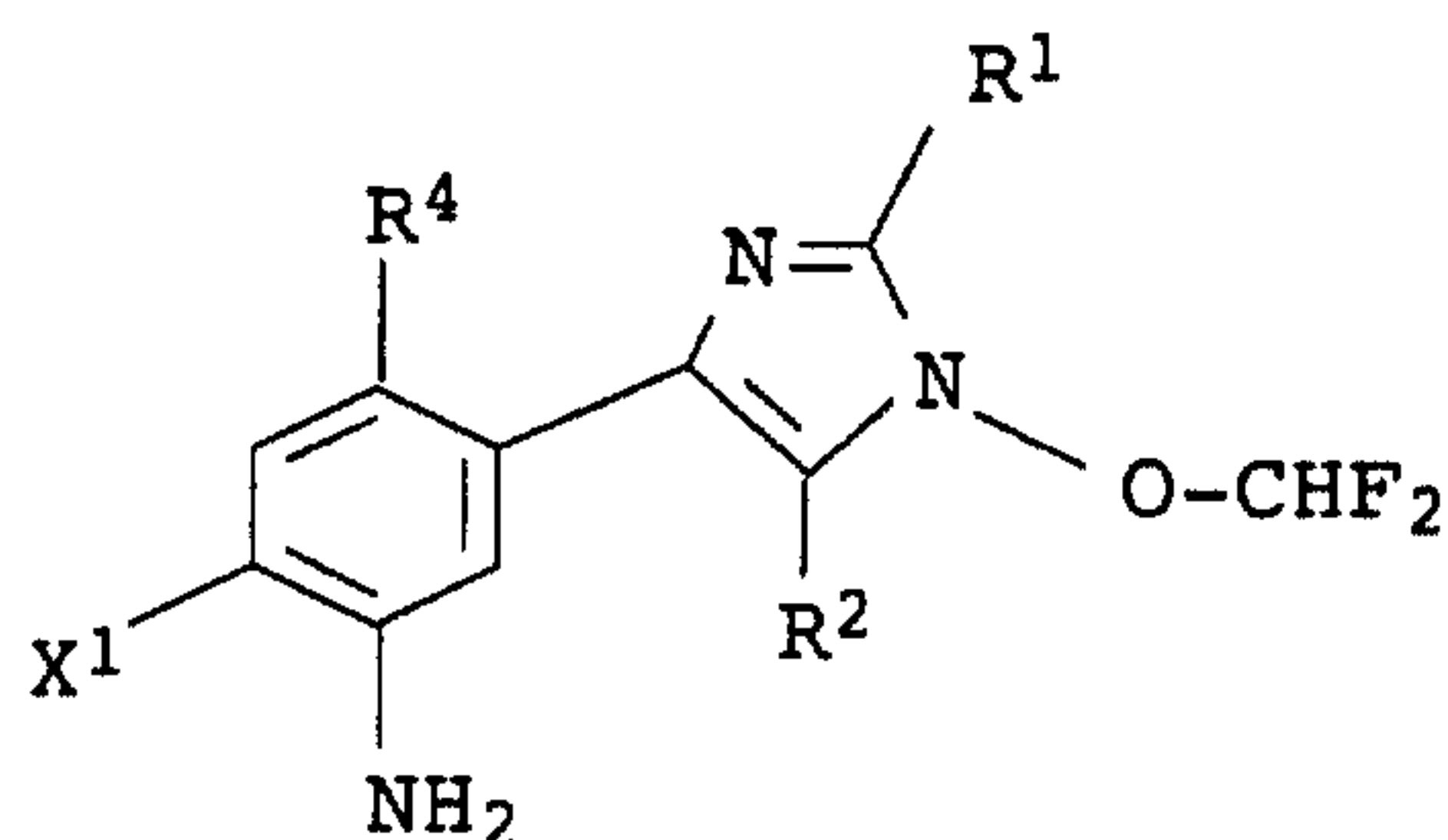
10

For the preparation of the compounds IC and ID, it is likewise possible to use the processes mentioned in sections A and B, or to use these processes for preparing suitable starting materials.

15

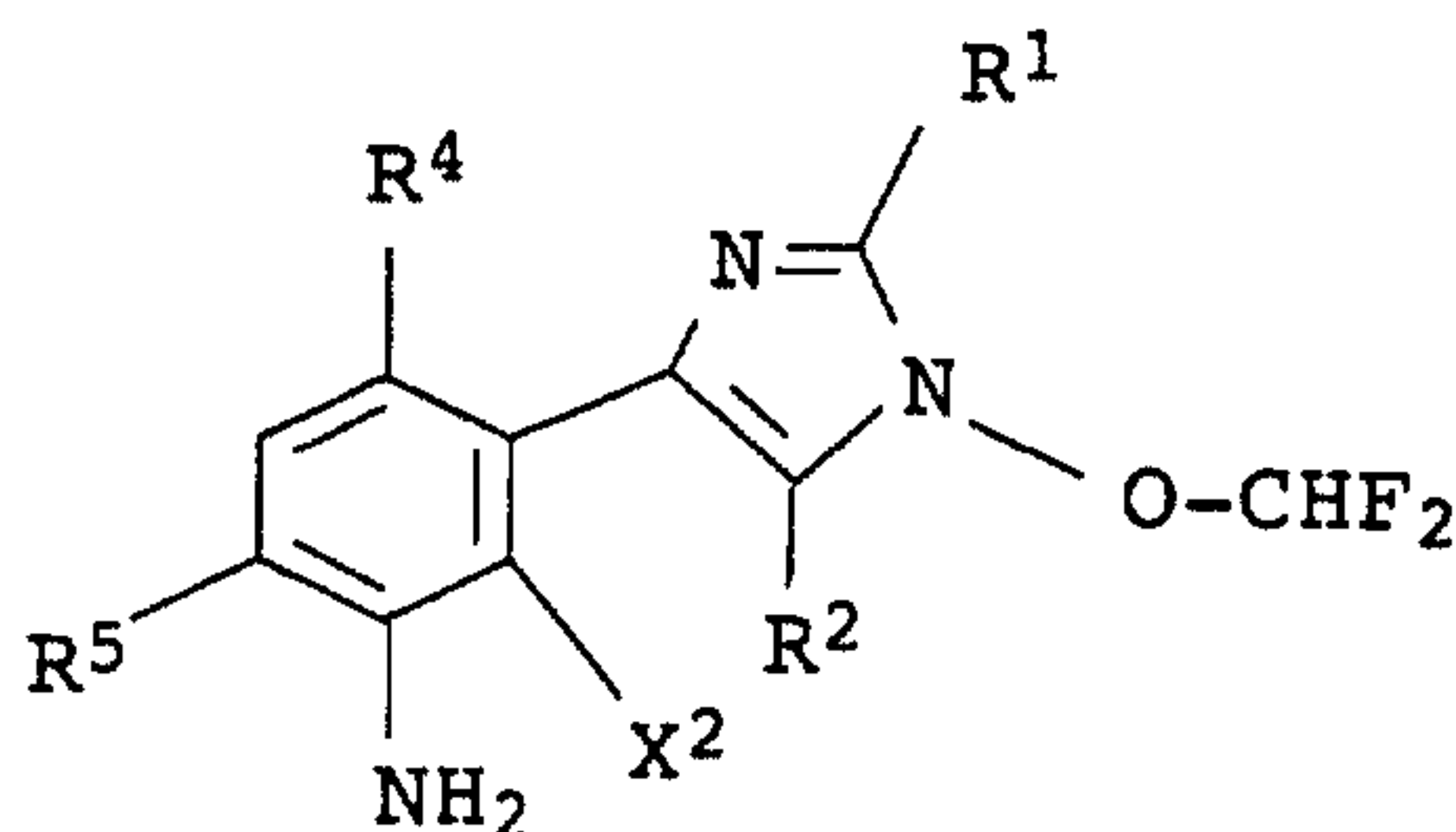
Furthermore, the compounds IC-1, IC-2, ID-1 and ID-2 can be synthesized analogously to known processes by ring closure reactions from the corresponding ortho-aminophenols or ortho-mercaptoanilines of the formulae IA-1, IA-2, IA-3 or IA-4; numerous methods for this purpose are known from the literature (see, for example, Houben-Weyl, Methoden der Organischen Chemie, Vol. E8a, p. 1028 et seq., Georg-Thieme-Verlag, Stuttgart 1993 and Vol. E8b, p. 881 et seq., Georg-Thieme-Verlag, Stuttgart 1994). In the formulae IA-1 to IA-4, the variables R^1 , R^2 , R^4 and R^5 are as defined above. The variables X^1 , X^2 , X^3 and X^4 are, independently of one another, OH or SH.

30



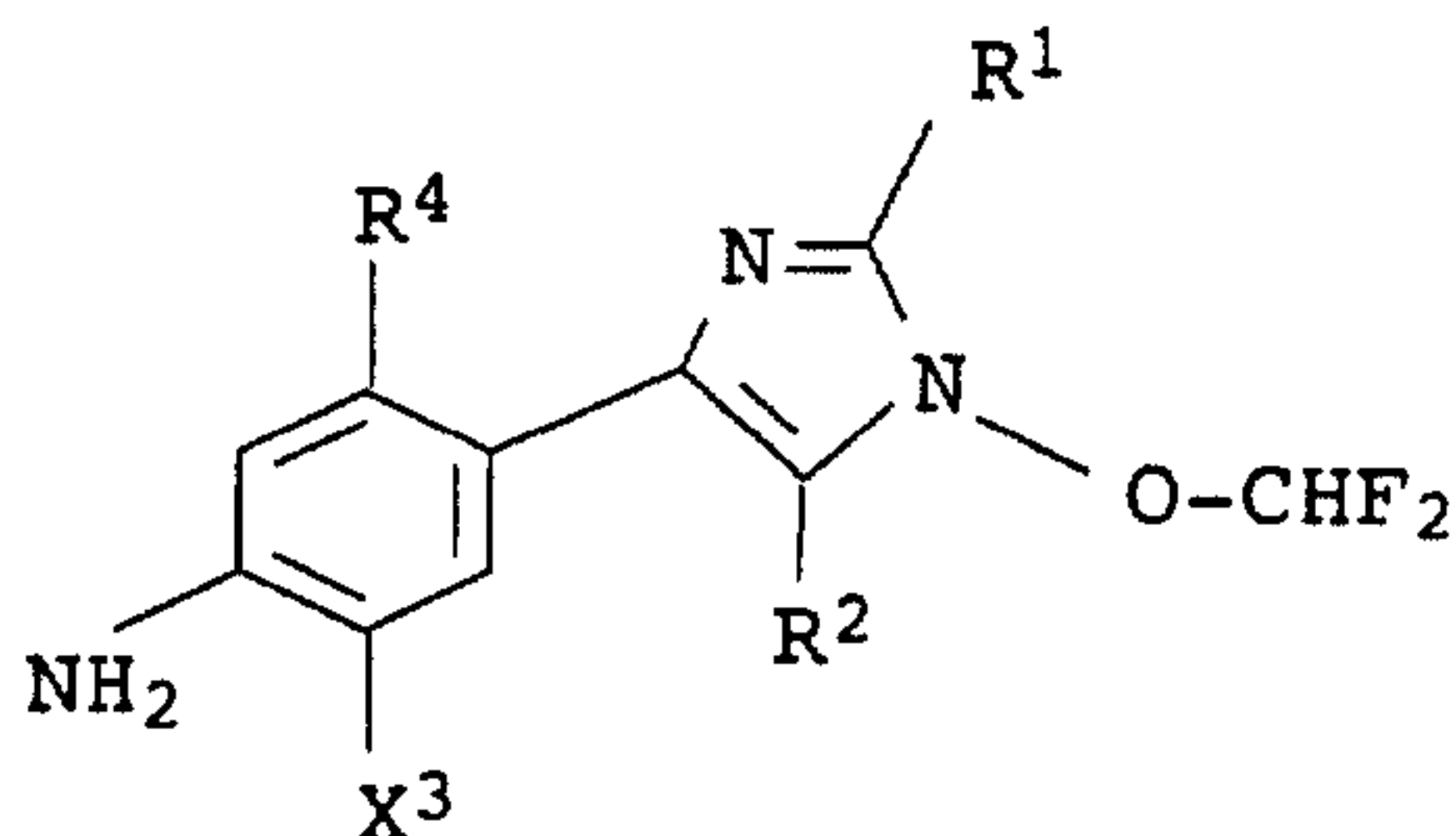
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(IA-1)



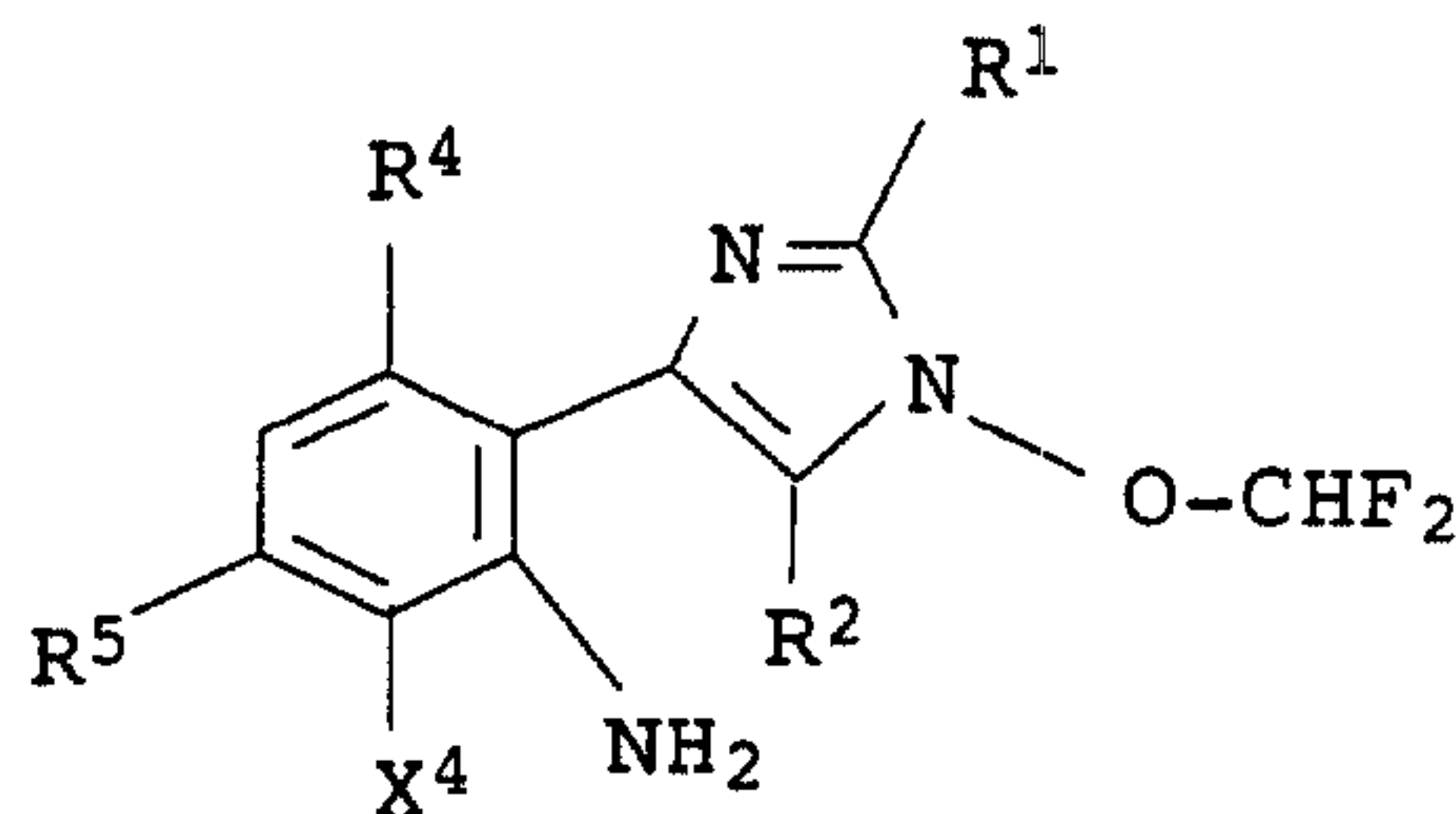
(IA-2)

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(IA-3)



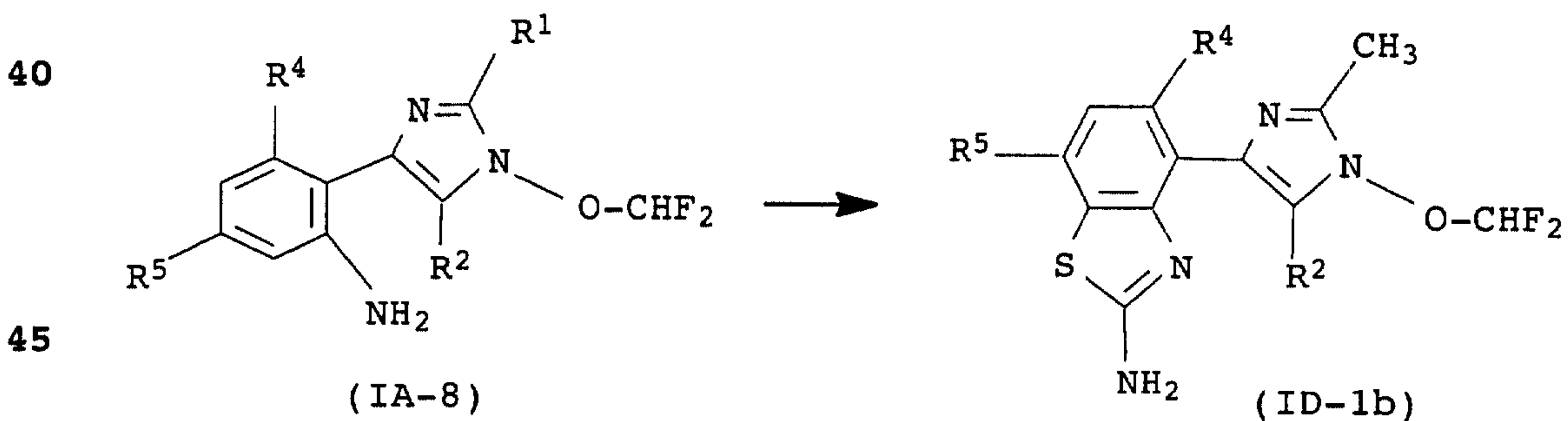
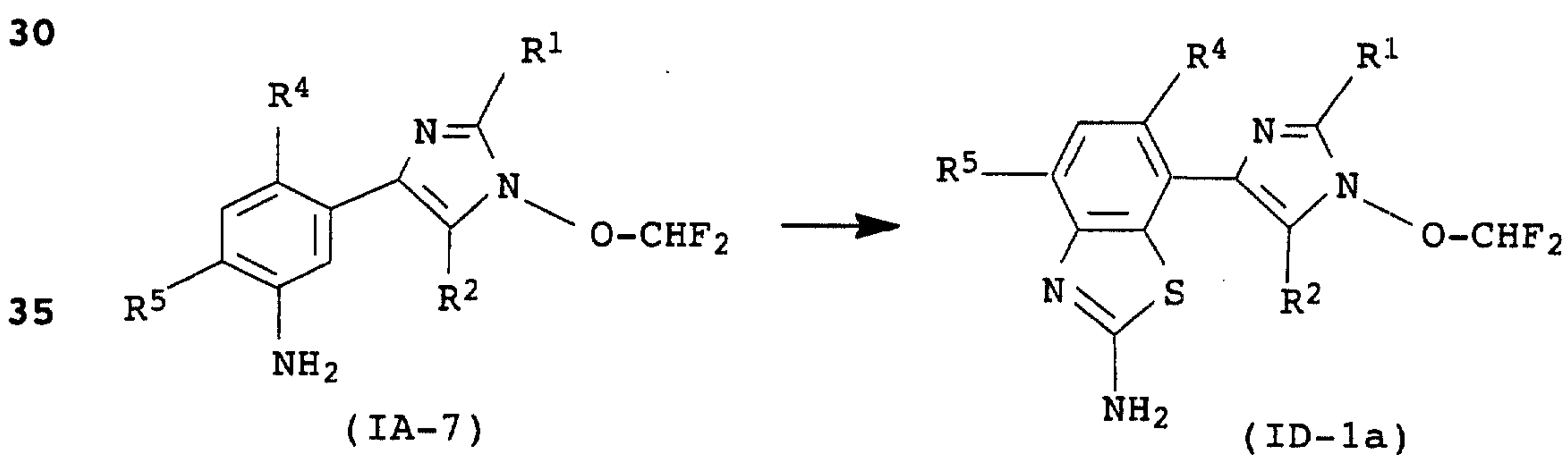
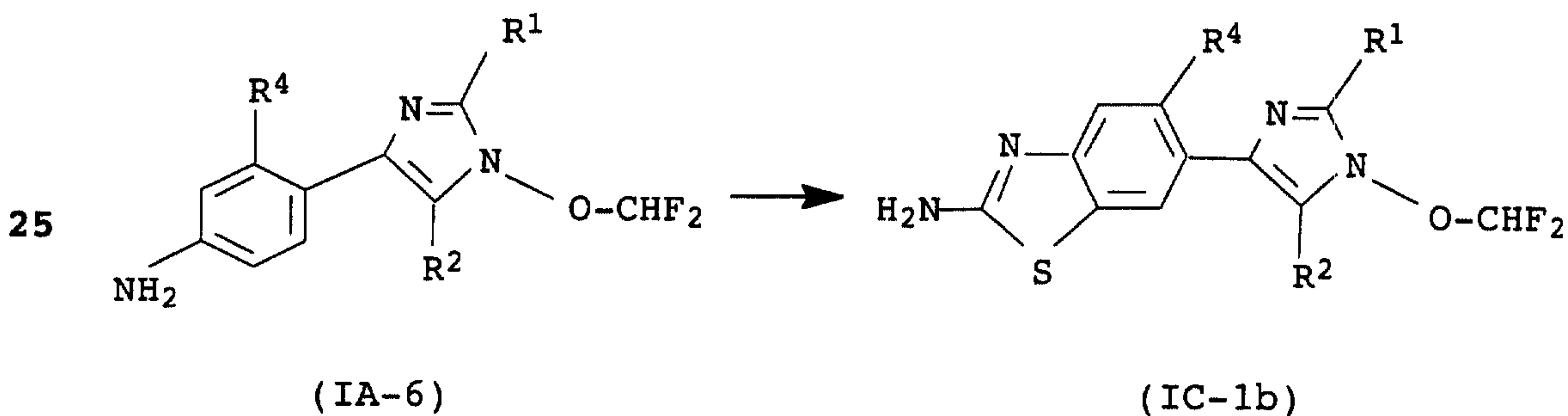
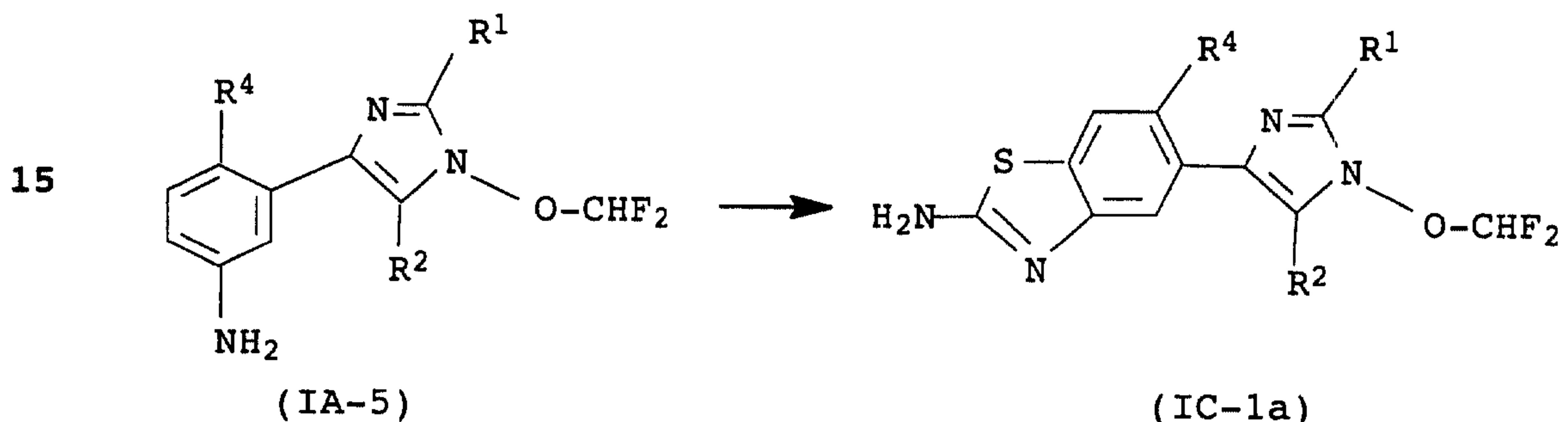
(IA-4)

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E.1 Compounds IC-1 or ID-1 in which R^5 together with X- R^6 or R^7 together with X- R^6 form one of the chains $-N=C(R^{19})-S-$ can also be prepared, in particular, by the process shown below:

5 This process entails the reaction of an aminophenylimidazole of the formula IA-5, IA-6, IA-7 or IA-8 with halogen and ammonium thiocyanate or with an alkali metal or alkaline earth metal thiocyanate. This gives compounds of the formulae IC-1a, IC-1b or ID-1a or ID-1b (compounds IC-1 or ID-1 in which R^{19} is NH_2).



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By subsequent reactions at the amino group, these compounds can be converted into other compounds IC-1 or ID-1.

5 Preferred halogen is chlorine or bromine; among the alkali metal/alkaline earth metal thiocyanates, preference is given to sodium thiocyanate.

10 In general, the reaction is carried out in an inert solvent/diluent, for example in a hydrocarbon, such as toluene and hexane, in a halogenated hydrocarbon, such as dichloromethane, in an ether, such as tetrahydrofuran, in an alcohol, such as ethanol, in a carboxylic acid, such as acetic acid, or in a polar aprotic solvent/diluent, such as dimethylformamide, acetonitrile and dimethyl sulfoxide.

15 The reaction temperature is usually from the melting point to the boiling point of the reaction mixture, preferably at from 0 to 150°C.

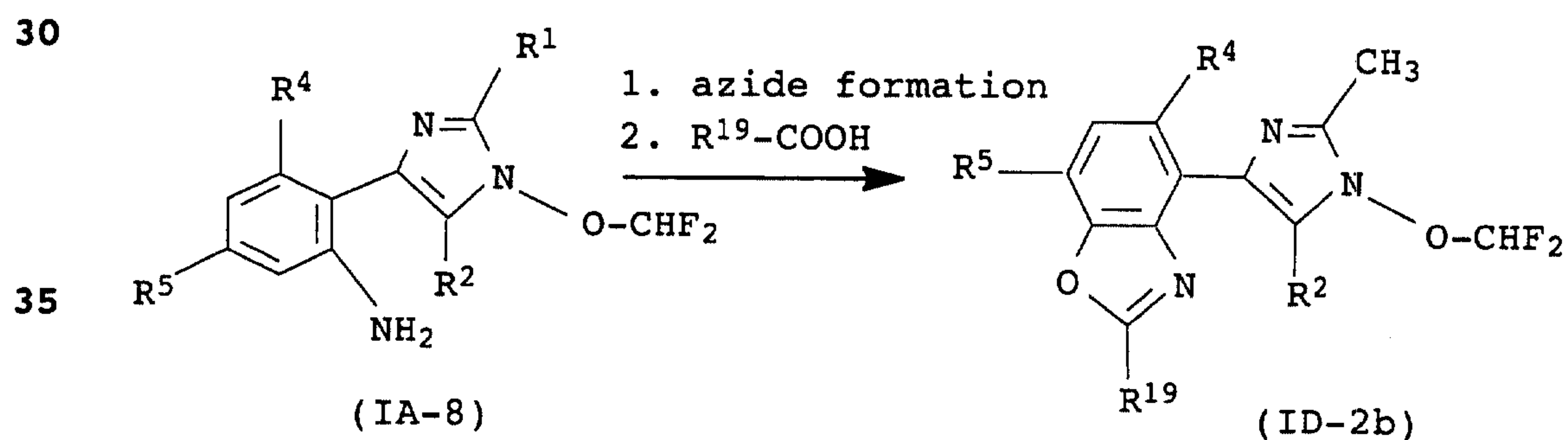
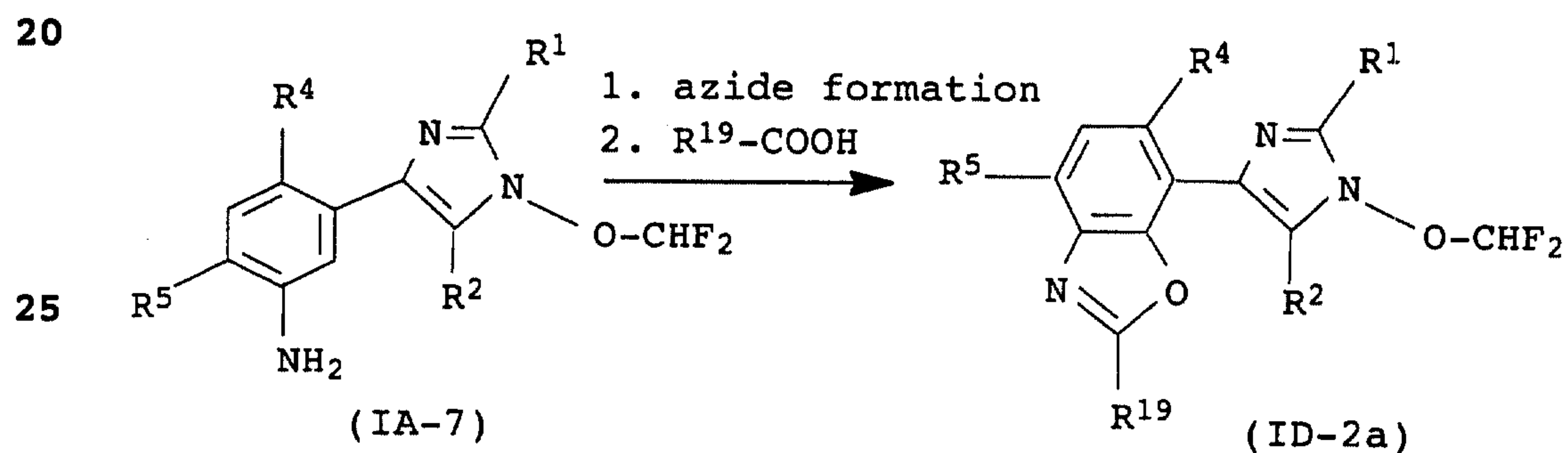
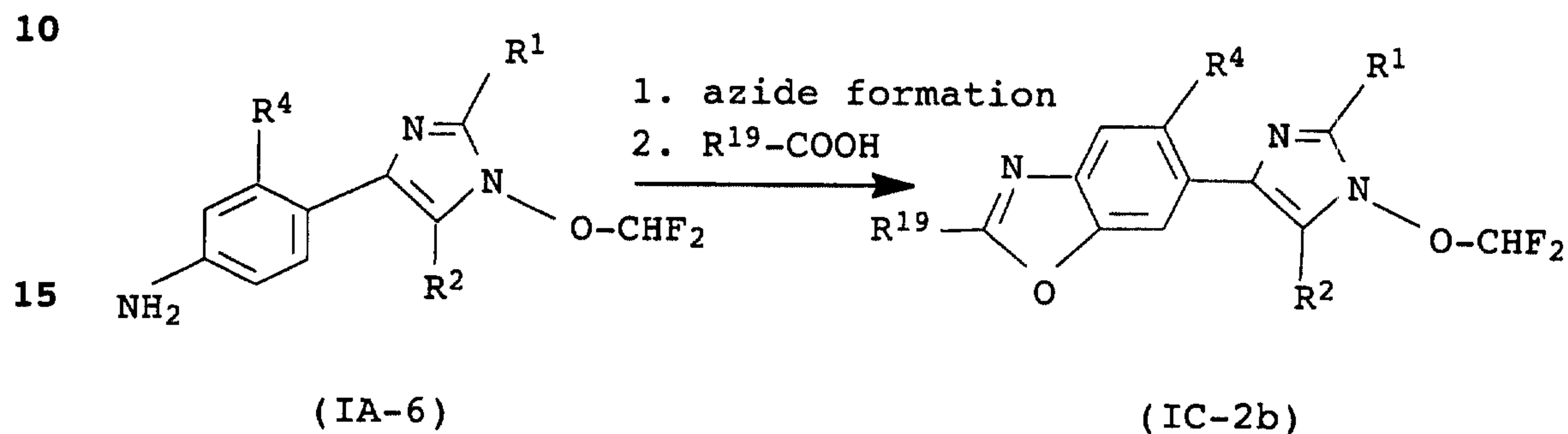
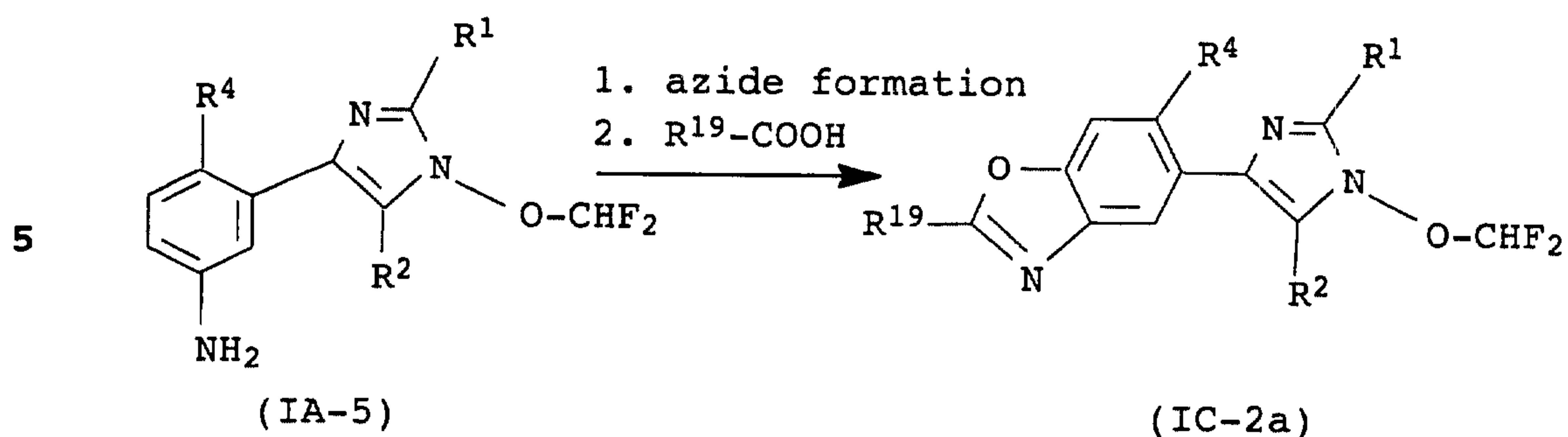
20 To obtain a high yield of the product of value, the halogen and ammonium thiocyanate or alkali metal/alkaline earth metal thiocyanate are preferably employed in an about equimolar amount or in an excess of up to about 5 times the molar amount, based on the amount of IA-5, IA-6, IA-7 or IA-8.

25 A variant of the process comprises converting the NH₂ group of the aminophenylimidazoles IA-5, IA-6, IA-7 or IA-8 initially with ammonium thiocyanate or an alkali metal or alkaline earth metal thiocyanate into a thiourea group
30 (NH-C(S)-NH₂ group), which is then converted by treatment with a halogen into the benzothiazoles (compounds IC-1 or ID-1 where R¹⁹ = NH₂).

35 Finally, it is possible to carry out reactions analogous to those which have already been described in section C.1) at the amino group of the chain -N=C(NH₂)-S-.

E.2 Compounds of the formulae IC and ID in which R⁵ together with X-R⁶ or R⁷ together with X-R⁶ form one of the chains
40 -N=C(R¹⁹)-O- can be prepared by conversion of the NH₂ group into the aminophenylimidazoles of the formula IA-5, IA-6, IA-7 or IA-8 into an azide group (N₃ group) and subsequent cyclization of the resulting azidophenylimidazoles with a carboxylic acid to give compounds of the formula IC-2a,
45 IC-2b, ID-2a or ID-2b.

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40 The conversion of the amino group in the
aminophenylimidazoles of the formula IA-5, IA-6, IA-7 or IA-8
into an azide group is generally carried out in two steps,
i.e. by diazotization of the amino group and subsequent
treatment of the resulting diazonium salt with an azide. To
45 carry out the diazotization, what has been stated in process
C.1) applies. The conversion into the aryl azides is
preferably carried out by reacting diazonium salts with an

99

alkali metal or alkaline earth metal azide, such as sodium azide, or by reaction with trimethylsilyl azide.

5 The reaction of the azide compounds IA ($X-R^6 = N_3$) with the carboxylic acid $R^{19}-COOH$ is carried out either in an inert organic solvent, for example in hydrocarbons, such as toluene or hexane, in halogenated hydrocarbons, such as dichloromethane or chloroform, in ethers, such as diethyl ether, dimethoxy ethane, methyl t-butyl ether, dioxane or
10 THF, in amides, such as DMF, DMA or NMP, in acetonitrile or, preferably, in the absence of solvent in an excess of carboxylic acid $R^{19}COOH$. In the latter case, it may be helpful to add a mineral acid, such as phosphoric acid, or a silylating agent, such as a mixture of phosphorus pentoxide
15 and hexamethyldisiloxane.

The reaction is preferably carried out at elevated temperature, for example at the boiling point of the mixture.

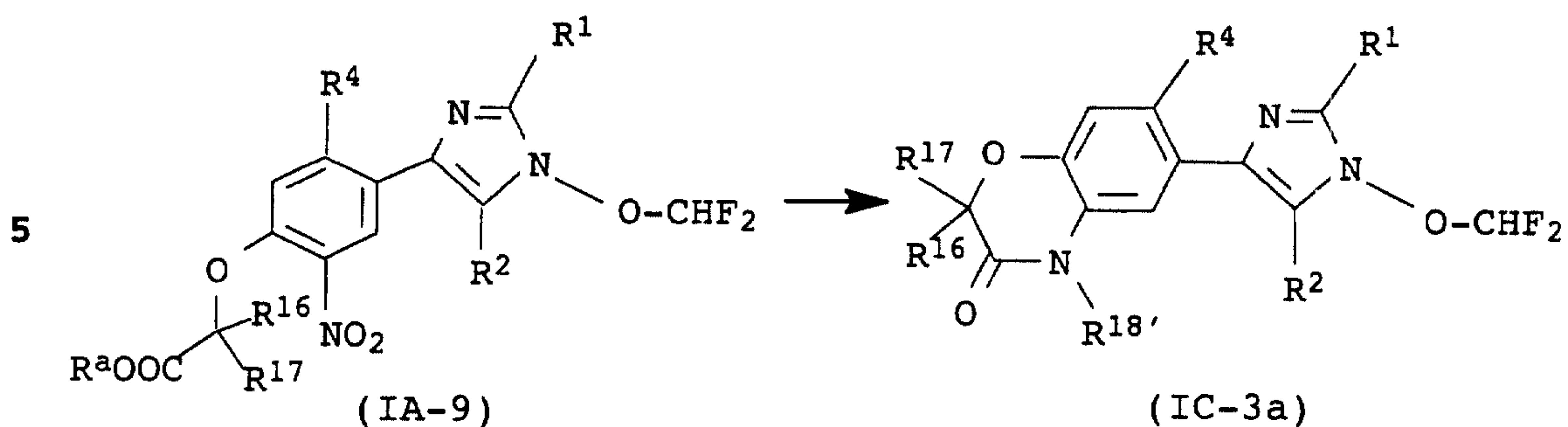
20 F) Compounds of the formula I in which R^3 is a radical of the formula II where $X-R^6$ together with R^5 or R^7 forms one of the chains $-O-C(R^{16}, R^{17})-CO-N(R^{18})-$ or $-S-C(R^{16}, R^{17})-CO-N(R^{18})-$ can be prepared by the processes mentioned in sections A and B. Moreover, they can be prepared in principle from the
25 corresponding aminophenols or mercaptoanilines IA-1, IA-2, IA-3 or IA-4 by known processes, for example by the process described in US 4,798,620. With a view to this reaction, the disclosure of this publication is expressly incorporated herein by way of reference.

30 In particular, those compounds of the formula I in which $X-R^6$ together with R^5 or together with R^7 in the formula II form a chain $-O-C(R^{16}, R^{17})-CO-N(R^{18})-$ can also be prepared from the nitrophenoxyacetic acid derivatives of the formulae IA-9, IA-10, IA-11 and IA-12. The conversion is carried out by
35 reducing the nitro groups in IA-9, IA-10, IA-11 or IA-12, where generally simultaneously with the reduction ring closure takes place, to give the compounds of the formula IC-3a, IC-3b, ID-3a or ID-3b.

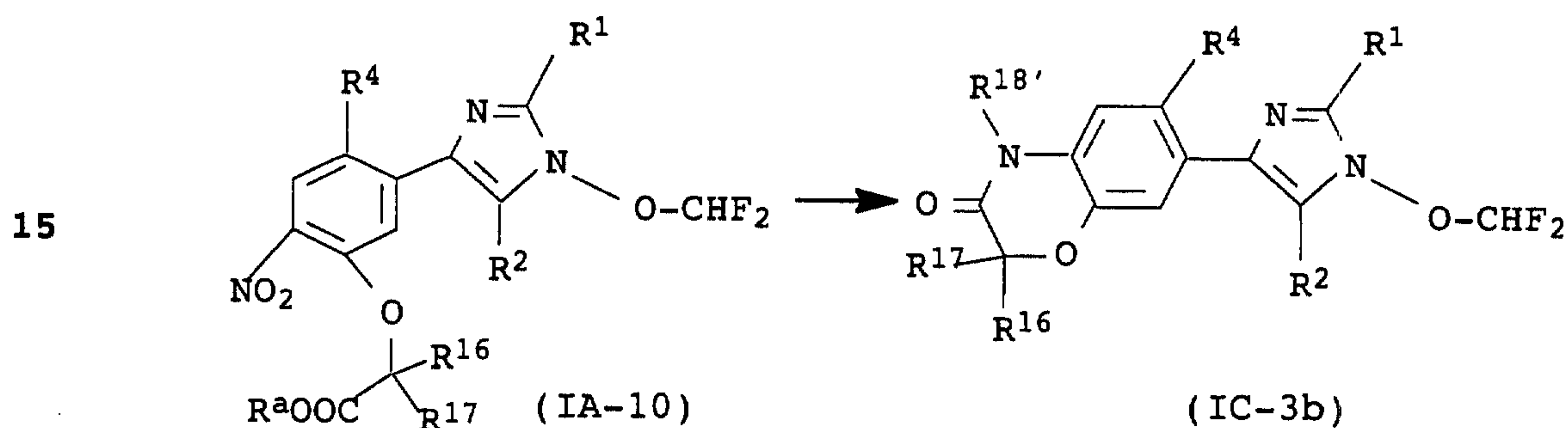
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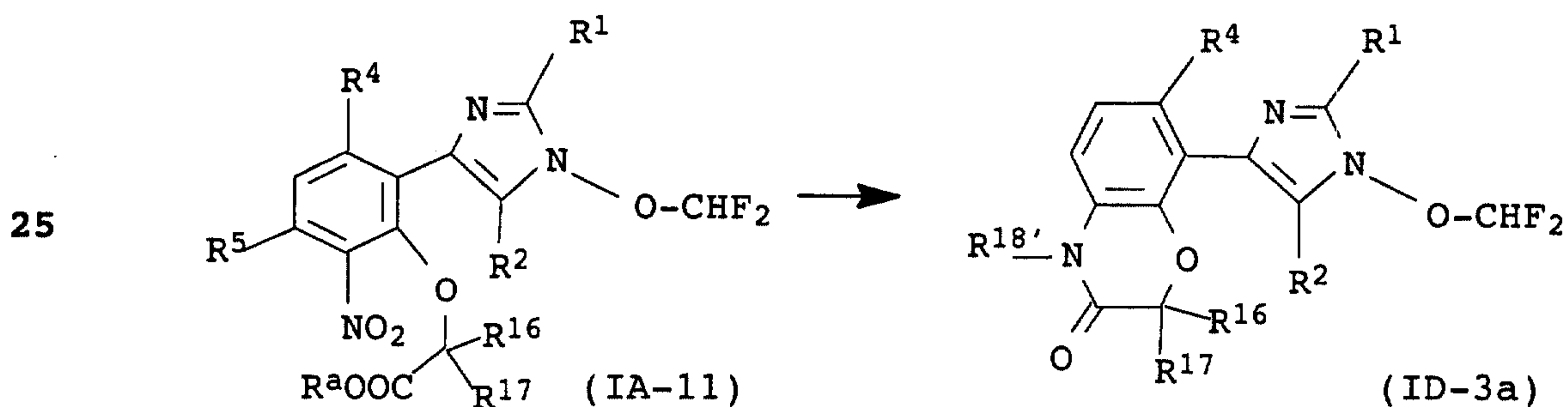
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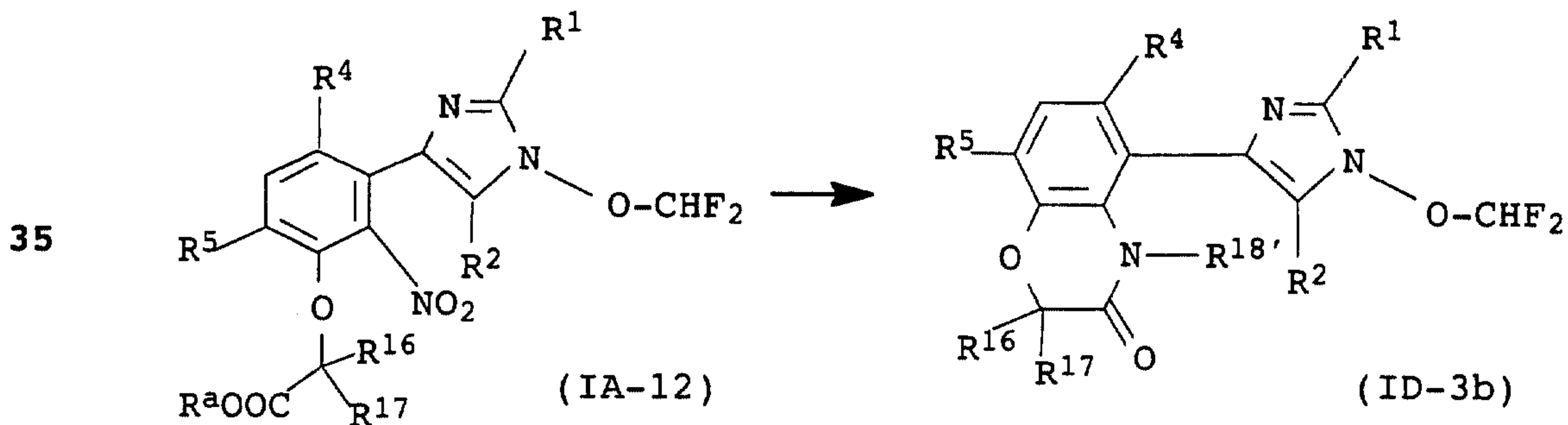
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In the formulae IA-9, IA-10, IA-11, IA-12, IC-3a, IC-3b, ID-3a or ID-3b, R¹, R², R⁴, R⁵, R¹⁶ and R¹⁷ are as defined above. R^{18'} is H or OH. R^a is a nucleophilically displaceable leaving group, for example a C₁-C₄-alkyl radical, such as methyl or ethyl.

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These reductions can be carried out under the conditions mentioned in section C.1) for the reduction of aromatic nitro groups.

- 5 If desired, the reaction products can be converted by alkylation into further compounds of the formula IC-3 or ID-3. For carrying out these reactions, what has been said in section C.4 applies correspondingly.
- 10 If not stated otherwise, all the processes described above are advantageously carried out under atmospheric pressure or under the autogenous vapor pressure of the reaction mixture in question.
- 15 The work-up of the reaction mixtures is usually carried out in a manner known per se. If not stated otherwise in the processes described above, the products of value are obtained, for example, after the dilution of the reaction solution with water by filtration, crystallization or solvent extraction, or by removing
- 20 the solvent, partitioning the residue in a mixture of water and a suitable organic solvent and work-up of the organic phase to afford the product.

The 4-aryl-1-difluoromethoxyimidazoles of the formula I can be

25 obtained as isomer mixtures in the preparation; however, if desired, these can be separated into largely pure isomers using customary methods such as crystallization or chromatography, including chromatography over an optically active adsorbate. Pure optically active isomers can be prepared advantageously from

30 suitable optically active starting materials.

Agriculturally useful salts of the compounds I can be formed by reaction with a base of the corresponding cation, preferably an alkali metal hydroxide or hydride, or by reaction with an acid of

35 the corresponding anion, preferably of hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid or nitric acid.

Salts of I where the metal ion is not an alkali metal ion can be prepared by cation exchange of the corresponding alkali metal

40 salt in a conventional manner, similarly ammonium, phosphonium, sulfonium and sulfoxonium salts by means of ammonia, phosphonium, sulfonium or sulfoxonium hydroxides.

The compounds I and their agriculturally useful salts are

45 suitable, both in the form of isomer mixtures and in the form of the pure isomers, as herbicides. The herbicidal compositions comprising I control vegetation on non-crop areas very

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efficiently, especially at high rates of application. They act against broad-leaved weeds and grass weeds in crops such as wheat, rice, maize, soya and cotton without causing any significant damage to the crop plants. This effect is mainly
5 observed at low rates of application.

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Depending on the application method in question, the compounds I, or herbicidal compositions comprising them, can additionally be employed in a further number of crop plants for eliminating
5 undesirable plants. Examples of suitable crops are the following:

- Allium cepa, Ananas comosus, Arachis hypogaea, Asparagus officinalis, Beta vulgaris spec. altissima, Beta vulgaris spec. rapa, Brassica napus var. napus, Brassica napus var.
10 napobrassica, Brassica rapa var. silvestris, Camellia sinensis, Carthamus tinctorius, Carya illinoensis, Citrus limon, Citrus sinensis, Coffea arabica (Coffea canephora, Coffea liberica), Cucumis sativus, Cynodon dactylon, Daucus carota, Elaeis guineensis, Fragaria vesca, Glycine max, Gossypium hirsutum,
15 (Gossypium arboreum, Gossypium herbaceum, Gossypium vitifolium), Helianthus annuus, Hevea brasiliensis, Hordeum vulgare, Humulus lupulus, Ipomoea batatas, Juglans regia, Lens culinaris, Linum usitatissimum, Lycopersicon lycopersicum, Malus spec., Manihot esculenta, Medicago sativa, Musa spec., Nicotiana tabacum
20 (N.rustica), Olea europaea, Oryza sativa, Phaseolus lunatus, Phaseolus vulgaris, Picea abies, Pinus spec., Pisum sativum, Prunus avium, Prunus persica, Pyrus communis, Ribes sylvestre, Ricinus communis, Saccharum officinarum, Secale cereale, Solanum tuberosum, Sorghum bicolor (s. vulgare), Theobroma cacao,
25 Trifolium pratense, Triticum aestivum, Triticum durum, Vicia faba, Vitis vinifera and Zea mays.

In addition, the compounds I may also be used in crops which tolerate the action of herbicides owing to breeding, including
30 genetic engineering methods.

In addition, the 4-aryl-1-difluormethoxyimidazoles and their agriculturally utilizable salts are also suitable for the desiccation and/or defoliation of plants.

35

As desiccants, they are suitable, in particular, for drying out the above-ground parts of crop plants such as potatoes, rapeseed, sunflower and soybeans. Completely mechanical harvesting of these important crop plants is made possible in this way.

40

Also of economic interest is

- the time-controlled fall of fruit or the reduction in their firmness of attachment to the plant, for example in the case
45 of citrus fruits, olives and other types of pomes, drupes and

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indehiscent fruit, since by this means the harvesting of this fruit is facilitated.

- Controlled defoliation in the case of useful plants,
5 especially cotton (defoliation).

The fall is based on the formation of abscission tissue between the fruit or leaf and sprout part of the plants and is promoted by the 4-aryl-1-difluormethoxyimidazoles according to the
10 invention and their agriculturally utilizable salts. Controlled defoliation of cotton is of particular economic interest, since by this means the harvesting is facilitated. By means of the shortening of the time interval in which the individual cotton plants become ripe, increased quality of the harvested fiber
15 material is achieved.

The active compounds I or the herbicidal compositions can be applied pre- or post-emergence. If the active ingredients are less well tolerated by certain crop plants, application
20 techniques may be used in which the herbicidal compositions are sprayed, with the aid of the spraying equipment, in such a way that they come into as little contact as possible, if any, with the leaves of the sensitive crop plants, while the active ingredients reach the leaves of undesirable plants growing
25 underneath, or the bare soil surface (post-directed, lay-by).

The compounds I, or the herbicidal compositions comprising them, can be used for example in the form of ready-to-spray aqueous solutions, powders, suspensions, also highly-concentrated
30 aqueous, oily or other suspensions or dispersions, emulsions, oil dispersions, pastes, dusts, materials for spreading, or granules, by means of spraying, atomizing, dusting, spreading or pouring. The use forms depend on the intended aims; in any case, they should ensure the finest possible distribution of the active
35 ingredients according to the invention.

Suitable inert additives are essentially: mineral oil fractions of medium to high boiling point, such as kerosene and diesel oil, furthermore coal tar oils and oils of vegetable or animal origin,
40 aliphatic, cyclic and aromatic hydrocarbons, e.g. paraffins, tetrahydronaphthalene, alkylated naphthalenes and their derivatives, alkylated benzenes and their derivatives, alcohols such as methanol, ethanol, propanol, butanol and cyclohexanol, ketones such as cyclohexanone, and strongly polar solvents, e.g.
45 amides such as N-methylpyrrolidone, and water.

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Aqueous use forms can be prepared from emulsion concentrates, suspensions, pastes, wettable powders or water-dispersible granules by adding water. To prepare emulsions, pastes or oil dispersions, the 4-aryl-1-difluoromethoxyimidazoles I, either as
5 such or dissolved in an oil or solvent, can be homogenized in water by means of a wetting agent, tackifier, dispersant or emulsifier. Alternatively, it is possible to prepare concentrates comprising active ingredient, wetting agent, tackifier, dispersant or emulsifier and, if desired, solvent or oil, which
10 are suitable for dilution with water.

Suitable surfactants are the alkali metal salts, alkaline earth metal salts and ammonium salts of aromatic sulfonic acids, e.g. ligno-, phenol-, naphthalene- and dibutyl-
15 naphthalenesulfonic acid, and of fatty acids, alkyl- and alkylarylsulfonates, alkyl sulfates, lauryl ether sulfates and fatty alcohol sulfates, and salts of sulfated hexa-, hepta- and octadecanols, and also of fatty alcohol glycol ethers, condensates of sulfonated naphthalene and its derivatives with
20 formaldehyde, condensates of naphthalene, or of the naphthalenesulfonic acids with phenol and formaldehyde, polyoxyethylene octylphenol ether, ethoxylated isooctyl-, octyl- or nonylphenol, alkylphenyl or tributyl-phenyl polyglycol ether, alkylaryl polyether alcohols,
25 isotridecyl alcohol, fatty alcohol/ethylene oxide condensates, ethoxylated castor oil, polyoxyethylene alkyl ethers or polyoxypropylene alkyl ethers, lauryl alcohol polyglycol ether acetate, sorbitol esters, lignin-sulfite waste liquors or methylcellulose.

30 Powders, materials for spreading and dusts can be prepared by mixing or grinding the active ingredients together with a solid carrier.

35 Granules, e.g. coated granules, impregnated granules and homogeneous granules, can be prepared by binding the active ingredients to solid carriers. Solid carriers are mineral earths, such as silicas, silica gels, silicates, talc, kaolin, limestone, lime, chalk, bole, loess, clay, dolomite, diatomaceous earth,
40 calcium sulfate, magnesium sulfate, magnesium oxide, ground synthetic materials, fertilizers such as ammonium sulfate, ammonium phosphate, ammonium nitrate, ureas, and products of vegetable origin, such as cereal meal, tree bark meal, wood meal and nutshell meal, cellulose powders, or other solid carriers.

45 The concentrations of the active compounds I in the ready-to-use preparations can be varied within wide ranges. In general, the

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formulations comprise approximately from 0.001 to 98% by weight, preferably 0.01 to 95% by weight, of at least one active compound. The active compounds are employed in a purity of from 90% to 100%, preferably 95% to 100% (according to NMR spectrum).

5

To widen the spectrum of action and to achieve synergistic effects, the 4-aryl-1-difluoromethoxyimidazoles I may be mixed with a large number of representatives of other groups of herbicidal or growth-regulating active ingredients and then applied concomitantly. Suitable components for mixtures are, for example, 1,2,4-thiadiazoles, 1,3,4-thiadiazoles, amides, aminophosphoric acid and its derivatives, aminotriazoles, anilides, (het)aryloxyalkanoic acids and their derivatives, benzoic acid and its derivatives, benzothiadiazinones, 2-aryl-1,3-cyclohexanediones, hetaryl aryl ketones, benzyl-isoxazolidinones, meta-CF₃-phenyl derivatives, carbamates, quinolinecarboxylic acid and its derivatives, chloroacetanilides, cyclohexane-1,3-dione derivatives, diazines, dichloropropionic acid and its derivatives, dihydrobenzofurans, dihydrofuran-3-ones, dinitroanilines, dinitrophenols, diphenyl ethers, dipyridyls, halocarboxylic acids and their derivatives, ureas, 3-phenyluracils, imidazoles, imidazolinones, N-phenyl-3,4,5,6-tetrahydrophthalimides, oxadiazoles, oxiranes, phenols, aryloxy- or hetaryloxyphenoxypropionic esters, phenylacetic acid and its derivatives, phenylpropionic acid and its derivatives, pyrazoles, phenylpyrazoles, pyridazines, pyridinecarboxylic acid and its derivatives, pyrimidyl ethers, sulfonamides, sulfonylureas, triazines, triazinones, triazolinones, triazolecarboxamides and uracils.

30

It may furthermore be advantageous also to apply the compounds I, alone or in combination with other herbicides, in the form of a mixture with other crop protection agents, for example together with agents for controlling pests or phytopathogenic fungi or bacteria. Also of interest is the miscibility with mineral salt solutions, which are employed for treating nutritional and trace element deficiencies. Nonphytotoxic oils and oil concentrates may also be added.

40 The rates of application of active ingredient are from 0.001 to 3.0, preferably 0.01 to 1.0, kg/ha of active substance (a.s.), depending on the control target, the season, the target plants and the growth stage.

45 The examples given hereinbelow are meant to illustrate the invention without limiting it.

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I Preparation Examples:

Example 1:

5 4-(4-Chlorophenyl)-1-difluoromethoxy-2-methyl-1H-imidazole
(compound No. IAb.1; see Table 1)

1.1: 4-(4-Chlorophenyl)-1-hydroxy-2-methyl-1H-imidazole:
5 g (43 mmol) of nitrosonium tetrafluoroborate were dissolved
in 40 ml of acetonitrile. Over the course of 8 h, the
10 solution was admixed dropwise with a solution of 5.9 g
(43 mmol) of 4-chlorostyrene in 50 ml of acetonitrile. The
mixture was then allowed to react at room temperature for
another 3 days, the pH was then adjusted to about 7-8 using
dil. sodium bicarbonate solution and the precipitated product
15 of value was filtered off and dried. Yield 2.8 g. MS (m/e):
208 [M]⁺.

1.2: 2.6 g (13 mmol) of 4-(4-chlorophenyl)-1-hydroxy-2-
methyl-1H-imidazole were dissolved in 100 ml of DMF and
20 admixed with 1.85 g (13 mmol) of potassium carbonate, and the
mixture was heated to 90°C. Gaseous chlorodifluoromethane was
then introduced until the reaction had gone to completion.
The resulting solution was admixed with water and the aqueous
phase was extracted with ethyl acetate. The organic phase was
25 washed with water, dried over magnesium sulfate, filtered and
concentrated. The residue was purified by silica gel
chromatography. This gave 0.9 g of the title compound (mobile
phase cyclohexane/ethyl acetate 4:1).
¹H-NMR (400 MHz, in CDCl₃): δ = 2.42 (s, 3 H), 6.59 (t, 1 H),
30 7.30 (m, 3 H), 7.64 (d, 2 H).

Example 2:

5-Chloro-4-(4-chlorophenyl)-1-difluoromethoxy-2-methyl-1H-
imidazole (compound No. IAb.4)

35 0.55 g (2.1 mmol) of 4-(4-chlorophenyl)-1-difluoromethoxy-2-
methyl-1H-imidazole from Example 1 was dissolved in 30 ml of
carbon tetrachloride and admixed with 0.32 g (2.3 mmol) of
sulfuryl chloride. After 4 h, a dilute aqueous sodium
40 bicarbonate solution was added and the organic phase was
separated off, washed with water, dried over magnesium
sulfate, filtered and concentrated. The residue was purified
by silica gel chromatography. This gave 0.3 g of the title
compound (mobile phase cyclohexane/ethyl acetate 4:1).
45 MS (m/e): 293 [M+H]⁺.

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Example 3:

4-(2,4-Dichlorophenyl)-1-difluoromethoxy-2-methyl-1H-imidazole (compound No. IAb.3)

5 3.1: 4-(2,4-Dichlorophenyl)-1-hydroxy-2-methyl-1H-imidazole
36 g (0.2 mol) of 2,4-dichlorostyrene were reacted by the
procedure of Example 1.1. This gave 16 g of the
hydroxyimidazole.

10 $^1\text{H-NMR}$ (270 MHz, in DMSO-d_6): δ = 2.29 (s, 3 H), 7.41 (dd,
1 H), 7.59 (d, 1 H), 7.81 (s, 1 H), 8.10 (d, 1 H).

15 3.2: 16 g (66 mmol) of the 4-(2,4-dichlorophenyl)-1-hydroxy-
2-methyl-1H-imidazole obtained according to 3.1 were reacted
by the procedure of Example 1.2. This gave 4 g of the title
compound.

$^1\text{H-NMR}$ (400 MHz, in CDCl_3): δ = 2.44 (s, 3 H), 6.61 (t, 1 H),
7.29 (dd, 1 H), 7.41 (d, 1 H), 7.79 (s, 1 H), 8.08 (d, 1 H).

Example 4:

20 5-Chloro-4-(2,4-dichlorophenyl)-1-difluoromethoxy-2-methyl-
1H-imidazole (compound No. IAb.6)

25 4 g (13 mmol) of 4-(2,4-dichlorophenyl)-1-difluoromethoxy-
2-methyl-1H-imidazole were reacted according to the procedure
of Example 2. Yield 2.4 g.

$^1\text{H-NMR}$ (400 MHz, in CDCl_3): δ = 2.48 (s, 3 H), 6.67 (t, 1 H),
7.31 (dd, 1 H), 7.40 (d, 1 H), 7.48 (d, 1 H).

Example 5:

30 5-Chloro-4-(2,4-dichloro-5-nitrophenyl)-1-difluoromethoxy-2-
methyl-1H-imidazole (compound No. IAb.30)

35 At -40°C , 2.1 g (34 mmol) of nitric acid were admixed with
2.0 g (20 mmol) of sulfuric acid. A solution of 2.1 g
(6.7 mmol) of 5-chloro-4-(2,4-dichlorophenyl)-1-
difluoromethoxy-2-methyl-1H-imidazole in 50 ml of methylene
chloride was added dropwise. The mixture was allowed to warm
to 0°C , and this temperature was maintained for 1 h. The
reaction mixture was then poured into ice water and extracted
40 with dichloromethane, and the combined organic phases were
washed with dilute aqueous sodium bicarbonate solution and
water. The organic phase was subsequently dried over
magnesium sulfate, filtered and concentrated. Yield 2 g.

45 $^1\text{H-NMR}$ (400 MHz, in CDCl_3): δ = 2.50 (s, 3 H), 6.71 (t, 1 H),
7.68 (s, 1 H), 8.09 (s, 1 H).

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Example 6:

2,4-Dichloro-5-(5-chloro-1-difluoromethoxy-2-methyl-1H-imidazol-4-yl)aniline (compound No. IAb.270)

- 5 A solution of 20 ml of acetic acid in 30 ml of ethanol was admixed successively with 1.5 g (27 mmol) of iron powder and 2 g (5.4 mmol) of 5-chloro-4-(2,4-dichloro-5-nitrophenyl)-1-difluoromethoxy-2-methyl-1H-imidazole (prepared, for example, according to Example 5) and heated to 70°C. After
10 2 h at this temperature, the mixture was diluted with ethyl acetate to five times its original volume. The solids were then filtered off through a bed of diatomaceous earth and the filtrate was concentrated and admixed with dichloromethane. The organic phase was washed with dilute aqueous sodium
15 bicarbonate solution and water, dried over magnesium sulfate, filtered and concentrated. The resulting residue was purified by silica gel chromatography (mobile phase cyclohexane/ethyl acetate 4:1). This gave 0.9 g of the title compound.
1H-NMR (270 MHz, in CDCl₃): δ = 2.48 (s, 3 H), 4.10 (s, 2 H),
20 6.67 (t, 1 H), 6.85 (s, 1 H), 7.36 (s, 1 H).

Example 7:

- 5-Chloro-4-(2,4-dichloro-5-(di(methylsulfonyl)amino)phenyl)-1-difluoromethoxy-2-methyl-1H-imidazole (compound No.
25 IAb.294)

- 0.9 g (2.7 mmol) of 2,4-dichloro-5-(5-chloro-1-difluoromethoxy-2-methyl-1H-imidazol-4-yl)aniline (prepared, for example, according to Example 6) was dissolved in 50 ml
30 of THF and admixed with 0.6 g (5.3 mmol) of methanesulfonyl chloride and 0.79 g (7.9 mmol) of triethylamine. After 8 h, the mixture was concentrated, and ethyl acetate was added. The organic phase was washed with water, dried over magnesium sulfate, filtered and concentrated. Yield 1.2 g.
35 1H-NMR (270 MHz, in CDCl₃): δ = 2.49 (s, 3 H), 3.50 (s, 6 H), 6.68 (t, 1 H), 7.54 (s, 1 H), 7.67 (s, 1 H).

Example 8:

- Methane sulfonic acid (2,4-dichloro-5-(5-chloro-1-difluoromethoxy-2-methyl-1H-imidazol-4-yl)anilide)
40 (compound No. IAb.306)

- 0.65 g (1.3 mmol) of 5-chloro-4-(2,4-dichloro-5-(di(methylsulfonyl)amino)phenyl)-1-difluoromethoxy-2-methyl-1H-imidazole (prepared, for example, according to Example 7)
45 were dissolved in 100 ml of methanol and admixed with 0.17 g (2.6 mmol) of potassium hydroxide. After 4 h, the mixture was

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concentrated and the residue was admixed with water and ethyl acetate. The organic phase was washed with water, dried over magnesium sulfate, filtered and concentrated. The resulting crude product was purified by silica gel chromatography (mobile phase cyclohexane/ethyl acetate 4:1). This gave 0.2 g of the title compound.

MS (m/e): 419 [M]⁺.

Example 9:

4-(4-Chloro-2-fluoro-5-isopropoxyphenyl)-1-difluoromethoxy-2-methyl-1H-imidazole (compound No. IAb.110)

9.1: 4-Chloro-2-fluoro-5-isopropoxystyrene

5.7 g (16 mmol) of methyltriphenylphosphonium bromide were suspended in 50 ml of THF and admixed with 6.8 g (16 mmol) of a 15% strength solution of butyllithium in hexane. The yellow suspension was cooled to -78°C. A solution of 2.3 g (10 mmol) of 4-chloro-2-fluoro-5-isopropoxybenzaldehyde in 20 ml of THF was added and the mixture was warmed to room temperature. After 2 h at room temperature, the solution was concentrated and the residue was chromatographed over silica gel (mobile phase hexane/ethyl acetate 2:1). Yield 2 g.

¹H-NMR (270 MHz, in CDCl₃): δ = 1.37 (d, 6 H), 4.48 (sept., 1 H), 5.39 (d, 1 H), 5.77 (d, 1 H), 6.79 (dd, 1 H), 7.03 (d, 1 H), 7.09 (d, 1 H).

9.2: 4-(4-Chloro-2-fluoro-5-isopropoxyphenyl)-1-hydroxy-2-methyl-1H-imidazole

2 g (9.3 mmol) of 4-chloro-2-fluoro-5-isopropoxystyrene were reacted by the procedure of Example 1.1. Yield 1.5 g.

MS (m/e): [M+H]⁺.

9.3: 1.5 g (5.2 mmol) of 4-(4-chloro-2-fluoro-5-isopropoxyphenyl)-1-hydroxy-2-methyl-1H-imidazole were reacted by the procedure of Example 1.2. Yield 0.2 g.

¹H-NMR (360 MHz, in CDCl₃): δ = 1.39 (d, 6 H), 2.44 (s, 3 H), 4.64 (sept., 1 H), 6.60 (t, 1 H), 7.12 (d, 1 H), 7.50 (d, 1 H), 7.70 (d, 1 H).

Example 10:

5-Chloro-4-(4-chloro-2-fluoro-5-isopropoxyphenyl)-1-difluoromethoxy-2-methyl-1H-imidazole (compound No. IAb.113)

0.2 g (0.5 mmol) of 4-(4-chloro-2-fluoro-5-isopropoxyphenyl)-1-difluoromethoxy-2-methyl-1H-imidazole was reacted by the procedure of Example 2. Yield 0.07 g.

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¹H-NMR (360 MHz, in CDCl₃): δ = 1.38 (d, 6 H), 2.49 (s, 3 H), 4.55 (sept., 1 H), 6.66 (t, 1 H), 7.19 (m, 3 H).

Example 11:

5 4-(2,4-Dichlorophenyl)-1-difluoromethoxy-2-isopropyl-1H-imidazole (compound No. IAd.3)

10 11.1: 4-(2,4-Dichlorophenyl)-1-hydroxy-2-isopropyl-1H-imidazole: 20 g (0.17 mol) of nitrosonium tetrafluoroborate were dissolved in 200 ml of isobutyronitrile and, over a period of 5 h, admixed dropwise with a solution of 30 g (0.17 mol) of 2,4-dichlorostyrene in 100 ml of isobutyronitrile. The mixture was allowed to react at room temperature for another 16 h, the pH was adjusted to about 7-8 using dil. sodium bicarbonate solution and the precipitated product of value was filtered off and dried. Yield 20 g.

20 11.2: 20 g (74 mmol) of 4-(2,4-dichlorophenyl)-1-hydroxy-2-isopropyl-1H-imidazole were reacted by the procedure of Example 1.2. This gave the title compound in a yield of 6 g. ¹H-NMR (270 MHz, in CDCl₃): δ = 1.37 (d, 6 H), 3.14 (sept., 1 H), 6.61 (t, 1 H), 7.29 (dd, 1 H), 7.41 (d, 1 H), 7.77 (s, 1 H), 8.16 (d, 1 H).

25 Example 12:

5-Chloro-4-(2,4-dichlorophenyl)-1-difluoromethoxy-2-isopropyl-1H-imidazole (compound No. IAd.6)

30 6 g (19 mmol) of 4-(2,4-dichlorophenyl)-1-difluoromethoxy-2-isopropyl-1H-imidazole were reacted by the procedure of Example 2. Yield 4.3 g.

¹H-NMR (400 MHz, in CDCl₃): δ = 1.37 (d, 6 H), 3.20 (sept., 1 H), 6.66 (t, 1 H), 7.30 (dd, 1 H), 7.42 (d, 1 H), 7.46 (d, 1 H).

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Example 13:

2-t-Butyl-4-(2,4-dichlorophenyl)-1-difluoromethoxy-1H-imidazole (compound No. IAe.3)

40 13.1: 2-t-Butyl-4-(2,4-dichlorophenyl)-1-hydroxy-1H-imidazole 20 g (0.17 mol) of nitrosonium tetrafluoroborate were dissolved in 200 ml of pivalonitrile and, over a period of 5 h, admixed dropwise with a solution of 30 g (0.17 mol) of 2,4-dichlorostyrene in 50 ml of pivalonitrile. The mixture was allowed to react at room temperature for another 16 h, the pH was adjusted to about 7-8 using dil. sodium bicarbonate solution and the precipitated product of value

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was filtered off and dried. Yield 19 g.

13.2: 19 g (67 mmol) of 2-t-butyl-4-(2,4-dichlorophenyl)-
1-hydroxy-1H-imidazole were reacted analogously to the
5 procedure of Example 1.2. Yield 4 g.
 $^1\text{H-NMR}$ (270 MHz, in CDCl_3): δ = 1.45 (s, 9 H), 6.57 (t, 1 H),
7.29 (dd, 1 H), 7.40 (d, 1 H), 7.83 (s, 1 H), 8.17 (d, 1 H).

Example 14:
10 2-t-Butyl-5-chloro-4-(2,4-dichlorophenyl)-1-difluoromethoxy-
1H-imidazole (compound No. IAe.6)

4 g (12 mmol) of 2-t-butyl-4-(2,4-dichlorophenyl)-
1-difluoromethoxy-1H-imidazole were reacted by the procedure
15 of Example 2. Yield 1.7 g.
 $^1\text{H-NMR}$ (400 MHz, in CDCl_3): δ = 1.45 (s, 9 H), 6.62 (t, 1 H),
7.30 (dd, 1 H), 7.41 (d, 1 H), 7.47 (d, 1 H).

The compounds prepared in the examples above are represented by
20 the formula below in which the variables R^1 , R^2 , R^4 and $\text{R}^{6'}$ are as
defined in Table 4.

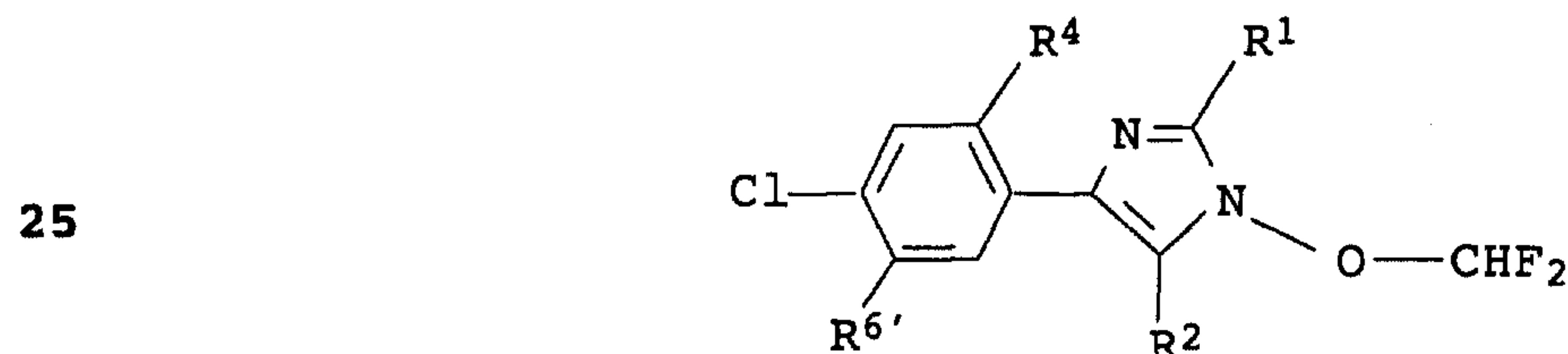


Table 4

Example (No.)	R ¹	R ²	R ⁴	R ^{6'} (= X-R ⁶)
1 (IAb.1)	CH ₃	H	H	H
2 (IAb.4)	CH ₃	Cl	H	H
3 (IAb.3)	CH ₃	H	Cl	H
4 (IAb.6)	CH ₃	Cl	Cl	H
5 (IAb.30)	CH ₃	Cl	Cl	NO ₂
6 (IAb.270)	CH ₃	Cl	Cl	NH ₂
7 (IAb.294)	CH ₃	Cl	Cl	N(SO ₂ CH ₃) ₂
8 (IAb.306)	CH ₃	Cl	Cl	NH(SO ₂ CH ₃)
9 (IAb.110)	CH ₃	H	F	OCH(CH ₃) ₂
10 (IAb.113)	CH ₃	Cl	F	OCH(CH ₃) ₂
11 (IAd.3)	CH(CH ₃) ₂	H	Cl	H
12 (IAd.6)	CH(CH ₃) ₂	Cl	Cl	H
13 (IAe.3)	C(CH ₃) ₃	H	Cl	H
14 (IAe.6)	C(CH ₃) ₃	Cl	Cl	H

II Formulation examples and examination of the herbicidal activity

20 The compounds I according to the invention can be formulated, for example, as follows:

25 I. 20 parts by weight of the compound example 1 are dissolved in a mixture composed of 80 parts by weight of alkylated benzene, 10 parts by weight of the adduct of 8 to 10 mol of ethylene oxide to 1 mol of oleic acid N-monoethanolamide, 5 parts by weight of calcium dodecylbenzenesulfonate and 5 parts by weight of the adduct of 40 mol of ethylene oxide to 1 mol of castor oil. Pouring
30 the solution into 100,000 parts by weight of water and finely distributing it therein gives an aqueous dispersion which comprises 0.02% by weight of the active ingredient.

35 II. 20 parts by weight of the compound example 2 are dissolved in a mixture composed of 40 parts by weight of cyclohexanone, 30 parts by weight of isobutanol, 20 parts by weight of the adduct of 7 mol of ethylene oxide to 1 mol of isooctylphenol and 10 parts by weight of the adduct of 40 mol of ethylene oxide to 1 mol of castor oil. Pouring
40 the solution into 100,000 parts by weight of water and finely distributing it therein gives an aqueous dispersion which comprises 0.02% by weight of the active ingredient.

45 III. 20 parts by weight of the active ingredient example 4 are dissolved in a mixture composed of 25 parts by weight of cyclohexanone, 65 parts by weight of a mineral oil fraction of boiling point 210 to 280°C and 10 parts by

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5 weight of the adduct of 40 mol of ethylene oxide to 1 mol of castor oil. Pouring the solution into 100,000 parts by weight of water and finely distributing it therein gives an aqueous dispersion which comprises 0.02% by weight of the active ingredient.

10 IV. 20 parts by weight of the active ingredient example 10 are mixed thoroughly with 3 parts by weight of sodium diisobutyl naphthalenesulfonate, 17 parts by weight of the sodium salt of a lignosulfonic acid from a sulfite waste liquor and 60 parts by weight of pulverulent silica gel, and the mixture is ground in a hammer mill. Finely
15 distributing the mixture in 20,000 parts by weight of water gives a spray mixture which comprises 0.1% by weight of the active ingredient.

20 V. 3 parts by weight of the active ingredient example 7 are mixed with 97 parts by weight of finely divided kaolin. This gives a dust which comprises 3% by weight of active ingredient.

25 VI. 20 parts by weight of the active ingredient example 8 are mixed intimately with 2 parts by weight of calcium dodecylbenzenesulfonate, 8 parts by weight of fatty alcohol polyglycol ether, 2 parts by weight of the sodium salt of a phenol/urea/formaldehyde condensate and 68 parts by weight of a paraffinic mineral oil. This gives a stable oily dispersion.

30 VII. 1 part by weight of the compound example 12 is dissolved in a mixture composed of 70 parts by weight of cyclohexanone, 20 parts by weight of ethoxylated isooctylphenol and 10 parts by weight of ethoxylated castor oil. This gives a stable emulsion concentrate.

35 VIII. 1 part by weight of the compound example 14 is dissolved in a mixture composed of 80 parts by weight of cyclohexanone and 20 parts by weight of Wettol[®] EM 31 (nonionic emulsifier based on ethoxylated castor oil). This
40 gives a stable emulsion concentrate.

The herbicidal activity of the 4-aryl-1-difluoromethoxyimidazoles of the formula I was demonstrated by the following greenhouse experiments:

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The culture containers used were plastic pots containing loamy sand with approximately 3.0% of humus as the substrate. The seeds of the test plants were sown separately for each species.

- 5 For the pre-emergence treatment, the active ingredients, which had been suspended or emulsified in water, were applied directly after sowing by means of finely distributing nozzles. The containers were irrigated gently to promote germination and growth and subsequently covered with transparent plastic hoods
10 until the plants had rooted. This cover causes uniform germination of the test plants, unless this has been adversely affected by the active ingredients.

- For the post-emergence treatment, the plants were first grown to
15 a height of 3 to 15 cm, depending on the plant habit, and only then treated with the active ingredients which had been suspended or emulsified in water. The test plants for this purpose were either sown directly and grown in the same containers, or they were first grown separately as seedlings and transplanted into
20 the test containers a few days prior to the treatment. The rate of application for the post-emergence treatment was 0.125 and 0.063 kg of a.s./ha.

- Depending on the species, the plants were kept at 10-25°C or
25 20-35°C. The test period extended over 2 to 4 weeks. During this time, the plants were tended, and their response to the individual treatments was evaluated.

- Evaluation was carried out using a scale from 0 to 100. 100 means
30 no emergence of the plants, or complete destruction of at least the above-ground parts, and 0 means no damage, or normal course of growth.

- The plants used in the greenhouse experiments belong to the
35 following species:

Bayer code Common Name

- | | |
|----------|-----------------|
| SETFA | giant foxtail |
| 40 ABUTH | velvetleaf |
| AMARE | redroot pigweed |
| POLPE | lady's thumb |

- Herbicidal activity when used post-emergence in a greenhouse
45 (Example 4: 5-chloro-4-(2,4-dichloro-phenyl)-1-difluoromethoxy-2-methyl-1H-imidazole (Compound No. IAb.6)

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At application rates of 0.125 kg/ha a.S. and 0.063 kg/ha a.S. compound Nr. IAb.6 from example 4 shows a good herbicidal action against SETFA, ABUTH, AMARE und POLPE, when applied by the post-emergence method.

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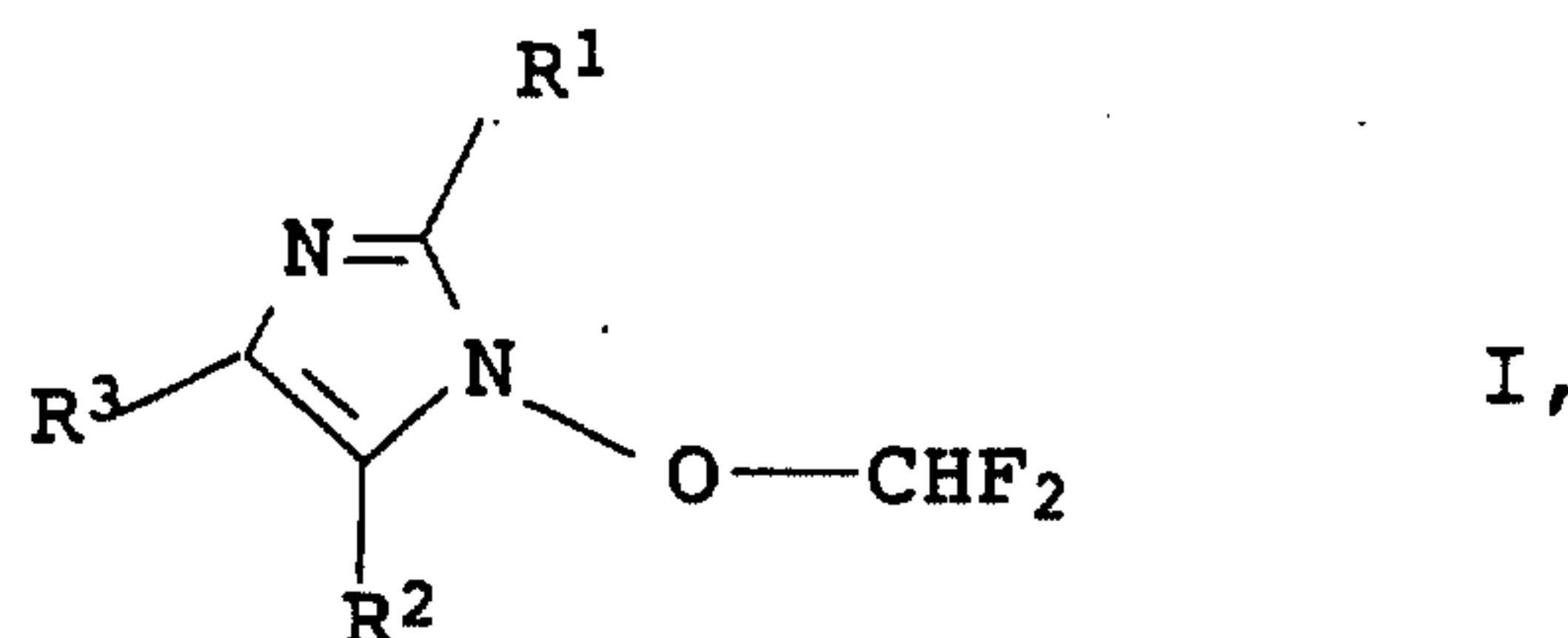
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We claim:

1. A 4-aryl-1-difluoromethoxyimidazole of the formula I

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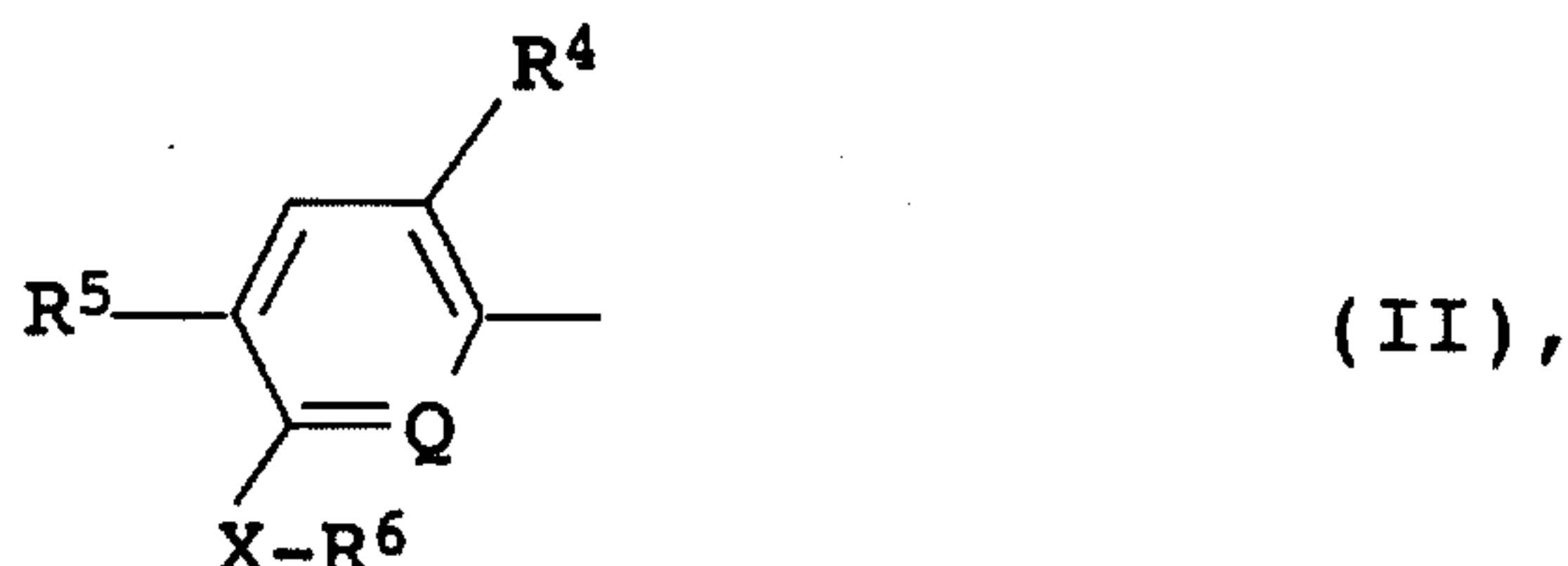
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in which the variables R^1 , R^2 and R^3 are as defined below: R^1 is hydrogen, C_1 - C_4 -alkyl or C_1 - C_4 -haloalkyl; R^2 is hydrogen, halogen, cyano, C_1 - C_4 -alkyl or C_1 - C_4 -haloalkyl;

20

 R^3 is an aromatic radical of the formula II

25



30

in which the variables X , Q , R^4 , R^5 and R^6 are as defined below:

35

 R^4 is hydrogen or halogen; R^5 is hydrogen, cyano, nitro, halogen, C_1 - C_4 -alkyl, C_1 - C_4 -haloalkyl, C_1 - C_4 -alkoxy or C_1 - C_4 -haloalkoxy;

40

 X is a chemical bond or a methylene, ethylene, propane-1,3-diyl, ethene-1,2-diyl chain or an oxymethylene or thiamethylene chain which is attached to the phenyl ring via the heteroatom, where all chains may be unsubstituted or may carry one or two substituents, in each case selected from the group consisting of cyano, carboxyl, halogen, C_1 - C_4 -alkyl, C_1 - C_4 -haloalkyl,

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C₁-C₄-alkoxy, (C₁-C₄-alkoxy)carbonyl, di(C₁-C₄-alkyl)amino and phenyl;

Q is nitrogen or a group C-R⁷ in which R⁷ is hydrogen;

5

R⁶ is hydrogen, nitro, cyano, halogen, halosulfonyl, -O-Y-R⁸, -O-CO-Y-R⁸, -N(Y-R⁸)(Z-R⁹), -N(Y-R⁸)-SO₂-Z-R⁹, -N(SO₂-Y-R⁸)(SO₂-Z-R⁹), -N(Y-R⁸)-CO-Z-R⁹, -N(Y-R⁸)(O-Z-R⁹), -S-Y-R⁸, -SO-Z-R⁸, -SO₂-Y-R⁸, -SO₂-O-Y-R⁸, -SO₂-N(Y-R⁸)(Z-R⁹), -CO-Y-R⁸, -C(=NOR¹⁰)-Y-R⁸, -C(=NOR¹⁰)-O-Y-R⁸, -CO-O-Y-R⁸, -CO-S-Y-R⁸, -CO-N(Y-R⁸)(Z-R⁹), -CO-N(Y-R⁸)(O-Z-R⁹) or -PO(O-Y-R⁸)₂; in which the variables Y, Z, R⁸, R⁹ and R¹⁰ are as defined below:

15

Y, Z are, independently of one another:

20

a chemical bond, a methylene or ethylene group which may be unsubstituted or may carry one or two substituents, in each case selected from the group consisting of carboxyl, C₁-C₄-alkyl, C₁-C₄-haloalkyl, (C₁-C₄-alkoxy)carbonyl and phenyl;

R⁸, R⁹ are, independently of one another:

25

hydrogen, C₁-C₆-haloalkyl, C₂-C₆-alkenyl, C₂-C₆-haloalkenyl, C₂-C₆-alkynyl, C₂-C₆-haloalkynyl, -CH(R¹¹)(R¹²), -C(R¹¹)(R¹²)-NO₂, -C(R¹¹)(R¹²)-CN, -C(R¹¹)(R¹²)-halogen, -C(R¹¹)(R¹²)-OR¹³, -C(R¹¹)(R¹²)-N(R¹³)R¹⁴, -C(R¹¹)(R¹²)-N(R¹³)-OR¹⁴, -C(R¹¹)(R¹²)-SR¹³, -C(R¹¹)(R¹²)-SO-R¹³, -C(R¹¹)(R¹²)-SO₂-R¹³, -C(R¹¹)(R¹²)-SO₂-OR¹³, -C(R¹¹)(R¹²)-SO₂-N(R¹³)R¹⁴, -C(R¹¹)(R¹²)-CO-R¹³, -C(R¹¹)(R¹²)-C(=NOR¹⁵)-R¹³, -C(R¹¹)(R¹²)-CO-OR¹³, -C(R¹¹)(R¹²)-CO-SR¹³, -C(R¹¹)(R¹²)-CO-N(R¹³)R¹⁴, -C(R¹¹)(R¹²)-CO-N(R¹³)-OR¹⁴, -C(R¹¹)(R¹²)-PO(OR¹³)₂,

35

is C₃-C₈-cycloalkyl which may contain a carbonyl or thiocarbonyl ring member,

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is phenyl or 3- to 7-membered heterocyclyl which may contain a carbonyl or thiocarbonyl ring member, where each cycloalkyl, the phenyl and each heterocyclyl ring may be unsubstituted or may carry one to four substituents, in each case selected from the group consisting of cyano, nitro, amino, hydroxyl,

45

carboxyl, halogen, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, C₁-C₄-alkylthio, C₁-C₄-haloalkylthio, C₁-C₄-alkylsulfonyl, C₁-C₄-haloalkylsulfonyl, (C₁-C₄-alkyl)carbonyl, (C₁-C₄-haloalkyl)carbonyl, (C₁-C₄-alkyl)carbonyloxy,

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(C₁-C₄-haloalkyl)carbonyloxy, (C₁-C₄-alkoxy)carbonyl and di-(C₁-C₄-alkyl)amino;

5 R¹⁰ is hydrogen, C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₂-C₆-alkenyl, C₂-C₆-haloalkenyl, C₂-C₆-alkynyl, C₂-C₆-haloalkynyl, C₃-C₈-cycloalkyl, phenyl or phenyl-C₁-C₄-alkyl;

10 where the variables R¹¹ to R¹⁵ are as defined below:

15 R¹¹, R¹² are, independently of one another, hydrogen, C₁-C₄-alkyl, C₁-C₄-alkoxy-C₁-C₄-alkyl, C₁-C₄-alkylthio-C₁-C₄-alkyl, (C₁-C₄-alkoxy)carbonyl-C₁-C₄-alkyl or phenyl-C₁-C₄-alkyl, where the phenyl ring may be unsubstituted or may carry one to three substituents, in each case selected from the group consisting of cyano, nitro, carboxyl, halogen, C₁-C₄-alkyl, C₁-C₄-haloalkyl and (C₁-C₄-alkoxy)carbonyl;

20 R¹³, R¹⁴ are, independently of one another, hydrogen, C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₂-C₆-alkenyl, C₂-C₆-haloalkenyl, C₂-C₆-alkynyl, C₂-C₆-haloalkynyl, C₃-C₈-cycloalkyl, C₃-C₈-cycloalkyl-C₁-C₄-alkyl, 25 phenyl, phenyl-C₁-C₄-alkyl, 3- to 7-membered heterocyclyl or heterocyclyl-C₁-C₄-alkyl, where each cycloalkyl and each heterocyclyl ring may contain a carbonyl or thiocarbonyl ring member, and where each cycloalkyl, the phenyl and each heterocyclyl ring may be unsubstituted or may carry one to four 30 substituents, in each case selected from the group consisting of cyano, nitro, amino, hydroxyl, carboxyl, halogen, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, C₁-C₄-haloalkoxy, C₁-C₄-alkylthio, C₁-C₄-haloalkylthio, C₁-C₄-alkylsulfonyl, C₁-C₄-haloalkylsulfonyl, (C₁-C₄-alkyl)carbonyl, (C₁-C₄-haloalkyl)carbonyl, (C₁-C₄-alkyl)carbonyloxy, (C₁-C₄-haloalkyl)carbonyloxy, (C₁-C₄-alkoxy)carbonyl and di-(C₁-C₄-alkyl)amino;

40 R¹⁵ is hydrogen, C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₂-C₆-alkenyl, C₂-C₆-haloalkenyl, C₂-C₆-alkynyl, C₂-C₆-haloalkynyl, C₃-C₈-cycloalkyl, phenyl or phenyl-C₁-C₄-alkyl; or

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5 R⁵ and X-R⁶ or X-R⁶ and R⁷ are a 3- or 4-membered chain whose chain members may, in addition to carbon, comprise 1, 2 or 3 heteroatoms selected from nitrogen, oxygen and sulfur atoms, which chain may be unsubstituted or may for its part carry one, two or three substituents, and whose members may also comprise one or two nonadjacent carbonyl, thiocarbonyl or sulfonyl groups.

and the agriculturally useful salts of I.

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2. A 4-aryl-1-difluoromethoxyimidazole as claimed in claim 1 in which Q in the formula II is nitrogen or C-H.

15 3. A 4-aryl-1-difluoromethoxyimidazole as claimed in claim 2 in which Q in the formula II is C-H and the variables X, R⁴, R⁵ and R⁶ are as defined below:

R⁴ is hydrogen, fluoro or chloro;

20 R⁵ is halogen;

X is a chemical bond, methylene or ethane-1,2-diyl, ethene-1,2-diyl, 2-chloroethane-1,2-diyl and 2-chloro-ethene-1,2-diyl;

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30 R⁶ is hydrogen, -O-Y-R⁸, -O-CO-Y-R⁸, -N(Y-R⁸)-SO₂-Z-R⁹, -N(SO₂-Y-R⁸)(SO₂-Z-R⁹), -S-Y-R⁸, -SO₂-N(Y-R⁸)(Z-R⁹), -C(=NOR¹⁰)-O-Y-R⁸, -CO-O-Y-R⁸, -CO-N(Y-R⁸)(Z-R⁹) or -PO(O-Y-R⁸)₂; in which the variables Y, R⁸ and R⁹ are as defined in claim 1.

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4. A 4-aryl-1-difluoromethoxyimidazole as claimed in claim 3 in which X is a chemical bond and R⁶ is a group -O-Y-R⁸, where the variables Y and R⁸ are as defined in claim 1.

40 5. A 4-aryl-1-difluoromethoxyimidazole as claimed in claim 1 in which Q in the formula II is C-H and R⁵ together with X-R⁶ is a chain of the formulae: -O-C(R¹⁶,R¹⁷)-CO-N(R¹⁸)-, -S-C(R¹⁶,R¹⁷)-CO-N(R¹⁸)-, -N=C(R¹⁹)-O- and -N=C(R¹⁹)-S-, in which the variables R¹⁶ to R¹⁹ are as defined below:

45 R¹⁶, R¹⁷ are, independently of one another, hydrogen, C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₂-C₆-alkenyl, C₂-C₆-haloalkenyl, C₂-C₆-alkynyl, C₂-C₆-haloalkynyl, C₃-C₈-cycloalkyl, phenyl or phenyl-C₁-C₄-alkyl;

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- 5 R^{18} is hydrogen, hydroxyl, C_1 - C_6 -alkyl, C_1 - C_6 -haloalkyl, C_2 - C_6 -alkenyl, C_2 - C_6 -haloalkenyl, C_2 - C_6 -alkynyl, C_1 - C_4 -alkoxy, C_1 - C_4 -haloalkoxy, C_3 - C_6 -alkenyloxy, C_3 - C_6 -alkynyloxy, C_1 - C_4 -alkylsulfonyl, C_1 - C_4 -haloalkylsulfonyl, C_1 - C_4 -alkylcarbonyl, C_1 - C_4 -haloalkylcarbonyl, C_1 - C_4 -alkoxycarbonyl, C_1 - C_4 -alkoxycarbonyl- C_1 - C_4 -alkyl, C_1 - C_4 -alkoxycarbonyl- C_1 - C_4 -alkoxy, $di(C_1$ - C_4 -alkyl)aminocarbonyl, $di(C_1$ - C_4 -alkyl)aminocarbonyl- C_1 - C_4 -alkyl, $di(C_1$ - C_4 -alkyl)aminocarbonyl- C_1 - C_4 -alkoxy, phenyl or phenyl- C_1 - C_4 -alkyl;
- 15 R^{19} is hydrogen, halogen, cyano, amino, C_1 - C_6 -alkyl, C_1 - C_6 -haloalkyl, C_2 - C_6 -alkenyl, C_2 - C_6 -haloalkenyl, C_2 - C_6 -alkynyl, C_1 - C_4 -alkoxy, C_1 - C_4 -haloalkoxy, C_3 - C_6 -alkenyloxy, C_3 - C_6 -alkynyloxy, C_1 - C_4 -alkylamino, $di(C_1$ - C_4 -alkyl)amino, C_1 - C_4 -haloalkoxy, C_1 - C_4 -alkylthio, C_1 - C_4 -haloalkylthio, C_1 - C_4 -alkylsulfinyl, C_1 - C_4 -haloalkylsulfinyl, C_1 - C_4 -alkylsulfonyl, C_1 - C_4 -haloalkylsulfonyl, C_1 - C_4 -alkylcarbonyl, C_1 - C_4 -haloalkylcarbonyl, C_1 - C_4 -alkoxycarbonyl, C_1 - C_4 -alkoxycarbonyl- C_1 - C_4 -alkyl, C_1 - C_4 -alkoxycarbonyl- C_1 - C_4 -alkoxy, C_1 - C_4 -alkoxycarbonyl- C_1 - C_4 -alkylthio, $di(C_1$ - C_4 -alkyl)aminocarbonyl, $di(C_1$ - C_4 -alkyl)aminocarbonyl- C_1 - C_4 -alkyl, $di(C_1$ - C_4 -alkyl)aminocarbonyl- C_1 - C_4 -alkoxy, $di(C_1$ - C_4 -alkyl)aminocarbonyl- C_1 - C_4 -alkylthio, phenyl or phenyl- C_1 - C_4 -alkyl.

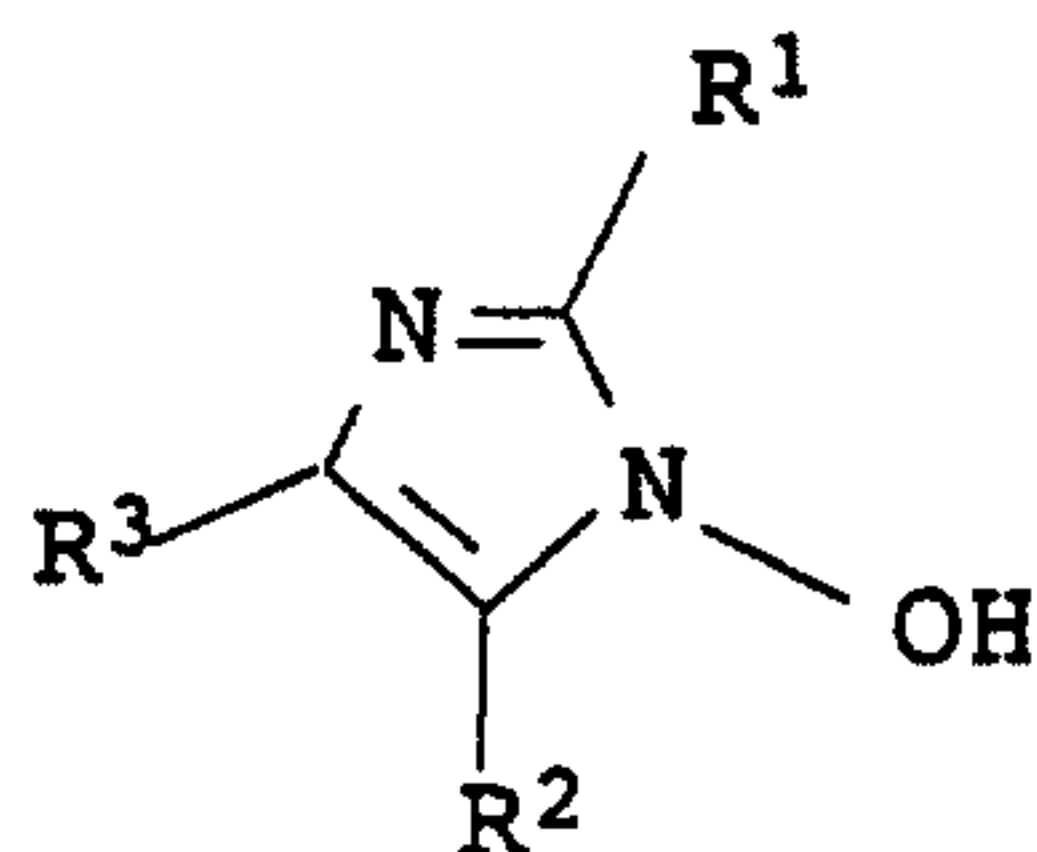
- 35 6. A 4-aryl-1-difluoromethoxyimidazole as claimed in claim 5 in which R^5 together with $-X-R^6$ is a chain of the formulae: $-O-CH(R^{16})-CO-N(R^{18})-$ or $-S-CH(R^{16})-CO-N(R^{18})-$, where the nitrogen atom of the chain is attached to the carbon atom of the phenyl ring in formula II which is adjacent to the group Q.
- 40 7. A 4-aryl-1-difluoromethoxyimidazole as claimed in claim 2 in which Q in the formula II is $C-R^7$ and R^7 together with $-X-R^6$ is a chain of the formulae: $-O-C(R^{16}, R^{17})-CO-N(R^{18})-$, $-S-C(R^{16}, R^{17})-CO-N(R^{18})-$, $-N=C(R^{19})-O-$ or $-N=C(R^{19})-S-$, in which the variables R^{16} to R^{19} are as defined in claim 4.

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8. The use of 4-aryl-1-difluoromethoxyimidazoles I and their agriculturally useful salts, as claimed in claim 1, as herbicides or for the desiccation/defoliation of plants.
- 5 9. A composition, comprising a herbicidally effective amount of at least one 4-aryl-1-difluoromethoxyimidazole of the formula I or an agriculturally useful salt of I, as claimed in claim 1, and at least one inert liquid and/or solid carrier and, if desired, at least one surfactant.
- 10 10. A composition for the desiccation and/or defoliation of plants, comprising such an amount of at least one 4-aryl-1-difluoromethoxyimidazole of the formula I or an agriculturally useful salt of I, as claimed in claim 1, as to have desiccant and/or defoliant action, and at least one inert liquid and/or solid carrier and, if desired, at least one surfactant.
- 15 11. A method for controlling undesirable vegetation, which comprises allowing a herbicidally effective amount of at least one 4-aryl-1-difluoromethoxyimidazole of the formula I or an agriculturally useful salt of I, as claimed in claim 1, to act on plants, their habitat or on seeds.
- 20 12. A method for the desiccation and/or defoliation of plants, which comprises allowing such an amount of at least one 4-aryl-1-difluoromethoxyimidazole of the formula I or an agriculturally useful salt of I, as claimed in claim 1, as to have desiccant and/or defoliant action, act on plants.
- 25 13. A method as claimed in claim 12, wherein cotton is treated.
- 30 14. A process for preparing 4-aryl-1-difluoromethoxyimidazoles of the formula I as claimed in claim 1, which comprises reacting a 4-aryl-1-hydroxyimidazole of the formula III
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(III)

in which the variables R¹ to R³ are as defined in claim 1 with chlorodifluoromethane.

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15. A process as claimed in claim 14, wherein the reaction is carried out in the presence of a base.

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