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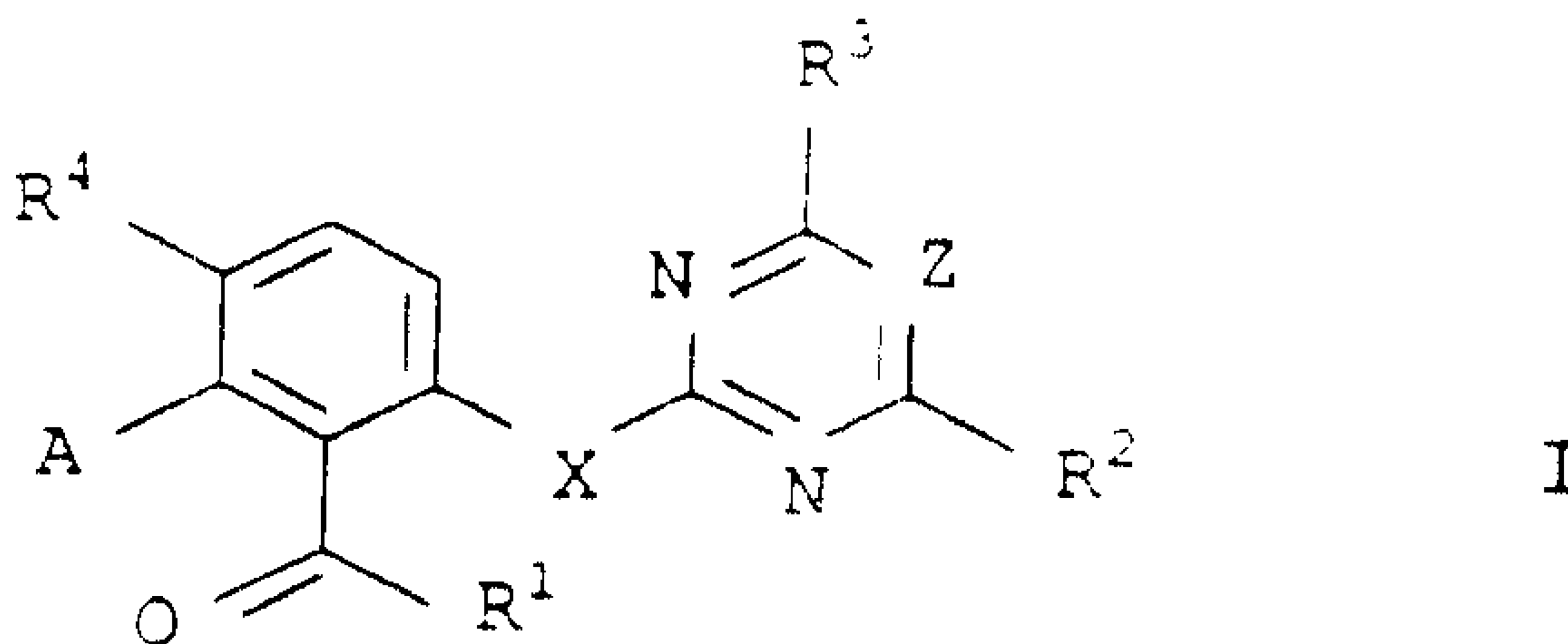
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(54) Titre : DERIVES SALICYLOYL(THIO)ETHER, LEUR PREPARATION ET INTERMEDIAIRES POUR LEUR PREPARATION

(54) Title: SALICYLOYL(THIO)ETHER DERIVATIVES, THEIR PREPARATION AND INTERMEDIATES FOR THEIR PREPARATION



(57) Abrégé/Abstract:

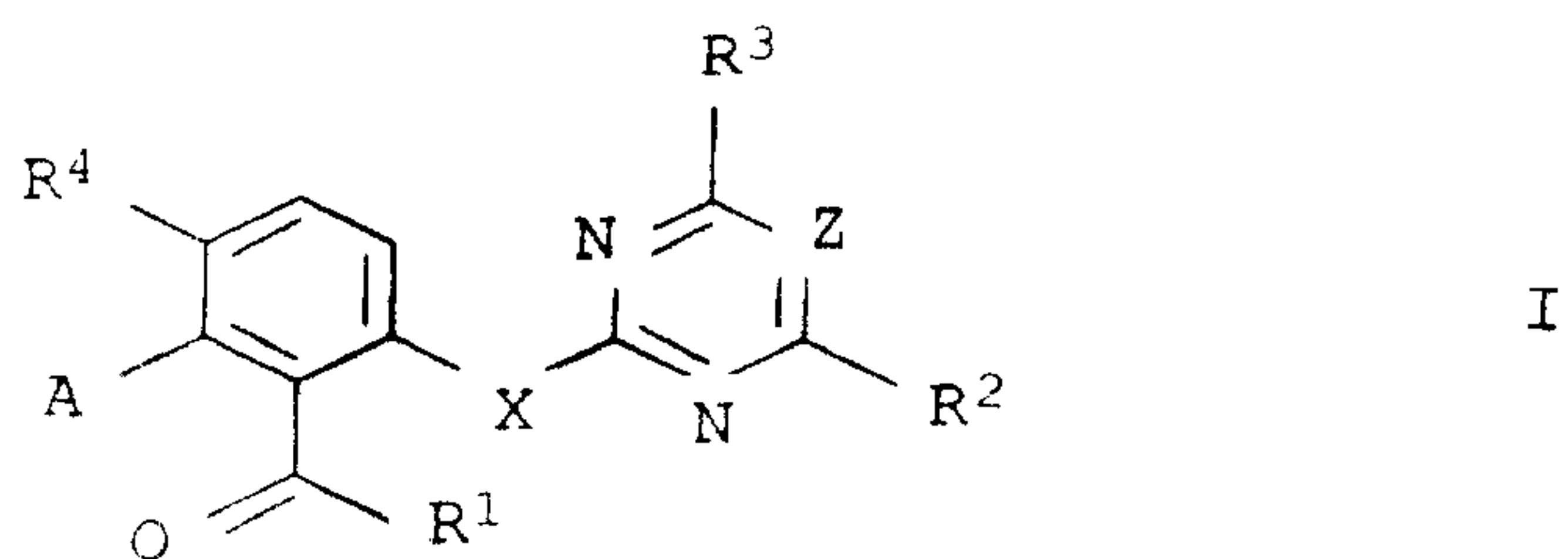
Salicyloyl(thio)ether derivatives of the formula I, (see formula I) where X is oxygen or sulfur and Z is carbon or nitrogen, and the radicals R¹ to R⁴ and A have the meanings given in the disclosure, and processes for preparing the same. These derivatives have improved herbicidal properties or other properties desirable in crop protection, such as growth-regulating or fungicidal activity.



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ABSTRACT OF THE DISCLOSURE:

Salicyloyl(thio)ether derivatives of the formula I,

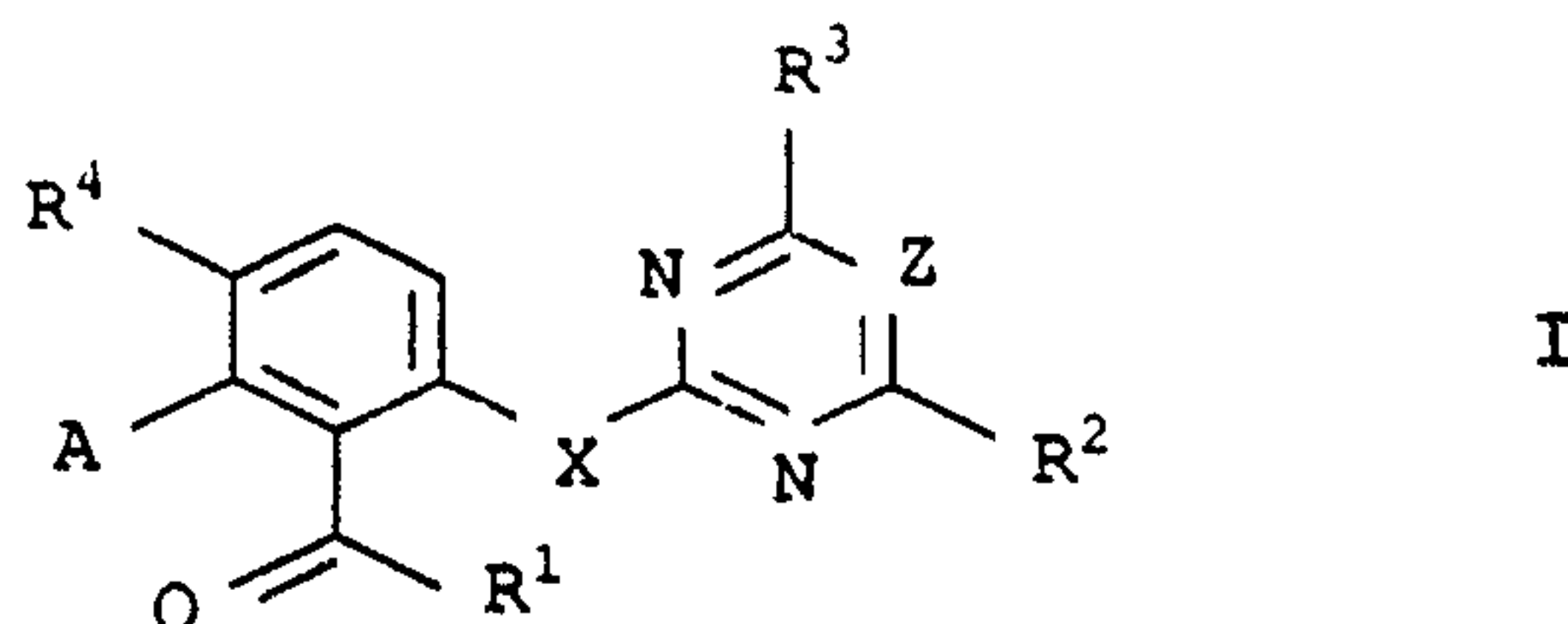


where X is oxygen or sulfur and Z is carbon or nitrogen, and the radicals R¹ to R⁴ and A have the meanings given in the disclosure, and processes for preparing the same. These derivatives have improved herbicidal properties or other properties desirable in crop protection, such as growth-regulating or fungicidal activity.

Salicyloyl(thio)ether derivatives, their preparation
and intermediates for their preparation

The present invention relates to salicyloyl-
(thio)ether derivatives of the formula I

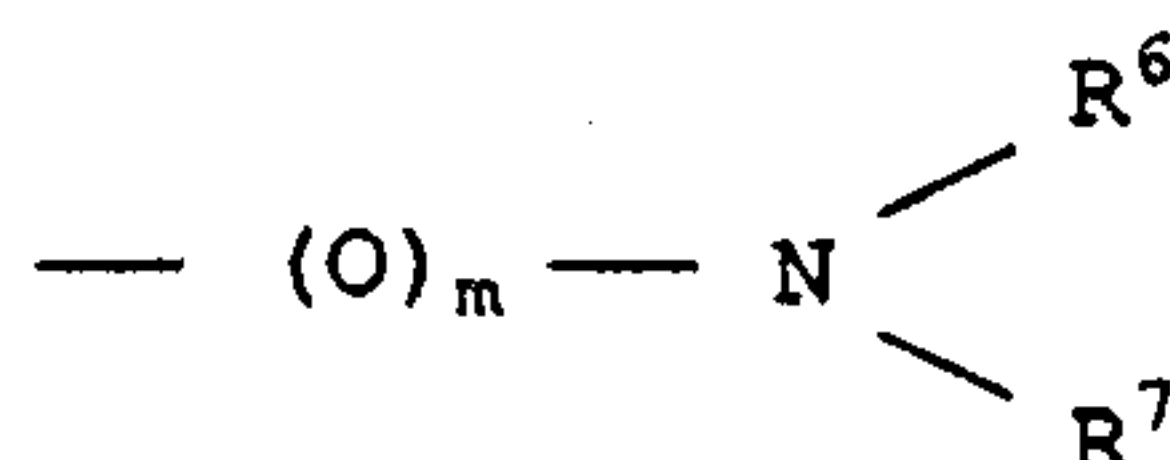
5



I

where

R^1 is a radical



in which m is 0 or 1 and R^6 and R^7 are each
hydrogen;

10

C_1 - C_6 -alkyl, C_3 - C_6 -alkenyl, C_3 - C_6 -alkynyl, where these
radicals may each carry from one to five halogen atoms
and/or one or two of the following groups: C_1 - C_6 -alkoxy,
 C_3 - C_6 -alkenyloxy, C_3 - C_6 -alkynyloxy, C_1 - C_6 -alkylthio, C_3 - C_6 -
alkenylthio, C_3 - C_6 -alkynylthio, C_1 - C_6 -haloalkoxy, cyano,
15 C_1 - C_6 -alkylcarbonyl, C_3 - C_6 -alkenylcarbonyl, C_3 - C_6 -alkynyl-
carbonyl, C_1 - C_6 -alkoxycarbonyl, C_3 - C_6 -alkenyloxycarbonyl,
 C_3 - C_6 -alkynyloxycarbonyl, C_1 - C_6 -dialkylamino or C_1 - C_6 -cyclo-
alkyl;

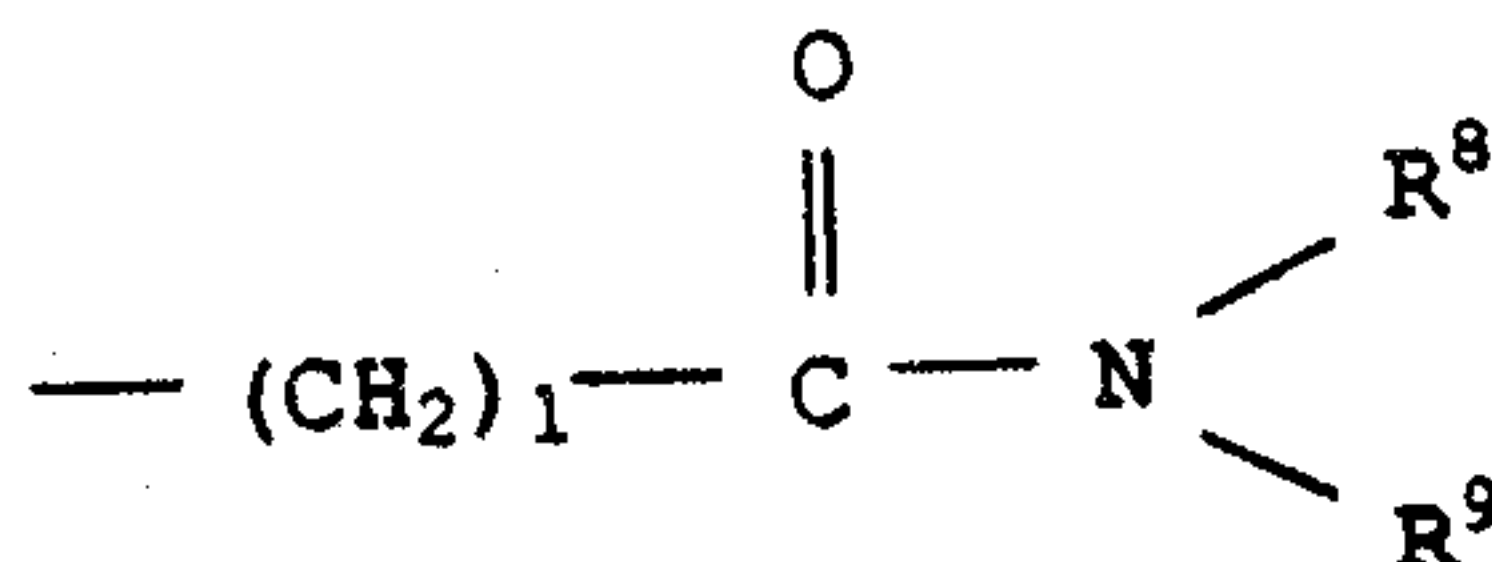
unsubstituted or substituted C_1 - C_6 -cycloalkyl;

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unsubstituted or substituted phenyl;

R^6 together with R^7 may be an unsubstituted or substituted
 C_4 - C_7 -alkylene chain in which a CH_2 group may be replaced
with oxygen, sulfur or -NH;

a group



where R^8 and R^9 are each hydrogen, C_1 - C_6 -alkyl, C_3 - C_6 -alkenyl or C_3 - C_6 -alkynyl and l is 1, 2, 3 or 4; or a group

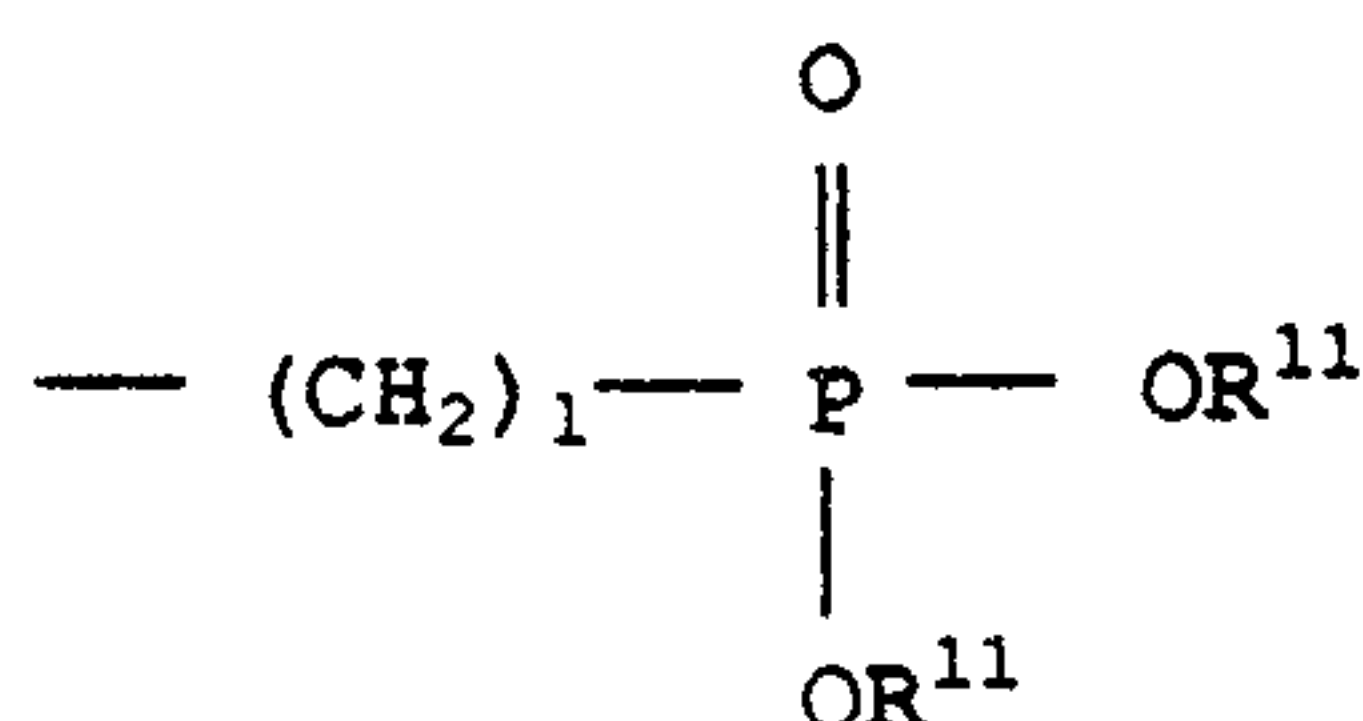


where R^{10} is C_1 - C_6 -alkyl, C_3 - C_6 -alkenyl or C_3 - C_6 -alkynyl, l is 1, 2, 3 or 4 and k is 0, 1 or 2;

a radical OR^5 , where

R^5 is an unsubstituted or substituted 5-membered aromatic heterocyclic structure bonded via a nitrogen atom and having from one to four nitrogen atoms in the ring

or a radical



where R^{11} and l have the abovementioned meanings, or a radical



where R^{12} is C_1 - C_6 -alkyl, C_1 - C_6 -haloalkyl or phenyl, which in turn may carry from one to four of the following substituents: halogen, nitro, cyano or C_1 - C_6 -alkyl;

R^2 and R^3 are each C_1 - C_4 -alkyl, C_1 - C_4 -haloalkyl, C_1 - C_4 -alkoxy, C_1 - C_4 -haloalkoxy and/or C_1 - C_4 -alkylthio;

X is oxygen or sulfur;

Z is nitrogen or the methine group;

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

A is a 5-membered heteroaromatic structure having from one to four nitrogen atoms or from one to three nitrogen atoms and additionally a sulfur or oxygen atom in the ring, which may carry from one to three halogen atoms and/or from one to three of the following radicals: nitro, cyano, C_1 - C_4 -alkyl, C_1 - C_4 -alkylthio, C_1 - C_4 -haloalkyl or phenyl which is unsubstituted or substituted by from one to three halogen atoms and/or from one to three

methyl groups;

a benzofused 5-membered heteroaromatic structure which may contain from one to three nitrogen atoms or a nitrogen atom and additionally one oxygen or sulfur atom and may carry one of the following radicals: C₁-C₄-alkyl, halogen or cyano;

a thienyl or furyl radical which may carry from one to three halogen atoms and/or from one to three of the following radicals: C₁-C₄-alkyl, C₁- or C₂-haloalkyl, unsubstituted or substituted phenyl or nitro;

a benzothienyl or benzofuryl radical which may carry one halogen atom and/or one of the following radicals: C₁-C₄-alkyl, C₁- or C₂-haloalkyl or nitro;

pyridyl which may carry from one to three halogen atoms and/or from one to three of the following radicals: C₁-C₄-alkyl, C₁- or C₂-haloalkyl, unsubstituted or substituted phenyl or nitro;

a naphthyl or quinolyl radical, each of which may carry up to three halogen atoms and/or up to three of the following radicals: C₁-C₄-alkyl or C₁- or C₂-haloalkyl, the expression unsubstituted or substituted in the abovementioned cases meaning that the corresponding groups may carry one or more of the following substituents: halogen, nitro, cyano, C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₁-C₆-alkoxy or C₁-C₆-alkylthio.

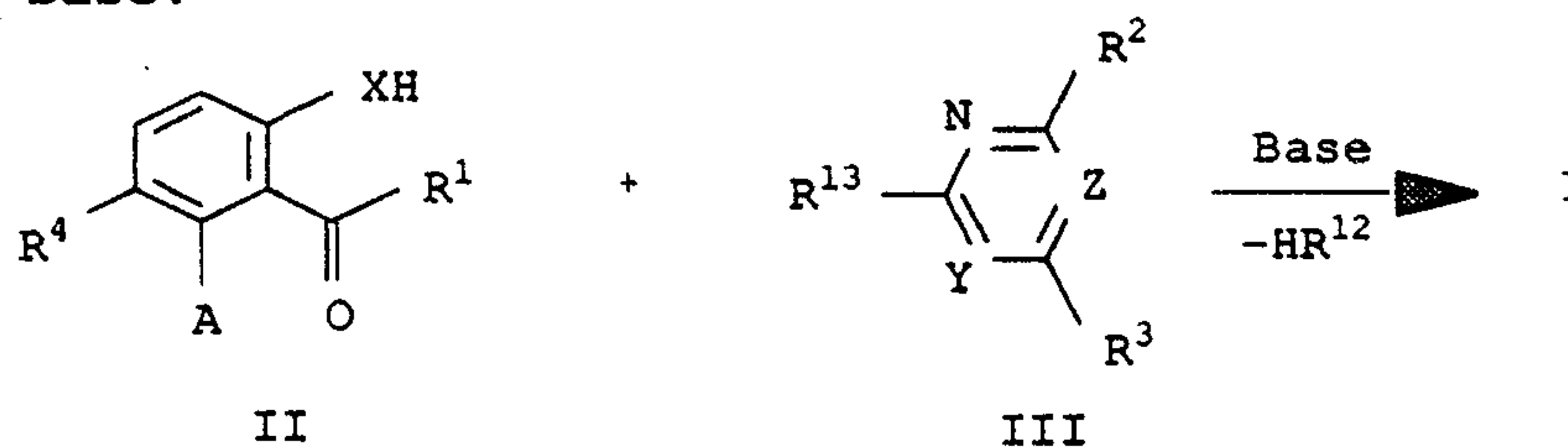
The literature (EP-A 223 406, EP-A 249 708, EP-A 426 476, EP-A 287 072, EP-A 287 079, EP-A 346 789 and EP-A 402 751) describes herbicidal, substituted salicyclic acids and sulfur analogs thereof. However, their action is not always satisfactory.

It is an object of the present invention to provide novel salicylic acid derivatives or sulfur analogs thereof having improved herbicidal properties or other properties desirable in crop protection, such as growth-regulating or fungicidal activity.

We have found that this object is achieved by the compounds of the formula I which are defined at the outset. We have also found processes for the preparation

of the compounds I and methods for controlling undesirable plant growth with the compounds I. We have furthermore found that salicylic acid derivatives of the general formula I defined above have excellent plant growth-regulating properties and in addition possess fungicidal and nitrification-inhibiting activity. The novel salicylic acid derivatives II' were found as intermediates for the preparation of the compounds I.

Compounds of the formula I are obtained, for example, by reacting a correspondingly substituted salicylic acid derivative of the formula II, which is known in specific cases or can be prepared by conventional methods, starting from known intermediates, with a corresponding compound of the formula III in the presence of a base.

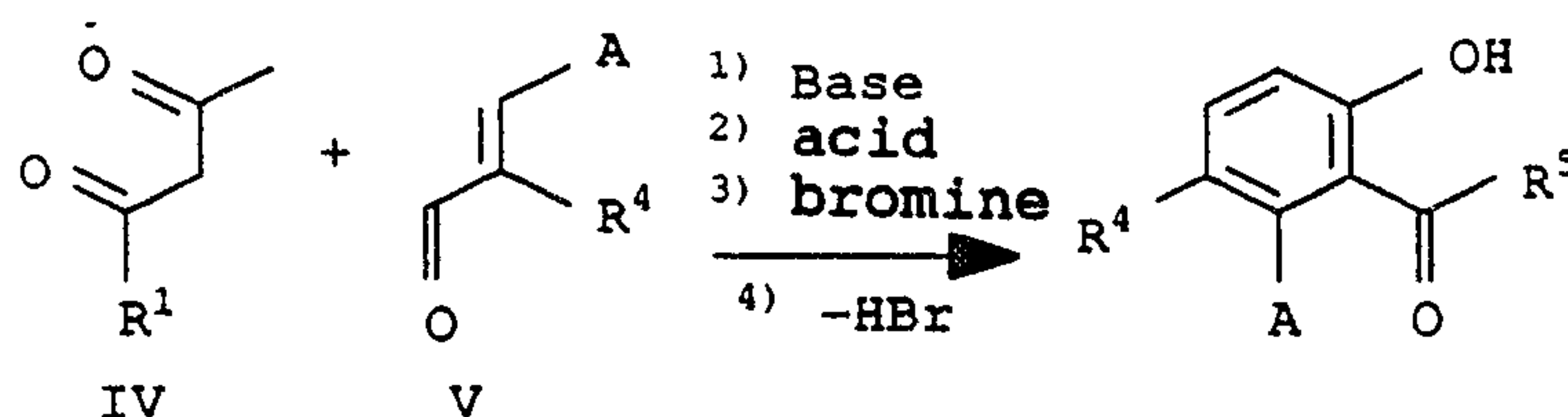


In the formula III, R^{13} is a conventional nucleofugic leaving group, for example halogen, such as chlorine, bromine, iodine, arylsulfonyl or alkylsulfonyl, such as toluenesulfonyl or methylsulfonyl, or another equivalent leaving group. Compounds of the formula III having a reactive substituent R^{12} are known or can readily be obtained with the general technical knowledge. Suitable bases are alkali metal or alkaline earth metal hydrides, such as NaH or CaH_2 , alkali metal hydroxides, such as NaOH or KOH, alkali metal alcoholates, such as potassium tert-butylate, alkali metal carbonates, such as Na_2CO_3 or K_2CO_3 , alkali metal amides, such as NaNH_2 or lithiumdiisopropylamide, or tertiary amines. When an inorganic base is used, a phase transfer catalyst may be added if it promotes the conversion.

Compounds of the formula I can also be prepared

by starting from the corresponding carboxylic acids, ie. compounds of the formula I in which R¹ is hydroxyl, and first converting them in a conventional manner into an activated form, such as a halide or imidazolid, and then reacting this with the corresponding hydroxy compound. These two steps can also be simplified, for example, by allowing the carboxylic acid to act on the hydroxy compound in the presence of a water-eliminating agent, such as a carbodiimide.

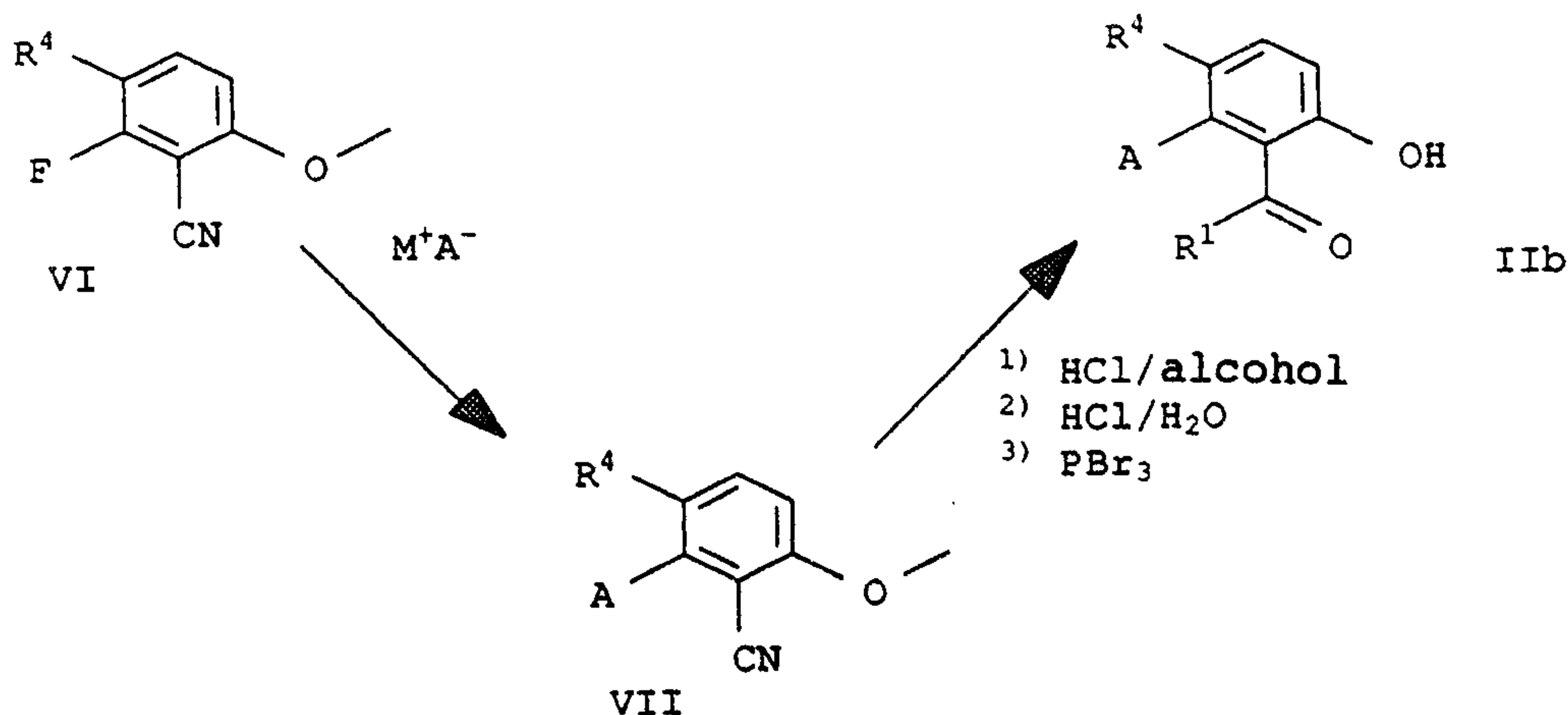
Where X is oxygen and A is a heteroaromatic structure bonded via a carbon atom, the intermediates of the formula III can be synthesized according to the following scheme from a 1,3-dicarbonyl compound IV (where R⁵ is unsubstituted or phenyl-substituted C₁-C₁₀-alkyl, in particular C₁-C₄-alkyl) and an α,β -unsaturated ketone V:



(A is a heteroaromatic or aromatic structure bonded via a carbon atom)

The compounds IV and V are generally known or can be readily prepared by the conventional methods. The abovementioned compounds can be used as the base. Suitable acids are strong acids, for example hydrochloric acid, hydrobromic acid, tetrafluoroboric acid, toluene-sulfonic acid or trifluoroacetic acid. The elimination of hydrogen bromide may be carried out thermally or in the presence of a base, for example of an organic amine.

If, in the formula II, A is a heteroaromatic structure bonded via a nitrogen atom and X is oxygen, this intermediate may be synthesized according to the following scheme:



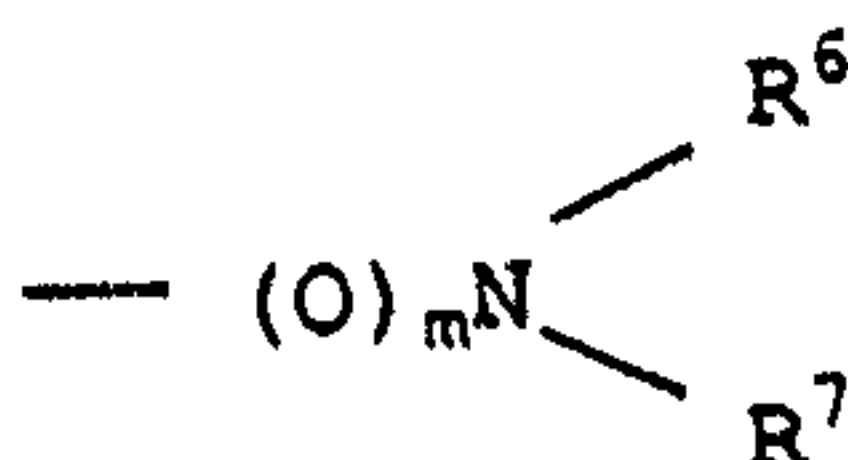
(A is a heteroaromatic structure bonded via N)

M⁺A⁻ is the particular alkali metal azolide. C₁-C₄-Alkyl alcohols are particularly suitable alcohols for the cleavage of the nitrile VII.

5 The intermediates of the formula II which are prepared as described above are usually obtained as alkyl esters. These can be hydrolyzed by the known methods to give the carboxylic acids. The latter can be converted by methods known from the literature into various esters which are required for the preparation of the active ingredients of the formula I as claimed in claim 1.

10 With regard to the herbicidal and plant growth-regulating activity, preferred compounds I are those in which the substituents have the following meanings:

15 R¹ is a radical



where m is 0 or 1 and R⁶ and R⁷ are each hydrogen;

alkyl, in particular methyl, ethyl, propyl, 1-methylethyl, butyl, 1-methylpropyl, 2-methylpropyl, 1,1-dimethylethyl, n-pentyl, 1-methylbutyl, 2-methylbutyl, 3-

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- methylbutyl, 1,2-dimethylpropyl, 2,2-dimethylpropyl, 1-ethylpropyl, n-hexyl, 1-methylpentyl, 2-methylpentyl, 3-methylpentyl, 4-methylpentyl, 1,2-dimethylbutyl, 1,3-dimethylbutyl, 2,3-dimethylbutyl, 1,1-dimethylbutyl, 2,2-dimethylbutyl, 3,3-dimethylbutyl, 1,1,2-trimethylpropyl, 1,2,2-trimethylpropyl, 1-ethylbutyl, 1-ethyl-2-methylpropyl, n-heptyl, 1-methylhexyl, 2-methylhexyl, 3-methylhexyl, 4-methylhexyl, 5-methylhexyl, 1-ethylpentyl, 2-ethylpentyl, 1-propylbutyl or octyl;
- 10 alkenyl, such as 2-propenyl, 2-butenyl, 3-butenyl, 1-methyl-2-propenyl, 2-methyl-2-propenyl, 2-pentenyl, 3-pentenyl, 4-pentenyl, 1-methyl-2-butenyl, 2-methyl-2-butenyl, 3-methyl-2-butenyl, 1-methyl-3-butenyl, 2-methyl-3-butenyl, 3-methyl-3-butenyl, 1,1-dimethyl-2-propenyl, 1,2-dimethyl-2-propenyl, 1-ethyl-2-propenyl, 2-hexenyl, 3-hexenyl, 4-hexenyl, 5-hexenyl, 1-methyl-2-pentenyl, 2-methyl-2-pentenyl, 3-methyl-2-pentenyl, 4-methyl-2-pentenyl, 1-methyl-3-pentenyl, 2-methyl-3-pentenyl, 3-methyl-3-pentenyl, 4-methyl-3-pentenyl, 1-methyl-4-pentenyl, 2-methyl-4-pentenyl, 3-methyl-4-pentenyl, 4-methyl-4-pentenyl, 1,1-dimethyl-2-butenyl, 1,1-dimethyl-3-butenyl, 1,2-dimethyl-3-butenyl, 1,2-dimethyl-3-butenyl, 1,3-dimethyl-2-butenyl, 1,3-dimethyl-3-butenyl, 2,2-dimethyl-3-butenyl, 2,3-dimethyl-2-butenyl, 2,3-dimethyl-3-butenyl, 1-ethyl-2-butenyl, 2-ethyl-2-butenyl, 1-ethyl-3-butenyl, 2-ethyl-3-butenyl, 1,1,2-trimethyl-2-propenyl, 1-ethyl-1-methyl-2-propenyl, 1-ethyl-2-methyl-2-propenyl, in particular 2-propenyl, 2-butenyl, 3-methyl-2-butenyl or 3-methyl-2-pentenyl;
- 30 alkynyl, such as 2-propynyl, 2-butyne, 3-butyne, 1-methyl-2-propynyl, 2-pentyne, 3-pentyne, 4-pentyne, 1-methyl-3-butyne, 2-methyl-3-butyne, 1-methyl-2-butyne, 1,1-dimethyl-2-propynyl, 1-ethyl-2-propynyl, 2-hexynyl, 3-hexynyl, 4-hexynyl, 5-hexynyl, 1-methyl-2-pentyne, 4-methyl-2-pentyne, 1-methyl-3-pentyne, 2-methyl-3-pentyne, 1-methyl-4-pentyne, 2-methyl-4-pentyne, 3-methyl-4-pentyne, 1,1-dimethyl-2-butyne, 1,1-dimethyl-

3-butynyl, 1,2-dimethyl-3-butynyl, 2,2-dimethyl-3-butynyl, 1-ethyl-2-butynyl, 1-ethyl-3-butynyl, 2-ethyl-3-butynyl or 1-ethyl-1-methyl-2-propynyl, preferably 2-propynyl, 2-butynyl, 1-methyl-2-propynyl or 1-methyl-2-butynyl, in particular 2-propyl or 1-methyl-2-propynyl.

The abovementioned alkyl, alkenyl or alkynyl groups may each carry from one to five halogen atoms, preferably fluorine and chlorine and/or one or two of the following radicals:

cyano;

alkoxy of one to four carbon atoms, in particular methoxy, ethoxy, propoxy, 1-methylethoxy, butoxy, 1-methylpropoxy, 2-methylpropoxy or 1,1-dimethylethoxy, preferably methoxy, ethoxy or 1-methylethoxy;

alkenyloxy of one to four carbon atoms, in particular ethenyloxy, propenyloxy, 1-methylethenyloxy, butenyloxy, 1-methylpropenyloxy, 2-methylpropenyloxy or 1,1-dimethylethenyloxy, preferably ethenyloxy or 1-methylethenyloxy;

alkynyloxy of one to four carbon atoms, in particular ethynyloxy, propynyloxy, 1-methylethynyloxy, butynyloxy, 1-methylpropynyloxy, 2-methylpropynyloxy or 1,1-dimethylethynyloxy, preferably ethynyloxy or 1-methylethynyloxy;

alkylthio of one to four carbon atoms, in particular methylthio, ethylthio, propylthio, 1-methylethylthio, butylthio, 1-methylpropylthio, 2-methylpropylthio or 1,1-dimethylethylthio, preferably methylthio, ethylthio or 1-methylethylthio;

alkenylthio of one to four carbon atoms, in particular ethenylthio, propenylthio, 1-methylethenylthio, butenylthio, 1-methylpropenylthio, 2-methylpropenylthio or 1,1-dimethylethenylthio, preferably ethenylthio or 1-methylethenylthio;

alkynylthio of one to four carbon atoms, in particular ethynylthio, propynylthio, 1-methylethynylthio, butynylthio, 1-methylpropynylthio, 2-methylpropynylthio or 1,1-dimethylethynylthio, preferably ethynylthio or 1-methylethynylthio;

haloalkoxy, such as difluoromethoxy, trifluoromethoxy, chlorodifluoromethoxy, dichlorofluoromethoxy, 1-fluoroethoxy, 2-fluoroethoxy, 2,2-difluoroethoxy, 1,1,2,2-tetrafluoroethoxy, 2,2,2-trifluoroethoxy, 2-chloro-1,1,2-trifluoroethoxy or pentafluoroethoxy, in particular difluoromethoxy or trifluoromethoxy;

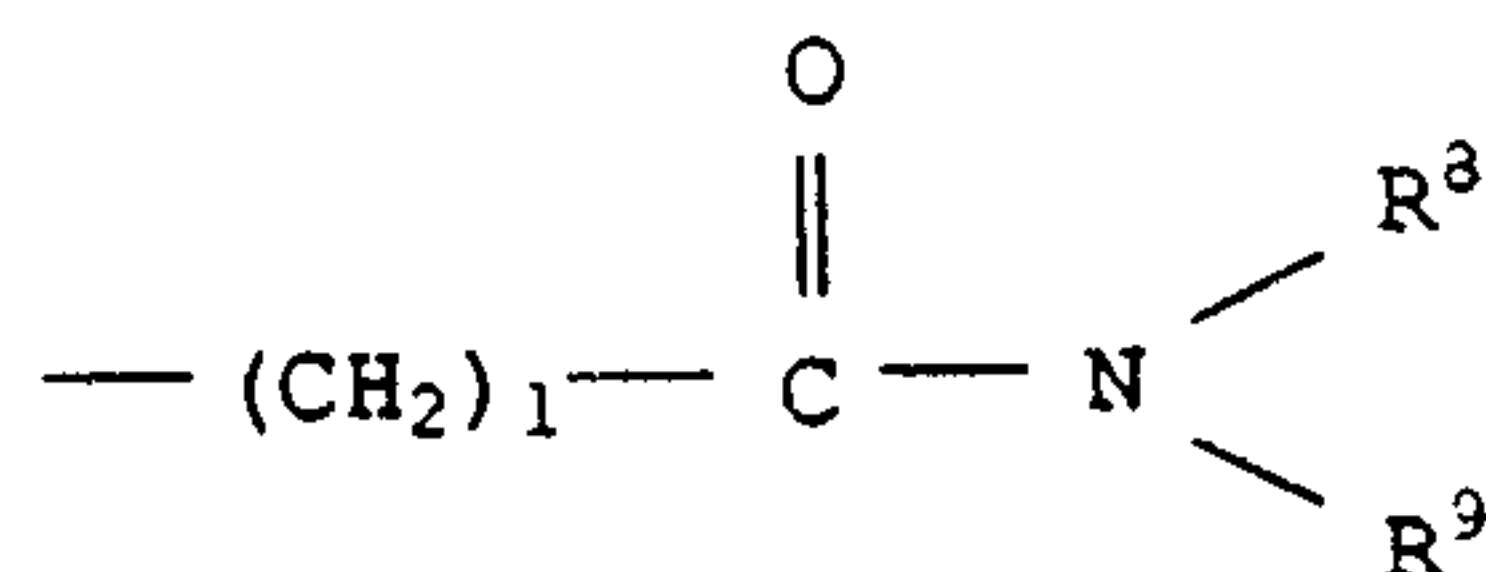
alkylcarbonyl, in particular methylcarbonyl, ethylcarbonyl, propylcarbonyl, 1-methylethylcarbonyl, butylcarbonyl, 1-methylpropylcarbonyl, 1,1-dimethylethylcarbonyl, pentylcarbonyl, 2-methylbutylcarbonyl, 1,1-dimethylpropylcarbonyl, 1,2-dimethylpropylcarbonyl, 2,2-dimethylpropylcarbonyl, 1-ethylpropylcarbonyl, hexylcarbonyl, 1-methylpentylcarbonyl, 2-methylpentylcarbonyl, 3-methylpentylcarbonyl, 4-methylpentylcarbonyl, 1,1-dimethylbutylcarbonyl, 1,2-dimethylbutylcarbonyl, 1,3-dimethylbutylcarbonyl, 2,2-dimethylbutylcarbonyl, 2,3-dimethylbutylcarbonyl, 3,3-dimethylbutylcarbonyl, 1-ethylbutylcarbonyl, 2-ethylbutylcarbonyl, 1,1,2-trimethylpropylcarbonyl, 1,2,2-trimethylpropylcarbonyl, 1-ethyl-1-methylpropylcarbonyl or 1-ethyl-2-methylpropylcarbonyl; alkoxycarbonyl, such as methoxycarbonyl, ethoxycarbonyl, propoxycarbonyl, 1-methylethoxycarbonyl, butoxycarbonyl, 1-methylpropoxycarbonyl, 2-methylpropoxycarbonyl, 1,1-dimethylpropoxycarbonyl, n-pentyloxycarbonyl, 1-methylbutoxycarbonyl, 2-methylbutoxycarbonyl, 3-methylbutoxycarbonyl, 1,2-dimethylpropoxycarbonyl, 1,1-dimethylpropoxycarbonyl, 2,2-dimethylpropoxycarbonyl, 1-ethylpropoxycarbonyl, 1-hexyloxycarbonyl, 1-methylpentenyloxycarbonyl, 2-methylpentenyloxycarbonyl, 3-methylpentenyloxycarbonyl, 4-methylpentenyloxycarbonyl, 1,2-dimethylbutoxycarbonyl, 1,3-dimethylbutoxycarbonyl, 2,3-dimethylbutoxycarbonyl, 1,1-dimethylbutoxycarbonyl, 2,2-dimethylbutoxycarbonyl, 3,3-dimethylbutoxycarbonyl, 1,1,2-trimethylpropoxycarbonyl, 1,2,2-trimethylpropoxycarbonyl, 1-ethylbutoxycarbonyl, 2-ethylbutoxycarbonyl, 1-ethyl-2-methylpropoxycarbonyl, n-heptyloxycarbonyl, 1-methylhexyloxycarbonyl, 2-methylhexyloxycarbonyl,

3-methylhexyloxycarbonyl, 4-methylhexyloxycarbonyl,
5-methylhexyloxycarbonyl, 1-ethylpentenyloxycarbonyl,
1-propylbutoxycarbonyl or octyloxycarbonyl, in particular
methoxycarbonyl, ethoxycarbonyl, 1-methylethoxycarbonyl
5 or 1-methylpropoxycarbonyl;
cycloalkyl, such as cyclopropyl, cyclobutyl, cyclopentyl,
cyclohexyl or cycloheptyl;
dialkylamino, such as dimethylamino, diethylamino,
dipropylamino, di-1-methylethyl, dibutylamino, di-1-
10 methylpropylamino, di-2-methylpropylamino, di-1,1-methyl-
ethylamino, ethylmethylamino, propylmethylamino, 1-
methylethylmethylamino or butylmethylamino;
phenyl, phenoxy or phenylcarbonyl, where these aromatic
radicals in turn may carry from one to five halogen atoms
15 as stated above, in particular fluorine, chlorine and
bromine, and/or from one to three of the following
radicals: alkyl, haloalkyl, alkoxy and/or alkylthio,
each of one to four carbon atoms, as stated above in
general and in particular;
20 C₃-C₁₂-cycloalkyl, in particular C₃-C₆-cycloalkyl, such as
cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl, which
is unsubstituted or substituted by one to three C₁-C₄-
alkyl radicals;
phenyl which is unsubstituted or monosubstituted to
25 trisubstituted by C₁-C₄-alkyl or C₁-C₄-alkoxy, such as
methyl, ethyl, propyl, butyl, methoxy or ethoxy or phenyl
which is substituted by one to five halogen atoms, eg.
chlorine or fluorine;
R⁶ and R⁷ together form an alkylene group which is closed
30 to form a ring, or together form an alkylene group which
has a hetero atom and is closed to form a ring, the ring
preferably having from five to seven members and the
hetero atom being oxygen, nitrogen or sulfur, and the
ring thus formed carries one or more of the radicals
35 stated under unsubstituted or substituted.

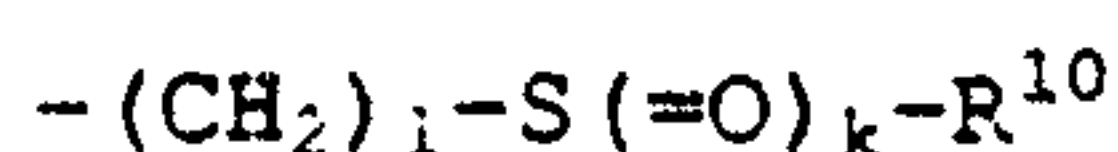
The following radicals may be mentioned in
particular for the group -NR⁶R⁷: dimethylamino,

tertbutylamino, cyclohexylamino, 1-cyano-1-cyclohexyl-
amino, isopropylamino, sec-butylamino, methylamino,
diethylamino, 1-pyrrolidinyl, 1-piperidyl, 4-morpholinyl,
phenylamino, methylphenylamino, methoxymethylamino, bis-
5 (methoxymethyl)-amino or methylthiomethylamino;

a radical



where 1 is from 1 to 4, preferably 1 or 2, and R^8 and R^9
are each alkyl, alkenyl or alkynyl as stated above;
a radical



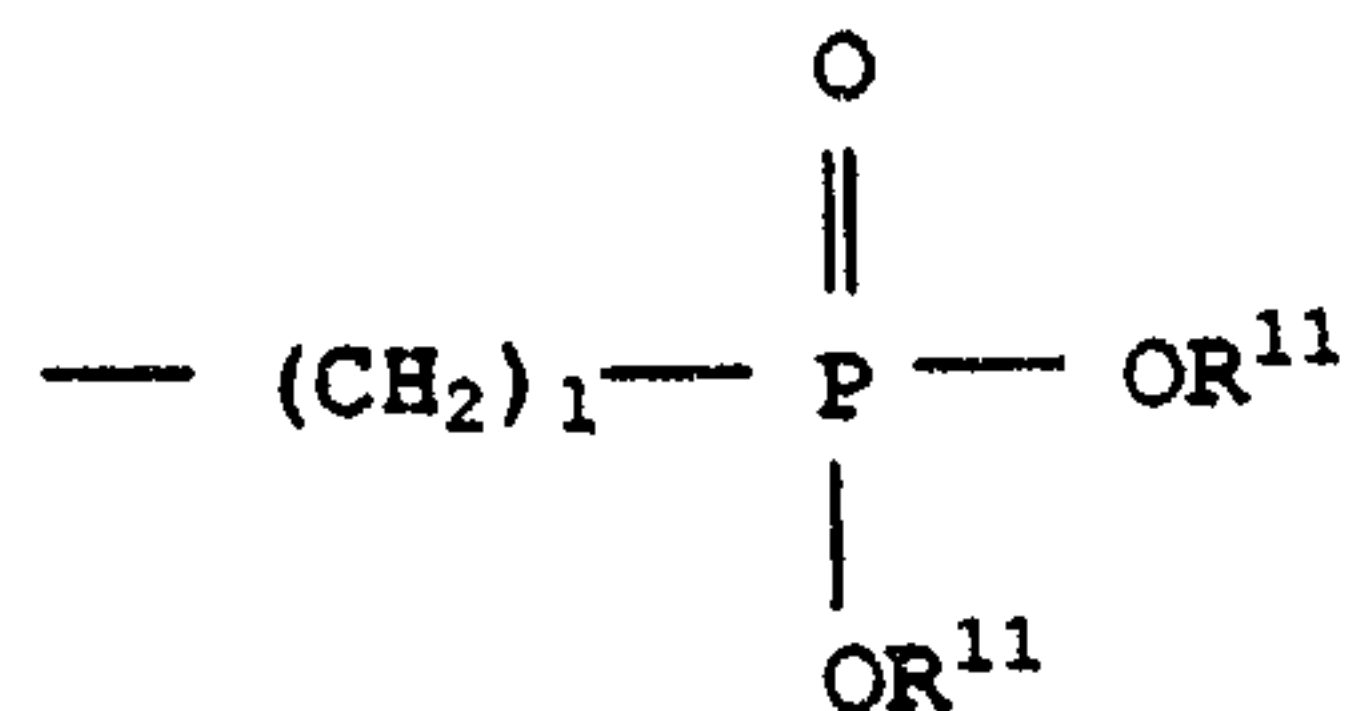
10 where 1 is from 1 to 4, preferably 1 or 2, and R^{10} is
alkyl, alkenyl or alkynyl as stated above;

a radical OR^5 , where

R^5 is a 5-membered hetaryl which has from one to four
nitrogen atoms in the ring, is bonded via a nitrogen atom
and may carry from one to four of the radicals stated

15 under unsubstituted or substituted. Particular examples
are 1-pyrazolyl, 3-methyl-1-pyrazolyl, 4-methyl-1-
pyrazolyl, 3,5-dimethyl-1-pyrazolyl, 3-phenyl-1-
pyrazolyl, 4-phenyl-1-pyrazolyl, 4-chloro-1-pyrazolyl,
4-bromo-1-pyrazolyl, 4-iodo-1-pyrazolyl, 1-imidazolyl,
20 1-benzoimidazolyl, 1,2,4-triazol-1-yl, 3-methyl-1,2,4-
triazol-1-yl, 5-methyl-1,2,4-triazol-1-yl or 1-benzo-
triazolyl,

or a group



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where l is from 1 to 4, preferably 1 or 2, and R^{11} is alkyl, alkenyl or alkynyl as stated for R^6 and R^7 , a radical



5 where R^{12} has the following meanings:

$\text{C}_1\text{-C}_6\text{-alkyl}$ which may carry from one to four of the following substituents: halogen, nitro, cyano or $\text{C}_1\text{-C}_6\text{-alkyl}$, particular examples being methyl, cyanomethyl, ethyl, 2-nitroethyl, propyl, 1-methylethyl, butyl, 1-methylpropyl, 2-methylpropyl, 1,1-dimethylethyl, n-pentyl, 1-methylbutyl, 2-methylbutyl, 3-methylbutyl, 1,2-dimethylpropyl, 2,2-dimethylpropyl, 1-ethylpropyl, n-hexyl, 1-methylpentyl, 2-methylpentyl, 3-methylpentyl, 4-methylpentyl, 1,2-dimethylbutyl, 1,3-dimethylbutyl, 2,3-dimethylbutyl, 1,1-dimethylbutyl, 2,2-dimethylbutyl, 3,3-dimethylbutyl, 1,1,2-trimethylpropyl, 1,2,2-trimethylpropyl, 1-ethylbutyl or 1-ethyl-2-methylpropyl;

phenyl which may carry from one to four of the following substituents: halogen, nitro, cyano or $\text{C}_1\text{-C}_6\text{-alkyl}$, particular examples being 2-fluorophenyl, 3-fluorophenyl, 4-fluorophenyl, 2,6-difluorophenyl, 2,4-difluorophenyl, 2,3-difluorophenyl, 2-fluoro-4-trifluoromethylphenyl, 2-chlorophenyl, 3-chlorophenyl, 2-bromophenyl, 2-iodophenyl, 2-chloro-6-fluorophenyl, 2,4-dichlorophenyl, 2,6-dichlorophenyl, 3,5-dichlorophenyl, 2-chloro-4-fluorophenyl, 2-chloro-6-methylphenyl, 2,3,5-trichlorophenyl, 2-methylphenyl, 3-methylphenyl, 4-methylphenyl, 2,6-dimethylphenyl, 2,4-dimethylphenyl, 3,5-dimethylphenyl, 2,4,6-trimethylphenyl, 2-chloro-4-methylphenyl, 2-trifluoromethylphenyl, 3-trifluoromethylphenyl, 2-cyanophenyl, 3-cyanophenyl, 4-cyanophenyl, 2-nitrophenyl, 3-nitrophenyl or 4-nitrophenyl;

R^2 and R^3 are each in general and in particular the alkyl, haloalkyl, alkoxy, haloalkoxy and/or alkylthio groups stated for R^6 and R^7 , each of one to four carbon atoms, in particular methyl, trifluoromethyl, methoxy, difluoromethoxy or methylthio;

R⁴ is hydrogen; halogen, in particular fluorine or chlorine, cyano; alkyl of one to four, in particular one to three, carbon atoms which is monosubstituted to pentasubstituted by halogen, in particular fluorine or chlorine. Examples are methyl, ethyl, n-propyl, isopropyl, trichloromethyl and trifluoromethyl.

A is unsubstituted or substituted 5-membered hetaryl having from one to four nitrogen atoms, such as pyrrolyl, pyrazolyl, imidazolyl, 1,2,3-triazolyl, 1,2,4-triazolyl or tetrazolyl, or having one or two nitrogen atoms and in addition one sulfur or oxygen atom, such as isoxazolyl, oxazolyl, thiazolyl or thiadiazolyl; examples of hetaryl radicals are the following:

pyrrol-1-yl, 2-methylpyrrol-1-yl, 3-methylpyrrol-1-yl, 1-methylpyrrol-2-yl, 1-methylpyrrol-3-yl, pyrazol-1-yl, 4-methylpyrazol-1-yl, 3,5-dimethylpyrazol-1-yl, 3,4,5-trimethylpyrazol-1-yl, 4-chloropyrazol-1-yl, 4-phenylpyrazolyl-1-yl, 4-nitropyrazol-1-yl, imidazol-1-yl, 4,5-dimethylimidazol-1-yl, 2-methyl-4,5-dichloroimidazol-1-yl, 4-nitroimidazol-1-yl, 5-nitroimidazol-1-yl, 1,2,4-triazol-1-yl, 3(5)-methyl-1,2,4-triazol-1-yl, 1,2,3-triazol-1-yl, 4,5-dimethyl-1,2,3-triazol-1-yl, 1,2,3,4-tetrazol-1-yl, 1-methylpyrazol-4-yl, 1-phenylpyrazol-4-yl, 1,3,5-trimethylpyrazol-4-yl, 1-methylpyrazol-5-yl, 1-phenylpyrazol-5-yl, 1-methylpyrazol-3-yl, 1-phenylpyrazol-3-yl, 1-methylimidazol-2-yl, 1-methylimidazol-5-yl, 1-phenylimidazol-5-yl, 1-phenyl-1,2,3-triazol-4-yl, isoxazol-5-yl, isoxazol-4-yl, 4-methylisoxazol-5-yl, 3-isopropylisoxazol-5-yl, 3-phenylisoxazol-5-yl, oxazol-2-yl, 2-methyloxazol-4-yl, thiazol-4-yl, 4-methylthiazol-2-yl, 4-methylthiazol-5-yl, 2-phenylthiazol-5-yl and 4-phenylthiazol-2-yl;

unsubstituted or substituted benzofused hetaryl having from one to three nitrogen atoms or one nitrogen atom and one oxygen or sulfur atom in the ring, for example indolyl, indazolyl, benzotriazolyl, benzoxazolyl, benzoisoxazolyl or benzothiazolyl;

unsubstituted or substituted thienyl radicals or benzo-thienyl radicals are, for example, 2-thienyl, 3-thienyl, 2-chloro-5-thienyl, 4-bromo-2-thienyl, 2-nitro-5-thienyl, 2-benzothienyl and 3-benzothienyl; and

5 unsubstituted or substituted naphthyl or quinolyl radicals are, for example, 1-naphthyl, 2-naphthyl, 2-chloro-1-naphthyl, 6-chloro-1-naphthyl, 2,6-dichloro-1-naphthyl, 2-methyl-6-chloro-1-naphthyl, 2-quinolyl, 4-quinolyl, 6-quinolyl, 8-quinolyl and 6-methyl-2-quinolyl.

10 If a radical is referred to as unsubstituted or substituted, it may carry one or more, in particular from one to three, of the following substituents: halogen, in particular chlorine or bromine, nitro, cyano or alkyl, haloalkyl, alkoxy or alkylthio as stated for R^6 and R^7 .

15 Particularly preferred compounds of the formula I are those in which

R^2 and R^3 are each methoxy, methyl, difluoromethoxy or chlorine,

R^4 is hydrogen or methyl and

20 R^6 and R^7 are each hydrogen, methyl or a C_4 - or C_5 -alkylene chain

and in which X is oxygen, Y is nitrogen and Z is a methine group and A has the meanings stated in the claim.

The structures given in the tables below describe particularly preferred active ingredients of the formula I.

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₂ C=CH	CH ₂ C=CH	O	CH	1-Pyrrolyl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	1-Pyrrolyl	
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	1-Pyrrolyl	
CH ₂ CO ₂ CH ₃	CH ₂ CO ₂ CH ₃	O	CH	1-Pyrrolyl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	1-Pyrrolyl	
CH ₂ CN	CH ₂ CN	O	CH	1-Pyrrolyl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	1-Pyrrolyl	
H	Cyclohexyl	O	CH	1-Pyrrolyl	
H	CH ₂ C ₆ H ₅	O	CH	1-Pyrrolyl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	1-Pyrrolyl	
CH ₃	C ₆ H ₅	O	CH	1-Pyrrolyl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	1-Pyrrolyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1-Pyrrolyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1-Pyrrolyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1-Pyrrolyl	
	-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	1-Pyrrolyl	
CH ₃	CH ₃	S	CH	1-Pyrrolyl	
CH ₃	CH ₃	O	N	1-Methyl-pyrrol-2-yl	
CH ₃	CH ₃	O	CH	1-Methyl-pyrrol-2-yl	
CH ₃	CH ₃	S	CH	1-Methyl-pyrrol-2-yl	
CH ₃	CH ₃	O	N	1-Methyl-pyrrol-3-yl	
CH ₃	CH ₃	O	CH	1-Methyl-pyrrol-3-yl	

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R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	CH ₃	S	CH	1-Methyl-pyrrol-3-yl	
CH ₃	CH ₃	O	CH	1-Indolyl	
CH ₃	CH ₃	O	CH	1-Methyl-indol-2-yl	
CH ₃	CH ₃	O	CH	1-Methyl-indol-3-yl	
CH ₃	CH ₃	O	CH	3-Methyl-indol-1-yl	
CH ₃	CH ₃	O	CH	3,5-Dimethyl-pyrrol-1-yl	
CH ₃	CH ₃	O	CH	3-Methylpyrrol-1-yl	
CH ₃	CH ₃	O	CH	4-Methylpyrrol-1-yl	
CH ₃	CH ₃	O	CH	4-chloropyrrol-1-yl	
CH ₃	CH ₃	O	CH	4-bromopyrrol-1-yl	
CH ₃	CH ₃	O	CH	4-Phenylpyrrol-1-yl	
CH ₃	CH ₃	O	CH	3,4,5-Trimethyl-pyrrol-1-yl	
CH ₃	CH ₃	O	CH	4-chloro-3,5-dimethyl-pyrrol-1-yl	
CH ₃	CH ₃	O	CH	4-Isopropylpyrrol-1-yl	
CH ₃	CH ₃	O	CH	3-Phenylpyrrol-1-yl	
CH ₃	CH ₃	O	CH	3-Methyl-5-phenyl-pyrrol-1-yl	
CH ₃	CH ₃	O	CH	3,5-Bis(trifluoromethyl)-pyrrol-1-yl	
CH ₃	CH ₃	O	CH	4-Nitropyrrol-1-yl	
CH ₃	CH ₃	O	CH	1-Phenylpyrrol-3-yl	
CH ₃	CH ₃	O	CH	1,3,5-Trimethyl-pyrrol-4-yl	
CH ₃	CH ₃	O	CH	1-Phenylpyrrol-2-yl	
CH ₃	CH ₃	O	CH	1-Phenylpyrrol-3-yl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	CH ₃	O	CH	1,4-Dimethylpyrrol-3-yl	
CH ₃	CH ₃	O	CH	5-Methyl-1-phenyl-pyrrol-3-yl	
CH ₃	CH ₃	O	CH	1,5-Dimethylpyrrol-3-yl	
CH ₃	CH ₃	O	CH	1,3-Dimethylpyrrol-4-yl	
CH ₃	CH ₃	O	CH	1,5-Dimethylpyrrol-3-yl	
CH ₃	CH ₃	O	CH	3-Methyl-1-phenyl-pyrrol-4-yl	
CH ₃	CH ₃	O	CH	5-Methyl-1-phenyl-pyrrol-2-yl	
CH ₃	CH ₃	O	CH	3,5-Dimethyl-1-phenyl-pyrrol-4-yl	
CH ₃	CH ₃	O	CH	3-Methyl-1-phenyl-pyrrol-5-yl	
CH ₃	CH ₃	O	CH	1,4-Dimethylpyrrol-5-yl	
CH ₃	CH ₃	O	CH	1,3-Dimethylpyrrol-5-yl	
CH ₃	CH ₃	O	N	2-Thienyl	
CH ₃	CH ₃	O	CH	2-Thienyl	
H	H	O	CH	2-Thienyl	
CH ₃	H	O	CH	2-Thienyl	
CH ₃	C ₂ H ₅	O	CH	2-Thienyl	
C ₂ H ₅	C ₂ H ₅	O	CH	2-Thienyl	
H	n-C ₃ H ₇	O	CH	2-Thienyl	
n-C ₃ H ₇	n-C ₃ H ₇	O	CH	2-Thienyl	
H	i-C ₃ H ₇	O	CH	2-Thienyl	
H	n-C ₄ H ₉	O	CH	2-Thienyl	
H	t-C ₄ H ₉	O	CH	2-Thienyl	

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R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₂ CH=CH ₂	CH ₂ CH=CH ₂	O	CH	2-Thienyl	
CH ₂ C=CH	CH ₂ C=CH	O	CH	2-Thienyl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	2-Thienyl	
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	2-Thienyl	
CH ₂ CO ₂ CH ₃	CH ₂ CO ₂ CH ₃	O	CH	2-Thienyl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	2-Thienyl	
CH ₂ CN	CH ₂ CN	O	CH	2-Thienyl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	2-Thienyl	
H	Cyclohexyl	O	CH	2-Thienyl	
H	CH ₂ C ₆ H ₅	O	CH	2-Thienyl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	2-Thienyl	
CH ₃	C ₆ H ₅	O	CH	2-Thienyl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	2-Thienyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Thienyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Thienyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Thienyl	
	-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	2-Thienyl	
CH ₃	CH ₃	S	CH	2-Thienyl	
CH ₃	CH ₃	O	N	3-Thienyl	
CH ₃	CH ₃	O	CH	3-Thienyl	
H	H	O	CH	3-Thienyl	
CH ₃	H	O	CH	3-Thienyl	

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R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	C ₂ H ₅	O	CH	3-Thienyl	
C ₂ H ₅	C ₂ H ₅	O	CH	3-Thienyl	
H	n-C ₃ H ₇	O	CH	3-Thienyl	
n-C ₃ H ₇	n-C ₃ H ₇	O	CH	3-Thienyl	
H	i-C ₃ H ₇	O	CH	3-Thienyl	
H	n-C ₄ H ₉	O	CH	3-Thienyl	
H	t-C ₄ H ₉	O	CH	3-Thienyl	
CH ₂ CH=CH ₂	CH ₂ CH=CH ₂	O	CH	3-Thienyl	
CH ₂ C=CH	CH ₂ C=CH	O	CH	3-Thienyl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	3-Thienyl	
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	3-Thienyl	
CH ₂ CO ₂ CH ₃	CH ₂ CO ₂ CH ₃	O	CH	3-Thienyl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	3-Thienyl	
CH ₂ CN	CH ₂ CN	O	CH	3-Thienyl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	3-Thienyl	
H	Cyclohexyl	O	CH	3-Thienyl	
H	CH ₂ C ₆ H ₅	O	CH	3-Thienyl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	3-Thienyl	
CH ₃	C ₆ H ₅	O	CH	3-Thienyl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	3-Thienyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	3-Thienyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	3-Thienyl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	3-Thienyl	
	-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	3-Thienyl	
5	CH ₃	S	CH	3-Thienyl	
	CH ₃	O	CH	2,3-Dichloro-4-thienyl	
	CH ₃	O	CH	2,5-Dichloro-3-thienyl	
	CH ₃	O	CH	2-bromo-5-thienyl	
10	CH ₃	O	CH	4-bromo-2-thienyl	
	CH ₃	O	CH	3-Methyl-2-thienyl	
	CH ₃	O	CH	2-chloro-5-thienyl	
	CH ₃	O	CH	2-Methyl-5-thienyl	
15	CH ₃	O	CH	2-Nitro-5-thienyl	
	CH ₃	O	N	Benzthien-2-yl	
	CH ₃	O	CH	Benzthien-2-yl	
	CH ₃	S	CH	Benzthien-2-yl	
20	CH ₃	O	N	Benzthien-3-yl	
	CH ₃	O	CH	Benzthien-3-yl	
	CH ₃	S	CH	Benzthien-3-yl	
	CH ₃	O	N	2-Furanyl	
	CH ₃	O	CH	2-Furanyl	
25	CH ₃	S	CH	2-Furanyl	
	H	O	CH	2-Furanyl	
	H	O	CH	2-Furanyl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	C ₂ H ₅	O	CH	2-Furanyl	
C ₂ H ₅	C ₂ H ₅	O	CH	2-Furanyl	
H	n-C ₃ H ₇	O	CH	2-Furanyl	
n-C ₃ H ₇	n-C ₃ H ₇	O	CH	2-Furanyl	
H	i-C ₃ H ₇	O	CH	2-Furanyl	
H	n-C ₄ H ₉	O	CH	2-Furanyl	
H	t-C ₄ H ₉	O	CH	2-Furanyl	
CH ₂ CH=CH ₂	CH ₂ CH=CH ₂	O	CH	2-Furanyl	
CH ₂ C=CH	CH ₂ C=CH	O	CH	2-Furanyl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	2-Furanyl	
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	2-Furanyl	
CH ₂ CO ₂ CH ₃	CH ₂ CO ₂ CH ₃	O	CH	2-Furanyl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	2-Furanyl	
CH ₂ CN	CH ₂ CN	O	CH	2-Furanyl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	2-Furanyl	
H	Cyclohexyl	O	CH	2-Furanyl	
H	CH ₂ C ₆ H ₅	O	CH	2-Furanyl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	2-Furanyl	
CH ₃	C ₆ H ₅	O	CH	2-Furanyl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	2-Furanyl	
	-CH ₂ CH ₂ CH ₂ -	O	CH	2-Furanyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Furanyl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Furanyl	
	-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	2-Furanyl	
5	CH ₃	O	N	3-Furanyl	
	CH ₃	O	CH	3-Furanyl	
	CH ₃	S	CH	3-Furanyl	
	H	O	CH	3-Furanyl	
10	CH ₃	O	CH	3-Furanyl	
	CH ₃	O	CH	3-Furanyl	
	C ₂ H ₅	O	CH	3-Furanyl	
	C ₂ H ₅	O	CH	3-Furanyl	
	n-C ₃ H ₇	O	CH	3-Furanyl	
15	n-C ₃ H ₇	O	CH	3-Furanyl	
	H	O	CH	3-Furanyl	
	H	O	CH	3-Furanyl	
	H	O	CH	3-Furanyl	
	CH ₂ CH=CH ₂	O	CH	3-Furanyl	
20	CH ₂ C=CH	O	CH	3-Furanyl	
	CH ₂ CH ₂ Cl	O	CH	3-Furanyl	
	(CH ₂) ₂ OCH ₃	O	CH	3-Furanyl	
	CH ₂ CO ₂ CH ₃	O	CH	3-Furanyl	
25	CH ₃	O	CH	3-Furanyl	
	CH ₂ CN	O	CH	3-Furanyl	
	CH ₂ CH ₂ CN	O	CH	3-Furanyl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
H	Cyclohexyl	O	CH	3-Furanyl	
H	CH ₂ C ₆ H ₅	O	CH	3-Furanyl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	3-Furanyl	
CH ₃	C ₆ H ₅	O	CH	3-Furanyl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	3-Furanyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	3-Furanyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	3-Furanyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	3-Furanyl	
	-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	3-Furanyl	
CH ₃	CH ₃	O	CH	2,3-Dichloro-4-furanyl	
CH ₃	CH ₃	O	CH	2,5-Dichloro-3-furanyl	
CH ₃	CH ₃	O	CH	2-bromo-5-furanyl	
CH ₃	CH ₃	O	CH	4-bromo-2-furanyl	
CH ₃	CH ₃	O	CH	3-Methyl-2-furanyl	
CH ₃	CH ₃	O	CH	2-chloro-5-furanyl	
CH ₃	CH ₃	O	CH	2-Methyl-5-furanyl	
CH ₃	CH ₃	O	CH	2-Nitro-5-furanyl	
CH ₃	CH ₃	O	N	Benzofuran-2-yl	
CH ₃	CH ₃	O	CH	Benzofuran-2-yl	
CH ₃	CH ₃	S	CH	Benzofuran-2-yl	
CH ₃	CH ₃	O	N	Benzofuran-3-yl	
CH ₃	CH ₃	O	CH	Benzofuran-3-yl	

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R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	CH ₃	S	CH	Benzofuran-3-yl	
CH ₃	CH ₃	O	N	1-Pyrazolyl	
CH ₃	CH ₃	O	CH	1-Pyrazolyl	
H	H	O	CH	1-Pyrazolyl	
CH ₃	H	O	CH	1-Pyrazolyl	
CH ₃	C ₂ H ₅	O	CH	1-Pyrazolyl	
C ₂ H ₅	C ₂ H ₅	O	CH	1-Pyrazolyl	
H	n-C ₃ H ₇	O	CH	1-Pyrazolyl	
n-C ₃ H ₇	n-C ₃ H ₇	O	CH	1-Pyrazolyl	
H	i-C ₃ H ₇	O	CH	1-Pyrazolyl	
H	n-C ₄ H ₉	O	CH	1-Pyrazolyl	
H	t-C ₄ H ₉	O	CH	1-Pyrazolyl	
CH ₂ CH=CH ₂	CH ₂ CH=CH ₂	O	CH	1-Pyrazolyl	
CH ₂ C=CH	CH ₂ C=CH	O	CH	1-Pyrazolyl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	1-Pyrazolyl	
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	1-Pyrazolyl	
CH ₂ CO ₂ CH ₃	CH ₂ CO ₂ CH ₃	O	CH	1-Pyrazolyl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	1-Pyrazolyl	
CH ₂ CN	CH ₂ CN	O	CH	1-Pyrazolyl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	1-Pyrazolyl	
H	Cyclohexyl	O	CH	1-Pyrazolyl	
H	CH ₂ C ₆ H ₅	O	CH	1-Pyrazolyl	

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R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	CH ₃	O	CH	4-chloropyrazol-1-yl	
CH ₃	CH ₃	O	CH	4-bromopyrazol-1-yl	
CH ₃	CH ₃	O	CH	4-Phenylpyrazol-1-yl	
CH ₃	CH ₃	O	CH	3,4,5-Trimethylpyrazol-1-yl	
CH ₃	CH ₃	O	CH	4-chloro-3,5-dimethylpyrazol-1-yl	
CH ₃	CH ₃	O	CH	4-Isopropylpyrazol-1-yl	
CH ₃	CH ₃	O	CH	3(5)-Phenylpyrazol-1-yl	
CH ₃	CH ₃	O	CH	3(5)-Methyl-5(3)-phenylpyrazol-1-yl	
CH ₃	CH ₃	O	CH	3,5-Bis(trifluoromethyl)pyrazol-1-yl	
CH ₃	CH ₃	O	CH	4-Nitropyrazol-1-yl	
CH ₃	CH ₃	O	CH	1-Phenylpyrazol-4-yl	
CH ₃	CH ₃	O	CH	1,3,5-Trimethylpyrazol-4-yl	
CH ₃	CH ₃	O	CH	1-Phenylpyrazol-5-yl	
CH ₃	CH ₃	O	CH	1-Phenylpyrazol-3-yl	
CH ₃	CH ₃	O	CH	1,4-Dimethylpyrazol-3-yl	
CH ₃	CH ₃	O	CH	5-Methyl-1-phenylpyrazol-3-yl	
CH ₃	CH ₃	O	CH	1,5-Dimethylpyrazol-3-yl	
CH ₃	CH ₃	O	CH	1,3-Dimethylpyrazol-4-yl	
CH ₃	CH ₃	O	CH	1,5-Dimethylpyrazol-4-yl	
CH ₃	CH ₃	O	CH	-Methyl-1-phenylpyrazol-4-yl	
CH ₃	CH ₃	O	CH	5-Methyl-1-phenylpyrazol-4-yl	
CH ₃	CH ₃	O	CH	3,5-Dimethyl-1-phenylpyrazol-4-yl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	CH ₃	O	CH	3-Methyl-1-phenylpyrazol-5-yl	
CH ₃	CH ₃	O	CH	1,4-Dimethylpyrazol-5-yl	
CH ₃	CH ₃	O	CH	1,3-Dimethylpyrazol-5-yl	
CH ₃	CH ₃	O	CH	1-Imidazolyl	
CH ₃	CH ₃	O	CH	1-Imidazolyl	
H	H	O	CH	1-Imidazolyl	
CH ₃	H	O	CH	1-Imidazolyl	
CH ₃	C ₂ H ₅	O	CH	1-Imidazolyl	
C ₂ H ₅	C ₂ H ₅	O	CH	1-Imidazolyl	
H	n-C ₃ H ₇	O	CH	1-Imidazolyl	
n-C ₃ H ₇	n-C ₃ H ₇	O	CH	1-Imidazolyl	
H	i-C ₃ H ₇	O	CH	1-Imidazolyl	
H	n-C ₄ H ₉	O	CH	1-Imidazolyl	
H	t-C ₄ H ₉	O	CH	1-Imidazolyl	
CH ₂ CH=CH ₂	CH ₂ CH=CH ₂	O	CH	1-Imidazolyl	
CH ₂ C=CH	CH ₂ C=CH	O	CH	1-Imidazolyl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	1-Imidazolyl	
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	1-Imidazolyl	
CH ₂ CO ₂ CH ₃	CH ₂ CO ₂ CH ₃	O	CH	1-Imidazolyl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	1-Imidazolyl	
CH ₂ CN	CH ₂ CN	O	CH	1-Imidazolyl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	1-Imidazolyl	

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R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
H	Cyclohexyl	O	CH	1-Imidazolyl	
H	CH ₂ C ₆ H ₅	O	CH	1-Imidazolyl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	1-Imidazolyl	
CH ₃	C ₆ H ₅	O	CH	1-Imidazolyl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	1-Imidazolyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1-Imidazolyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1-Imidazolyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1-Imidazolyl	
	-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	1-Imidazolyl	
CH ₃	CH ₃	S	CH	1-Imidazolyl	
CH ₃	CH ₃	O	N	1-Methyl-imidazol-2-yl	
CH ₃	CH ₃	O	CH	1-Methyl-imidazol-2-yl	
CH ₃	CH ₃	S	CH	1-Methyl-imidazol-2-yl	
CH ₃	CH ₃	O	N	1-Methyl-imidazol-4-yl	
CH ₃	CH ₃	O	CH	1-Methyl-imidazol-4-yl	
CH ₃	CH ₃	S	CH	1-Methyl-imidazol-4-yl	
CH ₃	CH ₃	O	N	1-Methyl-imidazol-5-yl	
CH ₃	CH ₃	O	CH	1-Methyl-imidazol-5-yl	
CH ₃	CH ₃	S	CH	1-Methyl-imidazol-5-yl	
CH ₃	CH ₃	O	CH	1-Methyl-imidazol-5-yl	
CH ₃	CH ₃	S	CH	1-Methyl-imidazol-5-yl	
CH ₃	CH ₃	O	CH	Benzimidazol-1-yl	
CH ₃	CH ₃	O	CH	1-Methyl-benz-imidazol-2-yl	
CH ₃	CH ₃	O	CH	4,5-Dimethylimidazol-1-yl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	CH ₃	O	CH	2-Phenylimidazol-1-yl	
CH ₃	CH ₃	O	CH	4,5-Dichloroimidazol-1-yl	
CH ₃	CH ₃	O	CH	2,4,5-Trichloroimidazol-1-yl	
CH ₃	CH ₃	O	CH	2-Methyl-4,5-dichloroimidazol-1-yl	
CH ₃	CH ₃	O	CH	2-Methyl-4,5-dibromoimidazol-1-yl	
CH ₃	CH ₃	O	CH	4(5)-chloro-5(4)-methylimidazol-1-yl	
CH ₃	CH ₃	O	CH	4(5)-Nitroimidazol-1-yl	
CH ₃	CH ₃	O	CH	1,4-Dimethyl-imidazol-5-yl	
CH ₃	CH ₃	O	CH	1-Methyl-5-nitro-imidazol-2-yl	
CH ₃	CH ₃	O	CH	1-Phenylimidazol-5-yl	
CH ₃	CH ₃	O	N	1,2,3-Triazol-1-yl	
CH ₃	CH ₃	O	CH	1,2,3-Triazol-1-yl	
CH ₃	CH ₃	S	CH	1,2,3-Triazol-1-yl	
H	H	O	CH	1,2,3-Triazol-1-yl	
CH ₃	H	O	CH	1,2,3-Triazol-1-yl	
CH ₃	C ₂ H ₅	O	CH	1,2,3-Triazol-1-yl	
C ₂ H ₅	C ₂ H ₅	O	CH	1,2,3-Triazol-1-yl	
H	n-C ₃ H ₇	O	CH	1,2,3-Triazol-1-yl	
n-C ₃ H ₇	n-C ₃ H ₇	O	CH	1,2,3-Triazol-1-yl	
H	i-C ₃ H ₇	O	CH	1,2,3-Triazol-1-yl	
H	n-C ₄ H ₉	O	CH	1,2,3-Triazol-1-yl	
H	t-C ₄ H ₉	O	CH	1,2,3-Triazol-1-yl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₂ CH=CH ₂	CH ₂ CH=CH ₂	O	CH	1,2,3-Triazol-1-yl	
CH ₂ C=CH	CH ₂ C=CH	O	CH	1,2,3-Triazol-1-yl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	1,2,3-Triazol-1-yl	
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	1,2,3-Triazol-1-yl	
CH ₂ CO ₂ CH ₃	CH ₂ CO ₂ CH ₃	O	CH	1,2,3-Triazol-1-yl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	1,2,3-Triazol-1-yl	
CH ₂ CN	CH ₂ CN	O	CH	1,2,3-Triazol-1-yl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	1,2,3-Triazol-1-yl	
H	Cyclohexyl	O	CH	1,2,3-Triazol-1-yl	
H	CH ₂ C ₆ H ₅	O	CH	1,2,3-Triazol-1-yl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	1,2,3-Triazol-1-yl	
CH ₃	C ₆ H ₅	O	CH	1,2,3-Triazol-1-yl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	1,2,3-Triazol-1-yl	
	-CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1,2,3-Triazol-1-yl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1,2,3-Triazol-1-yl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1,2,3-Triazol-1-yl	
	-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	1,2,3-Triazol-1-yl	
CH ₃	CH ₃	O	CH	1-Methyl-1,2,3-triazol-4-yl	
CH ₃	CH ₃	O	CH	1-Methyl-1,2,3-triazol-4-yl	
CH ₃	CH ₃	S	CH	1-Methyl-1,2,3-triazol-4-yl	
CH ₃	CH ₃	O	N	1-Methyl-1,2,3-triazol-5-yl	
CH ₃	CH ₃	O	CH	1-Methyl-1,2,3-triazol-5-yl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	CH ₃	S	CH	1-Methyl-1,2,3-triazol-5-yl	
CH ₃	CH ₃	O	CH	Benz-1,2,3-triazol-1-yl	
CH ₃	CH ₃	O	CH	4,5-Dimethyl-1,2,3-triazol-1-yl	
CH ₃	CH ₃	O	CH	4(5)-Phenyl-1,2,3-triazol-1-yl	
CH ₃	CH ₃	O	CH	1-Phenyl-1,2,3-triazol-4-yl	
CH ₃	CH ₃	O	CH	1-Phenyl-1,2,3-triazol-4-yl	
CH ₃	CH ₃	O	CH	5-Methyl-1-phenyl-1,2,3-triazol-4-yl	
CH ₃	CH ₃	O	N	1,2,4-Triazol-1-yl	
CH ₃	CH ₃	O	CH	1,2,4-Triazol-1-yl	
CH ₃	CH ₃	S	CH	1,2,4-Triazol-1-yl	
H	H	O	CH	1,2,4-Triazol-1-yl	
CH ₃	H	O	CH	1,2,4-Triazol-1-yl	
CH ₃	C ₂ H ₅	O	CH	1,2,4-Triazol-1-yl	
C ₂ H ₅	C ₂ H ₅	O	CH	1,2,4-Triazol-1-yl	
H	n-C ₃ H ₇	O	CH	1,2,4-Triazol-1-yl	
n-C ₃ H ₇	n-C ₃ H ₇	O	CH	1,2,4-Triazol-1-yl	
H	i-C ₃ H ₇	O	CH	1,2,4-Triazol-1-yl	
H	n-C ₄ H ₉	O	CH	1,2,4-Triazol-1-yl	
H	t-C ₄ H ₉	O	CH	1,2,4-Triazol-1-yl	
CH ₂ CH=CH ₂	CH ₂ CH=CH ₂	O	CH	1,2,4-Triazol-1-yl	
CH ₂ C=CH	CH ₂ C=CH	O	CH	1,2,4-Triazol-1-yl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	1,2,4-Triazol-1-yl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	1,2,4-Triazol-1-yl	
CH ₂ CO ₂ CH ₃		O	CH	1,2,4-Triazol-1-yl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	1,2,4-Triazol-1-yl	
CH ₂ CN	CH ₂ CN	O	CH	1,2,4-Triazol-1-yl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	1,2,4-Triazol-1-yl	
H	Cyclohexyl	O	CH	1,2,4-Triazol-1-yl	
H	CH ₂ C ₆ H ₅	O	CH	1,2,4-Triazol-1-yl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	1,2,4-Triazol-1-yl	
CH ₃	C ₆ H ₅	O	CH	1,2,4-Triazol-1-yl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	1,2,4-Triazol-1-yl	
	-CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1,2,4-Triazol-1-yl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1,2,4-Triazol-1-yl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1,2,4-Triazol-1-yl	
	-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	1,2,4-Triazol-1-yl	
CH ₃	CH ₃	O	N	1-Methyl-1,2,4-triazol-3-yl	
CH ₃	CH ₃	O	CH	1-Methyl-1,2,4-triazol-3-yl	
CH ₃	CH ₃	S	CH	1-Methyl-1,2,4-triazol-3-yl	
CH ₃	CH ₃	O	N	1-Methyl-1,2,4-triazol-5-yl	
CH ₃	CH ₃	O	CH	1-Methyl-1,2,4-triazol-5-yl	
CH ₂	CH ₃	S	CH	1-Methyl-1,2,4-triazol-5-yl	
CH ₂	CH ₃	O	CH	3(5)-Phenyl-1,2,4-triazol-1-yl	
CH ₃	CH ₃	O	CH	3,5-Dimethyl-1,2,4-triazol-1-yl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	CH ₃	O	CH	5-Methyl-1-phenyl-1,2,4-triazol-3-yl	
CH ₃	CH ₃	O	N	1-Tetrazolyl	
CH ₃	CH ₃	O	CH	1-Tetrazolyl	
CH ₃	CH ₃	O	CH	1-Tetrazolyl	
CH ₃	CH ₃	O	CH	1-Methyl-tetrazol-5-yl	
CH ₃	CH ₃	O	CH	1-Methyl-tetrazol-5-yl	
CH ₃	CH ₃	S	CH	1-Methyl-tetrazol-5-yl	
CH ₃	CH ₃	O	N	2-Oxazolyl	
CH ₃	CH ₃	O	CH	2-Oxazolyl	
CH ₃	CH ₃	S	CH	2-Oxazolyl	
CH ₃	CH ₃	O	N	4-Oxazolyl	
CH ₃	CH ₃	O	CH	4-Oxazolyl	
CH ₃	CH ₃	S	CH	4-Oxazolyl	
CH ₃	CH ₃	O	N	5-Oxazolyl	
CH ₃	CH ₃	O	CH	5-Oxazolyl	
CH ₃	CH ₃	S	CH	5-Oxazolyl	
CH ₃	CH ₃	O	CH	2-Methyloxazol-4-yl	
CH ₃	CH ₃	O	CH	Benzoxazol-2-yl	
CH ₃	CH ₃	O	N	Isoxazol-3-yl	
CH ₃	CH ₃	O	CH	Isoxazol-3-yl	
CH ₃	CH ₃	S	CH	Isoxazol-3-yl	
CH ₃	CH ₃	O	N	Isoxazol-4-yl	

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R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	CH ₃	O	CH	Isoxazol-4-yl	
CH ₃	CH ₃	S	CH	Isoxazol-4-yl	
CH ₃	CH ₃	O	N	Isoxazol-5-yl	
CH ₃	CH ₃	O	CH	Isoxazol-5-yl	
CH ₃	CH ₃	S	CH	Isoxazol-5-yl	
CH ₃	CH ₃	O	CH	Benzisoxazol-3-yl	
CH ₃	CH ₃	O	CH	3-Methylisoxazol-5-yl	
CH ₃	CH ₃	O	CH	3-Isopropylisoxazol-5-yl	
CH ₃	CH ₃	O	CH	3-Phenylisoxazol-5-yl	
CH ₃	CH ₃	O	CH	3-Methyl-4-chloro-isoxazol-5-yl	
CH ₃	CH ₃	O	CH	3-Methylisoxazol-4-yl	
CH ₃	CH ₃	O	CH	3,5-Dimethyl-isoxazol-4-yl	
CH ₃	CH ₃	O	N	2-Thiazolyl	
CH ₃	CH ₃	O	CH	2-Thiazolyl	
CH ₃	CH ₃	S	CH	2-Thiazolyl	
H	H	O	CH	2-Thiazolyl	
CH ₃	H	O	CH	2-Thiazolyl	
CH ₃	C ₂ H ₅	O	CH	2-Thiazolyl	
C ₂ H ₅	C ₂ H ₅	O	CH	2-Thiazolyl	
H	n-C ₃ H ₇	O	CH	2-Thiazolyl	
n-C ₃ H ₇	n-C ₃ H ₇	O	CH	2-Thiazolyl	
H	i-C ₃ H ₇	O	CH	2-Thiazolyl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
H	n-C ₄ H ₉	O	CH	2-Thiazolyl	
H	t-C ₄ H ₉	O	CH	2-Thiazolyl	
CH ₂ CH=CH ₂	CH ₂ CH=CH ₂	O	CH	2-Thiazolyl	
CH ₂ C=CH	CH ₂ C=CH	O	CH	2-Thiazolyl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	2-Thiazolyl	
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	2-Thiazolyl	
CH ₂ CO ₂ CH ₃	CH ₂ CO ₂ CH ₃	O	CH	2-Thiazolyl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	2-Thiazolyl	
CH ₂ CN	CH ₂ CN	O	CH	2-Thiazolyl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	2-Thiazolyl	
H	Cyclohexyl	O	CH	2-Thiazolyl	
H	CH ₂ C ₆ H ₅	O	CH	2-Thiazolyl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	2-Thiazolyl	
CH ₃	C ₆ H ₅	O	CH	2-Thiazolyl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	2-Thiazolyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Thiazolyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Thiazolyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Thiazolyl	
	-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	2-Thiazolyl	
CH ₃	CH ₃	O	N	4-Thiazolyl	
CH ₃	CH ₃	O	CH	4-Thiazolyl	
CH ₃	CH ₃	S	CH	4-Thiazolyl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	CH ₃	O	N	5-Thiazolyl	
CH ₃	CH ₃	O	CH	5-Thiazolyl	
CH ₃	CH ₃	S	CH	5-Thiazolyl	
CH ₃	CH ₃	O	CH	Benzthiazol-2-yl	
CH ₃	CH ₃	O	CH	2-Methylthiazol-4-yl	
CH ₃	CH ₃	O	CH	2-Phenylthiazol-4-yl	
CH ₃	CH ₃	O	CH	2-Benzylthiazol-4-yl	
CH ₃	CH ₃	O	CH	5-chloro-2-phenylthiazol-4-yl	
CH ₃	CH ₃	O	CH	4-Methylthiazol-2-yl	
CH ₃	CH ₃	O	CH	5-Methylthiazol-2-yl	
CH ₃	CH ₃	O	CH	4-Phenylthiazol-2-yl	
CH ₃	CH ₃	O	CH	4-Methylthiazol-5-yl	
CH ₃	CH ₃	O	CH	2-Methylthiazol-5-yl	
CH ₃	CH ₃	O	CH	2-Phenylthiazol-5-yl	
CH ₃	CH ₃	O	N	Isothiazol-3-yl	
CH ₃	CH ₃	O	CH	Isothiazol-3-yl	
CH ₃	CH ₃	S	CH	Isothiazol-3-yl	
CH ₃	CH ₃	O	N	Isothiazol-4-yl	
CH ₃	CH ₃	O	CH	Isothiazol-4-yl	
CH ₃	CH ₂	S	CH	Isothiazol-4-yl	
CH ₃	CH ₃	O	N	Isothiazol-5-yl	
CH ₂	CH ₃	O	CH	Isothiazol-5-yl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	CH ₃	S	CH	Isothiazol-5-yl	
CH ₃	CH ₃	O	CH	Benzisothiazol-3-yl	
CH ₃	CH ₃	O	N	1,2,3-Thiadiazol-4-yl	
CH ₃	CH ₃	O	CH	1,2,3-Thiadiazol-4-yl	
CH ₃	CH ₃	S	CH	1,2,3-Thiadiazol-4-yl	
CH ₃	CH ₃	O	N	1,2,3-Thiadiazol-5-yl	
CH ₃	CH ₃	O	CH	1,2,3-Thiadiazol-5-yl	
CH ₃	CH ₃	S	CH	1,2,3-Thiadiazol-5-yl	
CH ₃	CH ₃	O	N	1,3,4-Thiadiazol-2-yl	
CH ₃	CH ₃	O	CH	1,3,4-Thiadiazol-2-yl	
CH ₃	CH ₃	S	CH	1,3,4-Thiadiazol-2-yl	
CH ₃	CH ₃	O	N	1,3,4-Thiadiazol-5-yl	
CH ₃	CH ₃	O	CH	1,3,4-Thiadiazol-5-yl	
CH ₃	CH ₃	S	CH	1,3,4-Thiadiazol-5-yl	
CH ₃	CH ₃	O	CH	5-Methyl-1,3,4-thiadiazol-2-yl	
CH ₃	CH ₃	O	CH	5-Phenyl-1,3,4-thiadiazol-2-yl	
CH ₃	CH ₃	O	N	1,2,3-Oxadiazol-4-yl	
CH ₃	CH ₃	O	CH	1,2,3-Oxadiazol-4-yl	
CH ₃	CH ₃	S	CH	1,2,3-Oxadiazol-4-yl	
CH ₃	CH ₃	O	N	1,2,3-Oxadiazol-5-yl	
CH ₃	CH ₃	O	CH	1,2,3-Oxadiazol-5-yl	
CH ₃	CH ₃	S	CH	1,2,3-Oxadiazol-5-yl	

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R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	CH ₃	O	N	1,2,4-Oxadiazol-3-yl	
CH ₃	CH ₃	O	CH	1,2,4-Oxadiazol-3-yl	
CH ₃	CH ₃	S	CH	1,2,4-Oxadiazol-3-yl	
CH ₃	CH ₃	O	N	1,2,4-Oxadiazol-5-yl	
CH ₃	CH ₃	O	CH	1,2,4-Oxadiazol-5-yl	
CH ₃	CH ₃	S	CH	1,2,4-Oxadiazol-5-yl	
CH ₃	CH ₃	O	N	1,2,3,4-Thiadiazol-5-yl	
CH ₃	CH ₃	O	CH	1,2,3,4-Thiadiazol-5-yl	
CH ₃	CH ₃	S	CH	1,2,3,4-Thiadiazol-5-yl	
CH ₃	CH ₃	O	N	2-Pyridyl	
CH ₃	CH ₃	O	CH	2-Pyridyl	
CH ₃	CH ₃	S	CH	2-Pyridyl	
H	H	O	CH	2-Pyridyl	
CH ₃	H	O	CH	2-Pyridyl	
CH ₃	C ₂ H ₅	O	CH	2-Pyridyl	
C ₂ H ₅	C ₂ H ₅	O	CH	2-Pyridyl	
H	n-C ₃ H ₇	O	CH	2-Pyridyl	
n-C ₃ H ₇	n-C ₃ H ₇	O	CH	2-Pyridyl	
H	i-C ₃ H ₇	O	CH	2-Pyridyl	
H	n-C ₄ H ₉	O	CH	2-Pyridyl	
H	t-C ₄ H ₉	O	CH	2-Pyridyl	
CH ₂ CH=CH ₂	CH ₂ CH=CH ₂	O	CH	2-Pyridyl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₂ C=CH	CH ₂ C=CH	O	CH	2-Pyridyl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	2-Pyridyl	
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	2-Pyridyl	
CH ₂ CO ₂ CH ₃	CH ₂ CO ₂ CH ₃	O	CH	2-Pyridyl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	2-Pyridyl	
CH ₂ CN	CH ₂ CN	O	CH	2-Pyridyl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	2-Pyridyl	
H	Cyclohexyl	O	CH	2-Pyridyl	
H	CH ₂ C ₆ H ₅	O	CH	2-Pyridyl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	2-Pyridyl	
CH ₃	C ₆ H ₅	O	CH	2-Pyridyl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	2-Pyridyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Pyridyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Pyridyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Pyridyl	
	-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	2-Pyridyl	
CH ₃	CH ₃	O	N	3-Pyridyl	
CH ₃	CH ₃	O	CH	3-Pyridyl	
CH ₃	CH ₃	S	CH	3-Pyridyl	
H	H	O	CH	3-Pyridyl	
CH ₃	H	O	CH	3-Pyridyl	
CH ₃	C ₂ H ₅	O	CH	3-Pyridyl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
C ₂ H ₅	C ₂ H ₅	O	CH	3-Pyridyl	
n-C ₃ H ₇	OCH ₃	O	CH	3-Pyridyl	
n-C ₃ H ₇	n-C ₃ H ₇	O	CH	3-Pyridyl	
H	i-C ₃ H ₇	O	CH	3-Pyridyl	
H	n-C ₄ H ₉	O	CH	3-Pyridyl	
H	t-C ₄ H ₉	O	CH	3-Pyridyl	
CH ₂ CH=CH ₂	CH ₂ CH=CH ₂	O	CH	3-Pyridyl	
CH ₂ C=CH	CH ₂ C=CH	O	CH	3-Pyridyl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	3-Pyridyl	
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	3-Pyridyl	
CH ₂ CO ₂ CH ₃	CH ₂ CO ₂ CH ₃	O	CH	3-Pyridyl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	3-Pyridyl	
CH ₂ CN	CH ₂ CN	O	CH	3-Pyridyl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	3-Pyridyl	
H	Cyclohexyl	O	CH	3-Pyridyl	
H	CH ₂ C ₆ H ₅	O	CH	3-Pyridyl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	3-Pyridyl	
CH ₃	C ₆ H ₅	O	CH	3-Pyridyl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	3-Pyridyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	3-Pyridyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	3-Pyridyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	3-Pyridyl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
	-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	3-Pyridyl	
CH ₃	CH ₃	O	N	4-Pyridyl	
CH ₃	CH ₃	O	CH	4-Pyridyl	
CH ₃	CH ₃	S	CH	4-Pyridyl	
H	H	O	CH	4-Pyridyl	
CH ₃	H	O	CH	4-Pyridyl	
CH ₃	C ₂ H ₅	O	CH	4-Pyridyl	
C ₂ H ₅	C ₂ H ₅	O	CH	4-Pyridyl	
H	n-C ₃ H ₇	O	CH	4-Pyridyl	
n-C ₃ H ₇	n-C ₃ H ₇	O	CH	4-Pyridyl	
H	i-C ₃ H ₇	O	CH	4-Pyridyl	
H	n-C ₄ H ₉	O	CH	4-Pyridyl	
H	t-C ₄ H ₉	O	CH	4-Pyridyl	
CH ₂ CH=CH ₂	CH ₂ CH=CH ₂	O	CH	4-Pyridyl	
CH ₂ C=CH	CH ₂ C=CH	O	CH	4-Pyridyl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	4-Pyridyl	
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	4-Pyridyl	
CH ₂ CO ₂ CH ₃	CH ₂ CO ₂ CH ₃ H	O	CH	4-Pyridyl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	4-Pyridyl	
CH ₂ CN	CH ₂ CN	O	CH	4-Pyridyl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	4-Pyridyl	
H	Cyclohexyl	O	CH	4-Pyridyl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
H	CH ₂ C ₆ H ₅	O	CH	4-Pyridyl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	4-Pyridyl	
CH ₃	C ₆ H ₅	O	CH	4-Pyridyl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	4-Pyridyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	4-Pyridyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	4-Pyridyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	4-Pyridyl	
	-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	4-Pyridyl	
CH ₃	CH ₃	O	CH	6-Methyl-2-pyridyl	
CH ₃	CH ₃	O	CH	3-chloro-5-pyridyl	
CH ₃	CH ₃	O	CH	5-chloro-2-pyridyl	
CH ₃	CH ₃	O	N	2-Naphthyl	
CH ₃	CH ₃	O	CH	2-Naphthyl	
CH ₃	CH ₃	S	CH	2-Naphthyl	
H	H	O	CH	2-Naphthyl	
CH ₃	H	O	CH	2-Naphthyl	
CH ₃	C ₂ H ₅	O	CH	2-Naphthyl	
C ₂ H ₅	C ₂ H ₅	O	CH	2-Naphthyl	
H	n-C ₃ H ₇	O	CH	2-Naphthyl	
n-C ₃ H ₇	n-C ₃ H ₇	O	CH	2-Naphthyl	
H	i-C ₃ H ₇	O	CH	2-Naphthyl	
H	n-C ₄ H ₉	O	CH	2-Naphthyl	

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R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
H	t-C ₄ H ₉	O	CH	2-Naphthyl	
CH ₂ CH=CH ₂	CH ₂ CH=CH ₂	O	CH	2-Naphthyl	
CH ₂ C=CH	CH ₂ C=CH	O	CH	2-Naphthyl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	2-Naphthyl	
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	2-Naphthyl	
CH ₂ CO ₂ CH ₃	CH ₂ CO ₂ CH ₃	O	CH	2-Naphthyl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	2-Naphthyl	
CH ₂ CN	CH ₂ CN	O	CH	2-Naphthyl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	2-Naphthyl	
H	Cyclohexyl	O	CH	2-Naphthyl	
H	CH ₂ C ₆ H ₅	O	CH	2-Naphthyl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	2-Naphthyl	
CH ₃	C ₆ H ₅	O	CH	2-Naphthyl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	2-Naphthyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Naphthyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Naphthyl	
	-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	2-Naphthyl	
	-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	2-Naphthyl	
CH ₃	CH ₃	O	N	1-Naphthyl	
CH ₃	CH ₃	O	CH	1-Naphthyl	
CH ₃	CH ₃	S	CH	1-Naphtyl	
H	H	O	CH	1-Naphtyl	

R ⁶	R ⁷	X	Z	A	Phys. data m.p. [°C]
CH ₃	H	O	CH	1-Naphthyl	
CH ₃	C ₂ H ₅	O	CH	1-Naphthyl	
C ₂ H ₅	C ₂ H ₅	O	CH	1-Naphthyl	
H	n-C ₃ H ₇	O	CH	1-Naphthyl	
n-C ₃ H ₇	n-C ₃ H ₇	O	CH	1-Naphthyl	
H	i-C ₃ H ₇	O	CH	1-Naphthyl	
H	n-C ₄ H ₉	O	CH	1-Naphthyl	
H	t-C ₄ H ₉	O	CH	1-Naphthyl	
CH ₂ CH=CH ₂	CH ₂ CH=CH ₂	O	CH	1-Naphthyl	
CH ₂ C=CH	CH ₂ C=CH	O	CH	1-Naphthyl	
CH ₂ CH ₂ Cl	CH ₂ CH ₂ Cl	O	CH	1-Naphthyl	
(CH ₂) ₂ OCH ₃	(CH ₂) ₂ OCH ₃	O	CH	1-Naphthyl	
CH ₂ CO ₂ CH ₃	CH ₂ CO ₂ CH ₃	O	CH	1-Naphthyl	
CH ₃	CH ₂ CO ₂ CH ₃	O	CH	1-Naphthyl	
CH ₂ CN	CH ₂ CN	O	CH	1-Naphthyl	
CH ₂ CH ₂ CN	CH ₂ CH ₂ CN	O	CH	1-Naphthyl	
H	Cyclohexyl	O	CH	1-Naphthyl	
H	CH ₂ C ₆ H ₅	O	CH	1-Naphthyl	
CH ₂ C ₆ H ₅	CH ₂ C ₆ H ₅	O	CH	1-Naphthyl	
CH ₃	C ₆ H ₅	O	CH	1-Naphthyl	
(CH ₂) ₂ SCH ₃	(CH ₂) ₂ SCH ₃	O	CH	1-Naphthyl	
-CH ₂ CH ₂ CH ₂ CH ₂ -		O	CH	1-Naphthyl	

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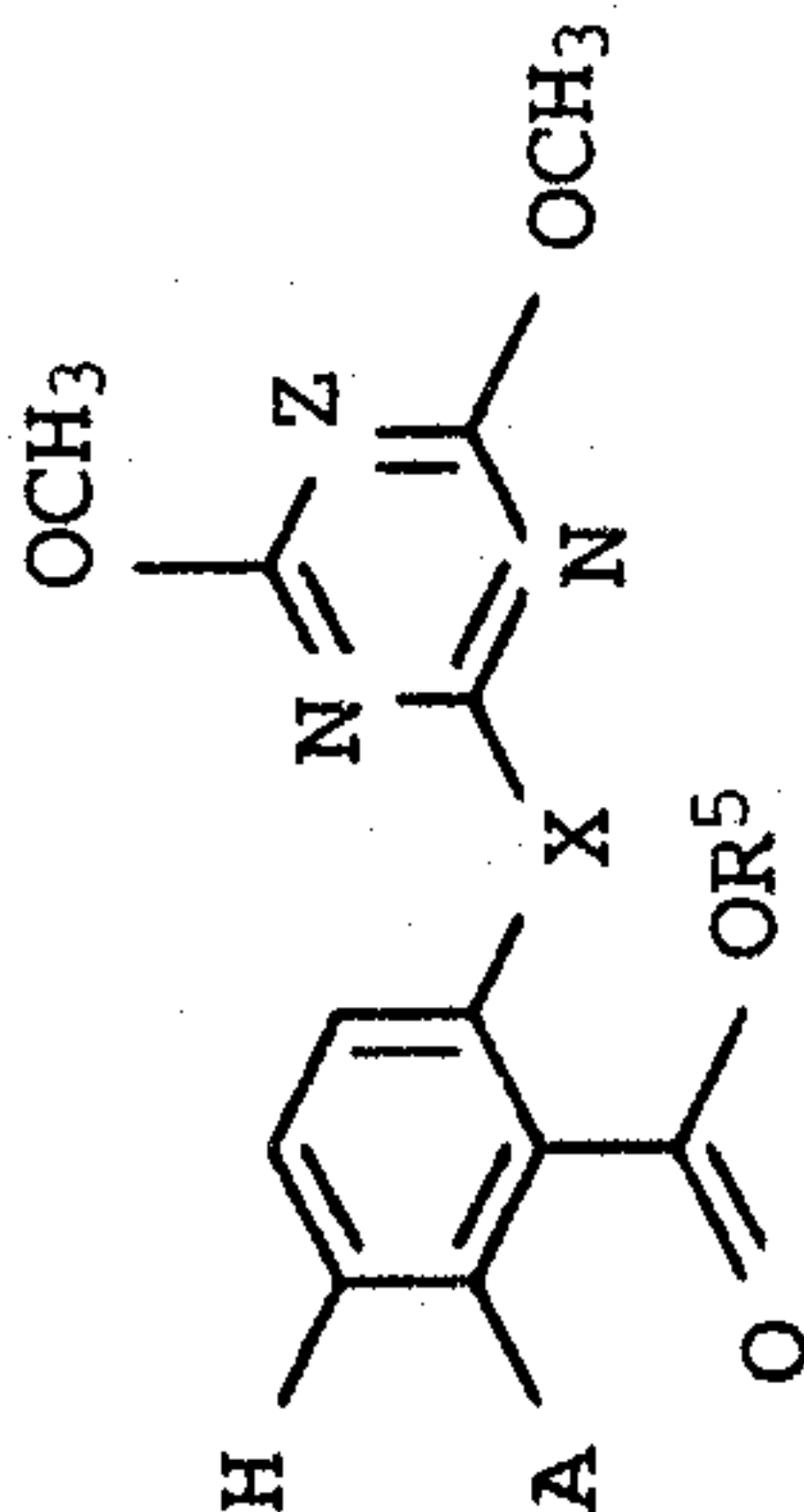
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R ⁶		R ⁷	X	Z	A	Phys. data m.p. [°C]
		-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1-Naphthyl	
		-CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ -	O	CH	1-Naphthyl	
		-CH ₂ CH ₂ OCH ₂ CH ₂ -	O	CH	1-Naphthyl	
5	CH ₃	CH ₃	O	CH	2-Methyl-1-naphthyl	
	CH ₃	CH ₃	O	CH	2-Methoxy-1-naphthyl	
	CH ₃	CH ₃	O	CH	1-chloro-4-naphthyl	
10	CH ₃	CH ₃	O	N	2-quinolinyl	
	CH ₃	CH ₃	O	CH	2-quinolinyl	
	CH ₃	CH ₃	S	CH	2-quinolinyl	
15	CH ₃	CH ₃	O	N	4-quinolinyl	
	CH ₃	CH ₃	O	CH	4-quinolinyl	
	CH ₃	CH ₃	S	CH	4-quinolinyl	
20	CH ₃	CH ₃	O	CH	2-chloro-quinolin-2-yl	
	CH ₃	CH ₃	O	CH	2,6-Dichloro-quinolin-3-yl	
	CH ₃	CH ₃	O	CH	2-chloro-6-methyl-quinolin-3-yl	

Table 2:

Compounds I in which R¹ is a radical OR⁵ (R, R³ = OCH₃, R⁴ = H).

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	O	N	1-Pyrrolyl	
1-Pyrazolyl	O	CH	1-Pyrrolyl	
1-Pyrazolyl	S	CH	1-Pyrrolyl	
1-Pyrazolyl	O	N	1-Methyl-pyrrol-2-yl	
1-Pyrazolyl	O	CH	1-Methyl-pyrrol-2-yl	
1-Pyrazolyl	S	CH	1-Methyl-pyrrol-2-yl	
1-Pyrazolyl	O	N	1-Methyl-pyrrol-3-yl	
1-Pyrazolyl	O	CH	1-Methyl-pyrrol-3-yl	
1-Pyrazolyl	S	CH	1-Methyl-pyrrol-3-yl	
1-Pyrazolyl	O	CH	1-Indolyl	
1-Pyrazolyl	O	CH	1-Methyl-indol-2-yl	
1-Pyrazolyl	O	CH	1-Methyl-indol-3-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	O	CH	3-Methyl-indol-1-yl	
1-Pyrazolyl	O	CH	3,5-Dimethyl-pyrrol-1-yl	
1-Pyrazolyl	O	CH	3-Methylpyrrol-1-yl	
1-Pyrazolyl	O	CH	4-Methylpyrrol-1-yl	
1-Pyrazolyl	O	CH	4-chloropyrrol-1-yl	
1-Pyrazolyl	O	CH	4-bromopyrrol-1-yl	
1-Pyrazolyl	O	CH	4-Phenylpyrrol-1-yl	
1-Pyrazolyl	O	CH	3,4,5-Trimethyl-pyrrol-1-yl	
1-Pyrazolyl	O	CH	4-chloro-3,5-dimethyl-pyrrol-1-yl	
1-Pyrazolyl	O	CH	4-Isopropylpyrrol-1-yl	
1-Pyrazolyl	O	CH	3-Phenylpyrrol-1-yl	
1-Pyrazolyl	O	CH	3-Methyl-5-phenyl-pyrrol-1-yl	
1-Pyrazolyl	O	CH	3,5-Bistrifluoromethyl-pyrrol-1-yl	
1-Pyrazolyl	O	CH	4-Nitropyrrol-1-yl	
1-Pyrazolyl	O	CH	1-Phenylpyrrol-3-yl	
1-Pyrazolyl	O	CH	1,3,5-Trimethyl-pyrrol-4-yl	
1-Pyrazolyl	O	CH	1-Phenylpyrrol-2-yl	
1-Pyrazolyl	O	CH	1-Phenylpyrrol-3-yl	
1-Pyrazolyl	O	CH	1,4-Dimethylpyrrol-3-yl	
1-Pyrazolyl	O	CH	5-Methyl-1-phenyl-pyrrol-3-yl	
1-Pyrazolyl	O	CH	1,5-Dimethylpyrrol-3-yl	
1-Pyrazolyl	O	CH	1,3-Dimethylpyrrol-4-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	O	CH	1,5-Dimethylpyrrol-3-yl	
1-Pyrazolyl	O	CH	3-Methyl-1-phenyl-pyrrol-4-yl	
1-Pyrazolyl	O	CH	5-Methyl-1-phenyl-pyrrol-2-yl	
1-Pyrazolyl	O	CH	3,5-Dimethyl-1-phenyl-pyrrol-4-yl	
1-Pyrazolyl	O	CH	3-Methyl-1-phenyl-pyrrol-5-yl	
1-Pyrazolyl	O	CH	1,4-Dimethylpyrrol-5-yl	
1-Pyrazolyl	O	CH	1,3-Dimethylpyrrol-5-yl	
1-Pyrazolyl	O	N	2-Thienyl	
1-Pyrazolyl	O	CH	2-Thienyl	
1-Pyrazolyl	S	CH	2-Thienyl	
1-Pyrazolyl	O	N	3-Thienyl	
1-Pyrazolyl	O	CH	3-Thienyl	
1-Pyrazolyl	S	CH	3-Thienyl	
1-Pyrazolyl	O	CH	2,3-Dichloro-4-thienyl	
1-Pyrazolyl	O	CH	2,5-Dichloro-3-thienyl	
1-Pyrazolyl	O	CH	2-bromo-5-thienyl	
1-Pyrazolyl	O	CH	4-bromo-2-thienyl	
1-Pyrazolyl	O	CH	3-Methyl-2-thienyl	
1-Pyrazolyl	O	CH	2-chloro-5-thienyl	
1-Pyrazolyl	O	CH	2-Methyl-5-thienyl	
1-Pyrazolyl	O	CH	2-Nitro-5-thienyl	
1-Pyrazolyl	O	N	Benzthien-2-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	O	CH	Benzthien-2-yl	
1-Pyrazolyl	S	CH	Benzthien-2-yl	
1-Pyrazolyl	O	N	Benzthien-3-yl	
1-Pyrazolyl	O	CH	Benzthien-3-yl	
1-Pyrazolyl	S	CH	Benzthien-3-yl	
1-Pyrazolyl	O	N	2-Furanyl	
1-Pyrazolyl	O	CH	2-Furanyl	
1-Pyrazolyl	S	CH	2-Furanyl	
1-Pyrazolyl	O	N	3-Furanyl	
1-Pyrazolyl	O	CH	3-Furanyl	
1-Pyrazolyl	S	CH	3-Furanyl	
1-Pyrazolyl	O	CH	2,3-Dichloro-4-furanyl	
1-Pyrazolyl	O	CH	2,5-Dichloro-3-furanyl	
1-Pyrazolyl	O	CH	2-bromo-5-furanyl	
1-Pyrazolyl	O	CH	4-bromo-2-furanyl	
1-Pyrazolyl	O	CH	3-Methyl-2-furanyl	
1-Pyrazolyl	O	CH	2-chloro-5-furanyl	
1-Pyrazolyl	O	CH	2-Methyl-5-furanyl	
1-Pyrazolyl	O	CH	2-Nitro-5-furanyl	
1-Pyrazolyl	O	N	Benzofuran-2-yl	
1-Pyrazolyl	O	CH	Benzofuran-2-yl	
1-Pyrazolyl	S	CH	Benzofuran-2-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	O	N	Benzofuran-3-yl	
1-Pyrazolyl	O	CH	Benzofuran-3-yl	
1-Pyrazolyl	S	CH	Benzofuran-3-yl	
1-Pyrazolyl	O	N	1-Pyrazolyl	
1-Pyrazolyl	O	CH	1-Pyrazolyl	
1-Pyrazolyl	S	CH	1-Pyrazolyl	
1-Pyrazolyl	O	N	1-Methyl-pyrazol-3-yl	
1-Pyrazolyl	O	CH	1-Methyl-pyrazol-3-yl	
1-Pyrazolyl	S	CH	1-Methyl-pyrazol-3-yl	
1-Pyrazolyl	O	N	1-Methyl-pyrazol-4-yl	
1-Pyrazolyl	O	CH	1-Methyl-pyrazol-4-yl	
1-Pyrazolyl	S	CH	1-Methyl-pyrazol-4-yl	
1-Pyrazolyl	O	N	1-Methyl-pyrazol-5-yl	
1-Pyrazolyl	O	CH	1-Methyl-pyrazol-5-yl	
1-Pyrazolyl	S	CH	1-Methyl-pyrazol-5-yl	
1-Pyrazolyl	O	CH	Benzpyrazol-1-yl	
1-Pyrazolyl	O	CH	1-Methyl-benzpyrazol-3-yl	
1-Pyrazolyl	O	CH	3,5-Dimethyl-pyrazol-1-yl	
1-Pyrazolyl	O	CH	3(5)-Methyl-pyrazol-1-yl	
1-Pyrazolyl	O	CH	4-Methylpyrazol-1-yl	
1-Pyrazolyl	O	CH	4-chloropyrazol-1-yl	
1-Pyrazolyl	O	CH	4-bromopyrazol-1-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	O	CH	4-Phenylpyrazol-1-yl	
1-Pyrazolyl	O	CH	3,4,5-Trimethyl-pyrazol-1-yl	
1-Pyrazolyl	O	CH	4-chloro-3,5-dimethyl-pyrazol-1-yl	
1-Pyrazolyl	O	CH	4-Isopropylpyrazol-1-yl	
1-Pyrazolyl	O	CH	3(5)-Phenylpyrazol-1-yl	
1-Pyrazolyl	O	CH	3(5)-Methyl-5(3)-phenyl-pyrazol-1-yl	
1-Pyrazolyl	O	CH	3,5-Bistrifluoromethyl-pyrazol-1-yl	
1-Pyrazolyl	O	CH	4-Nitropyrazol-1-yl	
1-Pyrazolyl	O	CH	1-Phenylpyrazol-4-yl	
1-Pyrazolyl	O	CH	1,3,5-Trimethyl-pyrazol-4-yl	
1-Pyrazolyl	O	CH	1-Phenylpyrazol-5-yl	
1-Pyrazolyl	O	CH	1-Phenylpyrazol-3-yl	
1-Pyrazolyl	O	CH	1,4-Dimethylpyrazol-3-yl	
1-Pyrazolyl	O	CH	5-Methyl-1-1-phenyl-pyrazol-3-yl	
1-Pyrazolyl	O	CH	1,5-Dimethylpyrazol-3-yl	
1-Pyrazolyl	O	CH	1,3-Dimethylpyrazol-4-yl	
1-Pyrazolyl	O	CH	1,5-Dimethylpyrazol-4-yl	
1-Pyrazolyl	O	CH	3-Methyl-1-1-phenyl-pyrazol-4-yl	
1-Pyrazolyl	O	CH	5-Methyl-1-1-phenyl-pyrazol-4-yl	
1-Pyrazolyl	O	CH	3,5-Dimethyl-1-1-phenyl-pyrazol-4-yl	
1-Pyrazolyl	O	CH	3-Methyl-1-1-phenyl-pyrazol-5-yl	
1-Pyrazolyl	O	CH	1,4-Dimethylpyrazol-5-yl	

R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	O	CH	1,3-Dimethylpyrazol-5-yl	
1-Pyrazolyl	O	N	1-Imidazolyl	
1-Pyrazolyl	O	CH	1-Imidazolyl	
1-Pyrazolyl	S	CH	1-Imidazolyl	
1-Pyrazolyl	O	N	1-Methyl-imidazol-2-yl	
1-Pyrazolyl	O	CH	1-Methyl-imidazol-2-yl	
1-Pyrazolyl	S	CH	1-Methyl-imidazol-2-yl	
1-Pyrazolyl	O	N	1-Methyl-imidazol-4-yl	
1-Pyrazolyl	O	CH	1-Methyl-imidazol-4-yl	
1-Pyrazolyl	S	CH	1-Methyl-imidazol-4-yl	
1-Pyrazolyl	O	N	1-Methyl-imidazol-5-yl	
1-Pyrazolyl	O	CH	1-Methyl-imidazol-5-yl	
1-Pyrazolyl	S	CH	1-Methyl-imidazol-5-yl	
1-Pyrazolyl	O	CH	Benzimidazol-1-yl	
1-Pyrazolyl	O	CH	1-Methyl-benzimidazol-2-yl	
1-Pyrazolyl	O	CH	4,5-Dimethylimidazol-1-yl	
1-Pyrazolyl	O	CH	2-Phenylimidazol-1-yl	
1-Pyrazolyl	O	CH	4,5-Dichloroimidazol-1-yl	
1-Pyrazolyl	O	CH	2,4,5-Trichloro-imidazol-1-yl	
1-Pyrazolyl	O	CH	2-Methyl-4,5-dichloro-imidazol-1-yl	
1-Pyrazolyl	O	CH	2-Methyl-4,5-dibromo-imidazol-1-yl	
1-Pyrazolyl	O	CH	4(5)-chloro-5(4)-methyl-imidazol-1-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	O	CH	4(5)-Nitroimidazol-1-yl	
1-Pyrazolyl	O	CH	1,4-Dimethyl-imidazol-5-yl	
1-Pyrazolyl	O	CH	1-Methyl-5-nitro-imidazol-2-yl	
1-Pyrazolyl	O	CH	1-Phenylimidazol-5-yl	
1-Pyrazolyl	O	N	1,2,3-Triazol-1-yl	
1-Pyrazolyl	O	CH	1,2,3-Triazol-1-yl	
1-Pyrazolyl	S	CH	1,2,3-Triazol-1-yl	
1-Pyrazolyl	O	N	1-Methyl-1,2,3-triazol-4-yl	
1-Pyrazolyl	O	CH	1-Methyl-1,2,3-triazol-4-yl	
1-Pyrazolyl	S	CH	1-Methyl-1,2,3-triazol-4-yl	
1-Pyrazolyl	O	N	1-Methyl-1,2,3-triazol-5-yl	
1-Pyrazolyl	O	CH	1-Methyl-1,2,3-triazol-5-yl	
1-Pyrazolyl	S	CH	1-Methyl-1,2,3-triazol-5-yl	
1-Pyrazolyl	O	CH	Benz-1,2,3-triazol-1-yl	
1-Pyrazolyl	O	CH	4,5-Dimethyl-1,2,3-triazol-1-yl	
1-Pyrazolyl	O	CH	4(5)-Phenyl-1,2,3-triazol-1-yl	
1-Pyrazolyl	O	CH	1-Phenyl-1,2,3-triazol-4-yl	
1-Pyrazolyl	O	CH	1-Phenyl-1,2,3-triazol-4-yl	
1-Pyrazolyl	O	CH	5-Methyl-1-phenyl-1,2,3-triazol-4-yl	
1-Pyrazolyl	O	N	1,2,4-Triazol-1-yl	
1-Pyrazolyl	O	CH	1,2,4-Triazol-1-yl	
1-Pyrazolyl	S	CH	1,2,4-Triazol-1-yl	

R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	O	N	1-Methyl-1,2,4-triazol-3-yl	
1-Pyrazolyl	O	CH	1-Methyl-1,2,4-triazol-3-yl	
1-Pyrazolyl	S	CH	1-Methyl-1,2,4-triazol-3-yl	
1-Pyrazolyl	O	N	1-Methyl-1,2,4-triazol-5-yl	
1-Pyrazolyl	O	CH	1-Methyl-1,2,4-triazol-5-yl	
1-Pyrazolyl	S	CH	1-Methyl-1,2,4-triazol-5-yl	
1-Pyrazolyl	O	CH	3(5)-Phenyl-1,2,4-triazol-1-yl	
1-Pyrazolyl	O	CH	3,5-Dimethyl-1,2,4-triazol-1-yl	
1-Pyrazolyl	O	CH	5-Methyl-1-phenyl-1,2,4-triazol-3-yl	
1-Pyrazolyl	O	N	1-Tetrazolyl	
1-Pyrazolyl	O	CH	1-Tetrazolyl	
1-Pyrazolyl	S	CH	1-Tetrazolyl	
1-Pyrazolyl	O	N	1-Methyl-tetrazol-5-yl	
1-Pyrazolyl	O	CH	1-Methyl-tetrazol-5-yl	
1-Pyrazolyl	S	CH	1-Methyl-tetrazol-5-yl	
1-Pyrazolyl	O	N	2-Oxazolyl	
1-Pyrazolyl	O	CH	2-Oxazolyl	
1-Pyrazolyl	S	CH	2-Oxazolyl	
1-Pyrazolyl	O	N	4-Oxazolyl	
1-Pyrazolyl	O	CH	4-Oxazolyl	
1-Pyrazolyl	S	CH	4-Oxazolyl	
1-Pyrazolyl	O	N	5-Oxazolyl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	O	CH	5-Oxazolyl	
1-Pyrazolyl	S	CH	5-Oxazolyl	
1-Pyrazolyl	O	CH	2-Methylloxazol-4-yl	
1-Pyrazolyl	O	CH	Benzoxazol-2-yl	
1-Pyrazolyl	O	N	Isoxazol-3-yl	
1-Pyrazolyl	O	CH	Isoxazol-3-yl	
1-Pyrazolyl	S	CH	Isoxazol-3-yl	
1-Pyrazolyl	O	N	Isoxazol-4-yl	
1-Pyrazolyl	O	CH	Isoxazol-4-yl	
1-Pyrazolyl	S	CH	Isoxazol-4-yl	
1-Pyrazolyl	O	N	Isoxazol-5-yl	
1-Pyrazolyl	O	CH	Isoxazol-5-yl	
1-Pyrazolyl	S	CH	Isoxazol-5-yl	
1-Pyrazolyl	O	CH	Benzisoxazol-3-yl	
1-Pyrazolyl	O	CH	3-Methylisoxazol-5-yl	
1-Pyrazolyl	O	CH	3-Isopropylisoxazol-5-yl	
1-Pyrazolyl	O	CH	3-Phenylisoxazol-5-yl	
1-Pyrazolyl	O	CH	3-Methyl-4-chloro-isoxazol-5-yl	
1-Pyrazolyl	O	CH	3-Methylisoxazol-4-yl	
1-Pyrazolyl	O	CH	3,5-Dimethyl-isoxazol-4-yl	
1-Pyrazolyl	O	N	2-Thiazolyl	
1-Pyrazolyl	O	CH	2-Thiazolyl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	S	CH	2-Thiazolyl	
1-Pyrazolyl	O	N	4-Thiazolyl	
1-Pyrazolyl	O	CH	4-Thiazolyl	
1-Pyrazolyl	S	CH	4-Thiazolyl	
1-Pyrazolyl	O	N	5-Thiazolyl	
1-Pyrazolyl	O	CH	5-Thiazolyl	
1-Pyrazolyl	S	CH	5-Thiazolyl	
1-Pyrazolyl	O	CH	Benzthiazol-2-yl	
1-Pyrazolyl	O	CH	2-Methylthiazol-4-yl	
1-Pyrazolyl	O	CH	2-Phenylthiazol-4-yl	
1-Pyrazolyl	O	CH	2-Benzylthiazol-4-yl	
1-Pyrazolyl	O	CH	5-chloro-2-phenyl-thiazol-4-yl	
1-Pyrazolyl	O	CH	4-Methylthiazol-2-yl	
1-Pyrazolyl	O	CH	5-Methylthiazol-2-yl	
1-Pyrazolyl	O	CH	4-Phenylthiazol-2-yl	
1-Pyrazolyl	O	CH	4-Methylthiazol-5-yl	
1-Pyrazolyl	O	CH	2-Methylthiazol-5-yl	
1-Pyrazolyl	O	CH	2-Phenylthiazol-5-yl	
1-Pyrazolyl	O	N	Isothiazol-3-yl	
1-Pyrazolyl	O	CH	Isothiazol-3-yl	
1-Pyrazolyl	S	CH	Isothiazol-3-yl	
1-Pyrazolyl	O	N	Isothiazol-4-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	O	CH	Isothiazol-4-yl	
1-Pyrazolyl	S	CH	Isothiazol-4-yl	
1-Pyrazolyl	O	N	Isothiazol-5-yl	
1-Pyrazolyl	O	CH	Isothiazol-5-yl	
1-Pyrazolyl	S	CH	Isothiazol-5-yl	
1-Pyrazolyl	O	CH	Benzisothiazol-3-yl	
1-Pyrazolyl	O	N	1,2,3-Thiadiazol-4-yl	
1-Pyrazolyl	O	CH	1,2,3-Thiadiazol-4-yl	
1-Pyrazolyl	S	CH	1,2,3-Thiadiazol-4-yl	
1-Pyrazolyl	O	N	1,2,3-Thiadiazol-5-yl	
1-Pyrazolyl	O	CH	1,2,3-Thiadiazol-5-yl	
1-Pyrazolyl	S	CH	1,2,3-Thiadiazol-5-yl	
1-Pyrazolyl	O	N	1,3,4-Thiadiazol-2-yl	
1-Pyrazolyl	O	CH	1,3,4-Thiadiazol-2-yl	
1-Pyrazolyl	S	CH	1,3,4-Thiadiazol-2-yl	
1-Pyrazolyl	O	N	1,3,4-Thiadiazol-5-yl	
1-Pyrazolyl	O	CH	1,3,4-Thiadiazol-5-yl	
1-Pyrazolyl	S	CH	1,3,4-Thiadiazol-5-yl	
1-Pyrazolyl	O	CH	5-Methyl-1,3,4-thiadiazol-2-yl	
1-Pyrazolyl	O	CH	5-Phenyl-1,3,4-thiadiazol-2-yl	
1-Pyrazolyl	O	N	1,2,3-Oxadiazol-4-yl	
1-Pyrazolyl	O	CH	1,2,3-Oxadiazol-4-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	S	CH	1,2,3-Oxadiazol-4-yl	
1-Pyrazolyl	O	N	1,2,3-Oxadiazol-5-yl	
1-Pyrazolyl	O	CH	1,2,3-Oxadiazol-5-yl	
1-Pyrazolyl	S	CH	1,2,3-Oxadiazol-5-yl	
1-Pyrazolyl	O	N	1,2,4-Oxadiazol-3-yl	
1-Pyrazolyl	O	CH	1,2,4-Oxadiazol-3-yl	
1-Pyrazolyl	S	CH	1,2,4-Oxadiazol-3-yl	
1-Pyrazolyl	O	N	1,2,4-Oxadiazol-5-yl	
1-Pyrazolyl	O	CH	1,2,4-Oxadiazol-5-yl	
1-Pyrazolyl	S	CH	1,2,4-Oxadiazol-5-yl	
1-Pyrazolyl	O	N	1,2,3,4-Thiatriazol-5-yl	
1-Pyrazolyl	O	CH	1,2,3,4-Thiatriazol-5-yl	
1-Pyrazolyl	S	CH	1,2,3,4-Thiatriazol-5-yl	
1-Pyrazolyl	O	N	2-Pyridyl	
1-Pyrazolyl	O	CH	2-Pyridyl	
1-Pyrazolyl	S	CH	2-Pyridyl	
1-Pyrazolyl	O	N	3-Pyridyl	
1-Pyrazolyl	O	CH	3-Pyridyl	
1-Pyrazolyl	S	CH	3-Pyridyl	
1-Pyrazolyl	O	N	4-Pyridyl	
1-Pyrazolyl	O	CH	4-Pyridyl	
1-Pyrazolyl	S	CH	4-Pyridyl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrazolyl	O	CH	6-Methyl-2-pyridyl	
1-Pyrazolyl	O	CH	3-chloro-5-pyridyl	
1-Pyrazolyl	O	CH	5-chloro-2-pyridyl	
1-Pyrazolyl	O	N	2-Naphthyl	
1-Pyrazolyl	O	CH	2-Naphthyl	
1-Pyrazolyl	S	CH	2-Naphthyl	
1-Pyrazolyl	O	N	1-Naphthyl	
1-Pyrazolyl	O	CH	1-Naphthyl	
1-Pyrazolyl	S	CH	1-Naphthyl	
1-Pyrazolyl	O	CH	2-Methyl-1-1-naphthyl	
1-Pyrazolyl	O	CH	2-Methoxy-1-naphthyl	
1-Pyrazolyl	O	CH	1-chloro-4-naphthyl	
1-Pyrazolyl	O	N	2-quinolinyl	
1-Pyrazolyl	O	CH	2-quinolinyl	
1-Pyrazolyl	S	CH	2-quinolinyl	
1-Pyrazolyl	O	N	4-quinolinyl	
1-Pyrazolyl	O	CH	4-quinolinyl	
1-Pyrazolyl	S	CH	4-quinolinyl	
1-Pyrazolyl	O	CH	2-chloro-quinolin-2-yl	
1-Pyrazolyl	O	CH	2,6-Dichloro-quinolin-3-yl	
1-Pyrazolyl	O	CH	2-chloro-6-methyl-quinolin-3-yl	
1-Imidazolyl	O	CH	1-Pyrrolyl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Imidazolyl	O	CH	1-Indolyl	
1-Imidazolyl	O	CH	2-Thienyl	
1-Imidazolyl	O	CH	3-Thienyl	
1-Imidazolyl	O	CH	2-bromo-5-thienyl	
1-Imidazolyl	O	CH	3-Methyl-2-thienyl	
1-Imidazolyl	O	CH	2-chloro-5-thienyl	
1-Imidazolyl	O	CH	Benzthien-2-yl	
1-Imidazolyl	O	CH	Benzthien-3-yl	
1-Imidazolyl	O	CH	2-Furanyl	
1-Imidazolyl	O	CH	3-Furanyl	
1-Imidazolyl	O	CH	Benzofuran-2-yl	
1-Imidazolyl	O	CH	1-Pyrazolyl	
1-Imidazolyl	O	CH	1-Methyl-pyrazol-3-yl	
1-Imidazolyl	O	CH	Benzpyrazol-1-yl	
1-Imidazolyl	O	CH	1-Imidazolyl	
1-Imidazolyl	O	CH	1-Methyl-imidazol-4-yl	
1-Imidazolyl	O	CH	Benzimidazol-1-yl	
1-Imidazolyl	O	CH	1,2,3-Triazol-1-yl	
1-Imidazolyl	O	N	1-Methyl-1,2,3-triazol-4-yl	
1-Imidazolyl	O	CH	Benz-1,2,3-triazol-1-yl	
1-Imidazolyl	O	CH	1,2,4-Triazol-1-yl	
1-Imidazolyl	O	CH	1-Methyl-1,2,4-triazol-3-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Imidazolyl	O	CH	1-Tetrazolyl	
1-Imidazolyl	O	CH	2-Oxazolyl	
1-Imidazolyl	O	CH	4-Oxazolyl	
1-Imidazolyl	O	CH	5-Oxazolyl	
1-Imidazolyl	O	CH	Benzoxazol-2-yl	
1-Imidazolyl	O	CH	Isoxazol-3-yl	
1-Imidazolyl	O	CH	Isoxazol-4-yl	
1-Imidazolyl	O	CH	Isoxazol-5-yl	
1-Imidazolyl	O	CH	Benzisoxazol-3-yl	
1-Imidazolyl	O	CH	2-Thiazolyl	
1-Imidazolyl	O	CH	4-Thiazolyl	
1-Imidazolyl	O	CH	5-Thiazolyl	
1-Imidazolyl	O	CH	Benzthiazol-2-yl	
1-Imidazolyl	O	CH	Isotiazol-3-yl	
1-Imidazolyl	O	CH	Isotiazol-4-yl	
1-Imidazolyl	O	CH	Isotiazol-5-yl	
1-Imidazolyl	O	CH	Benzisothiazol-3-yl	
1-Imidazolyl	O	CH	1,2,3-Thiadiazol-4-yl	
1-Imidazolyl	O	CH	1,2,3-Thiadiazol-5-yl	
1-Imidazolyl	O	CH	1,3,4-Thiadiazol-2-yl	
1-Imidazolyl	O	CH	1,3,4-Thiadiazol-5-yl	
1-Imidazolyl	O	CH	1,2,3-Oxadiazol-4-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Imidazolyl	O	CH	1,2,3-Oxadiazol-5-yl	
1-Imidazolyl	O	CH	1,2,4-Oxadiazol-3-yl	
1-Imidazolyl	O	CH	1,2,4-Oxadiazol-5-yl	
1-Imidazolyl	O	CH	1,2,3,4-Thiatriazol-5-yl	
1-Imidazolyl	O	CH	2-Pyridyl	
1-Imidazolyl	O	CH	3-Pyridyl	
1-Imidazolyl	O	CH	4-Pyridyl	
1-Imidazolyl	O	CH	2-Naphthyl	
1-Imidazolyl	O	CH	1-Naphthyl	
1-Imidazolyl	O	CH	2-quinolinyl	
1-Imidazolyl	O	CH	4-quinolinyl	
1-Imidazolyl	O	CH	1-Pyrrolyl	
1-Imidazolyl	O	CH	1-Indolyl	
1-Imidazolyl	O	CH	2-Thienyl	
1-Imidazolyl	O	CH	3-Thienyl	
1-Imidazolyl	O	CH	2-bromo-5-thienyl	
1-Imidazolyl	O	CH	3-Methyl-2-thienyl	
1-Imidazolyl	O	CH	2-chloro-5-thienyl	
1-Imidazolyl	O	CH	Benzthien-2-yl	
1-Imidazolyl	O	CH	Benzthien-3-yl	
1-Imidazolyl	O	CH	2-Furanyl	
1-Imidazolyl	O	CH	3-Furanyl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Imidazolyl	O	CH	Benzofuran-2-yl	
1-Imidazolyl	O	CH	1-Pyrazolyl	
1-Imidazolyl	O	CH	1-Methyl-pyrazol-3-yl	
1-Imidazolyl	O	CH	Benzpyrazol-1-yl	
1-Imidazolyl	O	CH	1-Imidazolyl	
1-Imidazolyl	O	CH	1-Methyl-imidazol-4-yl	
1-Imidazolyl	O	CH	Benzimidazol-1-yl	
1-Imidazolyl	O	CH	1,2,3-Triazol-1-yl	
1-Imidazolyl	O	N	1-Methyl-1,2,3-triazol-4-yl	
1-Imidazolyl	O	CH	Benz-1,2,3-triazol-1-yl	
1-Imidazolyl	O	CH	1,2,4-Triazol-1-yl	
1-Imidazolyl	O	CH	1-Methyl-1,2,4-triazol-3-yl	
1-Imidazolyl	O	CH	1-Tetrazolyl	
1-Imidazolyl	O	CH	2-Oxazolyl	
1-Imidazolyl	O	CH	4-Oxazolyl	
1-Imidazolyl	O	CH	5-Oxazolyl	
1-Imidazolyl	O	CH	Benzoxazol-2-yl	
1-Imidazolyl	O	CH	Isoxazol-3-yl	
1-Imidazolyl	O	CH	Isoxazol-4-yl	
1-Imidazolyl	O	CH	Isoxazol-5-yl	
1-Imidazolyl	O	CH	Benzisoxazol-3-yl	
1-Imidazolyl	O	CH	2-Thiazolyl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Imidazolyl	O	CH	4-Thiazolyl	
1-Imidazolyl	O	CH	5-Thiazolyl	
1-Imidazolyl	O	CH	Benzthiazol-2-yl	
1-Imidazolyl	O	CH	Isothiazol-3-yl	
1-Imidazolyl	O	CH	Isothiazol-4-yl	
1-Imidazolyl	O	CH	Isothiazol-5-yl	
1-Imidazolyl	O	CH	Benzisothiazol-3-yl	
1-Imidazolyl	O	CH	1,2,3-Thiadiazol-4-yl	
1-Imidazolyl	O	CH	1,2,3-Thiadiazol-5-yl	
1-Imidazolyl	O	CH	1,3,4-Thiadiazol-2-yl	
1-Imidazolyl	O	CH	1,3,4-Thiadiazol-5-yl	
1-Imidazolyl	O	CH	1,2,3-Oxadiazol-4-yl	
1-Imidazolyl	O	CH	1,2,3-Oxadiazol-5-yl	
1-Imidazolyl	O	CH	1,2,4-Oxadiazol-3-yl	
1-Imidazolyl	O	CH	1,2,4-Oxadiazol-5-yl	
1-Imidazolyl	O	CH	1,2,3,4-Thiatriazol-5-yl	
1-Imidazolyl	O	CH	2-Pyridyl	
1-Imidazolyl	O	CH	3-Pyridyl	
1-Imidazolyl	O	CH	4-Pyridyl	
1-Imidazolyl	O	CH	2-Naphthyl	
1-Imidazolyl	O	CH	1-Naphthyl	
1-Imidazolyl	O	CH	2-quinolinyl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Imidazolyl	O	CH	4-quinolinyl	
1-Pyrrolyl	O	CH	1-Pyrrolyl	
1-Pyrrolyl	O	CH	1-Indolyl	
1-Pyrrolyl	O	CH	2-Thienyl	
1-Pyrrolyl	O	CH	3-Thienyl	
1-Pyrrolyl	O	CH	2-bromo-5-thienyl	
1-Pyrrolyl	O	CH	3-Methyl-2-thienyl	
1-Pyrrolyl	O	CH	2-chloro-5-thienyl	
1-Pyrrolyl	O	CH	Benzthien-2-yl	
1-Pyrrolyl	O	CH	Benzthien-3-yl	
1-Pyrrolyl	O	CH	2-Furanyl	
1-Pyrrolyl	O	CH	3-Furanyl	
1-Pyrrolyl	O	CH	Benzofuran-2-yl	
1-Pyrrolyl	O	CH	1-Pyrazolyl	
1-Pyrrolyl	O	CH	1-Methyl-pyrazol-3-yl	
1-Pyrrolyl	O	CH	Benzpyrazol-1-yl	
1-Pyrrolyl	O	CH	1-Imidazolyl	
1-Pyrrolyl	O	CH	1-Methyl-imidazol-4-yl	
1-Pyrrolyl	O	CH	Benzimidazol-1-yl	
1-Pyrrolyl	O	CH	1,2,3-Triazol-1-yl	
1-Pyrrolyl	O	N	1-Methyl-1,2,3-triazol-4-yl	
1-Pyrrolyl	O	CH	Benz-1,2,3-triazol-1-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrrolyl	O	CH	1,2,4-Triazol-1-yl	
1-Pyrrolyl	O	CH	1-Methyl-1,2,4-triazol-3-yl	
1-Pyrrolyl	O	CH	1-Tetrazolyl	
1-Pyrrolyl	O	CH	2-Oxazolyl	
1-Pyrrolyl	O	CH	4-Oxazolyl	
1-Pyrrolyl	O	CH	5-Oxazolyl	
1-Pyrrolyl	O	CH	Benzoxazol-2-yl	
1-Pyrrolyl	O	CH	Isoxazol-3-yl	
1-Pyrrolyl	O	CH	Isoxazol-4-yl	
1-Pyrrolyl	O	CH	Isoxazol-5-yl	
1-Pyrrolyl	O	CH	Benzisoxazol-3-yl	
1-Pyrrolyl	O	CH	2-Thiazolyl	
1-Pyrrolyl	O	CH	4-Thiazolyl	
1-Pyrrolyl	O	CH	5-Thiazolyl	
1-Pyrrolyl	O	CH	Benzthiazol-2-yl	
1-Pyrrolyl	O	CH	Isothiazol-3-yl	
1-Pyrrolyl	O	CH	Isothiazol-4-yl	
1-Pyrrolyl	O	CH	Isothiazol-5-yl	
1-Pyrrolyl	O	CH	Benzisothiazol-3-yl	
1-Pyrrolyl	O	CH	1,2,3-Thiadiazol-4-yl	
1-Pyrrolyl	O	CH	1,2,3-Thiadiazol-5-yl	
1-Pyrrolyl	O	CH	1,3,4-Thiadiazol-2-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
1-Pyrrolyl	O	CH	1,3,4-Thiadiazol-5-yl	
1-Pyrrolyl	O	CH	1,2,3-Oxadiazol-4-yl	
1-Pyrrolyl	O	CH	1,2,3-Oxadiazol-5-yl	
1-Pyrrolyl	O	CH	1,2,4-Oxadiazol-3-yl	
1-Pyrrolyl	O	CH	1,2,4-Oxadiazol-5-yl	
1-Pyrrolyl	O	CH	1,2,3,4-Thiatriazol-5-yl	
1-Pyrrolyl	O	CH	2-Pyridyl	
1-Pyrrolyl	O	CH	3-Pyridyl	
1-Pyrrolyl	O	CH	4-Pyridyl	
1-Pyrrolyl	O	CH	2-Naphthyl	
1-Pyrrolyl	O	CH	1-Naphthyl	
1-Pyrrolyl	O	CH	2-quinolinyl	
1-Pyrrolyl	O	CH	4-quinolinyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1-Pyrrolyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1-Indolyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	2-Thienyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	3-Thienyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	2-bromo-5-thienyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	3-Methyl-2-thienyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	2-chloro-5-thienyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Benzthien-2-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Benzthien-3-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	2-Furanyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	3-Furanyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Benzofuran-2-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1-Pyrazolyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1-Methyl-pyrazol-3-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Benzpyrazol-1-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1-Imidazolyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1-Methyl-imidazol-4-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Benzimidazol-1-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1,2,3-Triazol-1-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	N	1-Methyl-1,2,3-triazol-4-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Benz-1,2,3-triazol-1-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1,2,4-Triazol-1-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1-Methyl-1,2,4-triazol-3-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1-Tetrazolyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	2-Oxazolyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	4-Oxazolyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	5-Oxazolyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Benzoxazol-2-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Isoxazol-3-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Isoxazol-4-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Isoxazol-5-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Benzisoxazol-3-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	2-Thiazolyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	4-Thiazolyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	5-Thiazolyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Benzthiazol-2-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Isothiazol-3-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Isothiazol-4-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Isothiazol-5-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	Benzisothiazol-3-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1,2,3-Thiadiazol-4-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1,2,3-Thiadiazol-5-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1,3,4-Thiadiazol-2-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1,3,4-Thiadiazol-5-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1,2,3-Oxadiazol-4-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1,2,3-Oxadiazol-5-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1,2,4-Oxadiazol-3-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1,2,4-Oxadiazol-5-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1,2,3,4-Thiatriazol-5-yl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	2-Pyridyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	3-Pyridyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	4-Pyridyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	2-Naphtyl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	1-Naphthyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	2-quinolinyl	
CH ₂ P(O)(OC ₂ H ₅) ₂	O	CH	4-quinolinyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1-Pyrrolyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1-Indolyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	2-Thienyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	3-Thienyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	2-bromo-5-thienyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	3-Methyl-2-thienyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	2-chloro-5-thienyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Benzthien-2-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Benzthien-3-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	2-Furanyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	3-Furanyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Benzofuran-2-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1-Pyrazolyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1-Methyl-pyrazol-3-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Benzpyrazol-1-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1-Imidazolyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1-Methyl-imidazol-4-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Benzimidazol-1-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1,2,3-Triazol-1-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
CH ₂ P(O)(OCH ₃) ₂	O	N	1-Methyl-1,2,3-triazol-4-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Benz-1,2,3-triazol-1-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1,2,4-Triazol-1-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1-Methyl-1,2,4-triazol-3-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1-Tetrazolyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	2-Oxazolyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	4-Oxazolyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	5-Oxazolyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Benzoxazol-2-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Isoxazol-3-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Isoxazol-4-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Isoxazol-5-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Benzisoxazol-3-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	2-Thiazolyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	4-Thiazolyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	5-Thiazolyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Benzthiazol-2-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Isotiazol-3-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Isotiazol-4-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Isotiazol-5-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	Benzisothiazol-3-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1,2,3-Thiadiazol-4-yl	

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R ⁵	X	Z	A	Phys. data m.p. [°C]
CH ₂ P(O)(OCH ₃) ₂	O	CH	1,2,3-Thiadiazol-5-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1,3,4-Thiadiazol-2-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1,3,4-Thiadiazol-5-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1,2,3-Oxadiazol-4-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1,2,3-Oxadiazol-5-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1,2,4-Oxadiazol-3-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1,2,4-Oxadiazol-5-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1,2,3,4-Thiatriazol-5-yl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	2-Pyridyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	3-Pyridyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	4-Pyridyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	2-Naphthyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	1-Naphthyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	2-quinolinyl	
CH ₂ P(O)(OCH ₃) ₂	O	CH	4-quinolinyl	

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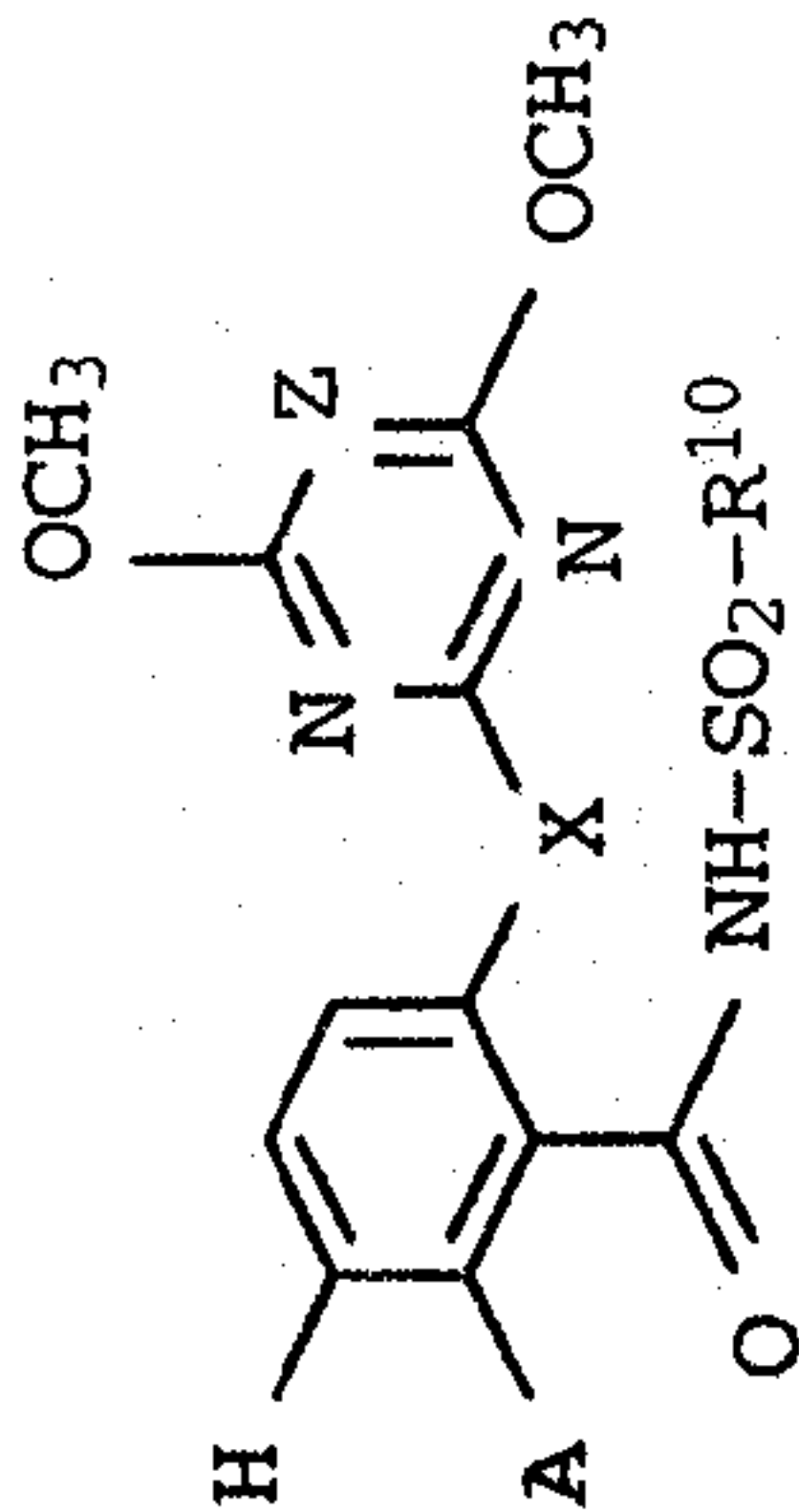
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Table 3: Compounds I in which R¹ is a radical NH-SO₂-R¹⁰ (R², R³ = OCH₃, R⁴ = H).



R ¹⁰	X	Z	A	Phys. data m.p., [°C]
CH ₃	O	N	1-Pyrrolyl	
CH ₃	O	CH	1-Pyrrolyl	
CH ₃	S	CH	1-Pyrrolyl	
CH ₃	O	N	1-Methyl-pyrrol-2-yl	
CH ₃	O	CH	1-Methyl-pyrrol-2-yl	
CH ₃	S	CH	1-Methyl-pyrrol-2-yl	
CH ₃	O	N	1-Methyl-pyrrol-3-yl	
C ₆ H ₄ -4-CH ₃	O	CH	1-Methyl-pyrrol-3-yl	
CH ₃	S	CH	1-Methyl-pyrrol-3-yl	
C ₆ H ₅	O	CH	1-Indolyl	
CH ₃	O	CH	1-Methyl-indol-2-yl	
CH ₃	O	CH	1-Methyl-indol-3-yl	

R ¹⁰	X	Z	A	Phys. data m.p, [°C]
CH ₃	O	CH	3-Methyl-indol-1-yl	
C ₆ H ₄ -4-CH ₃	O	CH	3,5-Dimethyl-pyrrol-1-yl	
CH ₃	O	CH	3-Methylpyrrol-1-yl	
CH ₃	O	CH	4-Methylpyrrol-1-yl	
CH ₃	O	CH	4-chloropyrrol-1-yl	
C ₆ H ₅	O	CH	4-Brompyrrol-1-yl	
CH ₃	O	CH	4-Phenylpyrrol-1-yl	
CH ₃	O	CH	3,4,5-Trimethyl-pyrrol-1-yl	
CH ₃	O	CH	4-chloro-3,5-dimethyl-pyrrol-1-yl	
C ₆ H ₄ -4-CH ₃	O	CH	4-Isopropylpyrrol-1-yl	
CH ₃	O	CH	3-Phenylpyrrol-1-yl	
CH ₃	O	CH	3-Methyl-5-phenyl-pyrrol-1-yl	
C ₆ H ₅	O	CH	3,5-Bistrifluoromethyl-pyrrol-1-yl	
CH ₃	O	CH	4-Nitropyrrol-1-yl	
CH ₃	O	CH	1-Phenylpyrrol-3-yl	
C ₆ H ₄ -4-CH ₃	O	CH	1,3,5-Trimethyl-pyrrol-4-yl	
CH ₃	O	CH	1-Phenylpyrrol-2-yl	
CH ₃	O	CH	1-Phenylpyrrol-3-yl	
CH ₃	O	CH	1,4-Dimethylpyrrol-3-yl	
C ₆ H ₅	O	CH	5-Methyl-1-phenyl-pyrrol-3-yl	
CH ₃	O	CH	1,5-Dimethylpyrrol-3-yl	
CH ₃	O	CH	1,3-Dimethylpyrrol-4-yl	

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R ¹⁰	X	Z	A	Phys. data m.p., [°C]
CH ₃	O	CH	1,5-Dimethylpyrrol-3-yl	
CH ₃	O	CH	3-Methyl-1-phenyl-pyrrol-4-yl	
CH ₃	O	CH	5-Methyl-1-phenyl-pyrrol-2-yl	
C ₆ H ₅	O	CH	3,5-Dimethyl-1-phenyl-pyrrol-4-yl	
CH ₃	O	CH	3-Methyl-1-phenyl-pyrrol-5-yl	
C ₆ H ₄ -4-CH ₃	O	CH	1,4-Dimethylpyrrol-5-yl	
CH ₃	O	CH	1,3-Dimethylpyrrol-5-yl	
CH ₃	O	N	2-Thienyl	
CH ₃	O	CH	2-Thienyl	
C ₆ H ₅	S	CH	2-Thienyl	
CH ₃	O	N	3-Thienyl	
CH ₃	O	CH	3-Thienyl	
CH ₃	S	CH	3-Thienyl	
CH ₃	O	CH	2,3-Dichloro-4-thienyl	
C ₆ H ₅	O	CH	2,5-Dichloro-3-thienyl	
CH ₃	O	CH	2-bromo-5-thienyl	
CH ₃	O	CH	4-bromo-2-thienyl	
C ₆ H ₄ -4-CH ₃	O	CH	3-Methyl-2-thienyl	
CH ₃	O	CH	2-chloro-5-thienyl	
CH ₃	O	CH	2-Methyl-5-thienyl	
CH ₃	O	CH	2-Nitro-5-thienyl	
CH ₃	O	N	Benzthien-2-yl	

R ¹⁰	X	Z	A	Phys. data m.p., [°C]
CH ₃	O	CH	Benzthien-2-yl	
C ₆ H ₅	S	CH	Benzthien-2-yl	
CH ₃	O	N	Benzthien-3-yl	
C ₆ H ₄ -4-CH ₃	O	CH	Benzthien-3-yl	
CH ₃	S	CH	Benzthien-3-yl	
CH ₃	O	N	2-Furanyl	
CH ₃	O	CH	2-Furanyl	
CH ₃	S	CH	2-Furanyl	
CH ₃	O	N	3-Furanyl	
C ₆ H ₅	O	CH	3-Furanyl	
CH ₃	S	CH	3-Furanyl	
CH ₃	O	CH	2,3-Dichloro-4-furanyl	
CH ₃	O	CH	2,5-Dichloro-3-furanyl	
CH ₃	O	CH	2-bromo-5-furanyl	
CH ₃	O	CH	4-bromo-2-furanyl	
CH ₃	O	CH	3-Methyl-2-furanyl	
C ₆ H ₄ -4-CH ₃	O	CH	2-chloro-5-furanyl	
C ₆ H ₅	O	CH	2-Methyl-5-furanyl	
CH ₃	O	CH	2-Nitro-5-furanyl	
CH ₃	O	N	Benzofuran-2-yl	
CH ₃	O	CH	Benzofuran-2-yl	
CH ₃	S	CH	Benzofuran-2-yl	

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R ¹⁰	X	Z	A	Phys. data m.p., [°C]
CH ₃	O	N	Benzofuran-3-yl	
C ₆ H ₄ -4-CH ₃	O	CH	Benzofuran-3-yl	
CH ₃	S	CH	Benzofuran-3-yl	
CH ₃	O	N	1-Pyrazolyl	
CH ₃	O	CH	1-Pyrazolyl	
CH ₃	S	CH	1-Pyrazolyl	
C ₆ H ₅	O	N	1-Methyl-pyrazol-3-yl	
CH ₃	O	CH	1-Methyl-pyrazol-3-yl	
CH ₃	S	CH	1-Methyl-pyrazol-3-yl	
CH ₃	O	N	1-Methyl-pyrazol-4-yl	
CH ₃	O	CH	1-Methyl-pyrazol-4-yl	
C ₆ H ₄ -4-CH ₃	S	CH	1-Methyl-pyrazol-4-yl	
CH ₃	O	N	1-Methyl-pyrazol-5-yl	
CH ₃	O	CH	1-Methyl-pyrazol-5-yl	
C ₆ H ₅	S	CH	1-Methyl-pyrazol-5-yl	
CH ₃	O	CH	Benzpyrazol-1-yl	
CH ₃	O	CH	1-Methyl-benzpyrazol-3-yl	
CH ₃	O	CH	3,5-Dimethyl-pyrazol-1-yl	
CH ₃	O	CH	3(5)-Methyl-pyrazol-1-yl	
C ₆ H ₄ -4-CH ₃	O	CH	4-Methylpyrazol-1-yl	
CH ₃	O	CH	4-chloropyrazol-1-yl	
C ₆ H ₅	O	CH	4-bromopyrazol-1-yl	

R ¹⁰	X	Z	A	Phys. data m.p., [°C]
CH ₃	O	CH	4-Phenylpyrazol-1-yl	
CH ₃	O	CH	3,4,5-Trimethyl-pyrazol-1-yl	
CH ₃	O	CH	4-chloro-3,5-dimethyl-pyrazol-1-yl	
CH ₃	O	CH	4-Isopropylpyrazol-1-yl	
C ₆ H ₄ -4-CH ₃	O	CH	3(5)-Phenylpyrazol-1-yl	
CH ₃	O	CH	3(5)-Methyl-5(3)-phenyl-pyrazol-1-yl	
C ₆ H ₅	O	CH	3,5-Bis(trifluoromethyl)-pyrazol-1-yl	
CH ₃	O	CH	4-Nitropyrazol-1-yl	
CH ₃	O	CH	1-Phenylpyrazol-4-yl	
CH ₃	O	CH	1,3,5-Trimethyl-pyrazol-4-yl	
CH ₃	O	CH	1-Phenylpyrazol-5-yl	
CH ₃	O	CH	1-Phenylpyrazol-3-yl	
C ₆ H ₄ -4-CH ₃	O	CH	1,4-Dimethylpyrazol-3-yl	
CH ₃	O	CH	5-Methyl-1-phenyl-pyrazol-3-yl	
C ₆ H ₅	O	CH	1,5-Dimethylpyrazol-3-yl	
CH ₃	O	CH	1,3-Dimethylpyrazol-4-yl	
CH ₃	O	CH	1,5-Dimethylpyrazol-4-yl	
CH ₃	O	CH	3-Methyl-1-phenyl-pyrazol-4-yl	
CH ₃	O	CH	5-Methyl-1-phenyl-pyrazol-4-yl	
C ₆ H ₄ -4-CH ₃	O	CH	3,5-Dimethyl-1-phenyl-pyrazol-4-yl	
CH ₃	O	CH	3-Methyl-1-phenyl-pyrazol-5-yl	
CH ₃	O	CH	1,4-Dimethylpyrazol-5-yl	

R ¹⁰	X	Z	A	Phys. data m.p., [°C]
CH ₃	O	CH	1,3-Dimethylpyrazol-5-yl	
CH ₃	O	N	1-Imidazolyl	
CH ₃	O	CH	1-Imidazolyl	
CH ₃	S	CH	1-Imidazolyl	
C ₆ H ₄ -4-CH ₃	O	N	1-Methyl-1-imidazol-2-yl	
C ₆ H ₅	O	CH	1-Methyl-1-imidazol-2-yl	
CH ₃	S	CH	1-Methyl-1-imidazol-2-yl	
CH ₃	O	N	1-Methyl-1-imidazol-4-yl	
CH ₃	O	CH	1-Methyl-1-imidazol-4-yl	
CH ₃	S	CH	1-Methyl-1-imidazol-4-yl	
CH ₃	O	N	1-Methyl-1-imidazol-5-yl	
C ₆ H ₅	O	CH	1-Methyl-1-imidazol-5-yl	
CH ₃	S	CH	1-Methyl-1-imidazol-5-yl	
CH ₃	O	CH	Benzimidazol-1-yl	
C ₆ H ₄ -4-CH ₃	O	CH	1-Methyl-benzimidazol-2-yl	
CH ₃	O	CH	4,5-Dimethylimidazol-1-yl	
CH ₃	O	CH	2-Phenylimidazol-1-yl	
CH ₃	O	CH	4,5-Dichloroimidazol-1-yl	
CH ₃	O	CH	2,4,5-Trichloroimidazol-1-yl	
CH ₃	O	CH	2-Methyl-4,5-dichloroimidazol-1-yl	
C ₆ H ₅	O	CH	2-Methyl-4,5-dibromoimidazol-1-yl	
CH ₃	O	CH	4(5)-chloro-5(4)-methyl-imidazol-1-yl	

R10	X	Z	A	Phys. data m.p, [°C]
5	C ₆ H ₄ -4-CH ₃	CH	4(5)-Nitroimidazol-1-yl	
	CH ₃	CH	1,4-Dimethyl-1-imidazol-5-yl	
	CH ₃	CH	1-Methyl-5-nitro-imidazol-2-yl	
	CH ₃	CH	1-Phenylimidazol-5-yl	
	CH ₃	N	1,2,3-Triazol-1-yl	
10	CH ₃	CH	1,2,3-Triazol-1-yl	
	CH ₃	CH	1,2,3-Triazol-1-yl	
	CH ₃	CH	1,2,3-Triazol-1-yl	
	CH ₃	N	1-Methyl-1,2,3-triazol-4-yl	
	C ₆ H ₅	CH	1-Methyl-1,2,3-triazol-4-yl	
15	CH ₃	CH	1-Methyl-1,2,3-triazol-4-yl	
	C ₆ H ₄ -4-CH ₃	N	1-Methyl-1,2,3-triazol-5-yl	
	CH ₃	CH	1-Methyl-1,2,3-triazol-5-yl	
	CH ₃	CH	1-Methyl-1,2,3-triazol-5-yl	
	CH ₃	CH	Benz-1,2,3-triazol-1-yl	
20	CH ₃	CH	4,5-Dimethyl-1,2,3-triazol-1-yl	
	CH ₃	CH	4(5)-Phenyl-1,2,3-triazol-1-yl	
	C ₆ H ₅	CH	1-Phenyl-1,2,3-triazol-4-yl	
	CH ₃	CH	1-Phenyl-1,2,3-triazol-4-yl	
	C ₆ H ₄ -4-CH ₃	CH	5-Methyl-1-phenyl-1,2,3-triazol-4-yl	
25	CH ₃	N	1,2,4-Triazol-1-yl	
	CH ₃	CH	1,2,4-Triazol-1-yl	
	C ₆ H ₅	CH	1,2,4-Triazol-1-yl	
	CH ₃	CH	1,2,4-Triazol-1-yl	
	C ₆ H ₅	CH	1,2,4-Triazol-1-yl	

R ¹⁰	X	Z	A	Phys. data m.p, [°C]
CH ₃	O	N	1-Methyl-1,2,4-triazol-3-yl	
CH ₃	O	CH	1-Methyl-1,2,4-triazol-3-yl	
CH ₃	S	CH	1-Methyl-1,2,4-triazol-3-yl	
CH ₃	O	N	1-Methyl-1,2,4-triazol-5-yl	
CH ₃	O	CH	1-Methyl-1,2,4-triazol-5-yl	
CH ₃	S	CH	1-Methyl-1,2,4-triazol-5-yl	
C ₆ H ₆ -4-CH ₃	O	CH	3(5)-Phenyl-1,2,4-triazol-1-yl	
CH ₃	O	CH	3,5-Dimethyl-1,2,4-triazol-1-yl	
C ₆ H ₅	O	CH	5-Methyl-1-phenyl-1,2,4-triazol-3-yl	
CH ₃	O	N	1-Tetrazolyl	
CH ₃	O	CH	1-Tetrazolyl	
CH ₃	S	CH	1-Tetrazolyl	
CH ₃	O	N	1-Methyl-tetrazol-5-yl	
CH ₃	O	CH	1-Methyl-tetrazol-5-yl	
CH ₃	S	CH	1-Methyl-tetrazol-5-yl	
CH ₃	O	N	2-Oxazolyl	
C ₆ H ₄ -4-CH ₃	O	CH	2-Oxazolyl	
CH ₃	S	CH	2-Oxazolyl	
C ₆ H ₅	O	N	4-Oxazolyl	
CH ₃	O	CH	4-Oxazolyl	
CH ₃	S	CH	4-Oxazolyl	
CH ₃	O	N	5-Oxazolyl	

R ¹⁰	X	Z	A	Phys. data m.p, [°C]
CH ₃	O	CH	5-Oxazolyl	
CH ₃	S	CH	5-Oxazolyl	
CH ₃	O	CH	2-Methylloxazol-4-yl	
C ₆ H ₄ -4-CH ₃	O	CH	Benzoxazol-2-yl	
CH ₃	O	N	Isoxazol-3-yl	
CH ₃	O	CH	Isoxazol-3-yl	
C ₆ H ₅	S	CH	Isoxazol-3-yl	
CH ₃	O	N	Isoxazol-4-yl	
CH ₃	O	CH	Isoxazol-4-yl	
CH ₃	S	CH	Isoxazol-4-yl	
CH ₃	O	N	Isoxazol-5-yl	
CH ₃	O	CH	Isoxazol-5-yl	
CH ₃	S	CH	Isoxazol-5-yl	
C ₆ H ₄ -4-CH ₃	O	CH	Benzisoxazol-3-yl	
CH ₃	O	CH	3-Methylisoxazol-5-yl	
CH ₃	O	CH	3-Isopropylisoxazol-5-yl	
CH ₃	O	CH	3-Phenylisoxazol-5-yl	
C ₆ H ₅	O	CH	3-Methyl-4-chloro-isoxazol-5-yl	
CH ₃	O	CH	3-Methylisoxazol-4-yl	
CH ₃	O	CH	3,5-Dimethyl-isoxazol-4-yl	
CH ₃	O	N	2-Thiazolyl	
CH ₃	O	CH	2-Thiazolyl	

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R ¹⁰	X	Z	A	Phys. data m.p, [°C]
CH ₃	S	CH	2-Thiazolyl	
C ₆ H ₄ -4-CH ₃	O	N	4-Thiazolyl	
CH ₃	O	CH	4-Thiazolyl	
C ₆ H ₅	S	CH	4-Thiazolyl	
CH ₃	O	N	5-Thiazolyl	
CH ₃	O	CH	5-Thiazolyl	
CH ₃	S	CH	5-Thiazolyl	
CH ₃	O	CH	Benzthiazol-2-yl	
CH ₃	O	CH	2-Methylthiazol-4-yl	
CH ₃	O	CH	2-Phenylthiazol-4-yl	
C ₆ H ₅	O	CH	2-Benzylthiazol-4-yl	
CH ₃	O	CH	5-chloro-2-phenyl-thiazol-4-yl	
CH ₃	O	CH	4-Methylthiazol-2-yl	
CH ₃	O	CH	5-Methylthiazol-2-yl	
C ₆ H ₄ -4-CH ₃	O	CH	4-Phenylthiazol-2-yl	
CH ₃	O	CH	4-Methylthiazol-5-yl	
CH ₃	O	CH	2-Methylthiazol-5-yl	
CH ₃	O	CH	2-Phenylthiazol-5-yl	
C ₆ H ₅	O	N	Isothiazol-3-yl	
CH ₃	O	CH	Isothiazol-3-yl	
CH ₃	S	CH	Isothiazol-3-yl	
CH ₃	O	N	Isothiazol-4-yl	

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R ¹⁰	X	Z	A	Phys. data m.p, [°C]
CH ₃	O	CH	Isothiazol-4-yl	
CH ₃	S	CH	Isothiazol-4-yl	
CH ₃	O	N	Isothiazol-5-yl	
C ₆ H ₄ -4-CH ₃	O	CH	Isothiazol-5-yl	
CH ₃	S	CH	Isothiazol-5-yl	
CH ₃	O	CH	Benzisothiazol-3-yl	
CH ₃	O	N	1,2,3-Thiadiazol-4-yl	
CH ₃	O	CH	1,2,3-Thiadiazol-4-yl	
C ₆ H ₅	S	CH	1,2,3-Thiadiazol-4-yl	
CH ₃	O	N	1,2,3-Thiadiazol-5-yl	
CH ₃	O	CH	1,2,3-Thiadiazol-5-yl	
CH ₃	S	CH	1,2,3-Thiadiazol-5-yl	
CH ₃	O	N	1,3,4-Thiadiazol-2-yl	
CH ₃	O	CH	1,3,4-Thiadiazol-2-yl	
C ₆ H ₄ -4-CH ₃	S	CH	1,3,4-Thiadiazol-2-yl	
CH ₃	O	N	1,3,4-Thiadiazol-5-yl	
CH ₃	O	CH	1,3,4-Thiadiazol-5-yl	
CH ₃	S	CH	1,3,4-Thiadiazol-5-yl	
C ₆ H ₅	O	CH	5-Methyl-1,3,4-thiadiazol-2-yl	
CH ₃	O	CH	5-Phenyl-1,3,4-thiadiazol-2-yl	
CH ₃	O	N	1,2,3-Oxadiazol-4-yl	
CH ₃	O	CH	1,2,3-Oxadiazol-4-yl	

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R ¹⁰	X	Z	A	Phys. data m.p., [°C]
CH ₃	S	CH	1,2,3-Oxadiazol-4-yl	
CH ₃	O	N	1,2,3-Oxadiazol-5-yl	
CH ₃	O	CH	1,2,3-Oxadiazol-5-yl	
C ₆ H ₄ -4-CH ₃	S	CH	1,2,3-Oxadiazol-5-yl	
C ₆ H ₅	O	N	1,2,4-Oxadiazol-3-yl	
CH ₃	O	CH	1,2,4-Oxadiazol-3-yl	
CH ₃	S	CH	1,2,4-Oxadiazol-3-yl	
CH ₃	O	N	1,2,4-Oxadiazol-5-yl	
CH ₃	O	CH	1,2,4-Oxadiazol-5-yl	
CH ₃	S	CH	1,2,4-Oxadiazol-5-yl	
CH ₃	O	N	1,2,3,4-Thiadiazol-5-yl	
CH ₃	O	CH	1,2,3,4-Thiadiazol-5-yl	
C ₆ H ₅	S	CH	1,2,3,4-Thiadiazol-5-yl	
CH ₃	O	N	2-Pyridyl	
CH ₃	O	CH	2-Pyridyl	
CH ₃	S	CH	2-Pyridyl	
CH ₃	O	N	3-Pyridyl	
C ₆ H ₄ -4-CH ₃	O	CH	3-Pyridyl	
CH ₃	S	CH	3-Pyridyl	
CH ₃	O	N	4-Pyridyl	
C ₆ H ₅	O	CH	4-Pyridyl	
CH ₃	S	CH	4-Pyridyl	

R ¹⁰	X	Z	A	Phys. data m.p, [°C]
CH ₃	O	CH	6-Methyl-2-pyridyl	
CH ₃	O	CH	3-chloro-5-pyridyl	
CH ₃	O	CH	5-chloro-2-pyridyl	
C ₆ H ₄ -4-CH ₃	O	N	2-Naphthyl	
CH ₃	O	CH	2-Naphthyl	
CH ₃	S	CH	2-Naphthyl	
C ₆ H ₅	O	N	1-Naphthyl	
CH ₃	O	CH	1-Naphthyl	
CH ₃	S	CH	1-Naphthyl	
CH ₃	O	CH	2-Methyl-1-1-naphthyl	
CH ₃	O	CH	2-Methoxy-1-naphthyl	
CH ₃	O	CH	1-chloro-4-naphthyl	
CH ₃	O	N	2-quinoliny1	
C ₆ H ₅	O	CH	2-quinoliny1	
CH ₃	S	CH	2-quinoliny1	
CH ₃	O	N	4-quinoliny1	
C ₆ H ₄ -4-CH ₃	S	CH	4-quinoliny1	
CH ₃	S	CH	4-quinoliny1	
CH ₃	O	CH	2-chloro-quinolin-2-yl	
C ₆ H ₅	O	CH	2,6-Dichloro-quinolin-3-yl	
CH ₃	O	CH	2-chloro-6-methyl-quinolin-3-yl	

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The herbicidal and growth-regulating compounds I according to the invention, or agents containing them, may be applied for instance in the form of directly sprayable solutions, powders, suspensions (including high-percentage aqueous, oily or other suspensions), dispersions, emulsions, oil dispersions, pastes, dusts, broadcasting agents, or granules by spraying, atomizing, dusting, broadcasting or watering. The forms of application depend entirely on the purpose for which the agents are being used, but they must ensure as fine a distribution of the active ingredients according to the invention as possible.

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The compounds I are generally suitable for the preparation of solutions, emulsions, pastes and oil dispersions to be sprayed direct. Examples of inert additives are mineral oil fractions of medium to high boiling point, such as kerosene or diesel oil, further coal-tar oils, and oils of vegetable or animal origin, aliphatic, cyclic and aromatic hydrocarbons such as toluene, xylene, paraffin, tetrahydronaphthalene, alkylated naphthalenes and their derivatives, methanol, ethanol, propanol, butanol, cyclohexanol, cyclohexanone, chlorobenzene, isophorone, etc., and strongly polar solvents such as N,N-dimethylformamide, dimethyl sulfoxide, N-methylpyrrolidone, water, etc.

Aqueous formulations may be prepared from emulsion concentrates, pastes, oil dispersions, wettable powders or water-dispersible granules by adding water. To prepare emulsions, pastes and oil dispersions the ingredients as such or dissolved in an oil or solvent may be homogenized in water by means of wetting or dispersing agents, adherents or emulsifiers. Concentrates which are suitable for dilution with water may be prepared from active ingredient, wetting agent, adherent, emulsifying or dispersing agent and possibly solvent or oil.

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Examples of surfactants are: alkali metal, alkaline earth metal and ammonium salts of aromatic sulfonic acids, e.g., ligninsulfonic acid, phenolsulfonic acid, naphthalenesulfonic acid and dibutyl-naphthalene-sulfonic acid, and of fatty acids, alkyl and alkylaryl sulfonates, and alkyl, lauryl ether and fatty alcohol sulfates, and salts of sulfated hexadecanols, heptadecanols, and octadecanols, salts of fatty alcohol glycol ethers, condensation products of sulfonated naphthalene and naphthalene derivatives with formaldehyde, condensation products of naphthalene or naphthalenesulfonic acids with phenol and formaldehyde, polyoxyethylene octylphenol ethers, ethoxylated isooctylphenol, ethoxylated octylphenol and ethoxylated nonylphenol, alkylphenol polyglycol ethers, tributylphenyl polyglycol ethers, alkylaryl polyether alcohols, isotridecyl alcohol, fatty alcohol ethylene oxide condensates, ethoxylated castor oil, polyoxyethylene alkyl ethers, ethoxylated polyoxypropylene, lauryl alcohol polyglycol ether acetal, sorbitol esters, lignin-sulfite waste liquors and methyl cellulose.

Powders, dusts and broadcasting agents may be prepared by mixing or grinding the active ingredients with a solid carrier.

Granules, e.g., coated, impregnated or homogeneous granules, may be prepared by bonding the active ingredients to solid carriers. Examples of solid carriers are mineral earths such as silicic acids, silica gels, silicates, talc, kaolin, attapulgus clay, limestone, lime, chalk, bole, loess, clay, dolomite, diatomaceous earth, calcium sulfate, magnesium sulfate, magnesium oxide, ground plastics, fertilizers such as ammonium sulfate, ammonium phosphate, ammonium nitrate, and ureas, and vegetable products such as grain meals, bark meal, wood meal, and nutshell meal, cellulosic powders, etc.

The formulations contain from 0.1 to 95, and preferably 0.5 to 90, % by weight of active ingredient. The active ingredients are used in a purity of 90 to 100, and preferably from 95 to 100, % (according to the NMR spectrum).

The compounds I according to the invention may be formulated as follows:

I. 90 parts by weight of compound 1.001 is mixed with 10 parts by weight of N-methyl-alpha-pyrrolidone. A mixture is obtained which is suitable for application in the form of very fine drops.

II. 20 parts by weight of compound 1.001 is dissolved in a mixture consisting of 80 parts by weight of xylene, 10 parts by weight of the adduct of 8 to 10 moles of ethylene oxide and 1 mole of oleic acid-N-monoethanolamide, 5 parts by weight of the calcium salt of dodecylbenzenesulfonic acid, and 5 parts by weight of the adduct of 40 moles of ethylene oxide and 1 mole of castor oil. By pouring the solution into 100,000 parts by weight of water and uniformly distributing it therein, an aqueous dispersion is obtained containing 0.02% by weight of the active ingredient.

III. 20 parts by weight of compound 1.002 is dissolved in a mixture consisting of 40 parts by weight of cyclohexanone, 30 parts by weight of isobutanol, 20 parts by weight of the adduct of 7 moles of ethylene oxide and 1 mole of isooctylphenol, and 10 parts by weight of the adduct of 40 moles of ethylene oxide and 1 mole of castor oil. By pouring the solution into 100,000 parts by weight of water and finely distributing it therein, an aqueous dispersion is obtained containing 0.02% by weight of the active ingredient.

IV. 20 parts by weight of compound 1.002 is dissolved in a mixture consisting of 25 parts by weight of cyclohexanone, 65 parts by weight of a mineral oil fraction having a boiling point between 210 and 280°C, and 10 parts by weight of the adduct of 40 moles of ethylene oxide and 1 mole of castor oil. By pouring the solution into 100,000 parts by weight of water and uniformly distributing it therein, an aqueous dispersion is obtained containing 0.02% by weight of the active ingredient.

V. 20 parts by weight of compound 1.001 is well mixed with 3 parts by weight of the sodium salt of diisobutyl naphthalene- α -sulfonic acid, 17 parts by weight of the sodium salt of a lignin-sulfonic acid obtained from a sulfite waste liquor, and 60 parts by weight of powdered silica gel, and triturated in a hammer mill. By uniformly distributing the mixture in 20,000 parts by weight of water, a spray liquor is obtained containing 0.1% by weight of the active ingredient.

VI. 3 parts by weight of compound 1.001 is intimately mixed with 97 parts by weight of particulate kaolin. A dust is obtained containing 3% by weight of the active ingredient.

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VII. 30 parts by weight of compound 1.002 is intimately mixed with a mixture consisting of 92 parts by weight of powdered silica gel and 8 parts by weight of paraffin oil which has been sprayed onto the surface of this silica gel. A formulation of the active ingredient is obtained having good adherence.

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VIII. 20 parts by weight of compound 1.002 is intimately mixed with 2 parts of the calcium salt of dodecylbenzenesulfonic acid, 8 parts of a fatty alcohol polyglycol ether, 2 parts of the sodium salt of a phenol-sulfonic acid-urea-formaldehyde condensate and 68 parts of a paraffinic mineral oil. A stable oily dispersion is obtained.

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The active ingredients or the herbicidal and growth-regulating agents containing them may be applied pre- or postemergence. If certain crop plants tolerate the active ingredients less well, application techniques may be used in which the herbicidal agents are sprayed from suitable equipment in such a manner that the leaves of sensitive crop plants are if possible not touched, and the agents reach the soil or the unwanted plants growing beneath the crop plants (post-directed, lay-by treatment).

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The application rates depend on the objective to be achieved, the time of the year, the plants to be combated and their growth stage, and are from 0.001 to 3, preferably 0.005 to 0.5, kg of active ingredient per hectare.

The growth-regulating salicylic acid derivatives of the formula I may exercise a variety of influences on practically all plant development stages, and are therefore used as growth regulators. The diversity of action of growth regulators depends especially on

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- a) the type and variety of plant;
- b) the time applied, with reference to the development stage of the plants and the time of the year;
- c) the place and method of application (seed treatment, soil treatment, application to foliage, or injection into tree trunks);
- 10 d) climatic factors, e.g., average temperature, amount of precipitation, day length and light intensity);
- e) soil conditions (including fertilization);
- f) the formulation of the active ingredient; and
- 15 g) the concentration at which the active ingredient is applied.

The active ingredients I according to the invention may be applied not only to the seed (as a dressing), but also to the soil, i.e., via the roots, and to the foliage by spraying.

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As a result of the good tolerance by crop plants, the application rate when the active ingredients are used as growth regulators may vary within wide limits.

- 25 When the active ingredients are used for treating seed, amounts of from 0.001 to 50, and preferably from 0.01 to 10, g per kg of seed are generally required. For foliage and soil treatment, amounts of from 0.001 to 10, preferably from 0.01 to 3, and especially from 0.01 to 0.5, kg/ha are generally considered to be sufficient.

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- The active ingredients or the herbicidal agents containing them may be applied pre- or postemergence. If certain crop plants tolerate the active ingredients less well, application techniques may be used in which the that the leaves of sensitive crop plants are if possible not touched, and
- 35 the agents reach the soil or the unwanted plants growing beneath the crop plants (post-directed, lay-by treatment).

- The application rates depend on the objective to be achieved, the time of the year, the plants to be combated and their growth stage, and are from
- 40 0.001 to 3, preferably 0.15 to 1.0, kg of active ingredient per hectare.

In view of the many application methods possible, the compounds according to the invention, or agents containing them, may be used in a further number of crop plants for removing unwanted plant growth. The following crops are given by way of example:

Botanical name	Common name
Allium cepa	onions
Ananas comosus	pineapples
Arachis hypogaea	peanuts (groundnuts)
5 Asparagus officinalis	asparagus
Avena sativa	oats
Beta vulgaris spp. altissima	sugarbeets
Beta vulgaris spp. rapa	fodder beets
Beta vulgaris spp. esculenta	table beets, red beets
10 Brassica napus var. napus	rapeseed
Brassica napus var. napobrassica	swedes
Brassica napus var. rapa	turnips
Brassica rapa var. silvestris	
Camellia sinensis	tea plants
15 Carthamus tinctorius	safflower
Carya illinoensis	pecan trees
Citrus limon	lemons
Citrus maxima	grapefruits
Citrus reticulata	mandarins
20 Citrus sinensis	orange trees
Coffea arabica (Coffea canephora, Coffea liberica)	coffee plants
Cucumis melo	melons
Cucumis sativus	cucumbers
25 Cynodon dactylon	Bermudagrass
Daucus carota	carrots
Elais guineensis	oil palms
Fragaria vesca	strawberries
Glycine max	soybeans
30 Gossypium hirsutum (Gossypium arboreum, Gossypium herbaceum, Gossypium vitifolium)	cotton
Helianthus annuus	sunflowers
Helianthus tuberosus	Jerusalem artichoke
Hevea brasiliensis	rubber plants
35 Hordeum vulgare	barley
Humulus lupulus	hops
Ipomoea batatas	sweet potatoes
Juglans regia	walnut trees
Lactuca sativa	lettuce
40 Lens culinaris	lentils
Linum usitatissimum	flax
Lycopersicon lycopersicum	tomatoes
Malus spp.	apple trees
Manihot esculenta	cassava
Medicago sativa	alfalfa (lucerne)

Botanical name	Common name
Mentha piperita	peppermint
Musa spp.	banana plants
Nicotiana tabacum (N. rustica)	tobacco
5 Olea europaea	olive trees
Oryza sativa	rice
Panicum miliaceum	millet
Phaseolus lunatus	limabeans
Phaseolus mungo	mungbeans
10 Phaseolus vulgaris	snapbeans, green beans, dry beans
Pennisetum glaucum	pearl millet
Petroselinum crispum spp. tuberosum	parsley
Picea abies	Norway spruce
15 Abies alba	fir trees
Pinus spp.	pine trees
Pisum sativum	English peas
Prunus avium	cherry trees
Prunus domestica	plum trees
20 Prunus dulcis	almond trees
Prunus persica	peach trees
Pyrus communis	pear trees
Ribes sylvestre	redcurrants
Ribes uva-crispa	gooseberries
25 Ricinus communis	castor-oil plants
Saccharum officinarum	sugar cane
Secale cereale	rye
Sesamum indicum	sesame
Solanum tuberosum	Irish potatoes
30 Sorghum bicolor (s. vulgare)	sorghum
Sorghum dochna	sorgo
Spinacia oleracea	spinach
Theobroma cacao	cacao plants
Trifolium pratense	red clover
35 Triticum aestivum	wheat
Triticum durum	durum wheat
Vaccinium corymbosum	blueberries
Vaccinium vitis-idaea	cranberries
Vicia faba	tick beans
40 Vigna sinensis (V. unguiculata)	cow peas
Vitis vinifera	grapes
Zea mays	Indian corn, sweet corn, maize

The compounds of the formula I are of particular interest for controlling a large number of fungi in various crops, especially wheat, rye, barley, oats, rice, Indian corn, lawns, cotton, soybeans, coffee, sugar cane, fruit and ornamentals in horticulture and viticulture, and in vegetables 5 such as cucumbers, beans and cucurbits, and in the seeds of these plants.

The novel compounds are particularly useful for controlling the following plant diseases:

- 10 Erysiphe graminis in cereals,
Erysiphe cichoracearum and Sphaerotheca fuliginea in cucurbits,
Podosphaera leucotricha in apples,
Uncinula necator in vines,
Puccinia species in cereals,
- 15 Rhizoctonia solani in cotton,
Ustilago species in cereals and sugar cane,
Venturia inaequalis (scab) in apples,
Helminthosporium species in cereals,
Septoria nodorum in wheat,
- 20 Botrytis cinerea (gray mold) in strawberries and grapes,
Cercospora arachidicola in groundnuts,
Pseudocercospora herpotrichoides in wheat and barley,
Pyricularia oryzae in rice,
Phytophthora infestans in potatoes and tomatoes,
- 25 Fusarium and Verticillium species in various plants,
Plasmopara viticola in grapes,
Alternaria species in fruit and vegetables.

The compounds are applied by treating the fungi or the plants, seeds or 30 materials to be protected against fungus attack, or the soil with a fungicidally effective amount of the active ingredients. They may be applied before or after infection of the materials, plants or seeds by the fungi.

The fungicidal agents generally contain from 0.1 to 95, and preferably 35 from 0.5 to 90, wt% of active ingredient.

Depending on the type of effect desired, application rates vary from 0.02 to 3 kg of active ingredient per hectare. The novel compounds may also be used for protecting materials (timber), e.g., against Paecilomyces 40 variotii.

For treating seed, active ingredient amounts of from 0.001 to 50, and preferably from 0.01 to 10, g per kg of seed are generally sufficient.

The agents, or the ready-to-use formulations prepared therefrom, such as solutions, emulsions, suspensions, powders, dusts, pastes or granules, are applied in known manner, for example by spraying, atomizing, dusting, scattering, treating seed, or by watering.

5

To increase the spectrum of action and to achieve synergistic effects, the compounds I may be mixed with each other, or mixed and applied together with numerous representatives of other herbicidal or growth-regulating active ingredient groups. Examples of suitable components are diazines, 10 4H-3,1-benzoxazine derivatives, benzothiadiazinones, 2,6-dinitroanilines, N-phenylcarbamates, thiolcarbamates, halocarboxylic acids, triazines, amides, ureas, diphenyl ethers, triazinones, uracils, benzofuran derivatives, cyclohexane-1,3-dione derivatives, quinolinecarboxylic acids, (hetero)-aryloxyphenoxypropionic acids and salts, esters, amides thereof, etc.

15

It may also be useful to apply the compounds I, either alone or in combination with other herbicides, in admixture with other crop protection agents, e.g., agents for combating pests or phytopathogenic fungi or bacteria. The compounds may also be mixed with solutions of mineral salts 20 used to remedy nutritional or trace element deficiencies. Non-phytotoxic oils and oil concentrates may also be added.

Synthesis instructions

25 Example 1

General instructions for the preparation of aromatic carboxylic acid hydroxylamine esters or similar compounds of the formula I:

30 3.2 mmol of sodium hydride is added to a mixture of 3.2 mmol of the aromatic 2-(4,6-dimethoxypyrimidin-2-yl)-oxycarboxylic acid concerned in 20 ml of dimethoxyethane; gas immediately evolves. The mixture is stirred for 1 hour at room temperature and then cooled to 0°C, and 3.5 mmol of oxalyl chloride is added. The mixture is stirred for 1 hour at 0°C, and 35 about 30% of the solvent is evaporated under reduced pressure to remove excess oxalyl chloride. A solution of 4.2 mmol of the hydroxylamine in question or a comparable hydroxy compound in 10 ml of dimethoxyethane is added, followed by 3.2 mmol of pyridine, at 0°C, and the mixture is heated over a period of about 1 hour to room temperature. It is poured into 40 120 ml of cold water and extracted with methylene chloride. The organic phase is dried over sodium sulfate and evaporated down under reduced pressure. The substance which remains can be further purified by chromatography on silica gel.

Example 2

General instructions for the preparation of aromatic carboxylic acid hydroxylamine esters or similar compounds of the formula I:

5 1.75 g (10.8 mmol) of N,N'-carbonylbisimidazole is added to a solution of 10 mmol of the corresponding 6-hetaryl-2-(4,6-dimethoxypyrimidin-2-yloxy)-benzoic acid in 30 ml of tetrahydrofuran. After the mixture has been stirred for 30 minutes at room temperature, 9.9 mmol of the corresponding
10 hydroxy compound is added and the whole is stirred for a further 14 hours. The reaction mixture is then hydrolyzed with 300 ml of 1N phosphoric acid and the resulting mixture is extracted several times with methyl tert-butyl ether. The organic phases are dried over sodium sulfate and evaporated down under reduced pressure. The residue can be further
15 purified by column chromatography or recrystallization.

Example 3

General instructions for the preparation of aromatic carboxylic acid
20 hydroxylamine esters or similar compounds of the formula I:

1.75 g (10.8 mmol) of N,N'-carbonylbisimidazole is added to a solution of 10 mmol of the corresponding 6-hetarylsalicylic acid in 30 ml of dioxane. After the mixture has been stirred for 30 minutes at room temperature, 9.9
25 mmol of the corresponding hydroxy compound is added and the whole is stirred for a further 14 hours. The batch is then hydrolyzed with 300 ml of 1N phosphoric acid, and the resulting mixture is extracted several times with methyl tert-butyl ether. The organic phases are combined, dried over sodium sulfate and evaporated down under reduced pressure. The
30 residue is taken up in 40 ml of dimethylformamide, and 280 mg of sodium hydride (85% in paraffin, 10 mmol) is added. After the mixture has been stirred for 30 minutes at room temperature, 1.97 g (9 mmol) of 4,6-dimethoxy-2-methylsulfonylpyrimidine is added and the mixture is stirred for 14 hours. The reaction mixture is poured into 300 ml of 0.1N phosphoric
35 acid and extracted with diethyl ether. The ether phase is dried over sodium sulfate and evaporated down, and the residue is purified by column chromatography or recrystallization.

Example 4

40

General instructions for the preparation of aromatic carboxylic acid hydroxylamine esters or similar compounds of the formula I:

At 10°C, 0.46 g (0.015 mol) of sodium hydride (80% strength) is added to a solution of 15 mmol of azolyl 6-hetarylsalicylate in 25 ml of anhydrous

dimethylformamide, and the mixture is stirred for 3 hours at 30°C. 3.27 g (0.015 mol) of 2-methylsulfonyl-4,6-dimethoxypyrimidine is added and the mixture is stirred for 12 hours at room temperature. It is then introduced into 500 ml of water to which 2.5 ml of orthophosphoric acid has previously been added. The oil which separates out is taken up in ethyl acetate and dried over sodium sulfate. The greasy residue remaining after evaporation is purified by column chromatography or recrystallization.

Example 5

10

6-Pyrazolyl-2-(4,6-dimethoxypyrimidin-2-yloxy)-1-(N,N-dimethylaminooxycarbonyl)-benzene

At 10°C, 0.30 g (0.01 mol) of sodium hydride (80% strength) is added to a solution of 2.47 g (10 mmol) of 3-pyrazolyl-2-(N,N-dimethylaminooxycarbonyl)-phenol in 25 ml of anhydrous dimethylformamide, and the reaction mixture is stirred for 3 hours at 30°C. 2.18 g (0.01 mol) of 2-methylsulfonyl-4,6-dimethoxypyrimidine is added and the mixture is stirred for 12 hours at room temperature. The reaction mixture is introduced into 500 ml of water to which 2.5 ml of orthophosphoric acid has previously been added. The oil which separates out is taken up in ethyl acetate and dried over sodium sulfate. The greasy residue remaining after evaporation is purified to give a colorless solid.

25 Example 6

6-(2-Thienyl)-2-(4,6-dimethoxypyrimidin-2-yloxy)-1-(N,N-dimethylaminooxycarbonyl)-benzene

3.2 mmol of sodium hydride is added to a mixture of 1.14 g (3.2 mmol) of 6-(2-thienyl)-2-(4,6-dimethoxypyrimidin-2-yl)-benzoic acid in 20 ml of dimethoxyethane, whereupon a gas immediately evolves. The mixture is stirred for 1 hour at room temperature and cooled to 0°C, and 3.5 mmol of oxalyl chloride is added. The mixture is stirred for 1 hour at 0°C, after which about 30% of the solvent is evaporated under reduced pressure to remove excess oxalyl chloride. A solution of 4.2 mmol of N,N-dimethylhydroxylamine in 10 ml of dimethoxyethane (from 230 mg of N,N-dimethylhydroxylamine hydrochloride and 332 g of pyridine) is then added, followed by 3.2 mmol of pyridine at 0°C, and the mixture is heated over a period of 1 hour to room temperature. The mixture is poured into 120 ml of cold water and extracted with methylene chloride. The organic phase is dried over sodium sulfate and evaporated down under reduced pressure. The oil which remains is further purified by chromatography on silica gel.

Example 7

6-Imidazolyl-2-(3,5-dimethoxy-s-triazin-1-yloxy)-1-[(1-pyrazolyl)-oxy-carbonyl]-benzene

5

1.75 g (10.8 mmol) of N,N'-carbonylbisimidazole is added to a solution of 1.88 g (10 mmol) of 6-imidazolylsalicylic acid in 30 ml of tetrahydrofuran. After the mixture has been stirred for 30 minutes at room temperature, 9.9 mmol of N-hydroxypyrazole is added and the mixture is stirred 10 for a further 14 hours. The reaction mixture is then hydrolyzed with 300 ml of 1N phosphoric acid and the resulting mixture is extracted several times with methyl tert-butyl ether. The organic phases are dried over sodium sulfate and evaporated down under reduced pressure. The residue is taken up in 40 ml of dimethylformamide, and 280 mg of sodium 15 hydride (85% strength in paraffin, 10 mmol) is added. After the mixture has been stirred for 30 minutes at room temperature, 1.58 g (9 mmol) of 1-chloro-3,5-dimethoxy-s-triazine is added and the whole is stirred for 14 hours. The batch is introduced into 300 ml of 0.1N phosphoric acid, and extracted with diethyl ether. The ether phase is dried over sodium 20 sulfate and evaporated down, and the residue is purified by column chromatography.

Example 8

6-(2-Thienyl)-2-(4,6-dimethoxytriazin-2-yloxy)-1-(N,N-dimethylaminoxy-25 carbonyl)-benzene

4.4 g (20 mmol) of 6-(2-thienyl)-salicylic acid is dissolved in 30 ml of thionyl chloride, and refluxed for 90 minutes. After the reaction mixture has cooled it is evaporated down. Toluene is added twice (100 ml each 30 time) to remove the thionyl chloride, followed by evaporation. The residue is dissolved in 50 ml of toluene, and a solution of N,N-dimethylhydroxylamine (from 6.85 g of N,N-dimethylhydroxylamine hydrochloride, 15 g of potassium carbonate and 30 ml of toluene) is added; the mixture is stirred for 14 hours at room temperature. The solution is introduced into a 35 mixture of 150 ml of water and 4.5 g of orthophosphoric acid, the mixture is extracted with ethyl acetate, and the combined organic phases are washed with water and saturated sodium chloride solution, dried over sodium sulfate and evaporated down. After drying using an oil pump there remains 5 g of a colorless oil, which is dissolved in 50 ml of DMF and to 40 which 0.64 g of sodium hydride (85 % strength) is added. After the mixture has been stirred for 30 minutes, 3.67 g (21 mmol) of chlorodimethoxytriazine is added and the whole is heated for 2 hours at 50°C. The solution is poured into 400 ml of water/5 ml of orthophosphoric acid, extracted with ethyl acetate, dried over sodium sulfate, evaporated down

and chromatographed on silica gel. There is obtained 2.2 g of the product as a colorless viscous oil. $^1\text{H-NMR}$ in CDCl_3 , 270 MHz, δ in ppm: 2.58 (s, 6H), 3.99 (s, 6H), 7.0-7.6 (m, 6H) (active ingredient no. 1.002).

5 The structures given in the Tables 1 and 2 below describe particularly preferred active ingredients of the formula I, and may be prepared - with appropriate modifications of the starting materials - in accordance with the foregoing synthesis examples.

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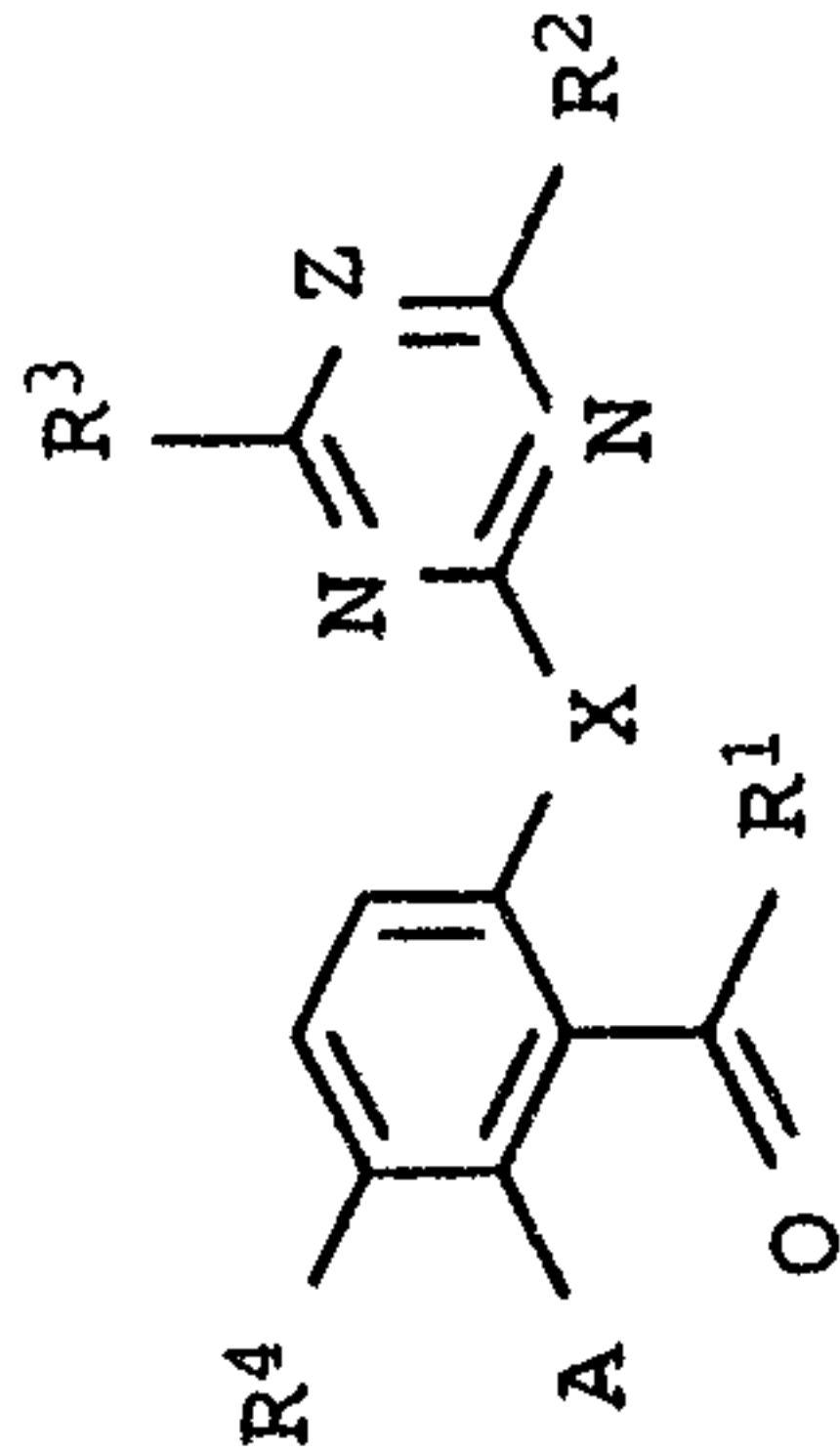
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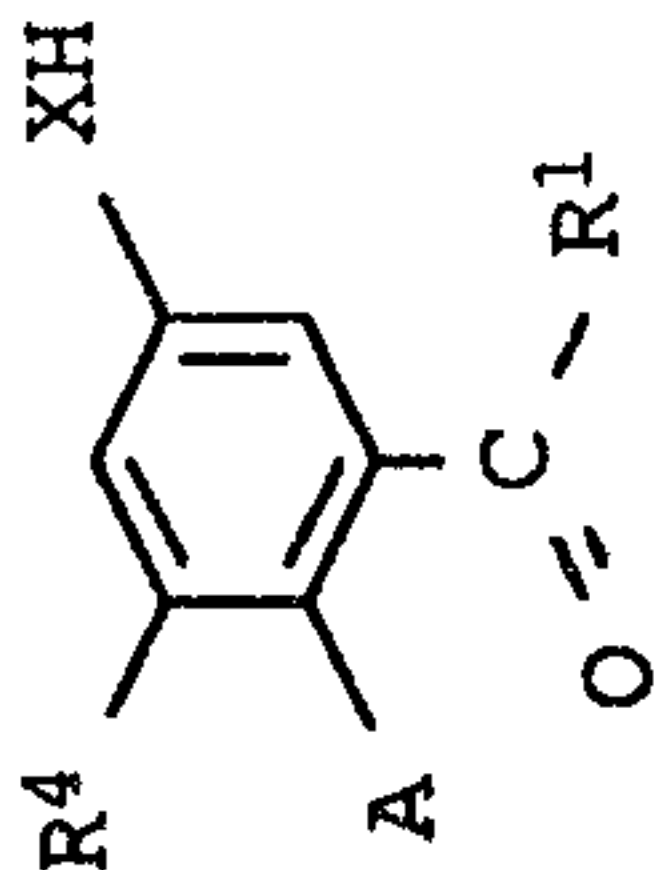
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Table 1



No.	R ¹	A	R ²	R ³	R ⁴	Z	X	Phys. data m.p. [°C] ¹ H-NMR in CDCl ₃ , δ [ppm]
1.001	ON (CH ₃) ₂	Thien-2-yl	OCH ₃	OCH ₃	H	CH	O	102-112
1.002	ON (CH ₃) ₂	Thien-2-yl	OCH ₃	OCH ₃	H	CH	O	2,58 (s, 6H), 3,99 (s, 6H), 7,0-7,6 (m, 6H)

Table 2



No.	R ¹	A	R ⁴	X	Phys. data m.p. [°C]
2.001	ON (CH ₂) ₂	Thienyl-2-yl	H	O	

Use examples

The herbicidal action of salicylic (thio)ether derivatives
5 of the formula I is demonstrated in greenhouse experiments:

The vessels employed were plastic flowerpots having a volume
of 300 cm³ and filled with a sandy loam containing about
3.0% humus. The seeds of the test plants were sown sepa-
10 rately, according to species.

For the preemergence treatment, the formulated active
ingredients were applied to the surface of the soil immedi-
ately after the seeds had been sown. The compounds were
15 emulsified or suspended in water as vehicle, and sprayed
through finely distributing nozzles.

After the agents had been applied, the vessels were lightly
sprinkler-irrigated to induce germination and growth.
20 Transparent plastic covers were then placed on the vessels
until the plants had taken root. The cover ensured uniform
germination of the plants, insofar as this was not impaired
by the active ingredients.

For the postemergence treatment, plants were used which had
been sown in the pots and grown there, or they were grown
separately as seedlings and transplanted to the pots a few
days before treatment. The plants were grown, depending on
growth form, to a height of 3 to 15 cm before being treated
30 with the compounds, suspended or emulsified in water. The
application rate for postemergence treatment was 0.5 kg/ha.

The pots were set up in the greenhouse, heat-loving species
at from 20 to 35°C, and species from moderate climates at
35 from 10 to 25°C. The experiments were run for from 2 to
4 weeks. During this period the plants were tended and their
reactions to the various treatments assessed. The assessment
scale was 0 to 100, 100 denoting nonemergence or complete
destruction of at least the visible plant parts, and 0 de-
40 noting no damage or normal growth.

The plants used in the greenhouse experiments were *Echinochloa crus-galli*, *Galium aparine* and *Centaurea cyanus*.

Active ingredients 1.001 and 1.002, applied postemergence at
5 a rate of 0.05 kg/ha, give excellent control of unwanted
plants.

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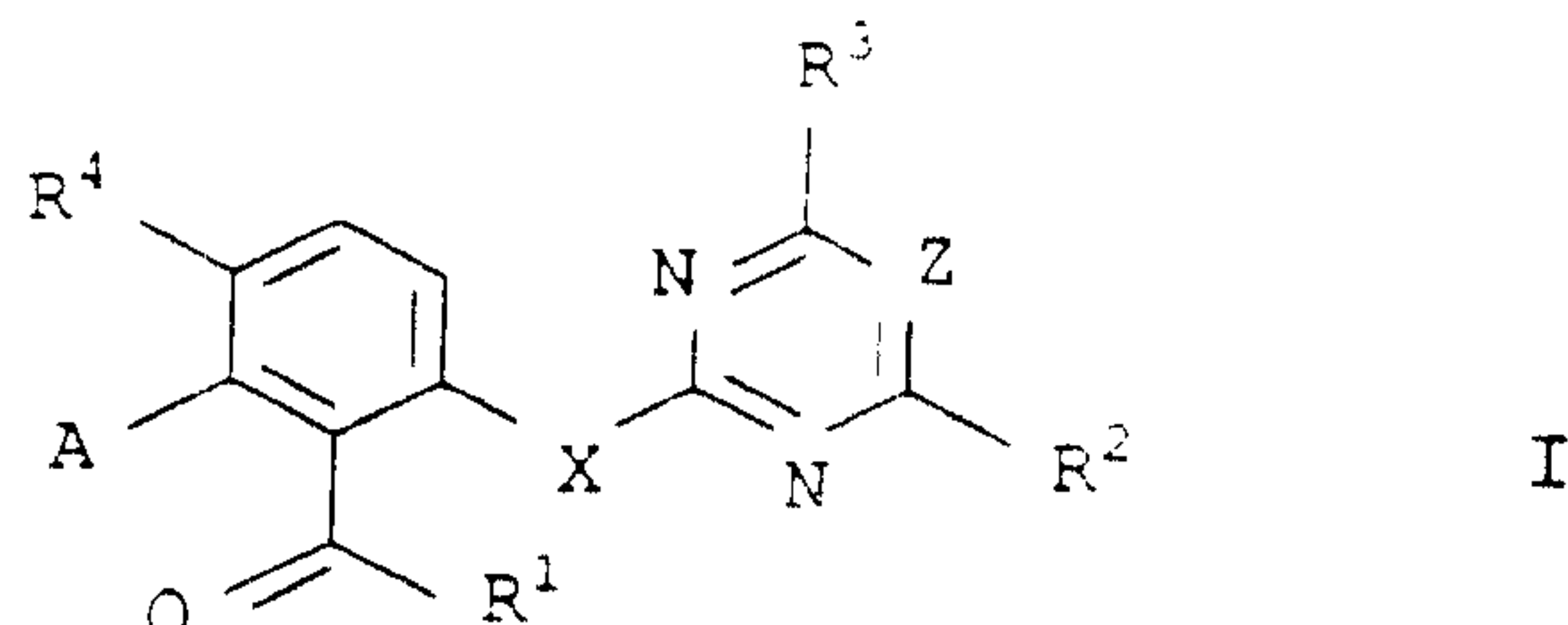
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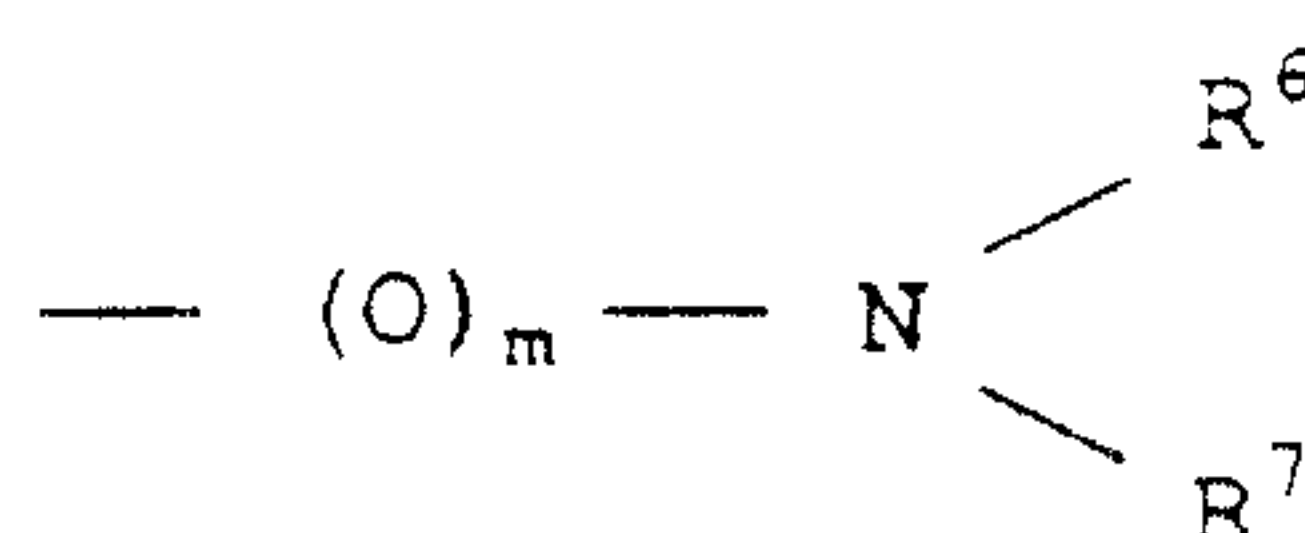
CLAIMS

1. A salicyloyl(thio)ether derivative of the formula I



where

10 R^1 is a radical



in which m is 0 or 1 and R^6 and R^7 are each hydrogen;

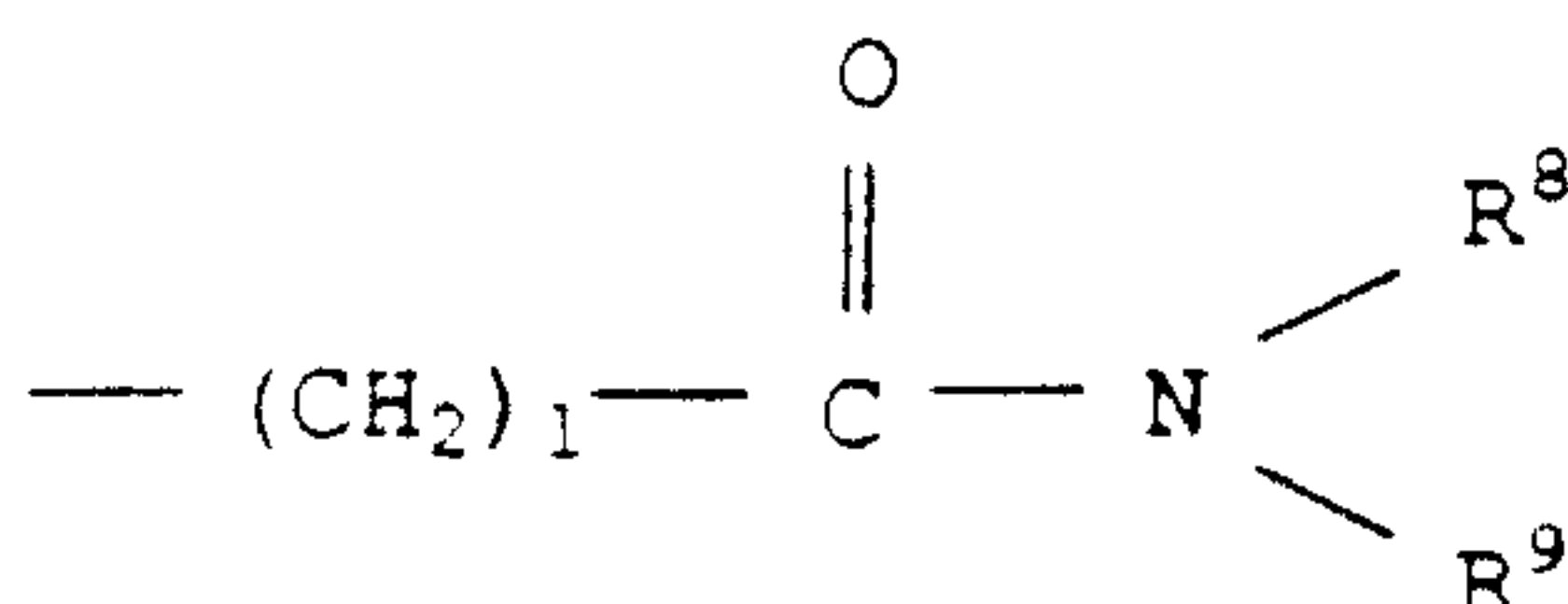
20 C_1 - C_6 -alkyl, C_3 - C_6 -alkenyl and C_3 - C_6 -alkynyl, where these radicals may each carry from one to five halogen atoms and/or one or two of the following groups: C_1 - C_6 -alkoxy, C_3 - C_6 -alkenyloxy, C_3 - C_6 -alkynyloxy, C_1 - C_6 -alkylthio, C_3 - C_6 -alkenylthio, C_3 - C_6 -alkynylthio, C_1 - C_6 -haloalkoxy, cyano, C_1 - C_6 -alkylcarbonyl, C_3 - C_6 -alkenylcarbonyl, C_3 - C_6 -alkynylcarbonyl, C_1 - C_6 -alkoxycarbonyl, C_3 - C_6 -alkenyloxycarbonyl, C_3 - C_6 -alkynyloxycarbonyl, C_1 - C_6 -dialkylamino or C_1 - C_6 -cycloalkyl;

unsubstituted or substituted C_1 - C_6 -cycloalkyl;

unsubstituted or substituted phenyl;

R^6 together with R^7 may be an unsubstituted or substituted C_4 - C_7 -alkylene chain in which a CH_2 group may be replaced with oxygen, sulfur or -NH;

30 a group



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where R^8 and R^9 are each hydrogen, C_1 - C_6 -alkyl, C_3 - C_6 -alkenyl or C_3 - C_6 -alkynyl and l is 1, 2, 3 or 4;
or a group

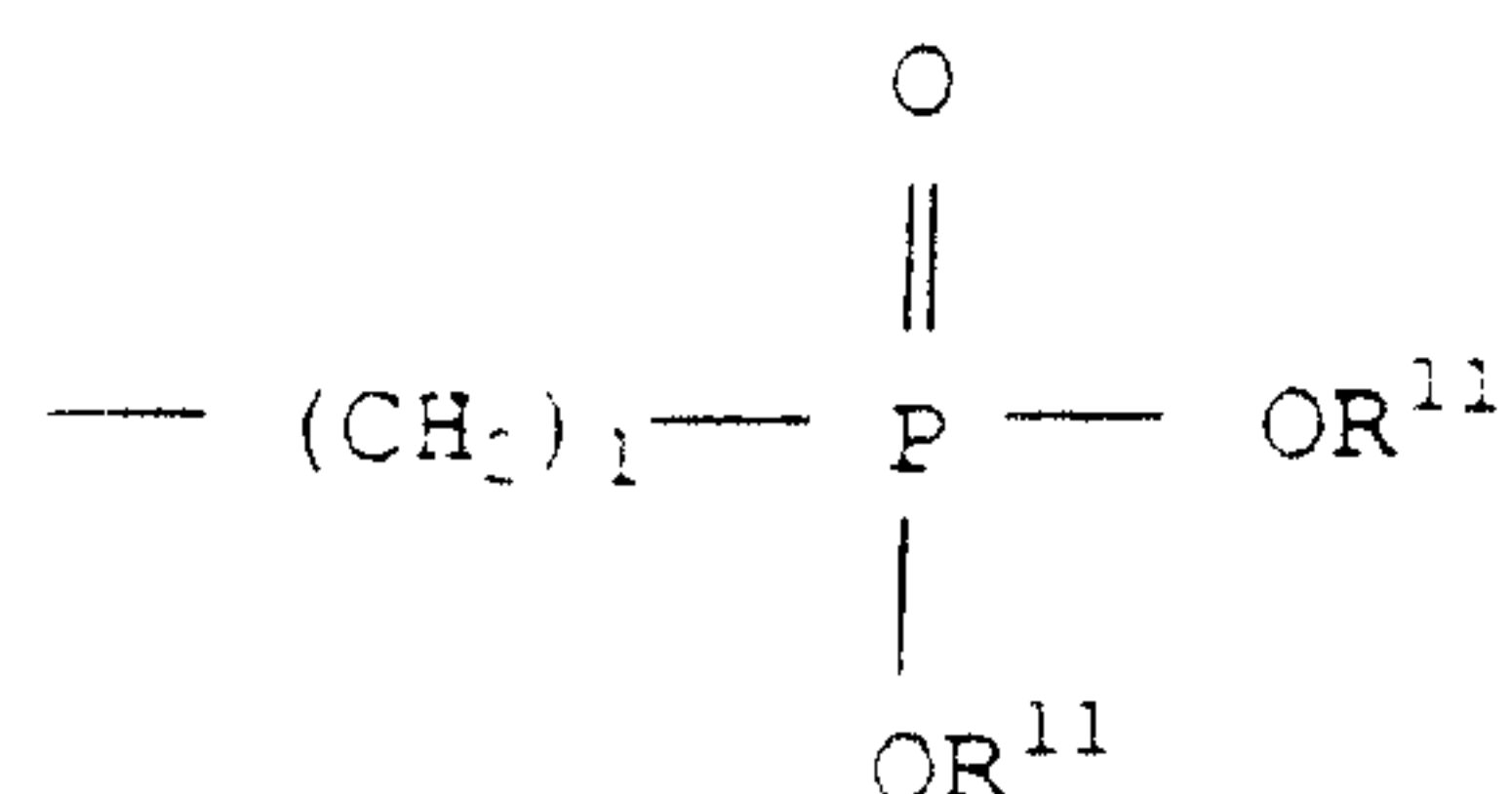


where R^{10} is C_1 - C_6 -alkyl, C_3 - C_6 -alkenyl or C_3 - C_6 -alkynyl, l is 1, 2, 3 or 4 and k is 0, 1 or 2;

a radical OR^5 , where

R^5 is an unsubstituted or substituted 5-membered aromatic heterocyclic structure bonded via a nitrogen atom and having from one to four nitrogen atoms in the ring

10 or a radical



where R^{11} is C_1 - C_6 -alkyl, C_3 - C_6 -alkenyl, and C_3 - C_6 -alkynyl,

where these radicals may each carry from one to five halogen atoms and/or one or two of the following groups:

C_1 - C_6 -alkoxy, C_3 - C_6 -alkenyloxy, C_3 - C_6 -alkynyloxy, C_1 - C_6 -alkylthio, C_3 - C_6 -alkenylthio, C_3 - C_6 -alkynylthio, C_1 - C_6 -

haloalkoxy, cyano, C_1 - C_6 -alkylcarbonyl, C_3 - C_6 -alkenyl-

20 carbonyl, C_3 - C_6 -alkynylcarbonyl, C_1 - C_6 -alkoxycarbonyl, C_3 -

C_6 -alkenyloxycarbonyl, C_3 - C_6 -alkynyloxycarbonyl, C_1 - C_6 -

dialkylamino or C_1 - C_6 -cycloalkyl,



where R^{12} is C_1 - C_6 -alkyl, C_1 - C_6 -haloalkyl or phenyl, which in turn may carry from one to four of the following substituents: halogen, nitro, cyano or C_1 - C_6 -alkyl;

R^2 and R^3 are each C_1 - C_4 -alkyl, C_1 - C_4 -haloalkyl, C_1 - C_4 -alkoxy, C_1 - C_4 -haloalkoxy and/or C_1 - C_4 -alkylthio;

X is oxygen or sulfur;

Z is nitrogen or the methine group;

30 R^4 is hydrogen, halogen, nitro, C_1 - C_4 -alkyl, cyano or C_1 - C_4 -haloalkyl; and

A is a 5-membered heteroaromatic structure having from one to four nitrogen atoms or from one to three nitrogen atoms and additionally a sulfur or oxygen atom in the ring, which may carry from one to three halogen atoms and/or from one to three of the following radicals: nitro, cyano, C₁-C₄-alkyl, C₁-C₄-alkylthio, C₁-C₄-haloalkyl or phenyl which is unsubstituted or substituted by from one to three halogen atoms and/or from one to three methyl groups;

10 a benzofused 5-membered heteroaromatic structure which may contain from one to three nitrogen atoms or a nitrogen atom and additionally one oxygen or sulfur atom and may carry one of the following radicals: C₁-C₄-alkyl, halogen or cyano;

a thienyl or furyl radical which may carry from one to three halogen atoms and/or from one to three of the following radicals: C₁-C₄-alkyl, C₁- or C₂-haloalkyl, unsubstituted or substituted phenyl or nitro;

a benzothienyl or benzofuryl radical which may carry one halogen atom and/or one of the following radicals: C₁-C₄-alkyl, C₁- or C₂-haloalkyl or nitro;

20 pyridyl which may carry from one to three halogen atoms and/or from one to three of the following radicals: C₁-C₄-alkyl, C₁- or C₂-haloalkyl, unsubstituted or substituted phenyl or nitro;

a naphthyl or quinolyl radical, each of which may carry up to three halogen atoms and/or up to three of the following radicals: C₁-C₄-alkyl or C₁- or C₂-haloalkyl, the expression unsubstituted or substituted in the abovementioned cases meaning that the corresponding groups may carry one or more of the following substituents: halogen, nitro, cyano, C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₁-C₆-alkoxy or C₁-C₆-alkylthio.

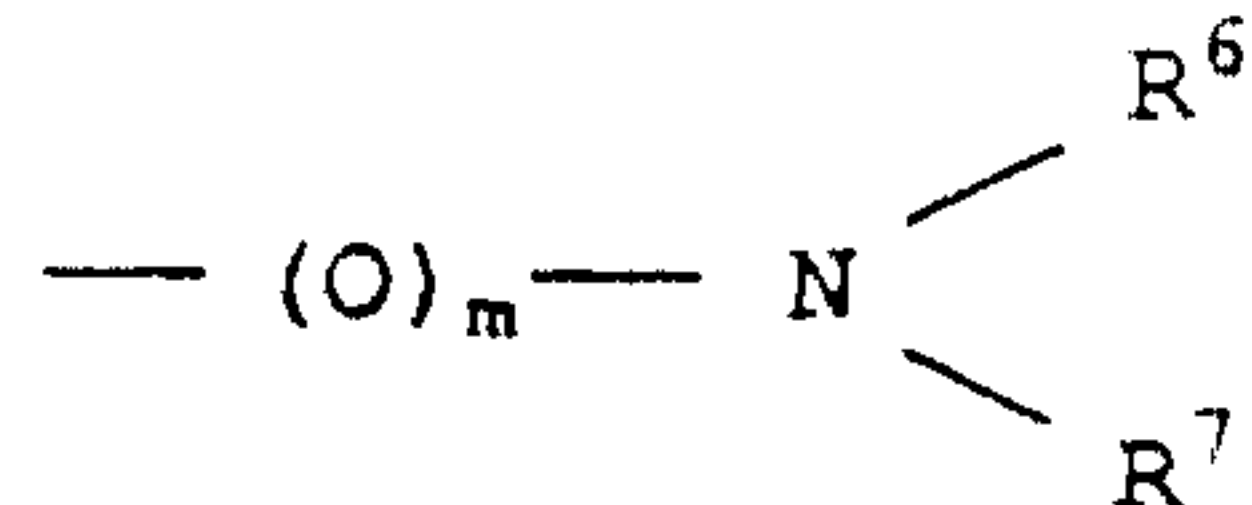
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2. A salicylic acid derivative of the formula I as claimed in claim 1,

where

R^1 is a group



where m is 0 or 1 and R^6 and R^7 are each hydrogen or methyl or R^6 and R^7 together form a C_4 - or C_5 -alkylene chain;

10 R^2 and R^3 are each methoxy, methyl, difluoromethoxy or chlorine;

R^4 is hydrogen or methyl;

X is oxygen;

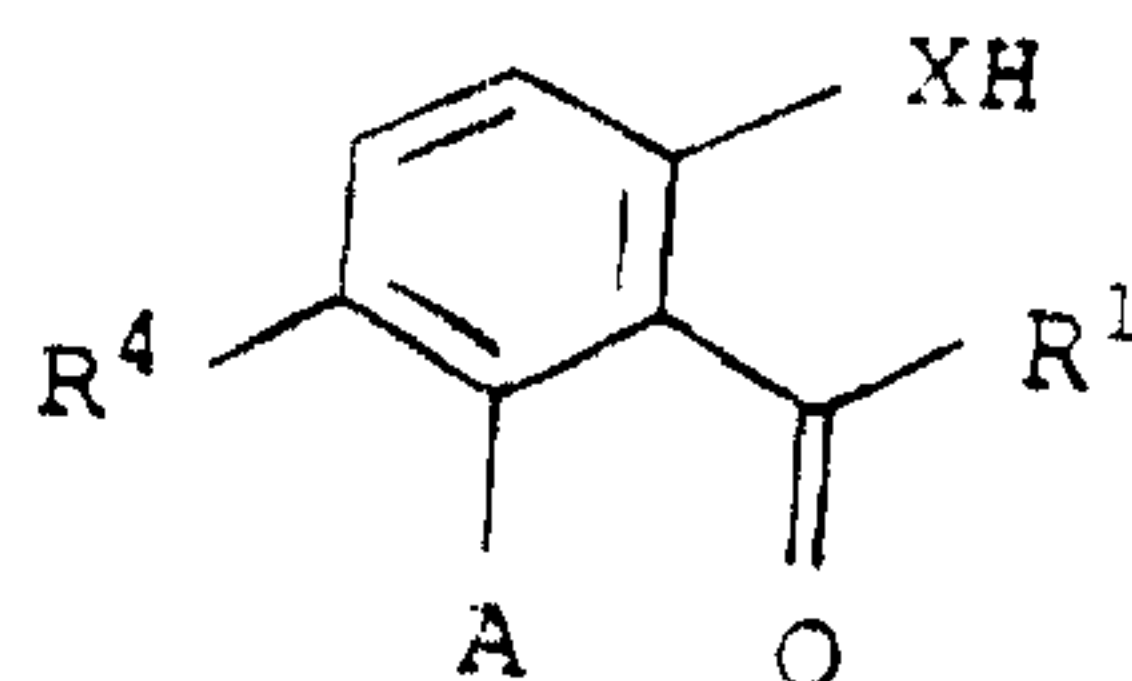
Y is nitrogen;

Z is the methine group and

A has the meanings stated in claim 1.

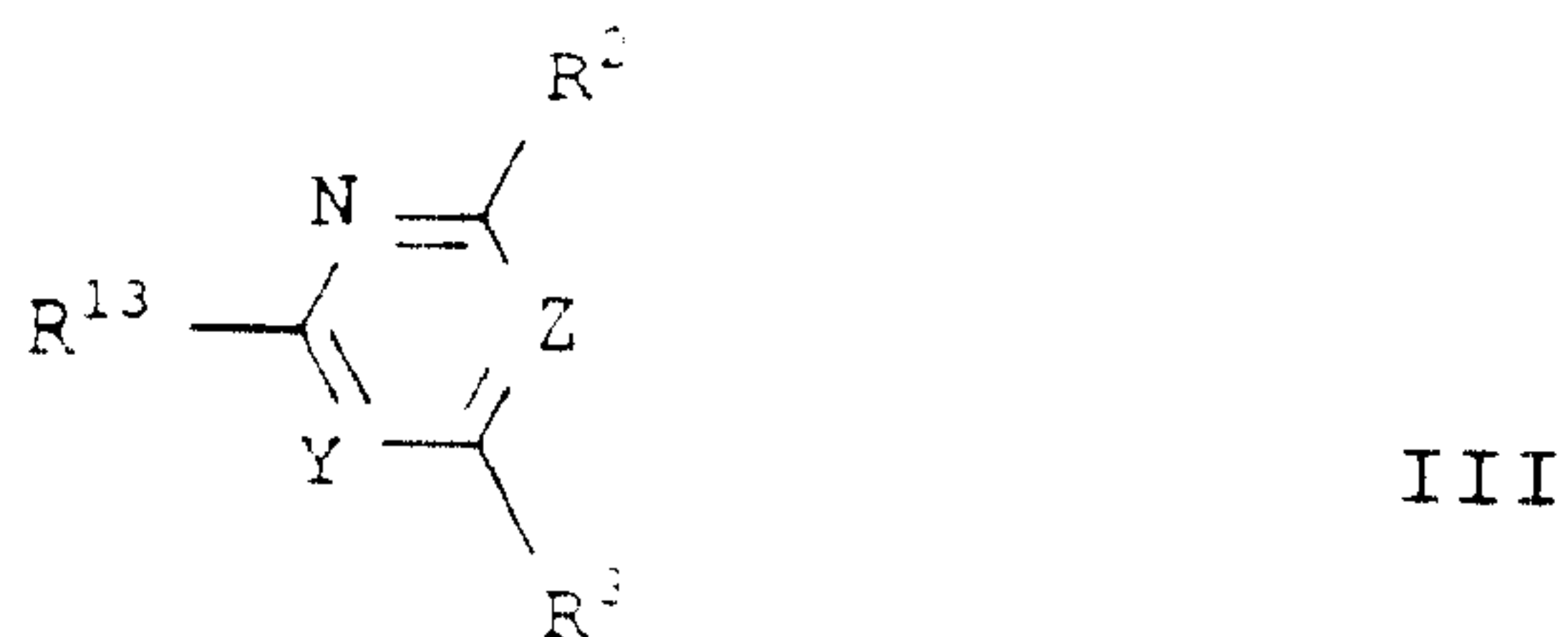
3. A salicylic acid derivative of the formula I as claimed in claim 1, where R_1 is $O-N(CH_3)_2$, X is oxygen, Y is nitrogen, Z is the methine group and R^2 and R^3 are each
20 methoxy and A are defined as in claim 1.

4. A process for the preparation of a compound of the formula I as claimed in claim 1, wherein the corresponding salicylic acid or thiosalicylic acid derivative of the formula II



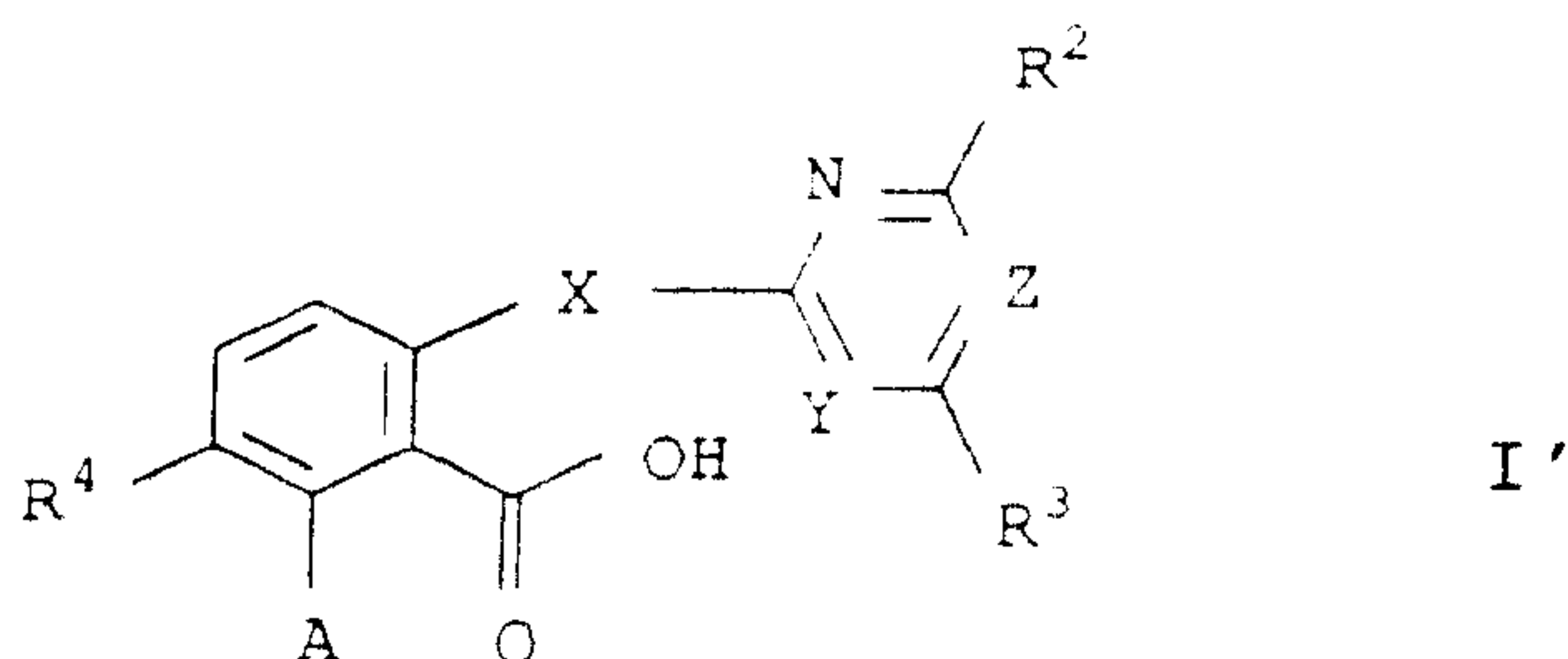
II

is reacted with a heteroaromatic structure of the formula
III



wherein R¹³ is a nucleofugic leaving group, in the presence
10 of an inorganic or organic base.

5. A process for the preparation of a compound of the
formula I as claimed in claim 1, wherein the free salicylic
acid or a sulfur analog thereof of the formula I'



20

is first converted into the halide or another activated
form of the carboxylic acid and this is then reacted, in
the presence or absence of an inorganic or organic base,
with an unsubstituted or substituted hydroxylamine, N-
hydroxyazole, hydroxyalkyl phosphonate or sulfonamide.

6. A herbicide containing a compound of the formula I as
claimed in claim 1, 2 or 3 and conventional inert
additives.

7. A method for controlling undesirable plant growth, wherein the undesirable plants or their habitat is or are treated with a herbicidal amount of a derivative I as claimed in claim 1, 2 or 3.

8. A method for regulating plant growth, wherein an amount, having a regulatory effect, of a salicylic acid derivative of the formula I as claimed in claim 1, 2 or 3, is allowed to act on the seeds, the plants or their habitat.

10 9. A fungicide or nitrification inhibitor, containing a salicylic acid derivative of the formula I as claimed in claim 1, 2, or 3 and conventional inert additives.

